

# AMERICAN CANALS

BULLETIN OF  
THE AMERICAN CANAL SOCIETY

BULLETIN NUMBER 76 Editorial Address—Rural Route 1, Box 87-T, Savannah, TN 38372 FEBRUARY 1991

## PRESIDENT'S MESSAGE

I'm pleased to welcome David Ross as our new Editor. You have seen David's articles in *American Canals* from time to time, and you can find an introduction to him in this issue. He will be taking over the selection and preparation of material for our bulletin, so send your news and articles to him at Rt. 1, Box 87T, Savannah, Tennessee 38372.

We are very fortunate to have a good man to take over the editorial work from Bill Shank, who has put in nearly two decades of work, in one capacity or another, on *American Canals*—the first issue was in 1972! Bill's editing talents and his knowledge of canals have kept our publication lively and regular and an inspiration to those interested in canal history, preservation, restoration, and parks. *American Canals* is your society's product, its reason for being, and it takes a great deal of work and dedication. Bill has decided that it's time to shift some of the work onto new shoulders, but don't worry, he's not leaving us! He will continue as publisher of the bulletin.

Readers of the British Waterways Board's monthly, *Waterways News*, have learned that it is now called *New Ways*, that BWB has moved out of London, and that Sheila Doeg, the editor for the past ten years, has decided to stay behind in the big city. Many thanks, Sheila, for your good work with BWB, and we hope you manage to stay in canal work and write a book on your canal adventures. The new BWB address is Greycaine Road, Watford WD2 4JR, England.

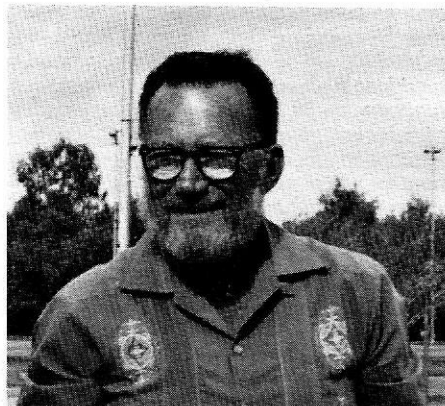
The Society for Historical Archaeology met this January in Richmond, so we treated attendees to a bus tour of the Kanawha Canal as part of a "Canals and Cities" symposium organized by Dr. Ron Carlisle, who excavated the Pennsylvania Canal locks in Pittsburgh. It's an encouraging sign for canal archaeology as a special field. We'll let you know when the papers are published.

Lastly, I must report that on December 17, we lost a friend, Russ Harding, one of America's foremost canal buffs. Russ grew up in New Jersey and became an authority on the Morris Canal; then he retired to Virginia, joined the Virginia Canals & Navigation Society, and became its first editor, developing *The Tiller* into a first-rate publication. We'll miss his company and enthusiasm. Fortunately, we managed to put one of his well-organized slide talks on videotape, just in time.

— Bill Trout

ACS Treasurer *Charlie Derr* reports that nearly one hundred of our members have not yet paid their 1991 dues. He is planning to give each one of them a second reminder. Please respond. Otherwise, this is the last issue of AMERICAN CANALS you will receive.

## OUR NEW EDITOR



David F. Ross

It is my pleasure to publish the accompanying photo of Dr. David F. Ross, the new Editor of AMERICAN CANALS and to tell you a little about him!

He was born November 27, 1925 at Ann Arbor, Michigan. He is a veteran of World War II, European Theatre, where he served with the 325th Combat Engineering Battalion. He has been variously employed in Puerto Rico, Florida, West Virginia, Liberia, Malaysia, and in 1967 began teaching American Economic History and Economic Development at the University of Kentucky. He is a graduate of Harvard University — A.B. 1950; M.A. 1951 and PhD 1956. He is an M.O.S. motorboat operator. He is married and has two children and five grandchildren.

For a number of years Dave has kept us informed of the condition of the various inland waterways in eastern USA by personal exploration in his own cabin-cruiser, the "Rosa Parks". In 1987 we gave him the title of Contributing Editor.

He retired from the University of Kentucky in May of 1989 and has moved from Kentucky to the right bank of the Tennessee River, at mile 211, four miles from the junction with the Tennessee-Tombigbee Waterway. From here (where his cruiser is now docked) he pursues his post-retirement career of exploring the various inland waterways which he has not already covered. He is also a contributing editor to "Quimby's Boating Guide".

I know you will give Dave the same cooperation you have given me in the past, by sending him articles, news and photos of what goes on in the field of historic canals and inland waterways.

Bill Shank

## EDITORIAL COMMENTS

The American Canal Society has almost a thousand members, and a considerable number of activities, each of which is of considerable importance to a few of the members. The only expression of the society's work that is important to all of the members, however, is this bulletin, *American Canals*. Most of us do not belong to any A.C.S. committees, or attend any A.C.S. meetings, or hold A.C.S. offices; but all of us receive and, at least to some extent, read *American Canals*. It is the bonding that makes this a society.

*American Canals* is a group effort. Without the active participation of all those of you who contribute articles, news items, pictures, suggestions, complaints, and so on, no editor, however dedicated, brilliant, and well-intentioned, could bring out a 12-page edition every three months. Above all else, I want you all to know how important you are to this endeavor, and how totally dependent I am on your keeping my in-basket full as I attempt to bring each issue out.

But beyond that, what needs to be said at this time is that the success of this publishing venture, and hence of the A.C.S. itself, has also depended upon the presence of a guiding spirit. Not alone, but more than any other single person, it has been Bill Shank who has made this the lively, enlightening, quality publication that it is. He has agreed to continue to play a major role as Publisher of *American Canals* while I relieve him of the editorial duties. Because he isn't really retiring, it isn't time to present him with the traditional gold watch. It's not too early, though, for a hearty round of applause and a heartfelt word of thanks. I know you'll want to join me in those expressions of appreciation.

— D.F.R.

## NEW PUBLICATIONS

*Canals for a Nation: The Canal Era in the United States, 1790-1860*, by Ronald E. Shaw, University Press of Kentucky, Lexington KY 40506-0336, \$28. (Reviewed elsewhere in this issue.)

*Goose Creek Scenic River Atlas*, by William E. Trout III. Distributed by Richard A. Davis, VC&NS Sales, Rt. 2, Box 254, Lexington VA 24450, \$3 ppd.

*Naval Institute Guide to Maritime Museums of North America*, by Robert H. Smith. United States Naval Institute, 2062 General's Highway, Annapolis MD 21401, \$19.95 plus \$3 shipping. (Reviewed elsewhere in this issue.)

# American Canals

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**“DEDICATED TO HISTORIC CANAL  
RESEARCH, PRESERVATION  
AND PARKS”**

AMERICAN CANALS is issued quarterly by the American Canal Society, Incorporated. Objectives of the Society are to encourage the preservation, restoration, interpretation and use of the historic navigational canals of the Americas; to save threatened canals; and to provide an exchange of canal information.

Annual subscription to “AMERICAN CANALS” is automatic with a minimum ACS dues payment of \$12.00. Individual copies may be purchased at \$3.00.

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## THE CIRCUS COMES TO TOWN — By CANALBOAT

By Bruce J. Russell  
Contributing Editor

Most people today think of the RINGLING BROTHERS, BARNUM & BAILEY CIRCUS and others as traveling aboard special circus trains, or in certain cases by Interstate Highway. In the 1880s there was actually a small circus show which moved throughout upstate New York using the Erie and Champlain canals. The SIG SAUTELLE “BIG SHOW” actually utilized two specially built boats which were used to transport its animals and employees on the enlarged or second Erie Canal between Albany and Buffalo, N.Y. and up the Champlain as far as Whitehall where Lake Champlain begins.

The SAUTELLE CIRCUS was a “regional show” rather than a big name affair such as RINGLING BROTHERS, yet by using canal transportation it was able to play in a large number of small towns and villages the big companies weren’t particularly interested in. Therefore when the two boats, gaily decorated, appeared at the locks outside any one of the “canal towns” of upstate N.Y. there was a general spirit of excitement. Later when the boats were tied onto the bank of the waterway special crews would unload such apparatus as a big top tent and get things ready for the evening’s performance. Once the show had played for two or three days it was on to the next community.

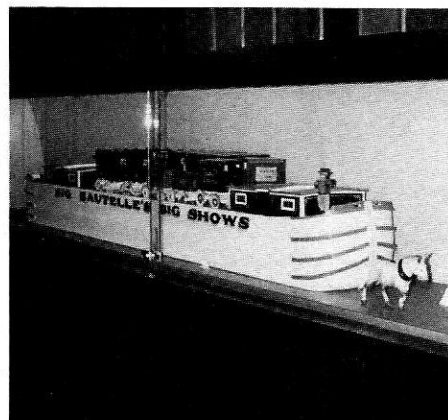
SAUTELLE’S CIRCUS consisted of two boats, the GOLDEN AGE which carried the performers, and the NOAH’S ARK which carried the animals. Often a third and fourth boat would be included in the entourage to make certain there was enough food for the animals. When the boats were on the move the animals were usually carried in cages positioned on the top deck of the boats which were colorfully decorated.

It appears that after 1887 SAUTELLE ceased use of the canal network and began moving his show by railway since by that time there was enough trackage in place to reach any point the canals went. What happened to his two big boats is unknown, but they were probably either converted to freight carriers or simply scrapped.

In an effort to capture this brief but colorful chapter in America’s canal history MILO SMITH of Herkimer, N.Y. has built two replica models of the GOLDEN AGE and the NOAH’S ARK. Working with historic photographs he was able to reconstruct the boats as they looked during 1881-1887. His models are currently on display at the Shelburne Museum in Vermont.



The Circus Performer Boat model (Russell photo.)



The Animal Boat model. (Russell photo.)

## CANAL CRUISE OF BELGIUM AND THE NETHERLANDS



The “Esmeralda”

The English magazine *Waterways World* has announced details of its 1991 “Readers’ Cruise.” The basic cost of £620 includes round-trip fare from London as well as the cruise from the Belgian Ardennes to Amsterdam on board the 135-passenger Esmeralda. Dates are Thursday, August 1st through Sunday, August 11th. For details and application forms, contact *Waterways World*, Kottingham House, Dale Street, Burton-on-Trent, Staffordshire DE14 3TD, England. Phone 0283 42721 or 0283 64290; Fax 0283 61077. (The Esmeralda is shown passing through lock 8 near Namur, Belgium.)

## NEWS BRIEFS

## ST. CATHARINES MUSEUM

[Most of the following items were culled from clippings and other material sent in by our readers. We welcome such contributions, and will use them if and as space permits, but for obvious reasons we cannot undertake to acknowledge them or return them.]

The New York Times for Sunday, November 4, 1990 ran a feature article by John H. Cushman, Jr., describing a 3-day bicycle trip that he took with his 8-year-old son along the Chesapeake and Ohio canal, from Washington to the Antietam battlefield. He estimates that adult cyclists could manage the entire length of the canal, 184.5 miles from Washington to Cumberland, Maryland, in a similar length of time. Specially recommended is the brochure "184 Miles of Adventure: Hiker's Guide to the C.&O. Canal," available for \$2.25 plus \$1 postage from the Boy Scouts of America Mason-Dixon Council, 1200 Crestwood Drive, P.O. Box 2133, Hagerstown MD 21742. (Contributed by J.W.S.)

