AMERICAN CANALS

BULLETIN OF
THE AMERICAN CANAL SOCIETY

BULLETIN NUMBER 67 Editorial Address—809 Rathton Road, York, Pa. 17403 **NOVEMBER 1988**

PRESIDENT'S MESSAGE

Perhaps the best tool for monitoring river corridors, including canal sites, is a standard river mileage system. Each river and stream should be marked at every mile on the USGS topo maps, and once established, these marks should never be changed. An official river mileage system won't replace the UTM co-ordinate system for pinpointing canal sites, but it is the ideal way to monitor river corridors. This is going to be even more important as the world fills up and brings greater pressure on river development. We need to monitor pollution sources, historic sites, proposed dams, industrial and housing developments, pipe lines, transmission lines, sewer lines, roads, and other river features and impacts. We need to know river mileages for flood control and flood monitoring, for water supply and water quality studies, for fishing and other recreation, and for river rescue operations. A mileage system is also handy for naming and recording historic streambed sites, such as "Slate River wing dam 3.5"!

The USGS policy is to mark river miles on all streams shown as a double line on their topo maps, once the mileage information is supplied by a state agency. River miles are already marked on topos along major navigable waterways such as the Ohio; they are shown for the entire Tennessee River watershed; and I understand they have been established for much of the midwest. If your topos don't show river miles, you might want to get the ball rolling in your state. Here in Virginia the Corps of Engineers, contractors, and canoeists all have their own different mileage systems, but we have learned that our Council on the Environment is developing an official state river and stream mileage system which they hope will be printed on the USGS topo maps. We're working with our representatives to see that the program is supported through to this goal. We are also working with the Council to see that all the known canal and riverbed sites become part of the state's river data base.

On the international scene, we regret to announce the death of Graham Palmer, founder of Britain's Waterway Recovery Group and first editor of its newsletter, NAVVIES. Working with the Inland Waterways Association, the WRG organizes work parties to restore canals all over the country and even has its own backhoes and dredgers! They're the ones to see when you're in England and want to do a bit of canal dirty work.

Don't forget to ask Charlie Derr for a supply of our new ACS membership flyers, and a handy countertop display holder for them, for your local museum or for canal talks.

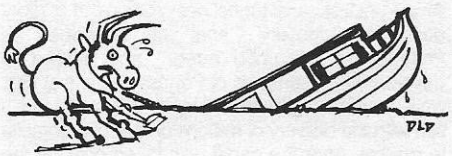
Happy Holidays!

Bill Trout

ST. HELENA II SCUTTLED!

Stern view of America's first authentic canal boat built this century, with her mule team "taking a break". (Photo by Terry Woods).

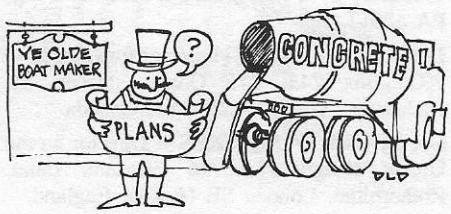
Designed by ACS Member Carroll M. Gantz and built by volunteer labor, with the cooperation of a number of Stark County (Ohio) historical organizations, the "St. Helena II" was launched at Canal Fulton, Ohio on June 17th, 1970. She was the first authentic, mule-powered canal boat to be built in the USA in the Twentieth Century. The boat was pulled along, via mule-power on the towpath, on a rewatered section of the old Ohio and Erie Canal between Canal Fulton and Lock 4, which had also been restored to working condition. During the past eighteen years, and until her demise this year due to irrepairable leakage, the "St. Helena II" has carried thousands of passengers, eager to experience the quiet ride of an historic canal boat "as it was" 150 years ago!



After nearly three months of pump-powered floating since she sank on the day of the final cruise, we finally laid the *St. Helena II* to rest. She is sitting on the bottom, right next to the boathouse. Most of the iron has been taken off to be used on the new boat now in preparation.

As sad as it is to see her resting on the bottom of the canal, we are all anxiously awaiting the start of the *St. Helena III*. Join us next year at Canal Days when we hope to christen the new boat!

by The Crew



The time has now arrived to begin building the *St. Helena III*. We recently received the $80,000 allocated by the state government. Preparations are being made to begin the construction as soon as possible.

The first task is to prepare the construction site which is the Mclaughlin Dry Dock located at the southern end of Canal Fulton Community Park. This has included sealing the gates between the canal and the dry dock, installing a tight security system and creating a decent work area. Once the site prep is complete, the construction will begin.

It will take many months to build the new canal boat, but much less time then it took to build the *St. Helena II*. The reason is the hull of the new boat will be *concrete* instead of wood. The goal is to have the boat completed by the Old Canal Days Festival in July 1989.

Some people have expressed interest in volunteering to help build the boat. Anyone else who wants to volunteer should contact the Heritage Society. Some volunteers will be used to build the superstructure of the boat.

(From "The Canawler", newsletter of the Canal Fulton (Ohio) Heritage Society)

American Canals

BULLETIN OF THE AMERICAN CANAL SOCIETY

"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.

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OAKES REACH ON NATIONAL REGISTER

Schuylkill Canal Assoc. members Jeffrey Amerine, Larry Whyte and Chairman John Hughes proudly display the "Take Pride in America" award which was presented on the South Lawn of the White House on July 26, 1988, by President Reagan.

By Larry Whyte

One of the few remaining intact segments of the Schuylkill Navigation was placed on the National Register in May, 1988, culminating an effort begun eight years ago with the formation of an ad hoc committee in Upper Providence Township (Mont Claire, PA). A few days after learning of this action, Chairman John Hughes received a letter from Interior Secretary Donald Hodel informing him that the committee's long struggle to reclaim this once-derelict piece of history had been chosen as a winner in the national "Take Pride in America" competition. Needless to say, the air was jubilant at the annual Canal Day celebration in June with this welcome news, and members of the Schuylkill Canal Association who spearheaded the effort were eagerly talking about future plans to restore Lock 60, the on-going restoration of one locktender's house, and possible acquisition of a historic building along the canal in Port Providence to serve as the Association's headquarters.

The Schuylkill Navigation Company was chartered in 1815 to complete a 108-mile navigable waterway along the Schuylkill River, extending from tidewater at Philadelphia to the anthracite fields near Port Carbon. The navigation comprised both slackwater and canal segments, and included America's first canal tunnel near Auburn. In its glory days, the Schuylkill Canal was described as Philadelphia's "carotid artery" and served to develop the hinterlands of Pennsylvania' first city, while contributing materially to the industrial revolution with the delivery of millions of tons of anthracite to market. After the canal was taken over by the Reading Railroad, the upper reaches were abandoned sequentially, with the major shipping facilities at Schuylkill Haven closing in 1888. Shipment of anthracite continued from Port Clinton until after World War I. The problems associated with coal siltation and the high cost of dredging to keep the channels clear brought about the cessation of commercial traffic on the old waterway sometime during the 1920's, but excursion boats and pleasure craft continued to ply the Schuylkill's lower reaches until the late 1940's. Landmark legislation enacted at that time created a compact between the State of Pennsylvania and the Federal Government for the purpose of cleaning up the much-abused Schuylkill River, and in the process, much of what remained of the Schuylkill Canal was destroyed.

The Oakes Reach, named for canal engineer Thomas Oakes, includes the slackwater pool above Black Rock Dam (from the Route 113 bridge), the dam itself, which is a surviving timber crib structure, the forebay and Lock 60 which gives access to the three-mile canal segment through Mont Clare and Port Providence. The canal segment is watered only as far as Longford Road, because of a silt impounding basin which was constructed during the river clean-up. However the committee chose to include in the nomination the canal prism which extends through this basin, the existing locktender's house, and the buried remnant of Lock 61 at Oaks, which was the outlet of the Oakes Reach, with the thought in mind of eventual re-watering of this segment and reconstruction of the outlet lock.

The Schuylkill Canal Association is a private non-profit organization which has helped to stimulate community interest and support for the project. Over the years, the association has acted in partnership with the township, civic organizations, and local business, and has been the recipient of awards for its efforts to bond area residents with the historic remnants of their cultural heritage.

Inquiries may be addressed to the Schuylkill Canal Association at 1301 Black Rock Road, Mont Clare, PA 19453.

QUIMBY'S BOATING GUIDE

David Ross reports that Quimby's Boating Guide will be using his material on the Kentucky River, and also on the Muskingum River, in their 1989 Guide. This material will be similar to that which he has already published in past issues of AMERICAN CANALS.

CSNJ to England

Plans are being formulated in anticipation of the fifth canal study tour to Great Britain by the Canal Society of New Jersey. Prior trips were in 1973, 1977, 1982, and 1987. Captain Bill McKelvey, leader of the last two trips, will again lead the group in 1990. The next trip will explore Southwest England and Southern Wales with one week each spent on boats on the Kennett & Avon and the Monmouthshire & Brecon Canals.

A one-day cruise will be taken on the Basinstoke Canal, which along with the K&A and M&B have each been largely restored in the past decade. Side trips to a steam pumping station for the K&A canal, canal and maritime museums, Brunel's S.S. Great Britain (1843), a steam railway ride and perhaps a steam fair are planned. The large new National Waterways Museum at Gloucester Docks will provide the group with an overview of the entire canal age.

Cost of the 2 week trip, which will include air fare from Newark, NJ, bus side trips, boat rental, admissions and 2 or 3 nights in hotels should not exceed $1700 (in 1987 it was $1200 per person). Please contact Capt. McKelvey, 103 Dogwood Lane, Berkeley Heights, NJ 07922 if you are interested.

SUMMER DROUGHT CHANGES WATER TRAVEL PATTERN

The big summer drought of 1988, which made sections of the central and lower Mississippi River almost unnavigable, were a boon to the new Tennessee-Tombigbee Waterway, as well as the St. Lawrence Seaway. The accompanying articles, sent us by Walter Meseck, show considerably more commercial activity on the Tenn-Tom, as an alternate route to the Gulf of Mexico, and also the St. Lawrence Seaway, as an alternate from the north central states and the Great lakes to the Atlantic Ocean. With some forecaster predicting another five dry years in central USA, commercial shippers may shy away from the lower Mississippi, in favor of the Tenn Tom, or even the Seaway. (The Editor.)

Tenn-Tom Cargo Increase "Massive"

Restriction of traffic on the Mississippi River as a result of the severe midwesten drought resulted in massive diversions of traffic to the Tennessee-Tombigbee Waterway, the Mobile Engineer District reports.

Traffic on the Tenn-Tom in July amounted to 2.7 million tons compared to 289,000 tons for July 1987.

Current thinking is that much of the commodity movements will revert to the Mississippi when normal conditions there return. It is believed, however, that the Tenn-Tom will retain a substantial amount of residual traffic as a result of users who became more familiar with the waterway during the drought, the Corps said.

