AMERICAN CANALS

BULLETIN OF
THE AMERICAN CANAL SOCIETY

BULLETIN NUMBER 65 Editorial Address—809 Rathton Road, York, Pa. 17403 **MAY 1988**

PRESIDENT'S MESSAGE

The National Trust for Historic Preservation has just distributed their "Summary of Results of the Maritime Heritage Survey" carried out in 1984, and their report discussing the needs of maritime preservation, "Maritime America: A Legacy at Risk." I was pleased to see that so many of the respondents — 18 of them — were canal societies, and that there's no doubt that canals, locks, and canal boats are "maritime resources." We canallers need to support the National Trust in their effort to make sure that the country's historic maritime resources are properly inventoried, researched, preserved and appreciated. Also, as the Keokuk Museum Commission noted in the survey, "We need to make the public aware that there is an inland river heritage every bit as important as the sea." That goes for canals, too!

Another quote was from the Canal Society of New Jersey, which wanted to see more canal-related projects. "Canals have been neglected and the time to change this has come. Canals, the waterways, the buildings and especially the boats must be protected. There is not one of our original boats preserved anywhere intact; our canal, the Lehigh Coal and Navigation Company's, was one of the longest in operation: 102 years. I think it's about time we preserved at least one wooden hull canal boat type from America's towpath canal era."

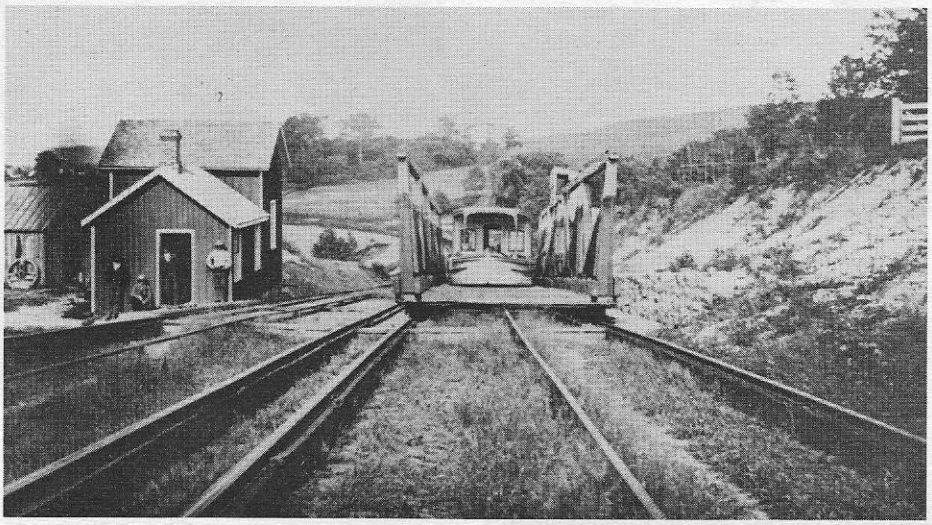
Author of the report is Marcia Myers, Vice-President for Maritime Preservation, National Trust for Historic Preservation, 1785 Massachusetts Avenue, N.W., Washington, D.C. 20036. She also has available a 14-minute slide show narrated by staunch supporter Walter Cronkite. Don't forget, we also have our own ACS Canal Boat Committee Chairman, V-P Bill McKelvey, who would like to keep up with your latest canalboat projects, prospects, and problems.

Those of you who have the 1988 edition of QUIMBY'S BOATING GUIDE (319 N. 4th St., 666 Security Bldg., St. Louis, Missouri 63102) will see a new section, on the Muskingum River Navigation, thanks to David Ross's ACS Navigable Canals Committee. He hopes next time to include the Kentucky River Navigation, another canalized river which so far has been kept alive by river buffs. We need your help on these and other canals and navigations which are, or should be, navigable.

I was pleased to meet members Bill Dzombak and Barnett Golding far from their home states, at the Virginia Canals & Navigations Society annual meeting. Don't forget, if you get down to Richmond, let me know so we can talk shop and show you the canal sights!

Bill Trout

MORRIS CANAL PLANE TO BE REBUILT



What made New Jersey's 102 mile long Morris Canal unique were its 23 inclined planes, such as this one located at Port Colden. Boats were floated into a railway carriage and pulled up a steep hill by wire ropes. A similar plane at Waterloo, N.J. is now slated for restoration. (Photo from the book THE MORRIS CANAL by James Lee)

By Bruce J. Russell

Sooner or later it had to happen. Considering the increased interest in New Jersey's CANAL ERA it was only a matter of time before proposals would be made to restore to working order one of the unique Morris Canal Inclined Planes. The Plane selected for restoration is Plane Number Four west, located just east of Waterloo Village, near Stanhope, New Jersey.