Contrary to the usual opinion, the Erie Canal was not the first Mohawk valley canalization project. Archaeologists are now beginning to excavate the remains of various short canals built 30 years earlier to circumvent obstacles to navigation on the Mohawk River, according to an article by David Germain published in the Daily Messenger of Canandaigua, N.Y. on October 11, 1990. Philip Lord of the State Museum in Albany is in charge of the work. (Contributed by Walter Meseck)

The Delaware and Raritan Canal, built in 1834, closed in 1933, and made a New Jersey State Park in 1975, is preserved both for recreational use and for urban water supply. Its future is threatened by uncontrolled and seemingly uncontrollable pollution, however, according to a 3-part feature in the Courier-News of Bridgewater, N.J., July 1-3, 1990. (Contributed by Tom Horvath)

The last surviving-intact Erie Canal aqueduct may become a shopping mall, an entertainment center, a museum, or simply a pedestrian viaduct, under plans being considered for the revitalization of downtown Rochester. After it ceased to carry the canal over the Genesee River, it was used for a time to carry subway tracks, and, after the subway went out of business, freight train tracks, but it has been idle and closed to the public since the 1960s. We have no date for the article by Sherrie Negea in the Rochester, N.Y. Democrat and Chronicle. (Contributed by Keith Kroon)

Tolls may once again be charged on the New York State Barge Canal under a proposed constitutional amendment which would also permit the long-term leasing of canal-side property to private businesses. Whether the result will be the creation of a "Coney Island monster" and "environmental horror" or the revitalization of an underutilized, underfinanced, and seriously deteriorating state and national treasure, is a subject of controversy. The article by Connie Cohn appeared in a new newspaper, *Waterways: New York's Waterfront News*, March/April 1990. The paper is published by North River Communications, P.O. Box 11, Croton-on-Hudson, New York 10520. A year's subscription costs \$22.50.

The segment of the Lehigh Canal lying within the town of Freemansburg, Pennsylvania, is the subject of restoration plans being developed by the Old Freemansburg Association. In addition to the now-dry canal bed, the property includes lock 44, the lock house, a mule barn, and other structures. The extent of the restoration will depend in part on the association's success in recruiting volunteers and in part on the funds that can be raised. Donald Blount wrote the article, which appeared in the Bethlehem PA Morning Call of October 4, 1990. (Contributed by Charles W. Derr)

"A magnificent boondoggle" is how industrial archaeologist Thomas Flagg described the 2-million-bushel grain elevator at the foot of Columbia St. in Brooklyn. The huge facility was built in 1922 to accommodate grain shipments arriving from the Great Lakes region via the New York State Barge Canal. It was never used to anywhere near capacity, and ceased to operate altogether in 1965, but remains a dominant and still magnificent feature of the landscape, according to an article by Christopher Gray in the New York Times of May 13, 1990. (Contributed by both Charles F. Hruska and Walter L. Meseck)

More than 20 years of effort by the Canal Society of New Jersey to generate interest in the preservation of the Morris Canal is paying off, according to an article of Edward Bove in the Morris County, N.J. Daily Record of December 2, 1990. Sections in Boonton, Montville, and Wharton have already been restored, and restoration plans are in the works at Lincoln Park. In addition, the International Trade Center in Mount Olive plans to restore a 2,100-foot section and then turn it over to the Allamuchy State Park in a land swap. (Contributed by Charles W. Derr)

## BOOKS REVIEWS

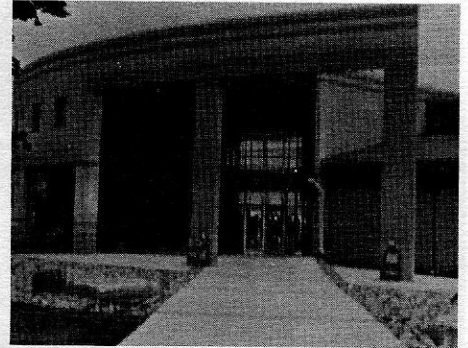
Robert H. Smith, *The Naval Institute Guide to Maritime Museums of North America* (Annapolis: U.S. Naval Institute, 1990). 256 pages plus photographs, map, indices. Softcover. \$19.95.

This "guide to maritime museums" is subtitled on the cover "with Selected Lighthouse, Canal, and Canal Lock Museums," and the author has done a good job of covering the canals, with the help of Charlie Derr and other canal people. I counted 25 detailed entries on canal museums and archives—everything from A (Alexandria Waterfront Museum) to W (Whitewater Canal State Historic Site), and from the Cumberland & Oxford Canal in Maine to Plaquemine Lock in Louisiana. Each has a one-page write-up supplied by the museum. If your favorite canal museum isn't there, let the author know, c/o the Naval Institute Press, United States Naval Institute, Annapolis MD 21402. There's a blank in the back of the book.

This is a handy guidebook for anyone interested in canals and watercraft. Even canal nuts like to explore submarines and lighthouses when there's no canal around, and this book can tell you if you are near any of the 300 maritime and canal museums in the U.S. and Canada.

Copies are available from the publisher. \$3 for shipping and handling should be added to the purchase price.

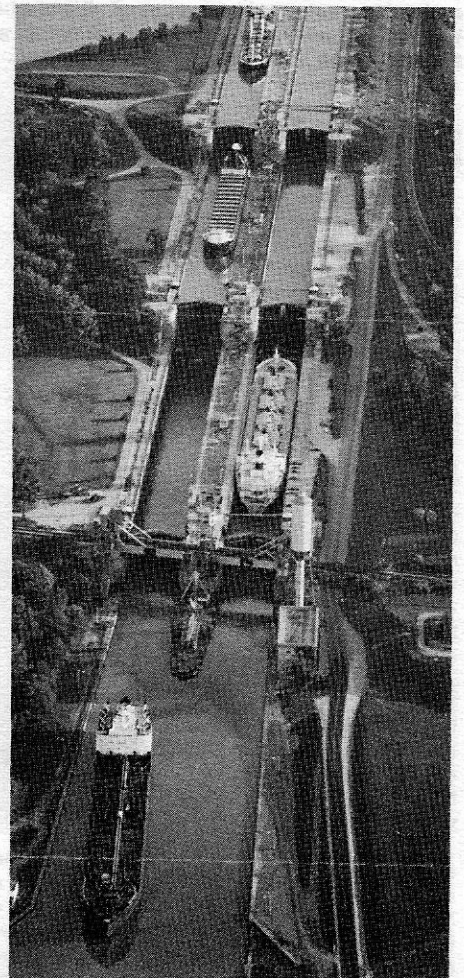
— William E. Trout III



The new St. Catharines Museum building at the lock 3 viewing site.

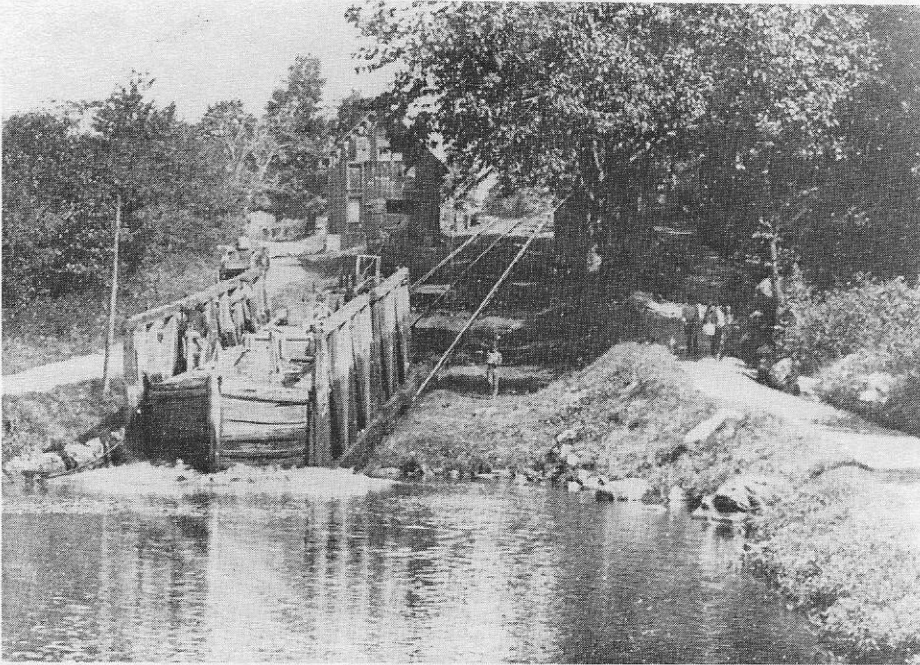
A 10-year effort involving all levels of government, the St. Lawrence Seaway Authority, and business and community participation, has reached fruition in the new St. Catharines Museum and Lock 3 Viewing Complex at St. Catharines, Ontario, on the Welland Canal. Even before the museum was in place, the site drew an estimated 600,000 visitors annually, to watch ships passing through the lock. Visitors will now in addition be able to study the history of the canal and a 16-foot working model of lock 3, among other exhibits.

Although the new building has been open to the public since the fall of 1990, the official opening ceremony is to take place on May 18th, 1991. The museum is open 7 days a week from 9 to 5.



The double staircase locks just south of St. Catharines on the Welland Canal at Thorold.

# CRUISING THE MORRIS CANAL IN 1917—A COUPLE'S ODYSSEY



In this photo from Jim Lee's book *The Morris Canal*, we see one of the inclined planes upon which John and Mabel Hutchins loaded their canoe and were carried up the steep hill from a lower to a higher level. They paddled their canoe to the foot of the plane and then dragged it into the boat cradle. After they signaled the plane operator, the cradle slowly began to move up the incline. In 1917, with the canal's closure only seven years away, many canoeists and outdoorsmen took trips over it. It's too bad color photography wasn't invented yet. At Waterloo in New Jersey, a scene such as this will be recreated once the plane there is rebuilt, a multi-million dollar project now underway.

by Bruce J. Russell, Contributing Editor

In recent years there has been a surge of interest in New Jersey's Morris Canal, a 100-mile artificial waterway which extended from the Hudson River in Jersey City to Phillipsburg on the Delaware. Its purpose was to bring coal from the mines of Pennsylvania to the homes and industries of Paterson, Newark, and Jersey City as well as New York. Its fleet of wooden boats was powered by mules, and the trip took approximately 5 days. Completed in 1824, one year prior to the opening of New York's Erie Canal, it was abandoned a century later in 1924 due to competition from railroads. The Morris Canal was unusual because in addition to locks it relied upon a system of inclined planes to get boats over steep hills and minor mountains. Originally powered by water wheels, the planes were later fitted with turbines which were more efficient. Boats entered cradles mounted on railroad cars and these were hoisted up the inclines using initially rope and later cables. The latter were manufactured by John Roebling & Sons, who also built the Brooklyn Bridge. Recently, plans were announced to completely rebuild one of these planes plus a mile of canal at Waterloo Village in western New Jersey so that future generations will be able to appreciate just what an engineering marvel the Morris Canal was.