During the first 18 days of August 149 tows carrying 638,000 tons of commerce locked through Columbus Lock alone. Columbus Lock is at the midway point of the 234-mile-long Tenn-Tom.

Tow sizes are generally larger on the Mississippi, but the Tenn-Tom offers shorter distances and travel times for some eight-barge and smaller tows.

Tenn-Tom tonnage has shown a slow but steady increase since the waterway opened in January 1985. Tonnage the first year was 1.7 million tons. It increased to 3.6 million in 1986 and 4 million in 1987.

Tonnage during the first seven months of 1988 totalled 5.8 million tons.

Shipments of coal, petroleum, ore and grain destined to or from inland states, top the list of commodities shipped so far in 1988.

During July locks on the waterway handled 402 tows compared to 64 tows during July 1987.

Operations personnel say that the number of tows (which averaged just over 13 per day) was still only about half of what the waterway is capable of handling safely and efficiently.

The drought conditions which affected many inland navigation systems in the eastern United States are not being felt to any extent on the Tenn-Tom. Channel dimensions of a minimum of 300 feet in width and 9 feet in depth have remained steady through the drought.

The Mobile District has had dredges on the waterway to clear any shoaling that occurred.

Donald G. Waldon, council president and administrator of the Tennessee-Tombigbee Waterway Development Authority, said 1988 "has been a banner year for both the Tenn-Tom Waterway and the council.

"The Waterway has proven to be an essential component of the Nation's inland waterway system during this year's severe drought. Its dependability as a viable alternative route between mid-America and the Gulf (of Mexico) has gained national recognition during the past three months."

Record commerce has been recorded this summer—over 2.7 million tons in July, alone, "nearly a 10-fold increase above . . . the same month in 1987. Through July, 5.8 million tons have already transmitted the waterway with an expected 10 million tons by the year's end."

Some portions of the Tenn-Tom corridor are enjoying "phenomenal success" in industrial development, Mr. Waldon said "Over $180 million of new and expanded industries have occurred along the waterway since its completion (in 1985). This amount does not include about $100 million for port development. Already this year over $1.1 billion of new investments have been announced, including a $500 million expansion of the Weyerhauser facility at Columbus, Miss., and proposed $600 million National Aeronautics and Space Administration (NASA) plant on the northern end of the waterway in Tishomingo County, Miss."

(Waterways Journal)

Seaway Cargo Boom

Cargo that has been diverted to the Great Lakes and the St. Lawrence Seaway has officials hoping that some of it will become permanent. Midyear figures show a 7 percent increase over the same period last year.

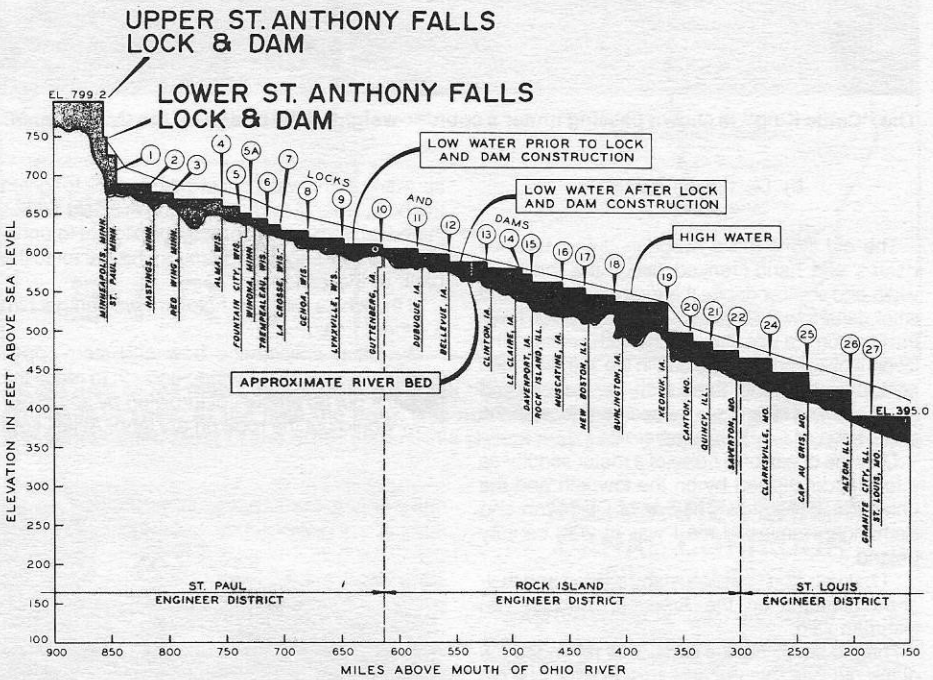
Such a pace would see more than 40 million metric tons passing through the seaway by the time the shipping season closes in mid-December.

James E. Emery, U.S. administrator for the Seaway, said weather forecásters are predicting continued low water levels on the Mississippi River next year and that low water will persist for the next five years unless there is substantial change in weather patterns.

A seaway spokesman in Chicago said already some 300,000 metric tons of grain originally destined for New Orleans has moved via the seaway from downstate Illinois elevators.

(Waterways Journal)

Meseck Travels Mississippi-Ohio



A profile of the Locks on the Upper Mississippi through which Walter Meseck traveled enroute from St. Paul, Minnesota to Cincinnati, Ohio on the "Viking Explorer" this summer.

Just got back from one of my river trips on my old friend the "VIKING EXPLORER". Went from St. Paul, Minnesota to Cincinnati, Ohio, (14 days) to join in on the TALL STACKS celebration to celebrate the 200th Anniversary of the founding of Cincinnati. I enjoyed every mile and as usual I don't think I missed very much.

The celebration was a three-day affair, the big event being the getting together of as many as possible stern wheelers. I think there were 16 so there was plenty of activity as many of them were taking our passengers for a ride up and down the river to see everything. They were making money like bandits. The "VE", drawing 6½ feet, could not dock on the Cincinnati side of the river so we laid at a float just across from all the activity which meant we had a front seat. The "VE" also made hourly trips but as I was a passenger I must have made 15 or 20 trips up and down. At night it was quite a sight. Friday night was "light up" Cincinnati night and I think every light in the city was on.

I was also able to pick up a few items from the *Waterway Journal* that may fit in with your efforts. As you can see my other friend, the TENN-TOM was getting a big play in view of the low water in the lower Mississippi. It may develop a pattern if shippers can see any advantage to using it. The St. Lawrence Seaway profited a bit but the SSHSA people who attended the Fall Meeting at St. Catherines said the traffic was not too heavy, although grain shipments were up a bit.

Don't hold your breath until the new Lock and Dam #26 at Alton, Illinois is dedicated. We went through the old lock on our way down the river and past the new work. They have accomplished something, however. The dam and spillway on

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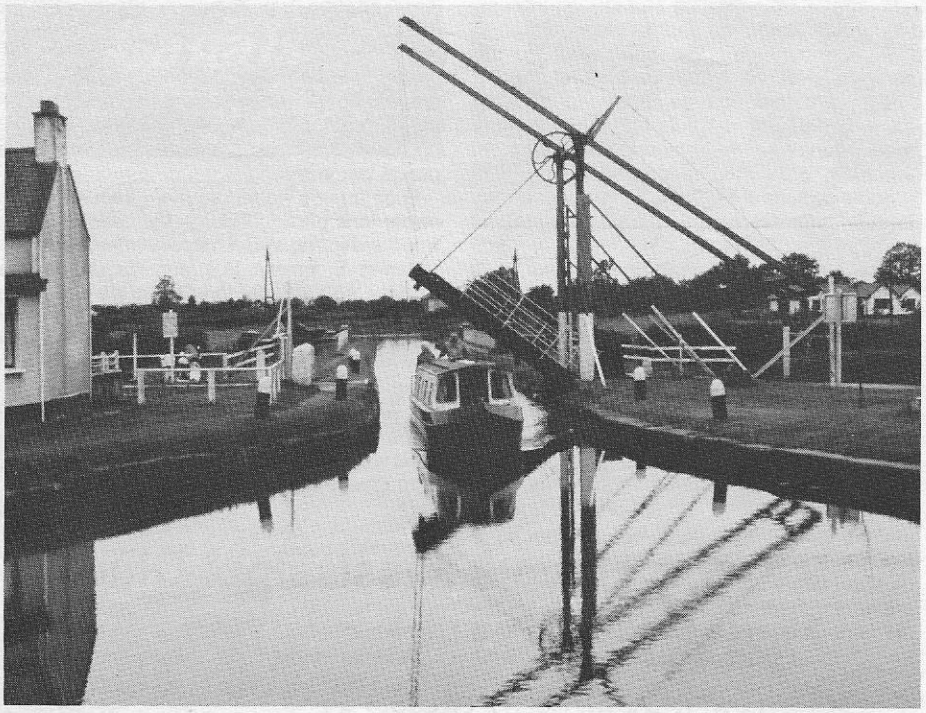
IRELAND'S GRAND CANAL



The "Celtic King" is shown passing under a counter-weighted lift-bridge on the Grand Canal.

By Dr. William Hullfish

The old stone locks, wooden gates, balance beams and hand-cranked racks; the forty foot width and shallow depth; the rural countryside and small canal towns all gave me the impression I was traveling on the Erie Canal in the 19th century. The lovely stone arch bridges, built in the 18th and 19th centuries; the long three-arch aqueducts and hand-cranked lift bridges helped contribute to the impression of travel in another era.

Only the occasional noise of a motor scooter as a locktender zipped by on the towpath and the unfamiliar Gaelic town names of Daingean and Rathangan reminded me I was in 20th century Ireland.

"I bet you don't see too many castles and thatched cottages on the American canals," an Irishman said.

I had to admit that the canal itself reminded me of the old Erie, but the countryside was a bit different. Stopping off at castles, abbeys and stone age forts was another reminder of Ireland.

For almost a week, I pondered the little flat rafts or docks tied to the canal banks. It wasn't until the end of my trip that I watched in amazement as a farmer rode his bicycle along the bank, disembarked, and poled himself to the opposite side on one of the rafts, and disappeared into a field. The scarcity of roads and bridges necessitate these individual ferries at regular intervals. There are also clearly defined spots where the canal separates a farmer from his field and he must swim his herd across the canal.

Run Aground

One day, in a strong wind, we "ran aground on a lump of coal that wasn't marked down in the chart." Using an old trick I saw in some 19th century canal photographs, I pole-vaulted ashore. No amount of pulling, pushing or prying freed us. We were debating a number of possible options, such as, letting all the water out of the bow tank to lighten the boat, when a farmer, working in a field across the canal from us, observed our plight. He unhitched his hay wagon and brought his tractor to the bank of the canal.