Waterloo Village was established in the 1960's in Sussex County. Designed to be a living museum of 18th and 19th Century Life in New Jersey, it was an immediate success, attracting thousands of visitors on weekends, not to mention special school trips. The remains of the Morris Canal pass directly through Waterloo, and at this location there was an inclined plane. While the tracks are long since gone, the profile of the incline is clearly visible as well as the ruins of part of a turbine chamber.

The full scale rebuilding of Plane 4 West will not be as difficult as some might imagine. According to Percival Leach, founder of Waterloo Village and one of its officials, blueprints, plans, and photographs are in existence which will guide the restorers at every stage of their work, expected to take about 3 years. Leach made the announcement concerning the rebuilding in April of this year, and already he has begun to assemble a team of consultants who are experts at projects of this type. According to Leach, "Plane 4 West will be fully restored to operating order, using long buried machinery parts as models, and archival blueprints and photographs to replicate a link in the transportation system that was once a wonder of the nation. We envision a completely functioning lock and plane system. It will be equipped with a traditional canal boat towed by mules. The plane will carry boat passengers up and over the crest of the hill, just as in the past it hauled boat captains, their families, and commercial cargoes heading for eastern markets." His remarks were followed by those of James Lee, the state's foremost Morris Canal historian and author of several books on the waterway. According to Lee, "Waterloo Village is an ideal place for a restoration of this kind. It is the only canal village left in New Jersey. It has the water and the plane inclination is fully intact. The rail tracks and sleepers are present in several spots. It's fully restorable. What makes it so suitable is that the old general store is still on the lock with its cargo hoist intact." Lee also explained that the Morris Canal was the only canal in the world that had hydraulic inclined planes to raise and lower boats over the hilly terrain that lay in its meandering path. Although as built it utilized waterwheels, turbines were considered a technological improvement and were thus installed about 1855. No other canals anywhere in the world used this exact mechanism.

In recent weeks workmen at Waterloo have cleared away trees and brush from the trough of the plane which can be seen rising from the

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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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MAINLINE CANAL "CLEAN-UP"

Part of the Conoy Township volunteer working group which turned out for the April 2nd "canal clean-up" party, shown enjoying a picnic lunch in the Falmouth social hall after a morning of hard work. Canal Committee includes Ken Brandt, Marge Smith, Tom Campbell, Ron Gainer, and Margaret Reynolds.

A group of dedicated residents of Conoy Township, Lancaster County, (Pa.) are hard at work restoring a section of the old Eastern Division Mainline Canal as a hiking-biking trail. The lead group is known as the "Canal Committee" of the Conoy Township Park and Recreation Commission. Cooperating in this volunteer project are the Bainbridge Fire Company, the Falmouth Civic Association, the Falmouth United Methodist Church, the Conoy Lunkers, the Conoy Lions Club, and the Bainbridge Jaycees, Boy Scouts and Girl Scouts. They have the active support of State Congressman Kenneth E. Brandt, and the advice and consultation of William H. Shank, ACS Newsletter Editor.

The several-mile long section of canal was recently deeded to Conoy Township by the Amtrak Company, successor to the Pennsylvania Railroad Company, operators of the canal in its hey-day. Included in the transfer are two canal locks, two aqueducts and a well preserved canal prism and towpath.

On April 2, 1988, the Conoy Canal Committee invited the general public in the area to a "get acquainted party" to start work on the canal clean-up at Collins Lock in the Village of Falmouth. A large group came out for the occasion, including Bill Shank, from York, Pa. and Bill Gerber, ACS Vice President, Chelmsford, Massachusetts.

The volunteer group at work cutting the brush and trees around Collins Lock at Falmouth, Pa., just below Three-Mile Island.