In 1917 the old canal was moribund. Formal abandonment was only seven years away and the number of mule-hauled coal boats was miniscule. Nevertheless all locks and inclined planes were still intact, and the company kept its employees on the payroll. It was still possible to take a boatload of coal from Phillipsburg to Jersey City. During a warm July in 1917, John and Mabel Hutchins, residents of New York City, decided it

might be fun to travel on a section of the Morris Canal over a three-day period in a canoe. In addition to looking for some "out of the ordinary" adventure, they knew the Morris Canal's days were numbered and wanted to savor it before it became a part of history. After making advance preparations, they took a train from Hoboken, N.J., along the Lackawanna Railroad's Boonton Line to Mountain View where they planned to begin their three-day odyssey. The canoe had been shipped ahead several days earlier and was waiting for them at the baggage room of the station. After taking on adequate provisions for overnight camping, the couple put their canoe which they had christened *Chippewa* into the Pompton River. After paddling a short distance they entered a branch or feeder canal which led directly to the main portion of the Morris. Their narrative, which later appeared in *Outing Magazine* (fall 1917) reads as follows: (Note that Mabel refers to her spouse as "the Captain.")

*The peaceful, quiet, almost deserted old canal—a peaceful Sunday afternoon! What a contrast from the din of New York City we had left that morning. The birds and even the trees seemed drowsy, and the flocks of ducks swimming placidly in the back-yards through which we passed scarcely moved or even quacked. Doubtless the farmers were having their Sunday afternoon naps. Occasionally a lone fisherman dreamed on the bank—so peacefully that we wondered if, perchance, he had not purposely forgotten to bait his hook for fear a fish might bite and disturb him.*

Husband and wife paddled on, occasionally encountering other canoers. Both noticed that commercial traffic was nonexistent. The surrounding area in 1917 was still largely rural, a sharp contrast to 1990 when real estate development threatens encroachment on what few portions of

the abandoned Morris Canal are still recognizable. After camping outdoors and fighting off mosquitos, they came upon one of the incredible inclined planes which distinguished the Morris Canal from most others. They never saw anything quite like it, and Mabel's description does it justice:

*The next morning the fun began. We had not paddled very far when we saw, looming up in the distance, an immense track. As we had been informed a short time before that there was a "plane" ahead we judged this must be it. Now we knew that canals had locks and that you had to be "locked through" from one level to another or carry your outfit around, but imagine, if you can, our amazement to see, apparently at the end of the canal, this track extending almost straight upward for nearly a quarter of a mile.*

*Not knowing just what method of advance was to be used here, we paddled on to the foot of the track, which, on closer inspection, proved to consist of two tracks set far apart with a system of pulleys and a huge cable in between. Disembarking, up we climbed to explore a bit. At the top we found that the track ran into the higher level of water at the other side. But how in the world did the boats get up there?*

*High and dry on the summit of the track stood a contraption—which we found out later they called a "cradle"—but it took some time to figure out that some way or other that rusty old cable must work and lower this cradle into the water so that boats could paddle or "mule" upon it and be pulled up and then lowered in to the next level.*

*Having no means of "greasing the wheels" so that it would run for us, there was nothing to do but use our own motive power, and down we started for the first load.*

## Portaging the Canoe

*Duffle first. Panting and perspiring, and stopping each time we reached a shady spot to cool off a bit, we reached the top with it. Then for the canoe—the real tug of war. Our canoe, chosen for the rough waters of the Hudson, is not a suitable model for cruising where there is much portaging to do, as it is too heavy. The bow paddler—that's "me"—had not yet become strong enough to swing it over her head, so there was nothing to do but lift by our arms or drag it up that incline. Accompanied by strong expressions from the Captain that we would have a different boat before we took another cruise, we did reach the top.*

*And weren't we glad to climb in and paddle on once more. Why, paddling wasn't work at all! But, alas! 'twas not for long. The canal climbs the mountains so rapidly along here that many planes were necessary and in a short time we saw before us a second plane even longer than the first. The sun was growing hotter every minute and, to make matters worse, some fellow canoeists who were "doing likewise" at this plane informed us that there was a third just beyond.*

*By the time we had ascended this third one it was noon and we were decidedly hot, uncomfortable, and hungry. Paddling on once more the town of Boonton appeared—and a lock—and shortly afterward another plane. Would troubles never cease?*

*At this plane the tender inquired, "Why don't youse get a permit and ride through?"*

*"Permit? Where do you get them? Will that rusty old thing work?"*

*"The man back at the lock can give you one. 'Twill cost youse fifteen cents a mile."*

Now the chances are that if any one had told us when we started out fresh, that we could get a permit—for fifteen cents a mile—we would have said, "Pay fifteen cents a mile to paddle our own canoe? Not much! We are after exercise anyway and we'll carry around." But, now, jaded and hot and tired, had it been the last fifteen cents we possessed it would have gone to carry us over that plane.

So back we went! Tired, hungry, and hotter every minute and going backward! Why is it that all joy is gone as soon as you start back over a route? Not finding the tender at the lock, we pulled out our "grub bag" and perched on a lumber pile to partake of a "bite."

In the midst of our repast a funny little man approached and greeted us.

"Can we get a permit from you?" asked the Captain of our ship.

"Yep," and he beamed all over, so pleased was he for a chance to show his ability. "You want to get one?" In response to an affirmative nod he hurried away saying, "I'll bring it out."

In a few minutes back he came carefully carrying a cigar box. "Thought I'd bring it out here," he remarked. Laboriously, while we sat in the blazing sun he filled in the blank, now and then asking our assistance in spelling a word or our advice regarding some detail. Thinking the transaction all finished but the exchange of our good coin for the sheet, the Captain was about to pay when the man decided that it was not done quite right—and started on a second. And hotter still grew the sun's rays.

#### "Permit" Completed

Again we were about to hand him the money when again something did not suit and a third blank must be made out—a momentous occasion this, he must make it last as long as possible.

At last, when old Sol had us almost melted, he reluctantly surrendered the bit of paper, which stated that in payment of \$360.00—he meant \$3.60—and assuming absolutely all risks for our own lives and property, we were entitled to ride henceforth. A trifle expensive transportation for twenty miles and furnish our own steam, but then—think of the fresh air and sunshine we got with it!

Anticipating gleefully the waving of our bit of paper to cause the turning of wheels and the opening of gates while we rode up or through in state, we once more embarked and paddled on. Our friend of the advice had the 'cradle' down waiting for us and, squeaking and squawking, the rusty old wheels turned and up we went.

It was a funny sensation, ascending into the air in a canoe and equally funny was the entering of the cavernous depths of a lock and feeling the water rise under us until the higher level was reached when the gates were dropped down and on we went. It was special fun to ride over the planes as around each one there was usually a small settlement, if not a town, and the natives came out en masse to see the sight. There are so few boats going through this canal now that it was an event like Fourth of July and they made the most of it.

Usually the crabbed old lock tenders were much disgusted to think they had to waste power on a mere canoe, but what cared we? We merely waved the paper at them with a supercilious air. One tender insisted "There's no use trying—the machinery is broke and 'twon't haul you half way. What's the use of that?"

We told him to go ahead, half way was better than none at all. He grumblingly went to work, and we reached the top without mishap.

Riding through locks and over planes was,

without doubt, a labor saver, but it could scarcely be called a time saver as, their duties not being arduous, we had usually to spend some time looking the tenders up. One old fellow was out fishing more than half a mile away and was considerably "grouchy" because he was disturbed.

Late in the afternoon we passed through the town of Rockaway and began to look about for a good camping spot. Good camping spots, however, seemed scarce, as the bank on one side was a very steep slope affording no place for our tent and on the other—lest we forget that this was a man-made stream—was always the tow-path.

In desperation, as we wanted to get camp pitched before dark, we were forced to disembark right on the tow-path. Now a track packed down by countless mules' hoofs is not the softest spot in the world and we were traveling light, which meant that there was no air mattresses to soften the bed, but to two weary tramps who had paddled all day long it seemed as soft as eider-down and, after a good hot supper, we slumbered soundly until morning.

It would appear from the narrative that the first two inclined planes the canalers encountered were in the vicinity of Mountain View. They hiked up both in spite of the sizzling hot sun. The third was at Boonton, the remains of which are still in existence although covered with weeds, garbage, and other debris. It was here that the plane tender suggested they pay \$3.60 for a permit which would entitle them to ride all of the planes over the 30 or so miles they intended to travel. Since there were no longer any commercial boats, this must have been welcome revenue.

Also noted is the description of the planes as old and creaky. Obviously by this late date the Morris Canal was in deferred maintenance. Nevertheless everything seemed to work. It must have been a sight to see the small canoe paddling into the wide cradle and being hoisted from bottom to top level. What they were doing would soon become impossible, once the canal was abandoned in 1924 and its planes dismantled. They obviously understood the purpose of these

unique devices, but would have been even more thrilled to have observed the turbine mechanism concealed in the subterranean chamber of each plane.

After a night of camping along the towpath in the vicinity of Rockaway, they continued their exploration of the Morris Canal with the goal of reaching Lake Hopatcong. From this lake the Morris Canal drew some of its water supply. The trip involved numerous passages over several more planes as well as being raised in various lock chambers.

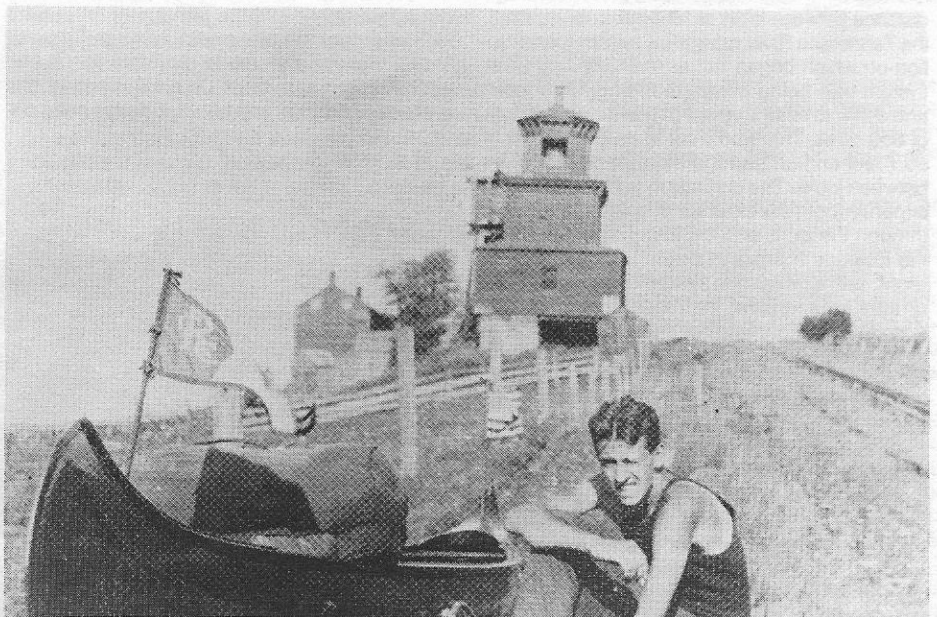
The mountain peaks in the distance formed a hazy background over all until, as we were riding over one plane, it suddenly looked and felt as if we were going to shoot out into space—and we realized that we had reached the summit. It was almost a surprise to find the next level of the canal lying peacefully on the other side.