"I think he's willing to help us if we can get him a rope," I said.

My father spliced the bow and stern ropes together to make a rope long enough to reach the far bank but no amount of throwing by any of our crew would put the rope on dry land. At last I got up enough nerve to slide into the frigid water and swim the rope across the canal. The farmer, who waited patiently for all of this to transpire, tied the rope to his tractor and in less than a minute we were afloat.

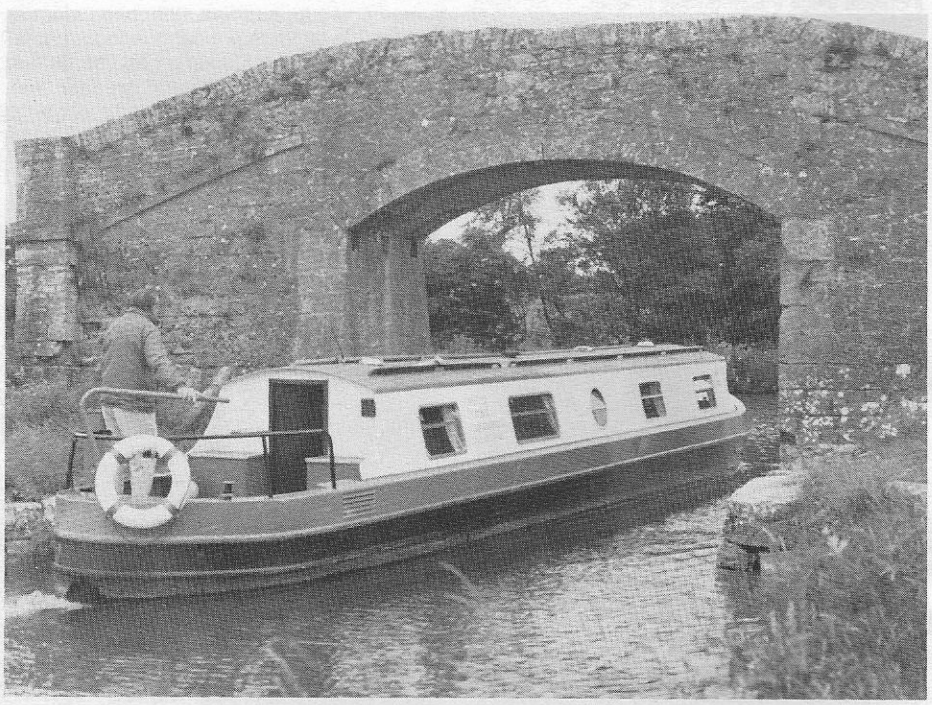
When my wife told this story to a woman in the next town, she didn't think it was anything unusual. "That's exactly what he should have done," she replied. "After all, we're here to help each other, aren't we?"

In A Lock Without A Paddle

Another day, we got ourselves into an empty lock chamber and then found there was no locktender on duty. Backing the boat through the one open lockgate was a real problem. Then I remembered what someone once told me about negotiating locks with a one or two man crew. Often, they would manage by having the bowsman climb the lock gates.

The moss covered gate sill and leaky wooden gates seemed a dangerous and unappealing climb. Backing out of the one open gate was even more unappealing. As we again debated what to do, two men, whitewashing a nearby cottage, climbed down from their ladders. One of the men pushed on the balance beam to close the tail gate behind us and the other cranked open the racks to fill the lock. Then they both went back to whitewashing. In a few minutes, I stepped ashore, pushed open the breast gate and we were on our way.

On another occasion we did much the same thing and three small boys helped us out. Eventually we got into a lock and no help appeared. This time I was forced to step cautiously off the bow onto a mossy gate sill, climb the gate, and squeeze through the small opening between the foot boards and the top of the lock — something I'd prefer not to do very often.



The "Celtic King" passes under a typical bridge across the Grand Canal. Bill Hullfish, Sr. is at the tiller.

No Waiting On The Irish Canals

During our week on Ireland's Grand Canal we didn't meet any other Americans. Most of the canallers were Irish or British, a few French.

"You have beautiful canals in your country, don't you?" I asked one of the Englishman.

"We're here to get away from the traffic," he replied.

"Traffic?"

"It's common on our canals to queue up six or seven boats at a lock. You can wait hours to get through a lock. My wife once went shopping for the afternoon while we waited to lock through.

"In Ireland, you only see two or three other boats the entire week and you never wait in line to lock through."

"Where else but Ireland would they let a boater handcrank a railway bridge?" he asked me.

I laughed because I remembered reading the instruction in the guidebook that said, "Have a member of the crew stand on the tracks to warn approaching trains of the raised bridge."

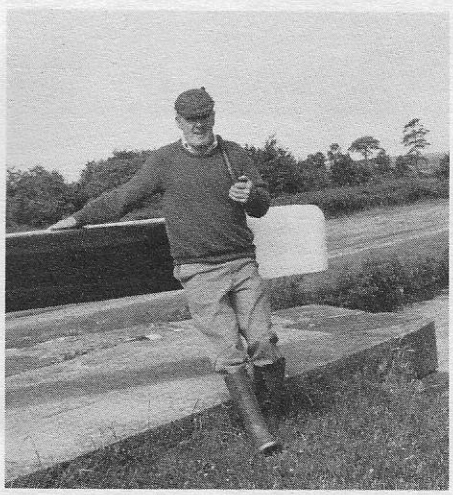
The Canalboats And Waterways

Our boat was a forty-five foot, steel-hulled, English style narrow boat called the "Celtic King". We rented the boat for a week from Celtic Canal Cruisers in Tullamore, County Offaly, Ireland. The five of us, my wife, her mother, and my mother and father, had plenty of room on this boat that was made for eight people. Celtic Canal Cruisers rents eight boats that accommodate from 2 to 9 persons.

The boats are fully equipped with refrigerators, stoves, all kitchen implements, blankets, pillows, and sleeping bags with liners. There is plenty of cabinet, shelf and closet space and even a shower.

Because the canal is too shallow for most other types of boats, and there are no other renters on the Grand Canal, traffic is light. Boaters have the options of traveling the Grand Canal from the Shannon River to the Liffey River in Dublin, the Barrow River, the Shannon River, and a number of small branch canals.

We chose to travel from Tullamore toward Dublin. After reaching Robertstown, we turned back and took the Barrow Line down to Athy. Upon returning to Tullamore, we still had time to explore the canal in the direction of the Shannon for a day. We could have gone even farther as it stays light in Ireland during June and July until 10:45 PM but we preferred to stop often and explore the small towns, castles, and beautiful countryside. We averaged about twenty miles each day.



An Irish locktender, and his pipe, whom we met at one of the locks. Note the heavy "balance beam" against which he is leaning.

Since no one in our party had any boating experience, I worried about being able to handle the boat and operate the locks. I need not have worried. All operations were thoroughly explained. The boat was simple to operate and proved to be no problem, except for sharp turns into a strong wind. We eventually solved this problem by having the bowsman pole the bow around.

The locks are much easier to operate than I anticipated. The first day Michael Thomas, of Celtic Canal Cruisers, and son, Barry, helped us through our first lock. The next day, a Sunday, they drove back out along the towpath and helped us through the second and third locks. After that we were on our own, but even when a locktender wasn't present, we had no trouble. We even managed a set of double locks on our own.

Ireland's Beautiful Midlands

Another added bonus to canalling in Ireland is that the beautiful midlands area is yet to be discovered by tourists. While we leisurely cruised one of the most beautiful areas in Ireland, the typical tourist is driving frantically around the entire coast of Ireland in a week. The canal runs

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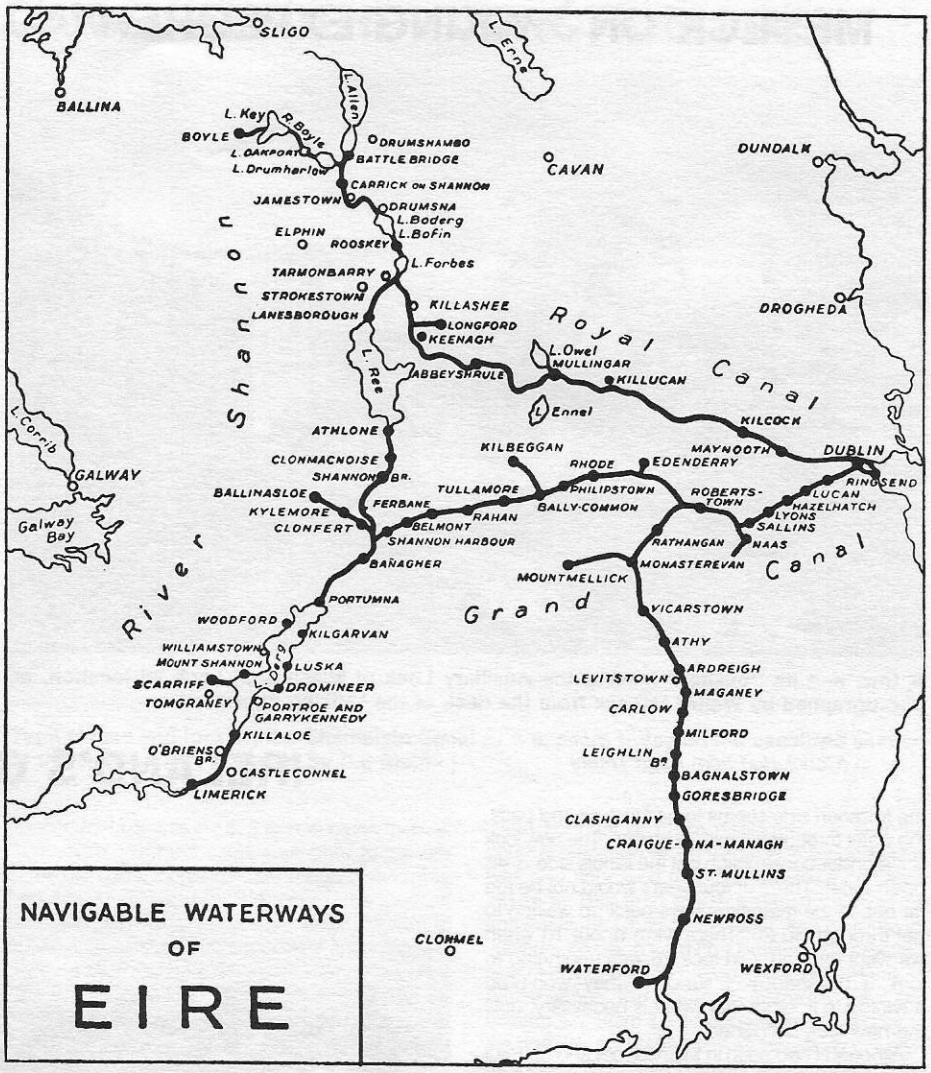


An old map of the Irish Canals, from the book "Green and Silver" by L.T.C. Rolt, published originally in 1949. At the time the book was published the Royal Canal, now defunct, was still operational. Most of the other waterways shown may still be enjoyed by the canal buff.