CANAL PLANE TO BE RE-BUILT

(Concluded from Page One)

bank of Waterloo Lake opposite the village to the crest of the 80 foot high hill. Tom Rick, who has the engineering contract to do the detailed engineering study necessary to restore the plane plus one lock chamber, said work is expected to begin this summer. He anticipated that major construction would take about two years. Rick is president of Manitou Machine Works Inc. of Cold Spring, New York, a small firm specializing in classic millwork and water turbine machinery for hydro-electric plants. He states, "It's going to take a lot of engineering to bring Plane 4 West to the condition it was in at the time the Morris Canal was abandoned in 1924. Our hope is to restore the lower level canal for a quarter of a mile, the lock at the bottom of the stilling basin, and one half of a mile of the upper canal. He further explained that a canal boat arriving at Waterloo Village and heading east would be maneuvered from the lock to the stilling basin where it would be floated aboard a half-submerged, heavy oak, cradle car with wheels on iron rails. The car would be winched by wire cable to the top of the plane and lowered into the upper canal to continue on its journey. In order to bring all of this back to life, such things as a cable drum plus the actual turbine would be required. Rick explained that the turbine used at Plane 4 West may still be buried at the bottom of the pit under tons of debris thrown in for safety reasons when the Morris Canal was closed in 1924. He states, "By now its probably useless, except as a relic. But even if the machinery is lost, we have photos and drawings. The NJ State archive on the Morris Canal in Trenton is quite complete." In the event an existing water turbine is required to be used as a model to fabricate a new one, there are two in existence. One is at Jim Lee's partially restored plane, and the other is on permanent display on the shore of Lake Hopatcong in a small park.

Fabrication of a new turbine as well as rails, a set of wire ropes, and other pieces of machinery to make Plane 4 West operational again should not be an insurmountable problem. Likewise the building of a canal boat and a railway carriage could be done without any great difficulty since photos and plans of both exist.

NEW CANAL BOOKS

FOX-WISCONSIN "PORTAGE" 1673-1987 — By Frederica Kleist. This 52-page booklet traces the history of the "Portage" in Wisconsin from the time of Father Marquette, priest and explorer in 1673, to the present time. Included are the history of the Fox River Navigation and the Portage Canal, as well as recent restoration work, also the new "Ice Age Trail". Well illustrated. Price $11.95, plus 60¢ tax plus 90¢ mailing/cost, from the author: Frederica Kleist, 528 West Cook Street, Portage, Wisconsin 53901.

MOHAWK RIVER BOATS AND NAVIGATION BEFORE 1820 — By Robert E. Hager. A 98-page, well researched and well-written account of Bateaux and Durham Boats which traveled the Mohawk River in upper New York State before the Erie Canal was built. There are a number of drawings showing full details of these early boats, their size and construction. Also a description and map of the first canals built to make the Mohawk navigable. Price $7.95 plus $1.00 postage. Write: Canal Society of New York State (attention of J. Hulchanski) P.O. Box 1156, Latham, NY 12110.

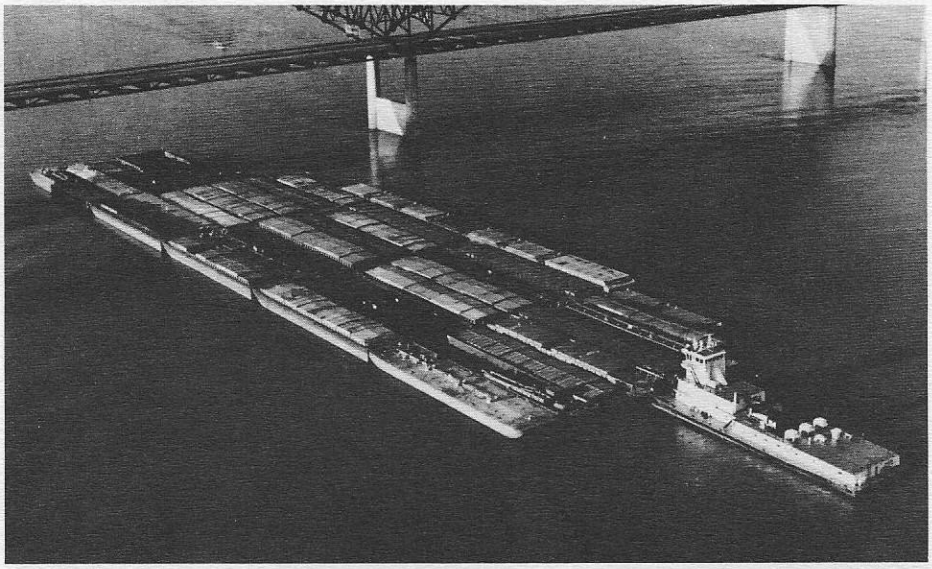
THE WELLAND CANALS — The Growth of Mr. Merritt's Ditch — By Roberta M. Styran and Robert R. Taylor, with John N. Jackson. This beautiful "picture book", tracing the history of the four Welland Canals is one which anyone with any interest in the Welland, past or present, will want! The text includes a well-written history and 233 excellent photos, maps and sketches. A handsome 8-½" x 11" book of 169 pages. Price $19.95, mailing cost included. Write the publisher: The Boston Mills Press, 132 Main Street, Erin, Ontario NOB 1TO, Canada.