#### Summit - Lake Hopatcong

We had reached the summit—and Lake Hopatcong was at the summit, that we knew. Henceforth the turning of each curve held a thrill, for a possible lake lay ahead.

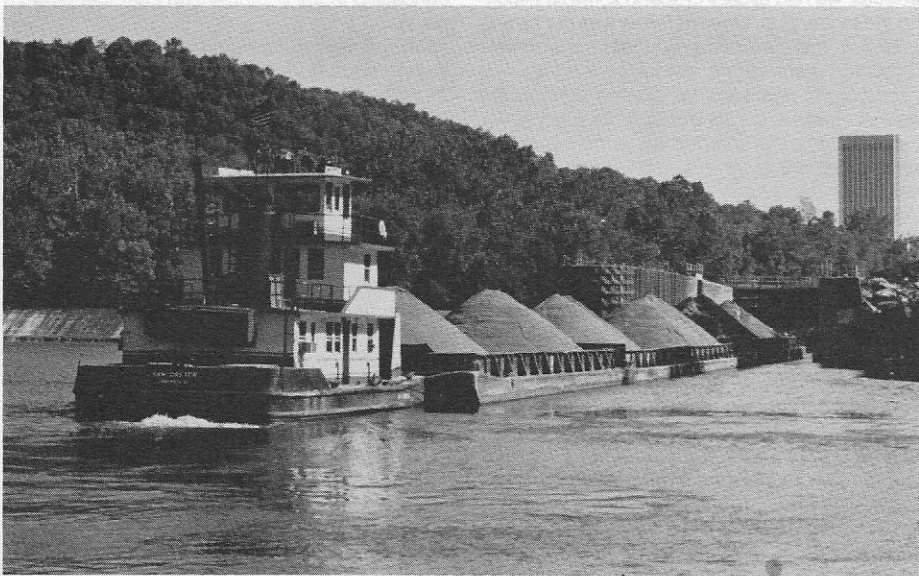
I wonder if it would be half as much fun if we learned beforehand the lay of the country. Is it the very uncertainty that makes the fascination?

The Hutchins' three-day outing ended at Lake Hopatcong. Here they disposed of their canoe and caught the Lackawanna Railroad back to Hoboken and thence to Manhattan, either on the Hudson Tubes or the ferries. Little could they realize that 73 years later the Morris Canal and its inclined planes upon which they had just traveled would become a major subject of interest for canal and industrial archaeology enthusiasts. But in 1917, on the eve of America's entry into World War I, it was STILL THERE—all of it. What would they have thought if told that in 1990 millions of dollars would be spent to restore to full working order the plane at Waterloo Village including the complete turbine mechanism?



In 1917, when John and Mabel Hutchins made their trip on the almost-abandoned Morris Canal, there were other canoeists traveling over it. In this picture from Jim Lee's book *The Morris Canal*, we see a young canoeist with his canoe resting at the mid-point of one of the planes somewhere in western New Jersey. Perhaps he couldn't afford the cost of a "pass" to ride up the plane in one of the inclined railway cars. Or possibly the plane wasn't working that day. As the end neared for the Morris Canal, many of its planes and locks were undoubtedly in deferred maintenance. The large structure in the background alongside the plane contained machinery to make it operate.

# CAPACITY FOR NAVIGATION VS. REASON FOR NAVIGATION



[Above] Kentucky River locks were designed to accommodate small, pre-Civil War steamboats. Here, loaded barges are pushed into a lock, barely wide enough, or long enough, to pass them.

A recent column from the Navigable Canals Committee ("Old Waterways: Antique or Historic?" in bulletin no. 74 [August 1990]) raised the question of a conflict between preservation for historic interest and preservation for use. There may be no sharper illustration of this conflict than in the continuing question of what to do about the locks and dams on the Kentucky River as they are abandoned by the Corps of Engineers.

The 19th Century navigation system on the Kentucky River employs 14 locks and dams to raise a vessel 215.8 feet from the mouth at Carrollton on the Ohio River to the Kentucky's origin at Beattyville, 254.8 miles upstream. This amounts to an average lift of 15.4 feet per lock, and an average distance between locks of 18.2 miles. By contrast, the Tennessee River navigation system (construction on which began just as the Kentucky River system was being completed) employs 9 locks and dams to raise a vessel 510 feet over a length of 650 miles. This works out to an average lift of 56.7 feet and an average distance of 72.2 miles between locks. The contrast in terms of time and expense (both the expense of operating a vessel through the locks and the expense of operating the locks) is sharp and clear. To put it in other terms, with a navigation system designed like that on the Kentucky River, the Tennessee would have approximately four times as many locks and dams to be transited and to be kept in operation and repair.

Given the fact that all the Kentucky River locks and dams are now fully depreciated and that some of them are in imminent danger of collapse, it is obvious that keeping the waterway open to navigation means not merely hiring locktenders but also rebuilding the locks and dams. For recreational navigation, a single shift of locktenders just on weekends and only during the six-month boating season is not a major burden on the state's finances. It is the rebuilding that involves the traumatic fiscal crunch. Kentucky legislators and administrators have an obligation to be responsible stewards of the people's financial resources, and to apply a rational system of priorities to their expenditures. Both economic and engineering considerations overwhelmingly dictate that if the Kentucky River locks and dams are to be rebuilt, they should be rebuilt according to a design ap-

propriate to the 20th, or even the now impending 21st, Century. Instead of 14, there should be perhaps 4 locks and dams. Even this would involve a major investment in a recreational and cultural project, but it would certainly be a great deal easier to justify than a much larger investment in a project of obsolete design. The interesting question, though, involves the effect that the modern, economical, and efficient navigation system would have on the cultural and recreational values that it was intended to enhance.

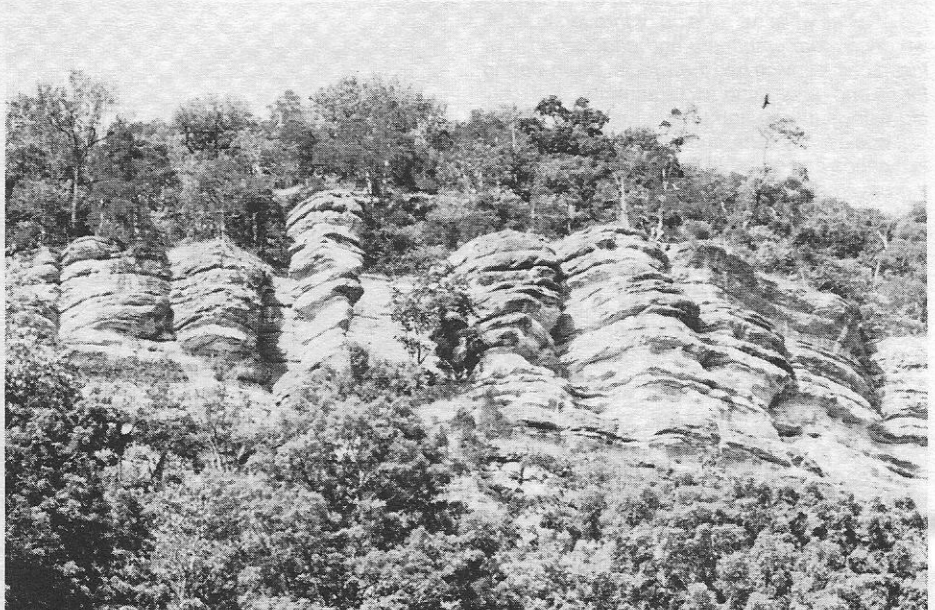
Most A.C.S. members being reasonable people, we do not generally insist that every antique lock in the United States must be kept in operation. In many cases, our hopes and expectations are adequately met if the remains of an ancient lock and dam are preserved, protected against further decay, and made available for public edification and enjoyment. On a defunct canal, this is entirely possible, and canal societies need on-

ly to stir up public support to achieve their modest goal. On a river which is being kept open for navigation through the rebuilding of its navigational improvements along modern lines, on the other hand, the preservation, protection, and public display of the historic artifacts becomes in most cases not merely difficult or expensive, but literally impossible. Fewer locks with higher lifts installed in higher dams means that most or all of the former lock-and-dam sites are under water. Study our own society's series of American Canal Guides if you need to be convinced of this. For waterways that have been modernized, the most common references to the older facilities are typified by the following randomly selected excerpt.

"LOCK AND DAM 4 (mile 216.6, 10' lift, R bank, 1908) is 20' underwater, just below the mouth of the Black Warrior River (no water or camping). LOCK & DAM 5 (mile 232.0, 10' lift, L bank, 1908) still has its land wall, 12' underwater; water, camping. LOCK & DAM 6 (mile 252.3, 10' lift, L bank, 1908) also has its land wall, 3' below low water; picnicking, no water. [Canal Guide 3, pp. 22-23.]"

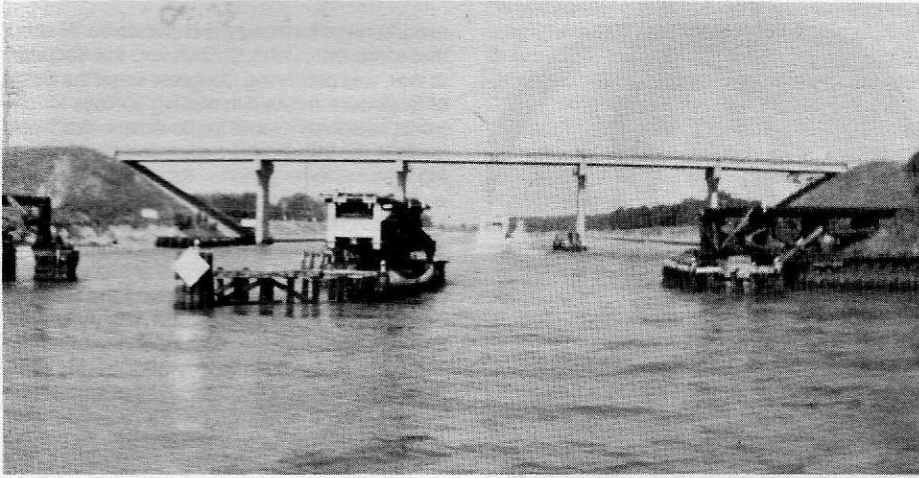
In addition to this ubiquitous problem, there is also a special one that applies to the conjectural modernization of the Kentucky River navigation system. In order to appreciate this, we must first examine why, apart from historic interest, a person not a resident of the Kentucky River valley might wish to cruise the river. There are, after all, a great many other rivers which remain navigable. Given access to all the rest and deprived only of the Kentucky, what of substance (still apart from historic interest) will be lost? The answer is that among navigable rivers it is one of the most scenic. There are of course many wild and scenic rivers which can be navigated only by canoe or raft, but among those accessible to powerboats of the cruiser or houseboat class, the available view tends to range from industrial and urban blight through agricultural abandonment. Once in a while, we find along the way an unspoiled gem of nature at her more glorious, and it is in this aspect that the Kentucky is outstanding. By far the most impressive of all its scenic attractions is its canyon, commonly known as "the palisades of the Kentucky," extending about 70 miles from Cum-

(Concluded on Page 7)



A modern system of high-lift locks and dams would involve submerging the Palisades, the Kentucky River's principal scenic attraction.