DELAWARE-LEHIGH CANAL CORRIDOR BILL PASSES

WASHINGTON—It was sponsored by two political enemies, threatened by the president, championed by a cabinet chief, saddled with commemorative coin amendments and kicked around the halls of Congress.

But after eight months of election-year maneuvering, the Delaware-Lehigh National Heritage Corridor finally cleared Congress. It provides for $1.7 million to protect the fragile 106-mile-long waterway.

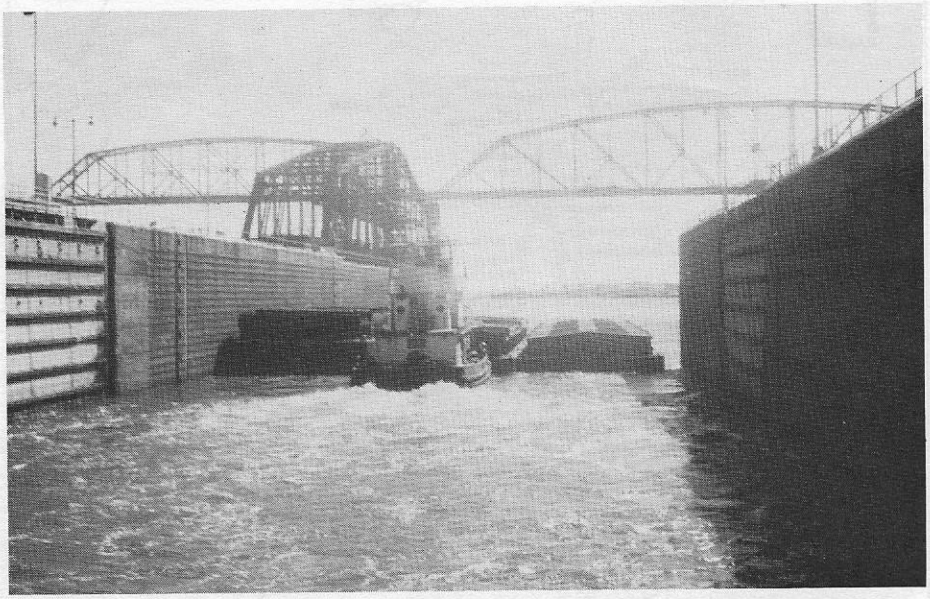
"It's been an odyssey," said U.S. Rep. Peter Kostmayer, D-8th District, who sponsored the bill along with U.S. Rep. Don Ritter, R-15th District. "We're lucky we got it."

The measure will create a 21-member commission to restore and protect the historic canal route. Once vital links between the state's coal mines and its industrialized cities, the canals ran from Jim Thorpe to Bristol, Pennsylvania.

The national heritage corridor, which will receive $350,000 a year from the federal government for the next five years, is expected to lure businesses and tourists to the region.

President Reagan signed the bill into law November 18th, and funding could be available by early next year.

MESECK ON "VIKING EXPLORER"



A tow, and its "pusher" leaving the Auxiliary Lock at Mississippi Lock 26 location, as photographed by Walter Meseck from the deck of the "Viking Explorer".

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the Missouri side seems to be finished and passing water through the middle section. The new lock is still under construction but the Illinois side is still open water. Three or four years would not be too far out. In the meantime tows back up waiting to get through old 26. There were about 10 when we went through. Old lock 26 was beginning to look a bit shabby. I suppose they won't do anything to it, other than what is necessary, until the new lock is finished.

Although I had been in Minneapolis and St. Paul twice before this is the first time I have seen St. Anthony's Falls. We rented a car and drove over. In 1890 it looked more like rapids than a falls but now the two dams have changed its appearance. There is a nice enclosed observation room from which you can see the whole works. The stone arch bridge, originally a railroad bridge, is still intact but used only as walkway across the river. It is a nice piece of stonework and obviously has withstood a few high waters. As you travel along the western rivers and see signs and markings indicating high water marks of various flood years you wonder where the water came from and how the people survived and re-established themselves but they seem to have done it.

There is a possibility the "VIKING EXPLORER" will come back up to St. Paul in the spring if she is not sold in which case it may or will be possible for anyone to come along as a passenger. This is not definite but keep it in mind. It will mean a trip through the TENN-TOM.

Sincerely,
Walter Meseck

SECRETARY'S REPORT

Charlie Derr, our hard-working Secretary-Treasurer, reports that William Lee Frost of New York City has just become the sixty-fourth Life Member of the American Canal Society. With our total membership now approaching 1000, Charlie asks if anyone knows of a second-hand computer which could be donated to help handle the membership-processing load????

ACS-MCA SPRING MEETING AT LOWELL

William E. Gerber, Jr., ACS Vice President, is working with the Middlesex Canal Association to plan a combined ACS-MCA week-end tour and conference at Lowell Massachusetts 26-29, Memorial Holiday week-end.

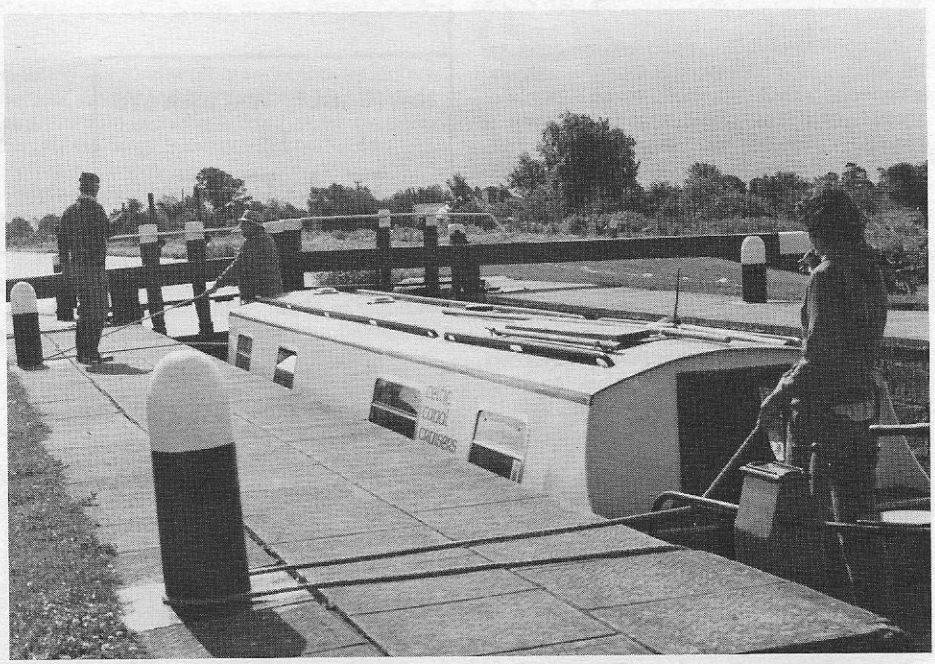
Headquarters will be the new Hilton Hotel on the Lowell Canals. During the three-day week-end there will be guided tours of the canals of Lowell, the Middlesex Canal, the Pawtucket Canal and the Blackstone Canal, with a pass-by of the Cape Cod Canal and the Pilgrim's Canal. Transportation will be by bus on all tours.

Evening lectures will include slides and history of the above canals and the Cumberland and Oxford Canal in Maine. Speakers and Guides who will be assisting in the affair include Ernest Knight, Fred Lawson, Richard Scott and David Barber — all well-known canal historians in the New England area.

Special arrangements have been made with the Hilton at $62 per night, with dinner meetings at the Hotel; lunches included with the bus fare.

Registration materials will be sent out in February, but anyone wishing early information is invited to contact Bill Gerber at 16 Princess Avenue, Chelmsford, Massachusetts 01863.

IRELAND'S GRAND CANAL



"Locking through on the Grand Canal."

(Concluded from Page Five)

through bogs, open fields, dense, tree-lined passageways, a profusion of wildflowers, and interesting rural towns. Wildlife and domestic animals graze along the canal banks. At one point we had to work around a cow and her calves to operate a lock.

The canal grapevine works very well, too. When we returned the boat to Tullamore our grounding incident was already public knowledge.

"We heard that one of the Americans went for a swim," the locktender laughed.

For further information on the Irish Canals, see Best From American Canals, Number I, pp. 68-69.

WHERE TO WRITE FOR INFORMATION

Celtic Canal Cruisers
24th Lock
Tullamore, Co. Offaly
Ireland

They have brochures, price lists and guides to the Grand Canal and Barrow River.

Bord Failte
Baggot Street Bridge
Dublin 2, Ireland

Write for Information Sheet No. 10, "Cruising on Inland Waterways."

THE CHAMPLAIN CANAL AND THE "JUNCTION LOCK"

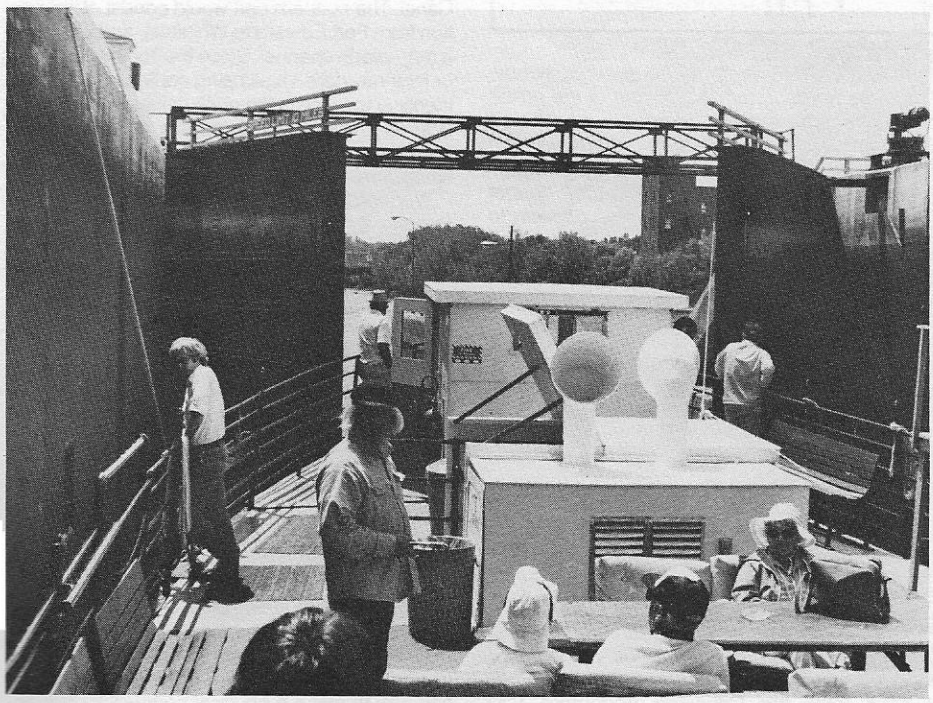
By Bruce J. Russell

Typical dam and lock on the Champlain Canal as it appears today on the canalized section of the Hudson River. (Photo by Bill Shank.)