MOSTLY CANALLERS — By Walter D. Edmonds. This collection of 24 short stories, originally published in 1934, represents some of the best of Edmonds fictional works from the days of the old Erie Canal. At the time, "Atlantic Monthly" wrote "Upstate New York has provided Edmonds with an inexhaustible store of characters one would like to know." A number of the stories are award-winners. "New York Times" states "The stories, all of them, are readable, and together with the novels are brilliant as well as thorough in their historical recreativeness". Republished by Syracuse University Press, 1600 Jamesville Avenue, Syracuse, New York, 13244 this 467-page paperback sells for just $12.95

THE AGED PILOT MAN — By Mark Twain. "One of the ablest poems of the age". This epic poem is probably based on the "Raging Canal", an old Erie Canal ballad. Republished in six-page booklet form (with original illustrations) by the Virginia Canals and Navigations Society, care of Richard A. Davis, VC&NS Sales, Rt. 2, Box 254, Lexington, Virginia 24450. A donation of $1.00 is suggested.

THE JAMES RIVER BATTEAU FESTIVAL TRAIL — By W.E. Trout III. This 8-½" x 14", 32-page booklet contains a series of topographic maps of the James River between Lynchburg and Richmond, published by the Virginia Canals and Navigations Society as a guide to boatmen (particularly batteau operators). Many interesting notes are printed directly on the maps. Write Richard A. Davis, VC&NS Sales, Rt. 2, Box 254, Lexington, Virginia 24450. A donation of $4.00 is suggested.

MOVING FREIGHT ON THE MISSISSIPPI



A "Towboat" on the Mississippi, pushing a fleet of freight barges. On the lower Mississippi, "tows" like this are common. On the upper Mississippi the number and size of the "barge tow" is limited by the length and width of the locks.

(The following item was published in a recent issue of the Lancaster (Pa.) Sunday News, author unknown. For additional info' on the Mississippi, see AC #62.)

The Mississippi River begins as a small stream in northwestern Minnesota and 2,552 miles later surges into the Gulf of Mexico. The mighty river is the nation's chief inland superwaterway, with more than 300 million tons of freight moving on it annually.

The barges slice steadily through the churning waves of the Mississippi River. Well protected within double-shelled hulls are 12,000 tons of cargo, on a typical "tow".

The shipment is one of hundreds a leading chemical company transports on the Mississippi each year. The country's largest chemical company and the nation's second longest river have had an ongong relationship for more than 25 years. An estimated one million tons of this company's freight move on the waterway annually.

The Mississippi is perfect for shipping.

From St. Louis down to New Orleans the river is like a superhighway for industry. It's a long, wide, fast, smooth ride.

Barges are industry's carriers on this highway. But unlike the barnacle-covered bows of a by-gone era, these vessels are highly complex. Some are 346 feet long and have a capacity of 3,700 tons. Many come equipped with engines and pumps permanently installed on deck. Some can refrigerate a gas into an easily transportable liquid. All conform to, or exceed, rigid Coast Guard specifications.

Barges are moved by towboats (the name is a contradiction, since the boat does not tow but pushes barges through the water). A towboat is a squat, flat-bottomed affair with a control tower standing in front and up to 10,000 horsepower pushing from the rear.

Modern towboaters are blessed with such seafaring equipment as depth recorders and radar, as well as such landlubbing luxuries as air-conditioning, color television and baking ovens.

But in these days of jet transportation, why does a company still push its goods along the Mississippi? There are three good reasons: the river is energy efficient, cost effective and safe.

U.S. Department of Transportation statistics indicate that barge shipping is the most energy efficient transportation method. One gallon of diesel fuel can move 400 ton-miles of freight, compared to 250 ton-miles by railroad and 75 ton-miles by truck.

The company is saving at least 150 ton-miles per gallon on average by shipping barges on the Mississippi. This translates into substantial energy savings. Statistics culled by a leading chemical company indicate that, on average, it costs 0.5 cents per ton-mile to ship freight by barge, 2 cents by railroad and more than 10 cents by truck.

Nationwide, the barge industry collects only 2 percent of the nation's total freight bill for transporting 12 percent of the freight.