# REHABILITATION WORK IN PROGRESS ON CAPE MAY CANAL



**The Cape May Canal is crossed by a Conrail railway bridge (inactive since 1981) and two highway bridges. The one in the photo carries the Garden State Parkway. (Photo by Bruce Russell)**

by Bruce J. Russell, Contributing Editor

The Cape May Canal, a man-made, sea-level waterway which slices across the southern tip of New Jersey's Cape May peninsula, is finally getting some long-deferred maintenance. The 3-mile canal was dug in 1942, during World War II, by the U.S. Army Corps of Engineers, to create a passageway for self-propelled oil barges and small ships to go from Cape May harbor to the Delaware Bay while avoiding the open Atlantic, where German submarines were lurking. After hostilities ended the canal became a major thoroughfare for recreational and commercial fishing vessels. Since Cape May harbor has access to the Atlantic Ocean via Cold Spring Inlet, it is possible to go from ocean to bay and avoid passage around the tip of the Cape May peninsula.

When constructed, the Cape May Canal was essentially dug out of the virgin earth using scrapers, steam shovels, et cetera. Practically no

## CAPACITY VS. REASON

(Concluded from Page 6)

mins Falls to Fort Boonesborough. If there is a single reason why the Kentucky should be kept open to navigation even at the cost of submerging its historic 19th-century navigation system, this is it.

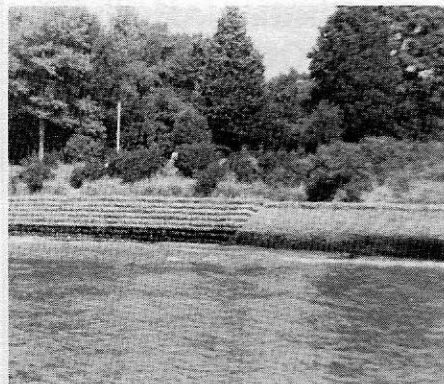
The irony of the situation is that a modern, economical, and efficient navigation system would also inevitably destroy the major part of the scenic beauty of the Kentucky valley. High dams and high-lift locks impound larger quantities of water than low dams with low-lift locks. The original Kentucky River dams merely held the river to approximately its ordinary high-water line short of flood stage. This type of lock and dam system can be installed on a river which meanders across a plain. A high-lift system, on the other hand, creates reservoirs, and requires basins in which they may be contained. The Kentucky River canyon provides the perfect and essential containment system for the water that would be impounded. It is inconceivable that a truly modern navigation system could be built on the Kentucky which did not flood this canyon. In doing so, it would tremendously facilitate the process of getting a boat from Carrollton to Beattyville and back. It would also destroy the last particular reason for wanting to make the trip.

— D.F.R.

embankment protection was provided. During the past 45 years the wake from many vessels passing through has gradually eroded the sides of the waterway, causing it to become wider and wider. Ultimately the widening canal began to encroach upon private dwellings, threatening them with destruction. Furthermore, the canal became harder and harder to dredge since material from the earthen banks kept falling in. A crisis point was ultimately reached.

The Corps of Engineers in conjunction with the U.S. Coast Guard has finally decided to tackle the problem. The entire Cape May Canal is now being lined with stone riprap which will be able to withstand the wake created by as many boats as decide to use the canal. The material is brought to the canal by truck, and after the bank where it is applied is smoothed and sculptured it is laid down. The result has been to restore the 1942-vintage waterway to the dimensions it had when originally dug. In many places once the stone embankment had been put into place, the area directly behind it was backfilled. This was because so much of the surrounding land had gradually slipped into the canal. The final result is a much more attractive waterway which will be considerably easier to maintain. Without its side constantly caving in there will be less need for dredging.

The Cape May Canal is part of the Intracoastal Waterway system, which begins in Bay Head, New Jersey, and extends all the way south to Key



**Two types of stone riprap are used to form the reconstituted bank of the Cape May Canal. This will prevent future bank erosion and allow the waterway to maintain an even profile. (Photo by Bruce Russell)**

West, Florida. By using this route, which consists of a series of tidal estuaries connected by man-made canals and channels, a boat can avoid the open Atlantic. After boats heading south exit the Cape May Canal, they proceed north a few miles across Delaware Bay and enter the Chesapeake and Delaware Canal, which provides access to beautiful Chesapeake Bay. This is a much older canal. Originally equipped with locks, it was converted during the 1930s to a sea-level waterway.

The western extremity of the Cape May Canal is used as the port for ferry boats traveling between New Jersey and Delaware. This service, begun in 1964, has been very successful and now carries hundreds of thousands of people a year. For those wishing to travel through the Cape May Canal who do not have access to a boat, there are two companies operating out of Wildwood, N.J. which run trips. They occur twice daily in summer including a twilight run, and less often in the spring and fall. Fare in 1990 was \$7.



**Captain Schuman's sightseeing boat which passes through the Cape May Canal, at Wildwood dock. (Photo by Bruce Russell)**

## THE MAKING OF A CANAL BUFF

[Letter received by A.C.S. Secretary/Treasurer Charles W. Derr]

Dear Charles —

Thanks for sending us information about the Illinois & Michigan Canal and the Chesapeake & Ohio Canal, plus the bulletin and the other brochures. We were very happy to receive all this information.

Since your introduction about the Lehigh Canal we have become very interested about canals and their history. The day after we biked from Lehigh to Allentown we "did" the Delaware from Upper Black Eddy to New Hope and then the Raritan Canal from Cambertville to Trenton. We'd like to come back with more time to spend. It's slow biking on those bumpy towpaths but it's also bikers' heaven with no traffic and beautiful scenery.

Last week we wanted to check out the Illinois & Michigan Canal. We spent two days biking there and found it most beautiful. Unfortunately the towpath is not cleared from Channahon on north towards Chicago. It's hard to read the maps those park services give out—they seem to project the future developments already.

Next week we are aiming for the Chesapeake & Ohio Canal for a few days of biking. As you can see, you really turned us on to canals. I find it extremely interesting to learn about the history and already read two books: *Canal Boatman*, by R. Garrity, and the American Heritage *The Erie Canal*. More to come! For somebody who didn't know a thing about the American canal system a few months ago that's quite an education. Thanks for your generous introduction.

M.N.

# ROBERDEAU'S TREATISE ON CANALS

by William Dzombak

When canal construction was begun in America, before 1800, there weren't any civil engineers on this side of the Atlantic Ocean to take charge of such undertakings. The first school of civil engineering in America was not established until 1802, when an act of Congress created a military academy at West Point, New York, for the education of young men who would provide the engineering skills needed by the country in time of war [1]. To wage the war of revolution, George Washington had been forced to rely on the services of French military engineers, who were given command of the design and construction of fortifications and other military works. To find engineers experienced in the construction of canals, America turned to England, where a number of canals had already been built by men who were largely self-taught, having begun as surveyors.

The education of civil-military engineers at West Point was at first conducted by French military men, and instruction was by means of textbooks written in French. Within a few years, some of the teachers at West Point were Americans who had studied engineering in France. By 1838, West Point students were using a book on engineering that had been written by an American, Dennis Mahan, who had graduated from West Point in 1824, at the head of his class. He was at once appointed professor of mathematics and engineering at West Point; in 1826, he was sent to France and spent four years there, studying at the French military school at Metz and examining all manner of civil and military works in Europe. Upon his return to the classrooms at West Point, he wrote several treatises and textbooks on military and civil engineering, including a book on civil engineering [4] that for many years was used as the standard text on the subject. The book includes a chapter on the construction of canals (pages 178-209).

Although Mahan's treatise appears to be the first



Major Isaac Roberdeau

formal exposition on canal engineering to be published in America, there is an earlier but unpublished manuscript that is also of interest, and that is the Mathematics and Treatise on Canals [5], written by Major Isaac Roberdeau.

During the War of 1812, Major Isaac Roberdeau served as a topographical engineer in the American army. In 1813, Congress authorized the appointment of eight topographical engineers and eight assistants, to serve the military. When the war ended, in December, 1814, only two of the engineers were retained: Major John Anderson and Major Roberdeau. Their assignment was to complete a survey of the northern frontier of the United States. [1]

In a report to the Secretary of War, these two engineers called attention to the need for a corps of topographical engineers to map the country and

make surveys for military and civil works. At about that same time, John C. Calhoun, the Secretary of War, was petitioning Congress to get the Corps of Engineers involved in making surveys for civil works, especially internal improvements that would facilitate the transport of troops and supplies during wartime emergencies, as well as serve the public and commerce during peacetime [2]. In 1816, Congress responded by authorizing the addition of topographical engineers to the general staff of the army. The duty of the topographical engineers was to make surveys for the Board of Engineers for Fortifications. Within a few years, the Corps of Engineers was actively engaged in making surveys for such civil works as the B&O Railroad and the C&O Canal and many other projects. In 1818, the Secretary of War, John Calhoun, appointed Major Roberdeau to serve as chief of the newly created Topographical Bureau in the Engineer Department of the Army. Isaac Roberdeau held that post until 1829, when he retired from the service.