New York State's "North Country" holds enormous fascination for the canal and inland waterway enthusiast as well as for the general historian, combining the still functioning NY State Barge Canal system with the extant remains of 19th Century towpath canals. The scenery is breathtaking, and the region is rich in history, with numerous reminders of the French and Indian and Revolutionary Wars as well as the early period of industrialization when primitive forges, factories, and mills powered by water wheels began dotting the landscape. In 1988 the 190 miles between Albany and the Canadian border continue to attract thousands of vacationers each summer, with the upper Hudson River, Lake George and Lake Champlain perhaps being the major points. However in the years following the War of 1812 and the establishment of peaceful relations with Canada, the most pressing need was transportation. The North Hudson River valley, bordered on the east by the Taconic Hills and on the west by the Adirondack Mountains, contained rich timber and mineral resources, not to mention acres of prime farmland waiting to be cultivated. The northern counties, in spite of their harsh winters, were beginning to attract settlers in significant numbers, and places such as Fort Edward and Whitehall which had previously served as frontier garrisons and trading posts began acquiring substantial population. The need for cheap as well as dependable transportation links with Albany to the south and the St. Lawrence River Valley to the north became more pressing each year. Primitive wagon roads, often impassable in the rainy season, were inadequate to do the job.

In 1817 the New York State legislature under the leadership of Gov. DeWitt Clinton authorized the building of two artificial canals to meet this need. The canal best known to students of American history was, of course, the Erie, which opened for business in 1825 amidst much fanfare. Conceived and built a few year prior to the era of the railroads, it provided a through water route between Albany and Buffalo, uniting the Hudson River with the Great Lakes. However in order to obtain enough statewide support for financing and building the original Erie, somewhat irreverently called "Clinton's Ditch", promises for similar internal improvements had to be made to the counties of the North Country. Otherwise their votes could not be counted on for the digging of the principle route to Buffalo. Then, as now, politics was the name of the game.

On account of these developments and the political posturing which followed, a second canal was also approved and the requisite funds allotted to it. This man made waterway was to be known as the Champlain Canal, and its route involved a passage from Fort Edward, the practical limit of navigation on the upper Hudson River, to Whitehall on the southern extremity of Lake Champlain. Here it was possible to sail a boat to the northern end of that 50 mile long body of water. In addition Canadian interests were contemplating a canal from the long narrow lake northward to Quebec province and on to Montreal via the St. Lawrence River. The American and Canadian canals would therefore permit passage of vessels from the Hudson River to the St. Lawrence, or from Albany to Montreal.



Interior of the Mechanicville, New York Lock on the present Champlain Canal, as seen from the deck of the Emita II. (Photo by Bill Shank.)

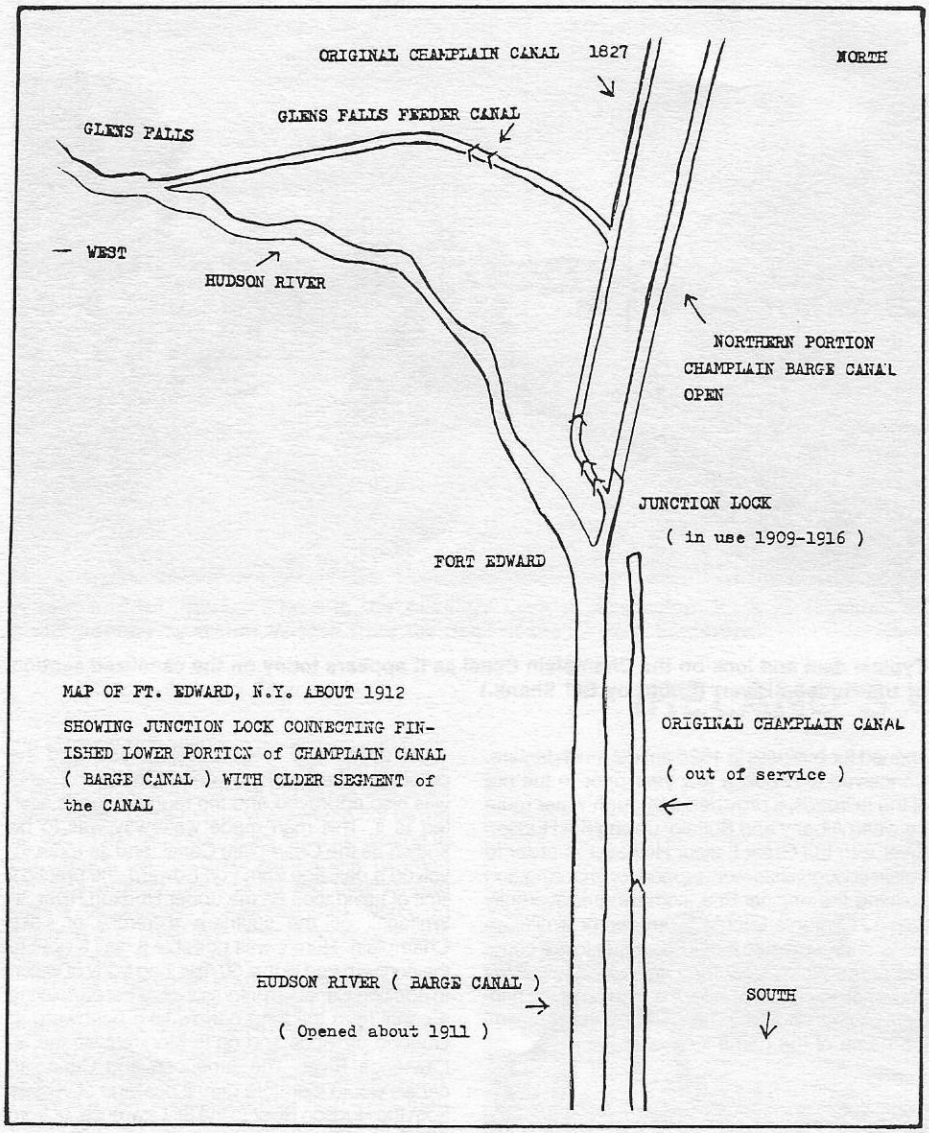
Original Champlain Canal

An initial survey for the Champlain waterway was undertaken by James Geddes in autumn of 1817, and the basic route from Fort Edward to Whitehall was staked out. Worked commenced almost immediately using gangs of immigrant laborers wielding pick axes and shovels, and by 1818 over 12 miles of ditch had been dug with dimensions conforming to New York's other canal - the Erie. By 1819 the entire stretch from Fort Edward to Whitehall, a distance of about 25 miles, was complete. However the original scheme, perhaps to economize on costs, was for boats to utilize the upper Hudson River from Fort Edward as far south as Saratoga Falls. At this point another man made channel would run as far south as Waterford where it would empty into the Erie. The combined canals would then proceed to Albany where cargos might be transferred to large river vessels, or groups of barges could be tied together and towed by steam tug to New York City.

The southern segment was finished in 1822, three years after the northern part. Nevertheless it appeared illogical to many people to have a situation whereby two artificial, man made canals

(Continued on Page Eight)

THE CHAMPLAIN CANAL (Cont.)



(Continued from Page Seven)

were separated by an intermediate section of Hudson River, forcing boats to exit the canal at Fort Edward, travel down the swift flowing river to Saratoga Falls, and then re-enter another canal for the remainder of the journey. Use of the unimproved Hudson for this middle portion created difficulties for the boatmen, and in 1825 it was decided to authorize the digging of a third stretch of artificial waterway so that a continuous canal from Whitehall to Waterford might be formed, with the natural river with its rock filled bottom bypassed entirely. The final section of the Champlain or Northern Canal was finished in 1827. Also in 1829 a short branch or feeder canal was dug from the main channel at Fort Edward to Glens Falls, a distance of about 5 miles. Its purpose was to bring water from another portion of the Hudson River, farther north, into the canal's summit level. Furthermore the Glens Falls feeder was made navigable, since that community constituted a valuable source of traffic.

The dimensions of the original 1827 Champlain Canal were 40 feet wide and 4 feet deep, with stone lock chambers measuring 90 feet by 15 feet. In subsequent years these figures were gradually increased, and by 1877 all locks had been rebuilt to 110 feet in length by 18 feet wide. Additionally a uniform depth was created by removing more material from the bottom of the prism. The enlargement of the Champlain was undertaken for two reasons - one to conform with the Erie Canal, which was simultaneously being improved, and the other to enable bigger, deeper bottomed boats with greater carrying capacity to use it. In 1896 a plan was drafted to expand even further the dimensions of the Champlain and Erie Canals which would have provided for a 7 foot depth and even larger locks. However by this late date in America's Canal Age competitive forces in the form of railroads and surfaced roads were at work, and this final improvement to the New York State inland waterway network was never begun. If water transport was to coexist with the Iron Horse, an all weather form of transportation capable of fast speeds and boats of much greater carrying capacity were needed so that bulk products such as board lumber and coal could be carried in sufficient quantity that a reasonable profit might be generated.