"The Metamora Gristmill, Metamora, Indiana" is a 2-½ page illustrated article by Jim Fox in the Spring issue of OLD MILL NEWS. Pictured is the mill wheel, in the lock in Whitewater Canal State Historic Site. The mill has been restored to operation and is open free to the public every day but Monday and some holidays.

Canal patch recently developed by the Canal Society of Ohio for all its members.

New York Canal Records in Milwaukee. "New materials at the Local History Collection of the Milwaukee Public Library include 'Selected Records Relating to New York State Canals,' 13 cubic feet of records dating from 1851-1882." (From the April newsletter of the Association for Great Lakes Maritime History, Editor, ACS member David T. Glick.)

BY TUG-BOAT THRU THE ERIE CANAL (Part II)

We pass a work boat and barges of the New York Department of Transportation on the Erie Canal. Note the dredging equipment towering above the trees on the bank.

By Gerard Chapman

After we passed through Lock No. 17, with the highest lift on the system, I finally went to bed while the mate drove on through the night from midnight to six in the morning.

My bunk, about three feet wide, was the upper of two in the Mate's cabin, and only a steel bulkhead separated it from the engine room. The pounding of the engine was heard and felt throughout the vessel, and especially severely in that confined space, but after more than 40 hours of wakefulness, I was tired enough to sleep fitfully — and by the next two nights I had become sufficiently acclimated to its presence to sleep well.

FRIDAY

When the cook rang his bell at 5:30 and I prepared to vacate the cabin for the Mate when the watch changed at six, we were in the summit level (420 feet above sea level) beyond Lock 20. In the basin at Rome we moored the scow and, turning about, ran back down through the locks to pick up the other scow just above Lock 16.

This time we went through No. 17 by daylight. At Little Falls, it is situated in a rocky gorge and from a distance suggests a fortress high on a hill. It has the highest lift in the system which, at 40½ feet, exceeds that of any lock on the Panama Canal. It also has the only vertically travelling, or lift, gate (also called a "Guillotine Gate"). Seen from within, the lock is a vast cavern with sheer concrete walls towering far above the float.

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All the locks on the Barge Canal are 328 feet between gates, with an available length in the chamber of 300 feet; width is 45 feet, with 12 feet of water over the sills. Gates are of the mitre type, akin to a pair of casement windows. Barges and scows are about 43½ feet wide, calling for a high degree of skill on the part of the pilot to guide it into the lock without undue bumping and scraping. The combined barge and tug — the float — is about 300 feet long and care is necessary to avoid ramming the gates. Both our pilots — Capt. MacDonald and Mate Gillikin — had light touches indeed upon the controls and were experts at "threading the needle." When entering a lock they contend with hazards such as cross currents from the adjacent dam, a curved approach to a lock, and high winds. When I expressed admiration for his skill, Gillikin said, "All that I know about this business I learned from the Skipper, and we've been together on this vessel for many years."

It was evident that each had complete confidence in the other.

Back up the canal with scow No. 121 we went, passed the other one moored at Rome, and began to descend from the summit level at Lock 21. This portion of the Canal, as with the summit level, no longer followed the Mohawk River but was a dug channel with few curves, no islands, and a regular shoreline. It was, accordingly, much less interesting in scenic attributes and rather monotonous. The Mohawk River wandered in and out, entering at one side and within a short distance, leaving over a spillway on the opposite side.

The undeviating straightness of the canal, its regular shoreline and its constant width gave rise, however, to an interesting phenomenon not observed elsewhere: standing waves which pursued the float at equal speed with it. Directly abeam of the tug the water would recede from the shore, exposing the rock rip-rap momentarily, and then a surging wave of cresting white water would inundate the rocks far above the normal water line. Birds would often fly onto the exposed rocks, looking for food, then have to spring out of the way of the overwhelming wave.

In both canalized river and dug portions of the canal one frequently sees the yellow-and-blue dredges of the Department of Transportation of the State working to keep the channel at its prescribed depth and free of obstructions. Hydraulic dredges draw muck from the bottom, pumping it through large pipes supported on pontoons, to low-lying land bordering the canal; the water runs back into the canal, leaving an alluvial deposit of fertile soil which the State leases to farmers for crops. Alternately, clamshell buckets scoop rocks or muck from the channel, which are conveyed by barge for dumping elsewhere.

The summit level and beyond was home territory to Capt. MacDonald, who lives in Rome. His wife and other relatives and friends were at Lock 20, 21 and 22 to see him and his tow, since this was his first trip up this way in almost two years. The conversations about family and friends in the soft summer evening made it seem like a homecoming celebration.