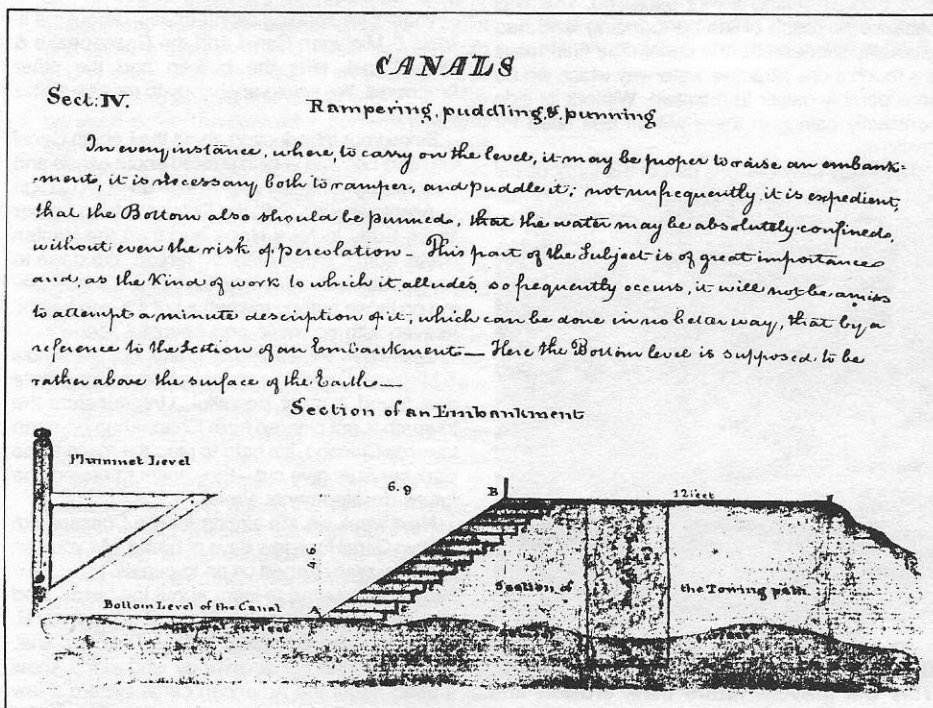
Roberdeau first gained civil engineering experience while working with Major L'Enfant and Col. Ellicott in laying out the city of Washington, in 1791; he had been recommended for that position by General Washington. Roberdeau next worked as assistant to the renowned British canal engineer, William Weston, who was in charge of construction of the Union Canal. Roberdeau recalled that episode in his life as follows:

## Assists Wm. Weston

*"Immediately after my marriage [Nov. 1792], I was appointed agent for the board of directors of canals and turnpikes in the State of Pennsylvania, the duties of which I performed until the arrival of the engineer, Mr. William Weston, from Gainsborough on Trent, in England, who had been sent for under a large salary to take charge of the canals and other works of internal improvement in that State. This gentleman, with the approbation of the directors, appointed me his assistant, in which capacity I served and conducted the canal intended to connect the waters of the Schuylkill with the Susquehanna, to his perfect approbation, until the failure of funds for all these companies in 1796 occasioned the relinquishment of the works and the return of Mr. Weston to his native land.*

*"By this occurrence (the failure of funds) I was again thrown out of employ in my profession — a profession which was then little cherished and imperfectly understood, even in the army of the United States, as most of the officers of engineers engaged in the Revolutionary War were foreigners who had, with few exceptions, returned to their respective countries. And as the Military Academy at West Point was not established until 1802, there existed no taste or desire for this kind of literature, nor was there a college or seminary of learning where the profession could be attained, and for many years afterwards but imperfectly, even under the patronage of the government."*

After spending several years in the management of family estates and affairs, Roberdeau was able to return to the work for which he had studied and trained: "As I had studied the science of arms in early life, in which my profession as an engineer afforded many advantages of improvement, I had made several attempts to enter the army, but this could not be accomplished with a rank suited either to my support or capacity, until the war with Great Britain in 1812 broke out, when an opportunity occurred and I was appointed in the



An excerpt from the Roberdeau manuscript.



*Topographical Engineers, with the rank, pay, and emoluments of a major of cavalry."* [3]

Isaac Roberdeau's manuscript [5] on Mathematics and Treatise on Canals consists of three parts:

Part 1, which constitutes half of the volume, is just a textbook course on geometry; Part 2 is 26 pages on practical surveying; Part 3, the Treatise on Canals, fills 45 pages and addresses two topics—levelling, and canals.

After devoting seven pages to a discussion of the theory and practice of levelling, Roberdeau launches into an explanation of the art of building canals. The Treatise on Canals includes a section on each of the following topics:

- (1) Survey of the course, and fall of the intended canal. (4 pages)
- (2) Size of the boats; setting out the work; sites of the locks; estimates. (5 pages)
- (3) Slopes of the Cutting, and embankments. (5 pages)
- (4) Tunnelling. (1 page)
- (5) Rampering, puddling, and punning. (5 pages & drawings)
- (6) Locks. (8 pages & drawings)
- (7) Culverts. (2 pages)
- (8) Bridges. (2 pages & drawings)
- (9) Waste-wears, Over-falls. (1 page)
- (10) Aqueduct bridges. (2 pages and a drawing)

### Geometry & Surveying

The plan of Roberdeau's "Mathematics and Treatise on Canals" is clear. He devotes half of the volume to a course on plane geometry, the mathematical foundation of surveying. He next discusses the application of geometry to practical surveying, especially to the task of levelling, "... which is most extensively connected with the construction of canals, and their various dependencies, for the extension of inland navigation, and also with the several branches of fortification. . . . As, however, greater difficulties are to be encountered in the construction of embankments, through which water cannot pass, than in the formation of a rampart, merely for the resistance of shot, or shells, so perhaps a greater degree of critical knowledge may be requisite in the construction of the one than of the other, at the same time that the general principles of both are in most respects precisely the same. These observations, therefore, shall be more immediately confined to the construction of canals, as the most difficult branch . . . ."

In the Treatise, Roberdeau goes into considerable detail, so that the reader begins to suspect that he is being equipped with as much knowledge of the construction process as was possessed by many of the people who were engaged in building parts of various canals. It is probably safe to assume that many of the procedures and practices recommended by Roberdeau were taught to him by the master canal builder, William Weston, in whose shadow Isaac Roberdeau worked. If that is so, the Treatise provides us with some insight into Weston's approach to the building of canals. In any case, Roberdeau's practical manual gives us an eye-witness account of how things were done in those early days of canal building in America. It is one thing to peruse the Canal Commissioner's specifications and plans; Roberdeau's manual bridges the gap between drawing board and on-site realities. In reading this hoary document (it is now two hundred years old), one is drawn subtly into the train of thought of the canal engineer of 1800, so that it is possible in that way to relive that early experience and so gain a much better appreciation of a primitive technology that has passed but still

merits our continuing interest.

It is not likely that Roberdeau's opus will ever be published, but for anyone who would like to read it (without paying the high price for a Library of Congress copy), I can supply the text of the Treatise on Canals (just the parts on Levelling and Canals, and without the drawings) on computer diskette (5 1/4 inch). The disk can be read by anyone with access to an MSDOS/PCDOS-compatible computer. The text is stored on disk in ASCII format, so that it can be handled by any printer or word processor. If you would like to obtain a copy of the disk, send \$2 (mailing costs) to me: W. Dzombak, 621 Spring St., Latrobe, PA, 15650.

### REFERENCES

- [1] Hill, Forest G. *Roads, Rails, and Waterways (The Army Engineers and Early Transportation)*, Greenwood Press, Westport, CN (1977).
- [2] Calhoun, John C. Speech, On the bill to set aside the Bank dividends and bonus as a permanent fund for the construction of Roads and Canals, delivered in the House of Representatives, February 4th, 1817.
- Report, On Roads and Canals, communicated to the House of Representatives, January 14, 1819.
- [3] Buchanan, Roberdeau *Genealogy of the Roberdeau Family* Joseph Pearson, Washington, 1876.
- [4] Mahan, Dennis H. *An Elementary Course of Civil Engineering for the Use of the Cadets of the United States' Military Academy* Wiley and Putnam, New York (1837).
- [5] Roberdeau, Major Isaac *Mathematics and Treatise on Canals* Unpublished manuscript (no date)
- Library of Congress, Manuscript Division, Isaac Roberdeau Treatise, Item MMC 1649, 170 pages. (available as a photocopy or on microfilm).

### Note:

In an effort to obtain information about Isaac Roberdeau, I wrote to the librarian at the headquarters of the U.S. Army Corps of Engineers, in Washington, D.C. My inquiry was answered by Mr. James Dorsey, a reference librarian, who happens to be a descendent of Isaac Roberdeau. How is that for a coincidence! Needless to say, Mr. Dorsey was well able to provide me with the references I needed.

## DELAWARE & LEHIGH NAVIGATION CANAL NATIONAL HERITAGE CORRIDOR

The Lehigh Navigation System and the Delaware Canal, constituting a continuous transportation system from Wilkes-Barre to Philadelphia, has been designated as a National Heritage Corridor under legislation signed into law by President Reagan on November 18th, 1988. Exactly what this will mean is being worked out by a 21-member commission including federal, state, and local representatives. For further information, contact Deirdre Gibson, Division of Park and Resource Planning, National Park Service, 260 Custom House, 2nd and Chestnut Streets, Philadelphia PA 19106. Phone 215 597 6486.

(For a map of the entire Corridor, please refer to AMERICAN CANALS #70, August 1989, page two.)

## SLIDE SHOW, ANYONE?

"Here and Now—Ohio's Canals" is the title of a slide show prepared by A.C.S. member Linn Loomis and offered to school groups, service clubs, and church groups. Mr. Loomis can be reached at 59821 CR 9, Newcomerstown, Ohio 43832, phone 614 498 7082.

An illustrated lecture on English canal boats is offered by Neil Watson. Mr. Watson, at present a resident of Virginia, lives on a 65-foot narrowboat when he is at home in England. He can be reached at 3409 White Oak Road, Raleigh NC 27609, phone 919 833 9964 or 919 781 3189. Travel expense and a "modest" fee are expected.

## LETTER TO THE EDITOR

On my vacation east through Maryland and D.C. this year I visited Cabin Johns near Washington D.C. where a section of the old canal is in operation. It was very interesting and I bought a book called *Towpath Guide*. It's an outstanding book—contains beautiful pictures of the canal and lock houses. I enjoyed the write-ups very much but was disappointed in some parts of it, especially coverage of lock 28 at Point of Rocks, Maryland.

I am 65 years old and was born and raised near the lock. My Grandpa Fulton was lock tender on lock 28. He lived there until he passed away in 1933 and the rest of the family continued to live there until the government took over. There was no picture of the lock house in your book.

My uncle William Fulton, Jr. worked 28 years on the canal (level walker) and was part-time foreman. His boss, supervisor Sam Fisher, lived down the berm just below the Point of Rocks bridge in an old house boat. I've been there with Uncle William time and time again. It washed away in the flood of 1936.

I knew lock tender "Bugs" Cross and his daughter Lavenia Washey and family at Lander, Maryland. I'm very familiar with the towpath from Brunswick to Point of Rocks—used to go to the old mill on the canal there at Brunswick often with Uncle William.

I was born across the canal and railroad track from the lock house at lock 28 but was raised on the hillside upstream from the lock by my uncle and aunt, William and Bessie Fulton. The house is still standing and is the only one in the area still standing except for the lock house.

I wasn't born early enough to see the canal boats in operation. I was born in 1925 and they weren't operating then, but the canal and the famous towpath hold a lot of wonderful memories for me. Thanks for writing and publishing such a wonderful and interesting piece of history. Robert W. Fulton, 3060 N. 400 E., Marion, Indiana 46952.

Two dedicated ACS members are working on projects which should be of interest to all of us: *William Dzombak* is putting the finishing touches on an Index to major articles published in AMERICAN CANALS, Issues Number One through 75 (1972-1990). *John Droeger* is working on a Glossary of Canal Terms used on our historic canals, as well as on our modern waterways. Both these important items will be available shortly to all ACS members who wish copies.