Best Years, 1830-1875

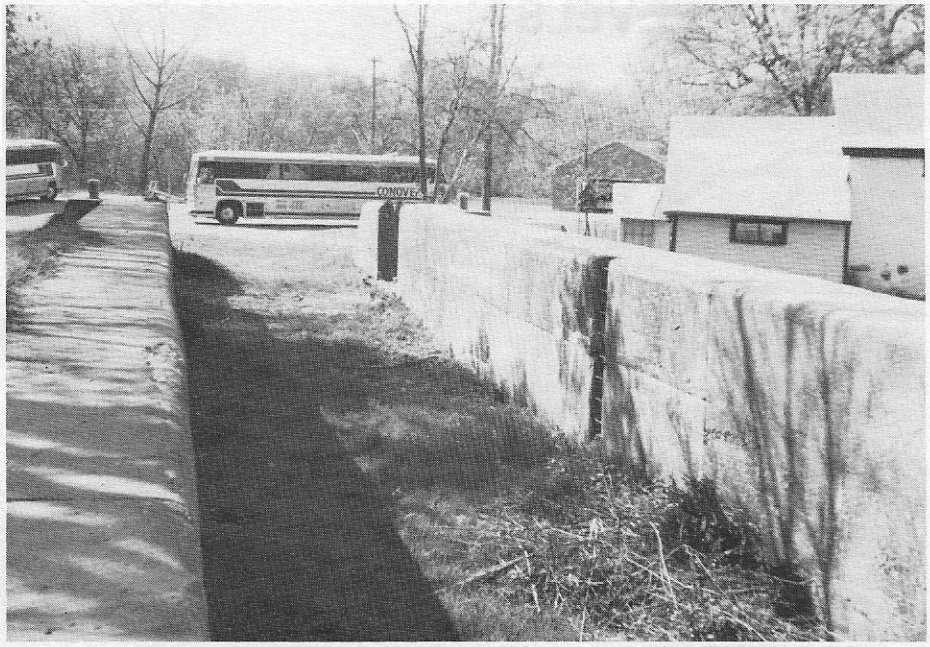
The best years in terms of volume of business and overall profitability for the original Champlain Canal were between 1830 and 1875. Much lumber from the Canadian wilderness was transported via this water route. Its journey often began on the shores of the St. Lawrence River. Subsequently it entered the Chambly Canal which gave access to Lake Champlain, and on to Whitehall. General merchandise including coal was also carried in the mule drawn, wooden boats, providing a lifeline to such North Country communities as Mechanicville, Saratoga, (site of a famous Revolutionary War battle), Fort Edward, Fort Ann, and Glens Falls, not to mention the tiny hamlets situated on the shores of the lake itself. Brutally cold winters meant that the canal had to be shut down from early December to late March, but during the brief summer season traffic along the 56 mile long man made canal was brisk and only began to be eclipsed when nearby railroads such as the Delaware & Hudson came into their own.

Barge Canal System Planned

New York State's decision to upgrade four of its 19th Century towpath canals (the Erie, Oswego, Cayoga-Seneca, and Champlain) into modern 20th Century waterways using a combination of improved rivers and wide, machine excavated channels was made in 1898, and in 1901 surveying commenced. The 1829 Champlain Canal was slated for replacement by a new navigational system involving the upper Hudson River from Waterford to Fort Edward, and a new cut-channel from Fort Edward to Whitehall, complete with electro-mechanically operated locks, large concrete chambers, and wide dimensions sufficient to permit passage of vessels in excess of 250 feet. No provision was made for a towpath; the barges would be self propelled or pulled by steam powered tugboats. The new route of the Champlain Canal would of course parallel the 19th Century waterway from Waterford north to Whitehall and the lake. In 1905 digging began, and the days of the mule-drawn boats in the North Country were numbered.

The work was divided into two principal sections. The southern portion would run from Waterford to Fort Edward and primarily consist of the Hudson River improved for navigation in the same fashion that the Mohawk was upgraded on the Erie Canal. The northern part would consist of the portion from Fort Edward to Whitehall, and would be a man-made channel. Since the southern section or river navigation was being equipped with locks identical to those in the north, it was likewise considered to be a canal. The water flowing through it would be regulated by a series of slack-water navigations.

Work on the two dissimilar sections proceeded steadily. By 1908 it appeared that the lower part, involving the aforementioned improvements to the Hudson River, would be finished long before the upper, which involved the digging of a new 25-mile waterway of wide width. Thus a situation developed in which 50% of the new Champlain Canal was ready for use while the remainder wasn't. Instead the old waterway from Whitehall to Fort Edward with its 19th Century locks had to remain in operation for several more years. In 1909 the southern section (of 1827 vintage) saw most of its traffic diverted into the canalized Hudson River although actual abandonment didn't occur until 1916. Nevertheless in order to maintain through navigation from the Albany/Waterford area to Canada the original "cut" still had to be utilized from Fort Edward to Whitehall at Lake Champlain. Furthermore it would be at least three more years before the northern portion of the new canal came into active usage. Consequently the logical solution was to make a physical connection or junction between the completed new waterway and the existing old canal.



All that remains of the Fort Edward Junction Lock which once connected the completed portion of the Champlain Barge Canal with the older northern segment. Lock was built about 1909 and abandoned approximately 1916 when the Champlain Barge Canal was completed in its entirety. (Bruce Russell photo)

The Junction Lock

Owing to the difference in elevation of several feet between the 19th Century man made Champlain Canal at Fort Edward and the canalized river running parallel to it the connection between the two was designed in the form of a lock. Boats exiting the Hudson would enter it, be raised to the level of the old waterway, and then proceed northward. Of course this would be a temporary situation, to preserve the continuity of inland navigation for a few years in order that work on the northern segment might be completed without interference. Once this was accomplished, the junction lock as well as the remainder of the old Champlain Canal north of Fort Edward could be abandoned and everything routed into the 20th Century barge canal.

In retrospect it might have been simpler to have suspended navigation on the Champlain route until the entire job was finished. However there were at the turn of the century a significant number of commercial customers including lumber mills and coal yards which required service, and if their shipments were interrupted for more than one season they might turn to the competing railroads or perhaps even relocate away from the canal. Hence it was in everyone's best interest to build the junction lock and keep traffic flowing over the whole length of the Champlain Canal.

Construction of this piece of waterway apparatus involved use of hydraulic concrete rather than traditional stone masonry. By 1900 concrete had been perfected and was also being used as the principal material for the 300 foot long locks of the replacement canal. Therefore it was designed as a modern lock except that the actual lock gates would continue to be opened and closed by hand. Also contributing to its uniqueness was the fact that at its south end was a traditional set of wooden miter gates fitted with balance beams, while at its north end existed a steel drop gate equipped with a cranking mechanism using a chain and wheel. A close inspection of the ruins of the chamber revealed recesses in its side walls where the heavy metal gate was raised from the floor by means of the aforementioned crank. Such hybrid lock chambers involving traditional miter gates on one end and a drop gate on the other were also used on other canals such as the Lehigh and the Delaware.

The Junction Lock had a very brief existence - no more than three or four years - since once the new channel came into usage about 1916, all traffic bypassed it. Soon water was drained from the original Champlain and the part through the village of Fort Edward filled in and converted into a road. However the lock itself, perhaps since it was constructed of concrete, was allowed to remain IN SITU, minus its metal drop gate and associated winding mechanism, which were probably removed for use elsewhere. Over the past 70 years it has held up reasonably well, and has been visited on several occasions by various canal societies, the most recent one being in the Spring of 1988.

Members of the Canal Society of New Jersey, under the able direction of Bill Moss, Capt. Bill McKelvey, and Lance Metz organized a two-day weekend tour of the Champlain Canal. One of the highlights was a stop at the Junction Lock at Fort Edward. Unless one uses his or her imagination it is difficult to imagine canal boats passing between its sturdy six foot thick concrete walls, now beginning to crumble. Yet this is precisely what they did for five years. The Junction Lock is perhaps but a minor footnote in the saga of American canaling, but nonetheless an interesting one.

Another view of the Junction Lock at Ford Edward, N.Y. with members of the Canal Society of New Jersey inspecting it. The thick concrete walls haven't seen water for over 70 years, yet they survive as reminders of another era. (Bruce Russell photo)

CANAL WATER LEVELS

I'm interested to see the discussion in "American Canals" about *water level along the levels*. We lived in Spencerport, NY, for 37 years, so we're very knowledgeable about the flow on the Erie. The "long level" from Lockport to the next lock east of Rochester is about 60 miles. I've been in touch with the New York DOT, which considers the elevation established in 1901 by the State Engineers' Survey as still valid. Elevation at the foot of the Lockport locks is 514.9 ft., at the head of that east of Rochester it is 512.6 ft., a drop of 2.5 inches per mile. Historian of Monroe County has reported that in 1880 the current was recorded at 0.52 MPH at Rochester.

"Canal Boatman" by Garrity (Syracuse U. Press 1977) tells us that progress for west-bound boats was "painfully slow because of the current . . . a hard pull for the mules" (p. 90). Water was used for irrigation and for small mills along the canal before electricity became available; there was evaporation and leakage.

Charles M. Knoll
Sonoma, California

SLOPED LEVELS?

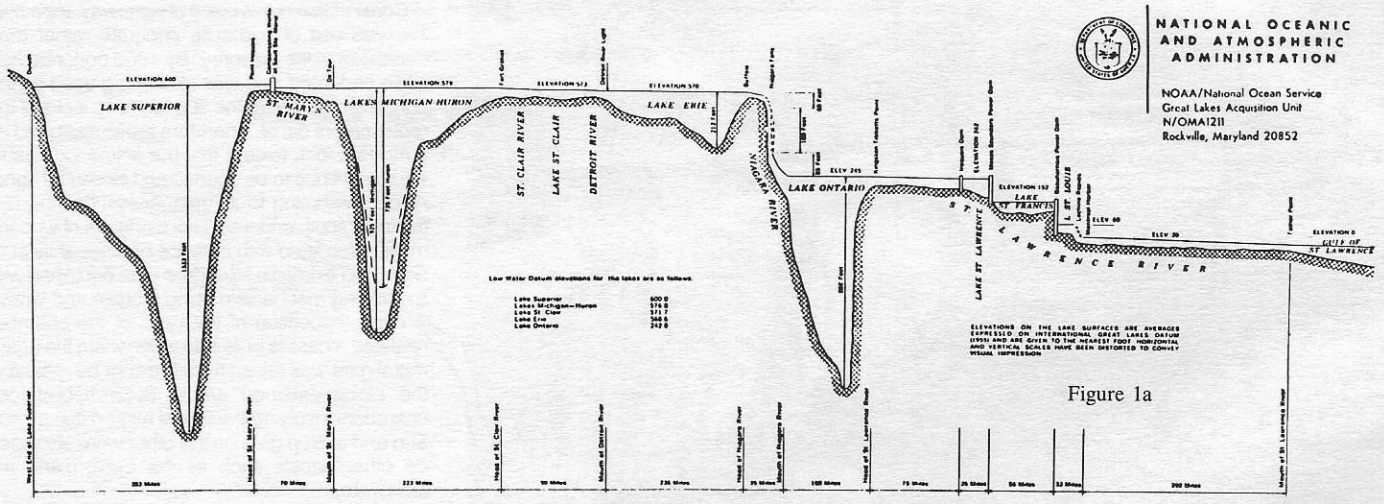


Figure 1a

By George Bartuska

Dear fellow canal enthusiasts. The last three issues of my "American Canals" have featured an article on 'sloped levels,' which I have been following with slight trepidation. As an engineer, I learned early in my career to avoid using such words as impossible, obviously, useless, absolutely, definitely, etc. Most of the information presented thus far pertaining to hydraulic engineering theory is somewhat valid. However, some information has been taken out of context and its interpretation is a bit misleading. In the interest of all of our members, not just the technically curious, I present here some additional information that hopefully 'will not' put this controversy to bed, but rather continue the high spirited debate! These same topics have been known to confuse 1st and 2nd year engineering students just as much as anyone else.