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Upstate New York is also familiar territory to Frank Schumaker, the cook, whose home is in Watervliet. An affable bachelor, he devotes a lot of his off-duty time taking neighbor boys on camping trips. On board the tug, he sets a marvelous table. For breakfast he offers hot oatmeal and several dry cereals, eggs cooked to order, bacon or sausages. Lunch is filling, with meat or fish, potatoes, two vegetables and dessert, and at dinner he offers a choice of meat or chicken or fish in ample quantity, and all the fixings. On Sunday he always serves turkey. The refrigerator in the galley is stocked with cold meat for sandwiches for between-meal snacks, and with a variety of soft drinks and milk. The crew eats well — and so did I. Frank cooks on a stove which burns diesel fuel; the fire burns low between meals to keep a pot of coffee warm.

As twilight dimmed the sky, the undeviating canal stretched into the distance like a broad silver ribbon tinged with pink. Finally the winking signal lights were the only indicator of the route ahead. Then the pilot switched on the searchlights; one mounted on the right side of the scow limned the adjacent shoreline while the other, atop pilot house, was focused on the left bank. Without diminishing speed, the float surged on through a seeming canyon of brightly lighted trees within an illimitable blackness.

The bright lights of Lock 21 and of 22 soon after, loomed out of the darkness, had their brief moments as we locked through, and faded into the rear. The watch changed and I slept during the transit of Oneida Lake and beyond.

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SATURDAY

When Frank rang his bell at 5:30, we had gained Lock 1 on the Oswego Canal. We were still going down hill and would continue until reaching the level of Lake Ontario, at 244 feet above the sea, the lowest of the five Great Lakes.

This canal, branching from the Oneida River beyond Lock 23, follows the course of the Oswego River. There are seven dams with associated locks, numbered from 1 to 8; there is no Lock 4. The aspect of the canal seems quite different from that of the Erie; even its rural stretches seem more built up, with waterfront homes and boats. Following the river, it too twists and turns and has islands, but church spires and factory chimneys appear at the far end of a reach. Much of the canal is wedged between Niagara-Mohawk powerhouses situated at the dams, or factories on the river banks. All give the impression of great age — of being holdovers from the nineteenth century. The constricted lockside areas do not permit the spacious green, manicured lawns of the Erie; there is barely room for the lockhouses. And overhead there are many more railway and highway bridges to cause the pilot to run with his domain retracted into its shell much of the time.

Finally, in close succession, we descended through Locks 5 to 8 to emerge upon the harbor at the Port of Oswego on Lake Ontario. There we moored scow 121 alongside the Port Authority wharf and started back up the canal.

On this passage we crossed Oneida Lake in the late afternoon under bright skies and with a following wind. Under full throttle the tug outran the waves, plunging her bow into the big ones and throwing green water far to either side. An oil barge, *Morania 300,* coming the other way and

breasting the waves, threw white spray high enough to obscure itself momentarily.