# "TWENTY-FIVE MILES TO NOWHERE"

By Terry K. Woods

Terry Woods is working on a re-write of his book *TWENTY-FIVE MILES TO NOWHERE*, which is essentially a history of the Walhonding Canal in Ohio. We are publishing this excerpt from his chapter on the Engineering and Structures of that canal, which ties in well with his activities as Chairman of the ACS Engineering Design Committee:

The Walhonding Canal was a 23 1/2 mile long artificial waterway for navigable purposes that connected the waters of the Ohio Canal at Roscoe Basin with those of the Mohican River below the villages of Cavallo and Rochester. The western-most endpoint of the canal was 89 feet and 10 inches above the level of Roscoe Basin. The goal of the engineers then, was to design and lay out a waterway that would transport the largest amount of cargo, in the most expeditious manner, while keeping the construction and maintenance costs of the canal to a minimum. To do this, any lifting devices used must be large enough to allow transit of the largest boats that navigated the canal, yet not too large that their construction costs would be excessive. Similarly, the canal's channel must be deep enough, and wide enough, to allow two of the largest, fully loaded boats to pass each other. Yet the surface of the channel should be small enough to minimize evaporation. The sides of the channel should be sloped steeply enough to economize on the amount of materials required, but not so steeply as to cause excessive erosion. The nearly 90 feet difference in elevation must be overcome by lifting devices that were, 1) economical in water usage, 2) efficient and, 3) low in maintenance. The channel between these devices must be constructed to a given slope such that water would move between levels to keep them full, but offer a minimal current to upstream bound boats.

Considering the remote sites, the equipment available, and the relative lack of mathematical tools, the canal engineer had a much more difficult task than did the later railway or modern highway engineer. Fortunately for the Walhonding engineer, many of these problems had been previously solved on the Ohio & Erie, and before that, on the Erie Canal. Walhonding engineering was a version of the engineering used and practiced for more than ten years on the Ohio & Erie. This, in turn, was an adaptation of the engineering taken from the British, and reworked and used by the engineers of New York's Erie Canal.

Lifting devices on all three canals were locks of finished stone construction. The size of the lock chambers had been standardized as 15 feet wide by 88 to 90 feet long. This fixed the maximum size of the craft that could navigate a canal to, roughly, 80 feet long by 14 feet wide. This, then, fixed the minimum dimensions of the canal's channel to 40 feet wide at the water line, 4 feet deep, and 28 feet wide at the bottom. Ohio's engineer's 'cheated' a bit here by making the bottom of their canals only 26 feet wide. Contractors on the Ohio & Erie were encouraged to exceed these minimum dimensions whenever the resultant overall cost wouldn't be greatly affected. The Walhonding contractors, however, were allowed to reduce these dimensions, in particular cases, with the approval of the Acting Commissioner or Resident Engineer.

When the engineering team began preparing the Walhonding Canal for bidding, surveys were first carefully run along the proposed route. Particular care was taken to minimize the amount of excavations and built-up embankment to be made. The optimum number of locks and their exact locations and lifts were determined as well as the



number and types of culverts, feeder dams, and other engineering structures.

Once the levels of the line and structure locations had been calculated and the contractor selected, a crew would move into the field and begin 'Canawling'. The entire area that would later be occupied by the canal's channel and embankments was 'grubbed'. 'Grubbing' consisted of removing all material, living or dead, that could later decompose and cause weak spots in the canal's bottom or embankments from on and below the ground. In addition, all loose material was removed from a 20 foot swathe on either side of the area actually to be occupied by the canal. All living material within those swathes was cut down to within 12 inches of the surface of the ground.

High portions of the terrain were excavated and carried to lower areas to build up embankments, to maintain the minimal fall (one inch per mile on the main Ohio canal) that would ensure a constant supply of water between levels. The towpath embankment was normally constructed on the river side of the canal. It was a minimum of two feet above the waterline and a minimum of ten feet wide. This embankment acted as an additional protection against high water in the river. The opposite bank was also constructed so as to extend two feet above the waterline in the channel. This bank had a minimum width of six feet and often followed the natural contour of the land. The engineering name for this bank was the berm, but boatmen usually called it the heelpath, if for no other reason than it was opposite the towpath.

A number of miles of the Walhonding Canal, in order to stay up and away from the river's frequent flooding, were constructed part way up a hillside or along the base of a bluff. In these cases, it was imperative that run-off water from the hill-sides, and the earth it would be carrying during heavy rains, be diverted from the canal's channel or first run into catch basins where the earth could settle out. Stone-lined drains and catch basins were constructed in all potentially troublesome areas.

Eleven lift locks and two guard locks were required on the Walhonding Canal. When one of them was constructed, a foundation, a framework of hewn timbers, (at least one foot square) was

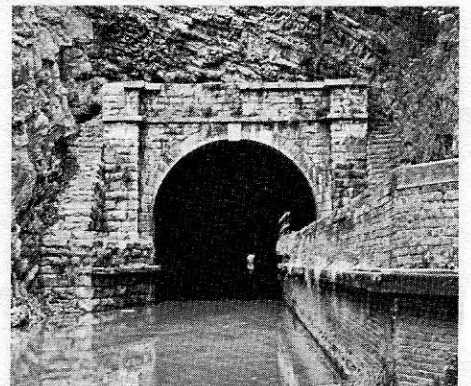
bolted to solid rock or spiked onto timber pilings that had been driven into an adequate thickness of 'puddle'. 'Puddle' was the early engineer's answer to the absence of formed concrete. It was built up to a required thickness by successive six inch layers of clay and gravel that had been thoroughly watered and rammed with iron bars or trodden by cattle until all the air bubbles had been worked out.

The wooden framework was oriented with the long timbers running parallel to the long dimension of the lock chamber and extended about 4" beyond the position of the outermost stone wall. The area between the beams was filled with layers of 'puddle' and a flooring of 3" white oak planks was laid longitudinally over the entire frame.

A double-walled chamber of stone was erected upon the flooring. An inner chamber of cut, finished stone as laid up at the same time as, and interlaced with, an outer chamber of rougher cut stone. Both walls were built in courses of stretchers and headers. A header from the inner wall projected into the backing wall a minimum of every ten feet. Headers projecting from the backing wall into the inner wall alternated with the inner wall headers. Spaces in both walls between the headers were filled with stretchers, whose long dimension ran parallel to the long dimension of the lock chamber. Any space within the double wall chamber that did not contain stone was filled with well-worked 'puddle'. A removable flooring made from 2" white oak plank was laid within the inner stone walls.

Lock walls on the Ohio & Erie Canal were a standard five feet thick at the bottom and four feet thick at the top water line. Lock walls on the Walhonding Canal, however, were to be 3/8 as thick as the lift of a particular lock. Since no lock on the Walhonding Canal had a lift greater than nine feet, these walls were considerable thinner than the lock walls on the main canal. A great deal had been learned about stone lock construction since the Ohio & Erie had been engineered. Much had been learned about the proper way to support foundations, how to select good, solid stone and the best methods to tie the entire stone structure together. As a result, the masonry work on the Walhonding Canal was perhaps the best and longest lasting example of stone lock construction on any Ohio State Canal.

A tumble and water by-pass channel were constructed around each lock on the Walhonding Canal to insure an even flow and adequate head of water in each level. This feature wasn't part of the original Erie nor was it included in the first lock structures on the Ohio & Erie. It was a later improvement and can be thought of as Ohio's contribution to the art of canal engineering.



**Paw Paw Tunnel below Cumberland on the C.&O. Canal (Photo by Ruthvan W. Morrow, Jr.; contributed by Tom Horvath)**

# INTERNATIONAL DIRECTORY

by Ron Oakley  
Chairman - IWA International Committee

Many other countries have navigable rivers and canals, and they too may be in need of defending from a seemingly inexorable march of road building programmes, urban development and a lack of finance to maintain them, because of a loss of demand for their original purpose.

Nations are drawing closer together and are becoming more interdependent. It is therefore fitting, we believe, that those of us who see the need should try to bring together all interested parties, in order to help support the continued existence of these waterways wherever they may be. However, the divergence of interest and level of awareness from country to country varies enormously, as does the attitudes of different governments and the degree of their financial support — or lack of it! Any framework of a future international waterways group must be flexible enough to accommodate these varying positions and attitudes.

There are canal societies in other countries — Canada, United States of America, Belgium, Ireland, France, Scotland, Italy and Australia, but none we know of in Germany, Holland or elsewhere. This first step, is to identify centres of interest and this letter is addressed to known groups. We hope that these groups will help us to make contact with other organisations or individuals who may be interested.

We plan to compile an International Waterways Directory and the enclosed circular is being sent to navigation authorities; tourist information centres etc., known to us. The directory will include details of canal societies and trusts. Your response, by returning the questionnaire, will be interpreted as meaning that you would like to be included, unless you indicate to the contrary.

(Canal organisations in the U.S. are urged to participate. For a copy of the Questionnaire, write to Charlie Derr or to Mr. Tony Rymell, Hon. Secretary, c/o Lyewwater Farmhouse, Lyewater, CREWKERNE, Somerset, TA18 8BB, England.)

## LETTER TO THE EDITOR

In Bruce Russell's account of the Canadian-American meeting in issue no. 71, I was interested in his paragraph: "The slide show brought back memories of both Great Lakes shipping and life along the canal, and it's sad to think that in the U.S.A. and Canada there are no longer companies which operate large luxury boats between various ports on the five major lakes and connecting rivers."

Yes, indeed, it is sad. But I feel myself fortunate to have enjoyed some of what he recalls in memory.

About 1938, I rode a Hudson River Day Line boat from Albany to New York City on a vessel that had a walking beam to transmit power from the steam engine to the side-wheel cranks. Such boats as may now remain do no more than short excursions on the river.

In late summer 1944, when I was working in Cloquet, Minnesota, west of Duluth, and my parents were in a Chicago suburb, I went home to visit them, then took the "North American" of the Chicago, Duluth & Georgian Bay Transit Co. — "Georgian Bay Line" — from Chicago to Buffalo, lay over a couple of days, then took the "South American" from there to Duluth. It was a good trip through four of the five Great Lakes. And we transited the canal through the Keweenaw Peninsula.

# BOOK REVIEW

Ronald E. Shaw, *Canals for a Nation: The Canal Era in the United States, 1790-1860* (Lexington: U. Press of Kentucky, 1990). 236 pages plus photographs, maps, notes, bibliography, index. Hardcover. \$28.

Such a brief work as this obviously cannot provide all the information that a serious canal buff would wish to have about any particular navigation system. The abbreviated summary discussions of the various projects are clearly based, however, on thorough research. For the reader seeking more detailed coverage, the source notes provide in most cases the necessary guidelines for follow-up study. A number of the sources cited, incidentally, are publications of the American Canal Society and of Bill Shank's American Canal and Transportation Center.

What the author does attempt to provide, and provides well, is a balanced survey of the canal era and its role in the economic, social, and political development of the United States during its formative years. Although words such as "mania" and "craze" are often applied to the latter years of the period, Shaw correctly points out that canals which were financially unsuccessful were not on that account necessarily ill-conceived or wastefully executed. They shaped and welded a nation, and like public education returned a profit in the broad even if not in the narrow sense.

The book is not entirely free of error, and A.C.S. members will no doubt enjoy searching for nuggets of misinformation on their respective specialties. This reader enjoyed discovering that the Sault Canal (the St. Mary's Falls Canal) opened navigation "between Lakes Michigan and Superior" (page 147) and was built "at the straits (page 226)." There is a remarkable bridge at the straits, where lakes Michigan and Huron meet, but no canal. The canal, some 50 miles to the north-northeast, connects lakes Superior and Huron.