Leveling: Leveling means different things to different people, in and out of engineering. For our purposes, the following definition of leveling from the profession of surveying (Brinker & Wolf, 1977) should be most enlightening.

> Level Surface. A *curved* surface which at every point is perpendicular to the plumb line (the direction in which gravity acts). Level surfaces are approximately *spheroidal* in shape. A body of still water is the best example.

For the purpose of studying canals, it should suffice to remember that we're always dealing with a curved surface. The phenomenon is nicely illustrated (Royer, 1970) when looking at the relationship of two suspension bridge towers. Two such structures that are part of the Verrazano-Narrows Bridge (which stands over the entrance of New York harbor to Staten Island), are 4260 feet apart and 690 feet high, and have been measured to be 1½ inches farther apart at the top than they are at the bottom (but don't forget that it's really a sphere that we live on, and not a round disc, thus a still water surface is really a three dimensional spheroid plane). Another illustration, as shown in figure 1a & 1b, is that of the Great Lakes and the St. lawrence Seaway. A diagram like Fig. 1a appears in many Corps of Army Engineers documents, and also in a document (Shank, 1985) that many of you may have at home. I have redrawn this diagram in Fig. 1b to show a better geometrical representation of the actual physical existence. More on this diagram later.

Impounded Waters: Basically, a barge canal is what we would consider to be impounded water. Or, to put it another way, if you were to walk into my office and ask me to design you a canal, I would ask you if your canal was to be impounded water or a flowing channel. You would probably answer "both," and that's where the problem begins, at least in understanding all that has been written in the newsletters to date.As engineers, we would say "no problem," we will simply prepare a set of calculations that reflect when your canal is impounded water, a set for when your canal is flowing water (upstream control), and a final set for flowing water (downstream control). Lost? Please, stay with me, and you'll see that it's not really as bad as an IRS tax form.

Gravity Flow: Now comes the easy (hard) part of why water flows in an open-channel (not in a full flowing pipe) configuration. From somewhere in school you remember that water seeks its own level. Great! So if you pull your garden hose up a step ladder and start to fill the end of your gutter, opposite the down spout end, you'll see that the water runs (flows) toward the other end, with or without any slope, until it reaches the spout, and begins to drain. If you plug the spout, you'll notice that not only does the water continue to flow, but now it is rising, because it has become impounded. At first it flowed quickly (like a river), then slower as you plugged the spout, and finally it didn't actually appear to be flowing at all, but rather just increasing in depth. Lets look at this a little closer with Figure 2a, b, and c, which are several gutters positioned on the ground (this is my version of the 'Amateur Scientist' for the hydraulic research assistant in all of us).

Hydraulic Gradient: In order for water to flow as a result of gravity, there must be a difference in the initial (high position) of a water molecule relative to another (lower position) water molecule. This difference in elevation is referred to as the hydraulic-gradient, or hydraulic grade, or grade line.

One of the questions we want to try to answer

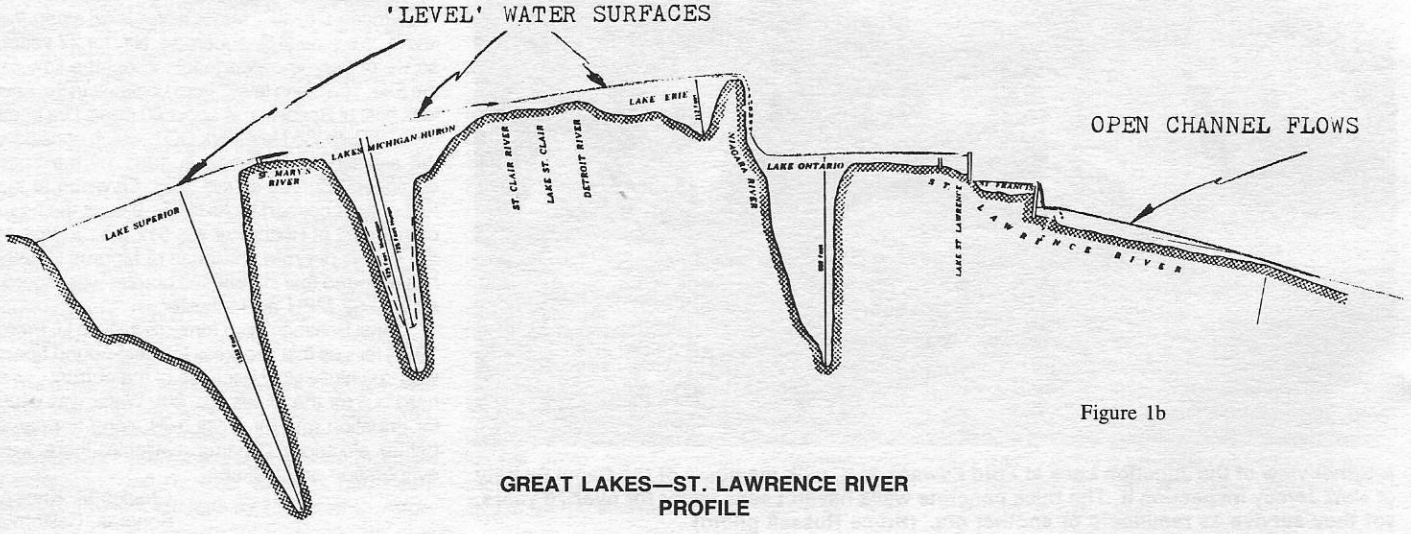
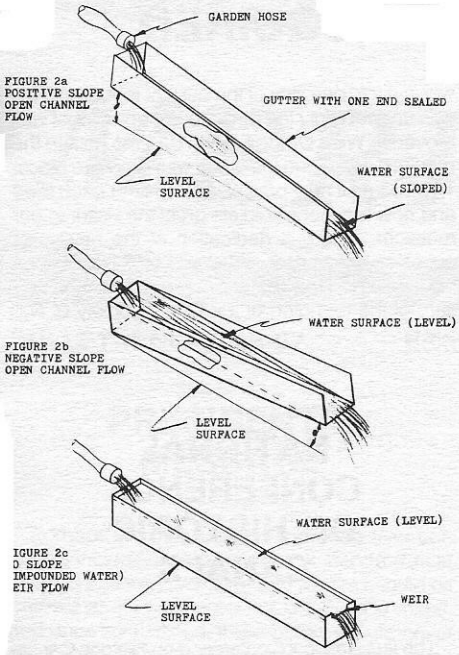


Figure 1b

GREAT LAKES—ST. LAWRENCE RIVER PROFILE



SLOPED LEVELS, A REJOINDER

By William Dzombak

now, is when does the slope of the canal bottom (if any is present) effect the flow of water? In Fig. 2a the bottom of the gutter is clearly sloped away from the source, and in this case (of free flowing water) the canal's bottom slope or grade and the water's slope or hydraulic grade or gradient are about the same. In Fig. 2b, however, the canal's bottom slope is negative (opposite that of the flow) and yet the water still flows, thus a hydraulic gradient exists. And finally, in Fig. 2c, there is no canal bottom slope, and it appears that there is no hydraulic gradient, but there is. If you actually do this experiment, or if there is a weir structure near you to go and observe, you will see that there is actually a decrease in elevation of the water just before it exits the structure.

This curvature of the water surface profile is referred to as a dropdown or drawdown profile curve. Similarly, in Figures 1a and 1b, it is simply the difference in elevation that creates the hydraulic gradient for Great Lakes flows.

Summary: Generally speaking, most of the time we can consider a barge canal as impounded water, and our major concern will be hydrostatic vs. hydrodynamic considerations and calculations. In most barge canals, even when there is some flow of water due to leakage and make up (and don't forget infiltration from ground water), the velocity at the canal bottom is probably low enough not to concern us with nonerodible bottoms and materials, although we will always do some preliminary calculations just to check. And what about level? From now on when you read or hear the word level related to the study of hydraulics, I hope you'll simply think of the earth and her oceans, and one of those great photos from remote sensing or the Space Shuttle looking down on our planet. We live on a sphere, and all liquid bodies of water at rest should have a spheroid surface, and can be compared to each other in terms of concentric spherical surfaces of varying elevation. A perfectly level canal bottom can be thought of as a spheroid surface concentric to the general surface of the earth (ignoring all of the imperfections of our earth such as the fact the earth isn't a perfect sphere, etc.). Finally, if we treat a canal as an impounded water, the canal bottom slope (if any exists) will rarely if ever have any bearing on whether there is flow in the canal, unless a lock gate fails and all of a sudden we have unrestricted open channel flow!

Hopefully, you've noticed that I've managed not to introduce any formulas or equations during my discussion. There are plenty of number-crunching determinations and proofs we can pursue at a later date should the members be so inclined. Since this isn't a technical society newsletter, I have tried to avoid numbers that might confuse more than help. However, should we move in that direction for a future article, you will probably be surprised to see less of the Manning or Bernoulli open channel math, and more of the orifice flow, weir flow, and hydrostatics computations. With over 700 volumes in our engineering library, I will be glad to recommend further reading to anyone who has the desire, persistance, determination, and time to master hydraulics.

George Bartuska
1875 Walker Ave.
Winter Park, Florida 32789

Works Cited

Brinker, R.C., and Wolf, P.R., *Elementary Surveying,* New York: Harper and Row, 1977, p. 97.

Shank, W.H. *Towpaths to Tugboats: A History of American Canal Engineering,* York, Pa., The American Canal and Transportation Center, 1985.

Royer, K., *Applied Field Surveying,* New York: John Wiley and Sons, 1970.

In my previous article (AC No. 65, p. 12) I tried to show that canal bottoms (probably) were not sloped one inch per mile because that feat would be impossible to achieve and because a bottom slope would not cause water to flow through a canal (one that is not open-ended, because closed by locks). I did not say, as Mr. Meek and Mr. Zellin assume (AC No. 66, p. 6, p. 7) that there was not a flow of water "down" a canal. Quite the contrary. In the last paragraph of my article, I pointed to four factors that "governed the flow of water in a canal": leakage, weir setting, evaporation, and operation of locks.

There was a current in every canal. There had to be, to deliver water for refilling (operating) locks and to replace water lost by leakage and evaporation; waste weirs dumped the excess flow. A waste weir was located immediately "down" the canal from every lock (or group of closely spaced locks), to maintain a fixed depth of water on the levels between locks (the towpath could not be allowed to become awash or, worse yet, overtopped). Overflow at a waste weir terminated any surface waves, however slight, that were sent down the canal every time a lock was emptied. That fact alone should suffice to tell us that we need not waste time talking about how a sloped water surface did, or did not, cause a current to flow through a canal. Another device used to maintain a fixed depth of water in the levels between locks was the by-pass or flume that allowed water to flow around a closed lock and so to be delivered further down the canal, where the water was perhaps needed to fill a lock that had just been opened and also to maintain overflow at weirs, thus to maintain fixed depth in the canal.