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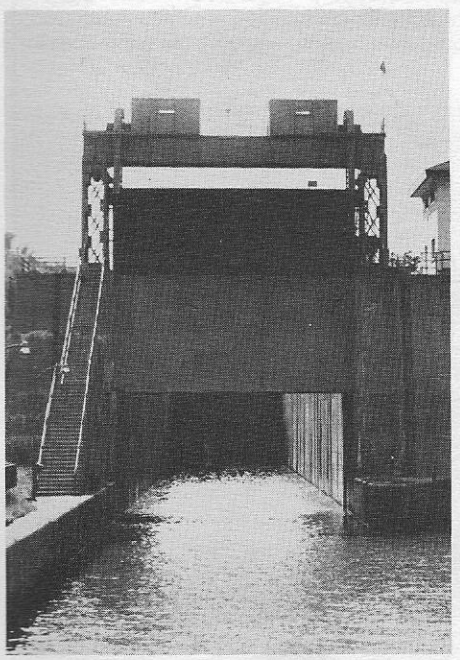
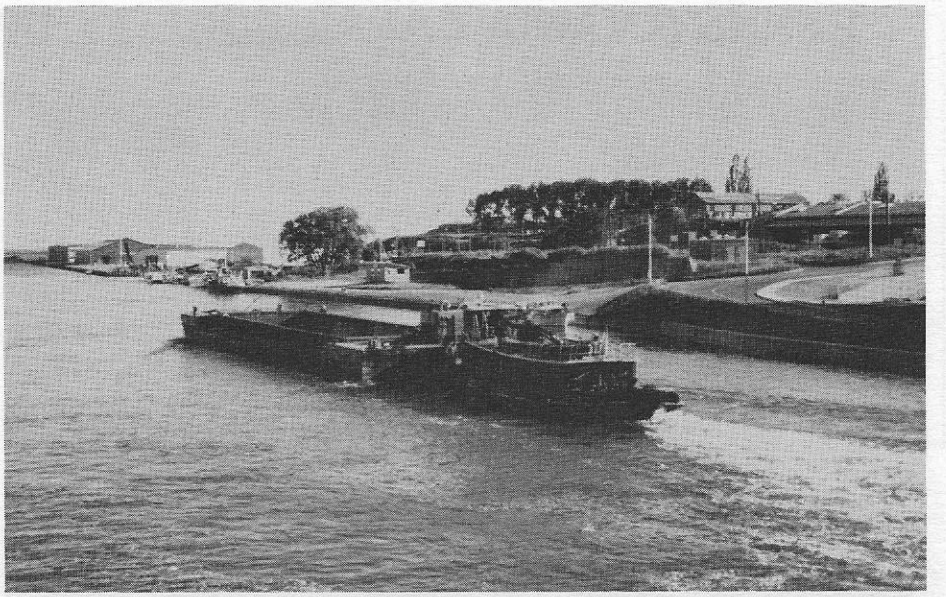
With a 21 mile run from Brewerton at the western end of the lake to Sylvan Beach on the east, the Mate set the tug on automatic pilot and sat back to take his ease. "Watch how well she holds the course," he suggested. "Even though the tail wind tends to make us yaw, the automatic pilot will compensate and keep us on course within about three degree either side." And so it was; the gyrocompass, which both indicates the bearing and actuates the corrective action of the automatic pilot, showed almost no deviation from the desired course.

When navigating the narrow canals, the human pilot seldom takes his hand from a short steering lever, as it requires constant small adjustment to keep the long tow aligned with the axis of the waterway. Susceptible of very small adjustment by the Sperry non-follow-up steering system, the hydraulically actuated, large rudder exerts virtually instant effect upon the heavy tow. Only a small deviation from the straight-and-narrow could run the float onto a shoal or into the mud. In his six hours of duty the pilot must make literally thousands of tiny corrections to keep out of trouble. And so he welcomes an opportunity such as offered by Oneida Lake to avail himself of the respite afforded by the Sperry Automatic Pilot, which works in conjunction with the steering system but which deactivates the steering levers. He can monitor the setting of the rudder from a gauge showing its angle in degrees right or left.

Although keeping his eye upon the buoys marking the course across the lake, Clayton Gillikin could relax and talk. His speech is mildly Southern and responding to my query, he said: "I live in Moorehead City, N.C. My wife and I operate a small bar and lunch counter, which she tends while I'm away. I fly down for my two weeks off and fly back again and in either place the change in work is a welcome variation. My wife and I like to travel and we have a camper. We hope to get enough time to drive up north — up here — and see some of the country beyond the canal. Our little girl is old enough to travel now and we'd like to show her something new and different."



Lock Number 17 on the Erie Canal at Little Falls, at 40-½′ lift, is the highest lift lock on the entire New York State canal system. An interesting feature of this lock is the lower "Guillotine Gate" which rises overhead to permit boats to pass in and out of the lock underneath it.



The "Margo Moran" heads out of Oswego Harbor, with one of the two barges, which it "leap-frogged" all the way from the Hudson River. After this photo was made, the crew picked up the other barge in the outer harbor and headed west on Lake Ontario for Rochester.

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A big man who habitually wears a visored cap set rakishly on his head, Gillikin pointed out the other instrumentation and controls. A gauge indicates propellor revolutions foreward or backward; there is a magnetic compass; a large lever controls the raising or lowering of the pilot house; there is a radar set, unused on this trip. Buttons can start or stop the engine without intervention by the engineer. For so small a vessel, the *Margot Moran* possesses an imposing array of modern controls and instrumentation appropriate to navigation on all types of water: narrow canals, broad bays, and open lake or ocean.

Out of the Oswego and into the Erie we proceeded, ascending to the summit level again and about 7:30 p.m. we tied onto scow 120 at Rome. Then it was back down through the now-familiar route, affording a chance for Bob Volz, Chief Engineer, to show me his domain below decks.