— DFR

In my copy of the Official Railway Guide dated July 1931, a full-page ad offers "A week's cruise on four lakes, \$72.50, including meals and berth." Imagine! Nearby in the Guide is a full-page ad of the Hudson River Day Line, offering the "Hudson River by Daylight."

The Eastern Steamship Lines have two facing pages, and when I was in college in Cambridge, Massachusetts, in the 1930s, I took both their boats, the "Boston" and the "New York," between those two cities; it was an overnight trip through the Cap Cod Canal.

And during that interval, also, I managed to ride the old Fall River Line; the boat train left Boston's South Station and ran right out onto the pier at Fall River for the transfer of but a few steps onto the side-wheel vessel, which took us overnight to New York. I was fortunate in being able to wangle my way onto the bridge as we went down Narragansett Bay. At that time one could also take a ferry from Boston to East Boston for a ride on the narrow gauge railroad, the Boston, Revere Beach, and Lynn.

All those interesting ways of travel are long gone, and it's a great shame. One would think that people today would enjoy a water trip between lake, ocean, and river cities. And that reminds me that I once took, in 1942, a stern-wheel Mississippi

## CANAL CALENDAR

**March 23, 1991.** 10th Annual Canal History and Technology Symposium at the William Simon Center, Lafayette College, Easton PA. Six research papers on subjects including the Little Kanawha, the Delaware Canal, the Morris Canal, and the Junction Canal. \$35 registration includes lunch and a copy of the proceedings. Write Hugh Moore Historical Park & Museums, P.O. Box 877, Easton PA 18044-0877, or phone 215 250 6700.

**April 20, 1991.** Tour of the Juniata Canal from Thompsontown to Newton-Hamilton, sponsored by the Pennsylvania Canal Society. Write Bob Keintz, R.D. 2, Box 135-L, Anthony Road, East Berlin PA 17316.

**April 27-28, 1991.** Tour of the Union Canal, connecting the Schuylkill River at Reading PA with the Susquehanna River at Middletown PA. Sponsored by the Canal Society of New Jersey. \$100 registration includes hotel, meals, and local transportation. Write Linda House, 214 North Bridge St., Somerville NJ 08876.

**April or May, 1991.** Tour of the Sandy & Beaver Canal, sponsored by the Canal Society of Ohio. Write Larry Turner, c/o Scott Bieszczad, 987 Mulberry St., Perrysburg, Ohio 43551.

**May 3-5, 1991.** Tour of the Erie Canal from Little Falls to Utica. Sponsored by the Canal Society of New York.

**May 3-5, 1991.** Virginia Canals & Navigation Society 14th Annual Meeting. Corrodoc Inn, 1500 E. Market, Leesburg VA. Featured waterways will be Goose Creek and the C&O Canal.

**May 18, 1991.** Canal Songfest and Singalong, featuring songs of the canal era. Old Santee Canal State Park, 900 Stony Landing Rd., Moncks Corner, South Carolina 29461; phone 803 899 5200.

**May 18, 1991.** Patowmack Canal Festival, 10 a.m. to 4 p.m. at Great Falls Park, Virginia. Write National Park Service, P.O. Box 66, Great Falls VA 22066.

**June 15-22, 1991.** Annual James River Batteau Festival, Lynchburg to Richmond, Virginia. Write James River Batteau Festival, Box 790, Columbia VA 23038.

**June 29-July 7, 1991.** New England tour including the Cumberland and Oxford Canal, the Cape Cod Canal, and the Middlesex Canal. Sponsored by the Canal Society of New Jersey. \$625 includes hotel, meals, and local transportation. A preview of this tour is offered on March 15. Write Linda House, 214 North St. Somerville NJ 08876.

**Fall 1991.** Tour of the Walhonding Canal, sponsored by the Canal Society of Ohio. Write Larry Turner, c/o Scott Bieszczad, 987 Mulberry St., Perrysburg, Ohio 43551.

River boat, the "Golden Eagle," from St. Louis to Peoria and back—a great trip.

Also, while in Boston I wangled my way onto a tug that went up to Beverly to undock a coal boat; and onto a steam locomotive from Boston to Fitchburg on the Boston & Maine Railroad. And a while ago, you published my account of a trip on an Erie Canal tug.

Gerald Chapman, P.O. Box 464, Stockbridge, Massachusetts, 01262.

# “MAIN STREET” ALONG THE ILLINOIS AND MICHIGAN CANAL

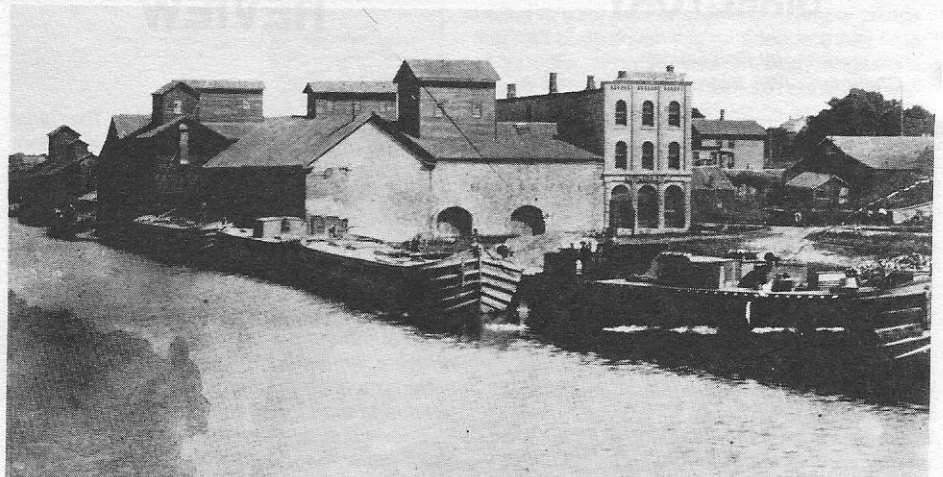
The Illinois and Michigan Canal was built by the state of Illinois, construction beginning in 1836 and completed in 1848. It connected Lake Michigan, at the mouth of the Chicago River, with the Illinois at LaSalle. From LaSalle to the mouth of the Illinois River at Grafton, on the Mississippi, the Illinois was navigable, during favorable conditions, by steamboats. The canal thus provided a direct water route from Lake Michigan to the Gulf of Mexico. It was profitable from the beginning, the profit increasing to 1862 and then declining until 1879, after which losses became chronic. Not only the railroads, but the changing technology of waterway transport made the canal obsolete. Boats that were not too large for the canal were too small for efficient use either on the lakes or on the rivers below LaSalle, so that transshipment was necessary at both ends of the 96-mile waterway. This effectively canceled out the cost advantage of water transport.

In 1930, the federal government, which had long been involved in navigational improvements along portions of the route between Chicago and Grafton, assumed responsibility for the whole, and in 1933 the present Illinois Waterway was opened to navigation. Rather than improving and enlarging the Illinois and Michigan Canal, the engineers had canalized the Chicago, Des Plaines, and Illinois rivers, leaving the old canal as a disused and gradually ruined relic paralleling the new waterway.

## C.C.C. Efforts

In the beginning, some efforts were made through the Civilian Conservation Corps (C.C.C.) to preserve and develop the old canal as a historical and recreational resource. World War II brought these efforts to an end, however, before a great deal had been accomplished. Not again until 1963 was there any organized effort on behalf of the Illinois and Michigan Canal. In that year, an “Open Lands Project” was organized with the mission of preserving public open space in north-eastern Illinois. The project took up the cause of the I&M, and in 1974 succeeded in persuading the state to designate the western-most 60 miles as a park under the name I&M Canal State Trail. The momentum continued to build, and in 1984 public pressure generated federal action creating the concept of a National Heritage Canal Corridor, under the supervision of the National Park Service, and designating the I&M as the first canal to be so distinguished. (See elsewhere in this issue notice of the recent bringing of the Delaware and Lehigh under this same program.) Canal Corridors receive federal funding but their development depends principally on the mustering of local and regional support and resources. A coalition of business and industry representatives was formed to organize and coordinate projects within the I&M Corridor. Originally known as the Upper Illinois Valley Association, the coalition now operates as the Canal Corridor Association.

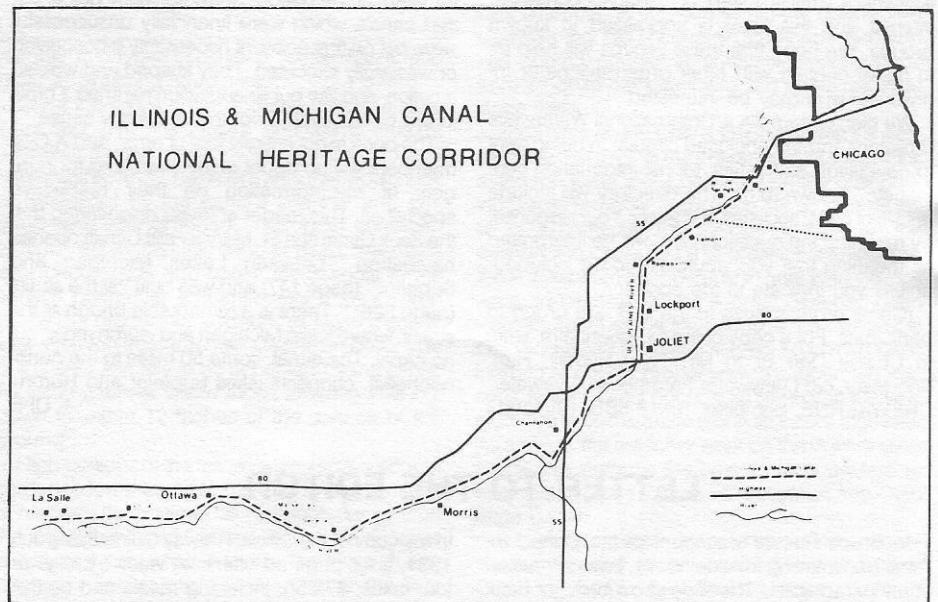
The most recent of the many joint projects that have begun the revitalization of the corridor is called Main Street. This is a national program under the National Trust for Historic Preservation, elsewhere operating through state agencies but applied to the I&M corridor under the leadership of the Canal Corridor Association and the Illinois and Michigan Canal National Heritage Corridor Commission. The focus of the program is historic preservation and restoration as a means to promote tourism for the stimulation of economic



Lockport on the I&M Canal about 1880. (Photo courtesy of the Canal Corridor Association)

development. The significance of this can scarcely be exaggerated. We ordinarily promote historic preservation as a public good, and struggle to find support for it through voluntary donations and governmental budget allocations. If instead it can

be shown to be a source of private profit, as the Canal Corridor Association believes, the trickle of dollars for which canal associations strive so earnestly may become a flood of free-flowing investment.



Mainstreet in Lockport today. (Photo courtesy of the Canal Corridor Association)