That canal current impeded the movement of boats being towed "upcanal", against that current; for that reason, a boat headed up the canal, against the current, was granted the right of way when it met a boat going in the opposite direction. The up-bound boat was allowed to maintain its "headway" (momentum), but the down-bound boat was expected to drop its tow line and so lose momentum, a sacrifice it could better aford to make, for it was being swept along on the water current moving down the canal. The velocity of the current varied with depth, being greatest at the surface and in the center of the stream (assuming the flow to be laminar, not turbulent), and was determined by the volume of water injected into the canal from the feeder (reservoir, river) to compensate for water consumed by lock operations and by losses caused by leakage and evaporation. Early keelboats and feeble steamboats moved upstream by hugging the river bank, where the current was not as strong as in the middle of the river.

How strong were canal currents? The minimum flow rate of water in a canal was the flow required to replace water lost even when locks were not in operation; let's assume that each mile of canal lost water, by leakage and evaporation, at the rate of 100 cubic feet/minute (100 cfm). Each mile of canal removes water, from the flow going by, at the rate of 100 cfm, which means that the canal current (flow rate) was not the same everywhere along the canal but was strongest at places close to the feeder and was most feeble at points distant from the source of the injected water — the courtesy of dropping tow lines became more appreciated as boats approached closer to the feeder.

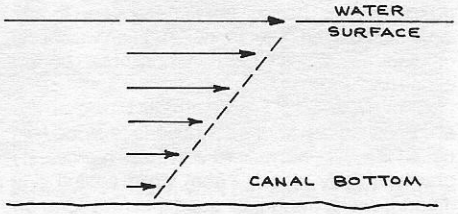


FIG. 1 VELOCITY DECREASES WITH DEPTH

To illustrate the point we have been considering, we may calculate the flow rate (canal current) at several points along the 22-mile level cited by Mr. Meek — that is, between Delphi and Lafayette in Indiana. At the Delphi end of that level, water was introduced at the rate of 2200 cfm. The injected feed water did not slide infinitely slowly down an imperceptible slope on the surface of the water in the canal (which some people believe sloped one inch per mile) but flowed as an "underwater" current, the velocity of which decreases with depth, as shown in Fig. 1, where the velocity gradient (broken line) is assumed to be linear, to simplify our calculation. For low-velocity currents, the flow may be assumed to be laminar, as shown, and not turbulent (no eddies). Given those assumptions, we can calculate the resulting canal current as follows:

2200 cfm	=	minimum flow rate of injected water (at Delphi)
40 ft	=	width of canal (assume rectangular cross-section)
2 ft	=	average (mean) depth of water in canal 4 ft deep
V	=	average velocity of water moving in canal (ft/min)
2200 cfm	=	40 ft x 2 ft x V V = 28 ft/min = 0.32 mile/hr

At a point 11 miles down canal from Delphi, V = 0.16 mile/hr because, by the time that point was reached, half of the water would have been removed from the canal current by leakage and evaporation.

(Concluded on Page Twelve)

SLOPED LEVELS

(Concluded from Page Eleven)

Let's now calculate the maximum possible water velocity encountered by a boat moving upcanal, from Lafayette toward Delphi, given

6600 cfm = inflow at Delphi, that figure being
2200 cfm = inflow to replace losses, plus
4400 cfm = inflow to deliver to Lafayette.

It is easy to see that 0.96 mile/hr is the maximum flow, at Delphi; at Lafayette, the canal current would be 0.64 mile/hr. The closer a boat came to Delphi, the stronger the "head wind" it had to overcome. At both Delphi and Lafayette, the current was sufficiently strong to be noticeable but still less than the 4 mile/hr speed limit imposed on boats to protect the banks of canals from erosion by bow wake. Pity the horses pulling a packet boat upcanal into Delphi, straining against a countercurrent of one mile per hour while being urged to maintain a six mile per hour packet boat speed. We need to put to rest the notion of water sliding down an imperceptible slope on the surface of water in a canal. That mechanism could not possibly convey 4400 cfm down the canal.

6600 cfm departs Delphi at 0.96 mile/hr (84 ft/min) To pass that volume of water in one minute of flow, the pile of water could be spread out as a sheet or slab of water, floating along in the manner of a barge, with these dimensions: 40 ft. wide x 84 ft. long x 1.9 ft. deep = 6600 cubic feet. That never happened. Canals were 4 ft. deep, with a freeboard of only 1-2 feet. There was never a wave on the surface, nor did the surface slope to any significant degree. After all, how fast can water flow on a surface that is essentially horizontal (sloped only 1 inch/mile)?

An explanation of canal currents based on the assumed existence of a slight surface slope fails because it does not accord with these realities: (1) gravity quickly "levels" (that word again!) any mound, wave, trough, or slope that may form on the surface of water; (2) waste weirs and leaks immediately level any slight wave that may be moving down a canal, furthermore, leaks can even create a depression in the water level so that a negative wave (a trough) is sent up and down the canal from the point of the leak (or breach) in the canal, and a negative wave cancels a positive wave; (3) the flow of water is not confined to sliding along on the essentially horizontal surface of a stream. It is difficult to wade in a river or creek because there is an "underwater" current that sweeps one off one's feet, not a current that is confined to the surface of the stream. Canal currents flowed below the surface of water that was four feet deep everywhere.

So what does cause water to flow through a canal, as an "underwater current", if it is not a slope on the bottom or a slope on the surface of the water? The answer is simple horizontal displacement of water.

We regret that the extreme length of Bill Dzombak's manuscript prevents it from being published here in full. Anyone wishing the full text may contact the ACS Editorial Office.

FROM THE EDITOR

With the additional articles in this issue on the subject of "sloped canal levels", we hope to have laid this matter to rest for all time! We plan to publish nothing further about it in future issues. Any of our readers who are still confused are invited to write Terry Woods, ACS Engineering Design Committee Chairman, who started the whole discussion in the first place!

SNUBBING POST ACQUIRED

Delaware and Hudson Canal Snubbing Post being installed at Waterloo Village, New Jersey, close to the French Snubbing Post, previously acquired by Bill McKelvey. (McKelvey photo.)

In spring of 1988 Capt. Bill McKelvey had the good fortune to meet former NJ Assemblyman, Loree Collins, grandson of Leonor Fresnel Loree, the eighth president (1907-1938) of the Delaware & Hudson Railroad which was the successor to the Delaware & Hudson Canal (1828-1898). Mr. Collins alerted McKelvey to the existence of a D & H Canal snubbing post in a most unlikely location, West Orange, NJ.

L.F. Loree's office was in New York City and c.1916 he built "Bowood", a country estate with a large mansion on the southeast corner of Prospect and Mt. Pleasant Avenues, atop First Mountain, in West Orange. The carved granite post with deep rope burns was brought from the D & H Canal to decorate the triangle at the main entrance of the drive to Loree's home. L.F. Loree died in 1940 and "Bowood" was sold by his family a year later to Carteret School, a private institution, which occupied the mansion for many years.

Mr. Saul Werner of New Vernon, NJ, the current owner of the property, was contacted by Capt. McKelvey and permission was graciously granted to move the snubbing post to the Canal Society museum at Waterloo Village. Member Allen Nelson assisted McKelvey in digging a hole for the new snubbing post to a depth of three feet opposite the French (Canal du Midi) snubbing post which Bill had acquired for the society seven years prior. An exploratory "dig" was made by McKelvey at West Orange to determine foundation conditions and depth of the post. This excavation reached three feet without finding the bottom of the stone.

Heavy equipment would be needed to excavate, lift and transport the stone to Waterloo and to dig the hole there deeper for the new post. An offer of free help came from friend John C. Nolan, a contractor and owner of Stone Row Nursery, Stockton, NJ. Friday, August 26, 1988 was set as the day for the move. Nolan loaded his backhoe/front end loader on his trailer, towed by his dump truck. Nolan and McKelvey then proceeded to West Orange. In short order John had the snubbing post excavated, lifted clear, and the hole filled in. The approximately 14" x 14" square base of the stone extended five feet below grade. Length overall was 7½ feet with the topmost 30" being a smooth, round cylinder 12 ¾" in diameter.

With the post and the backhoe loaded on the trailer, John and Bill proceeded to Waterloo. Upon arrival it was discovered that the date "DEC 1923" was cut into one side of the base of the stone. This was undoubtedly the date the snubbing post was moved to West Orange. John dug the hole to the required depth and the stone was lifted into place. The beautiful new post was in no time back filled and now two stone soldiers greet the visitor to our museum. A formal dedication of the newly acquired snubbing post will be held on Sunday, June 4th, 1989, on the occasion of the 20th anniversary of the founding of the Canal Society of NJ.

NATIONAL CONFERENCE ON HISTORIC CANALS

The first National Conference on Historic Canals was a great success. Held in Morris, Illinois, and sponsored by the Illinois and Michigan Canal State Trail, State of Illinois Department of Conservation, the conference was held September 12-15, 1988. The I&M State Trail is a cooperative arrangement between the National Park Service and the State of Illinois, to preserve the historic canal corridor from Chicago to Peru, Illinois. This is a distance of almost 102 miles.

The conference began with a series of evening presentations starting with the executive director of the area's visitors bureau; then an entertaining presentation from Piqua, Ohio; a very well-done slide presentation on the Cape Cod Canal; and ending with my presentation on the stabilization of the Patowmack Canal. My slide presentation was mostly a technical, after action report on the first phase of the stabilization of locks 1 and 2. It was the most technical presentation of the conference and received a lot of interest. The audience was interested in the concept of preserving the wall intact. The president of Frauenhoffer & Associates, a structural engineering firm from Champaign, Illinois, was interested in the concept and presentation. He is currently doing work along the C&M Canal and is designing a project that he calls a "shroud", made of adhesive concrete that will attach itself to the back of a lock wall. This adds support and aids in sealing it from destructive hydraulic action.

Dick Stanton, Superintendent of the C&O Canal, was the keynote speaker and gave an inspiring presentation. It included a very moving and informative narrative on a recent discovery of some early photographs of the C&O Canal. If you have not seen this fine presentation, you are missing a wonderful experience.

Day 2 and 3 were packed with interesting presentations and a delightful field trip. It was nice to be among people who love canals and they talked into the night about their own special experiences and tall canal stories.

The conference attendees in the wrap-up were united in their desire to meet again next year. The sixty people represented most of the canals east of the Mississippi. I hope we will be able to report a lot of progress on our work at the Patowmack Canal at their next meeting.

John C. Howland
Historian
George Washington Memorial Parkway

(From "The Tiller," newsletter of the Virginia Canals & Navigations Society)