His engine room was spotless, with "a place for everything and everything in its place." Wearing a pair of acoustical earmuffs I could understand him quite clearly despite the din of the laboring engine. Bob was proud of his Fairbanks-Morse machine developing 1,280 horsepower and one of only a few made, since it was not a popular design. With eight cylinders it has 16 opposing pistons instead of cylinder heads and most engineers consider it too complicated. But Bob finds it easy to maintain, and he got his job with Moran because he is an expert on that type of engine.

He pointed out all the auxiliary apparatus: steering gear, electrical generator, batteries for use when the engine is shut down; compressed air tank for starting the engine; pressurized tanks of drinking water and ordinary water from the lake or canal; the electrical distribution panel; fuel tanks with capacity for a week's operation or longer; and other essential components of a self-contained floating power plant and residence for nine men.

Alternating six-hour watches with Ben Larson, Assistant Engineer, Bob Volz admitted that life during a tour of duty was exacting and confining. "But," he said, "it's a good life. I like the work and Moran is a good company to work for. We are well paid and, actually, with two weeks on and two off, we work only a half a year. Where most shore-bound men work a whole year for a two-week vacation, I have two weeks off every month. I live in a waterfront house in Florida and have a boat, with time to use it. I fly home and fly back to work, wherever the vessel might be at the time. The scenery changes, and the air fare is deductable!"

Charged with general maintenance of the tug, Volz oversees all the equipment, and had been chipping rust during the trip so that the deckhands could apply fresh paint to keep the boat looking trim.

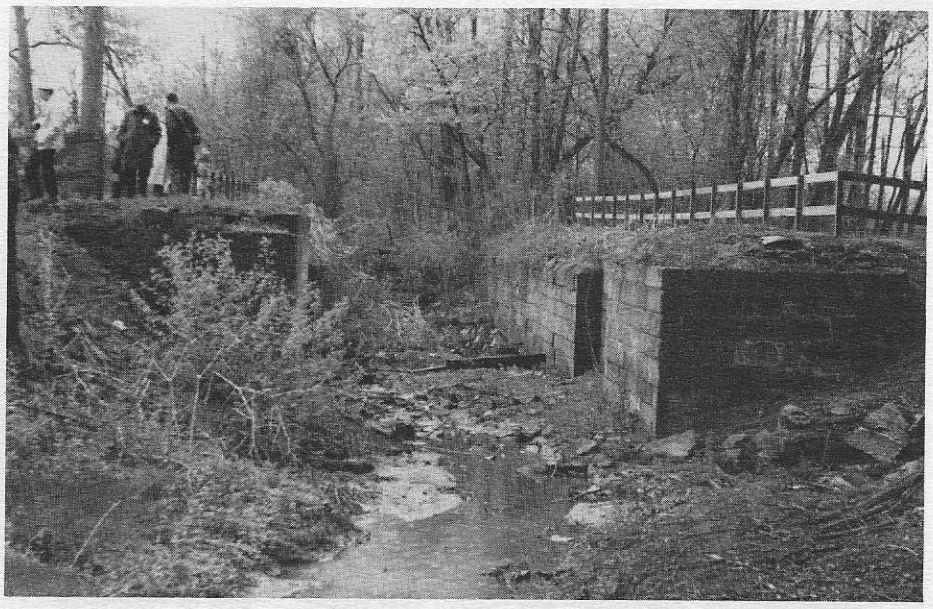
It was evening in Sylvan Beach as we approached the lake for the third time. The lights were bright and the Saturday evening crowds all but surrounded us as we floated past; we seemed almost a part of that traditional weekly convocation. We started across Oneida Lake about 11 p.m. under the light of a brilliant, almost full, moon which cast a long silvery track upon the rippling water. The glow of Sylvan Beach faded astern, lights winked all around the horizon and we throbbed along under the guidance of the automatic pilot. When the watch changed at midnight I reluctantly left the enchanting scene and retired for the night.

SUNDAY

Down through the succession of locks in the Oswego Canal we came to the harbor once again, and there I left the tug to return home. While waiting for the bus I climbed to old Fort Ontario, overlooking the bay, and saw the *Margot Moran* stand out into Lake Ontario past the breakwater, turn west while towing the two scows in tandem, and on its final lap, head toward Charlotte, port for Rochester.

We are happy to welcome into the ranks of LIFE MEMBERS of the American Canal Society: *Arthur Sweeton III* of Canton Center, Connecticut and *John P. Grossman* of North Tonawanda, New York. This now brings total membership in this special group to sixty-three.

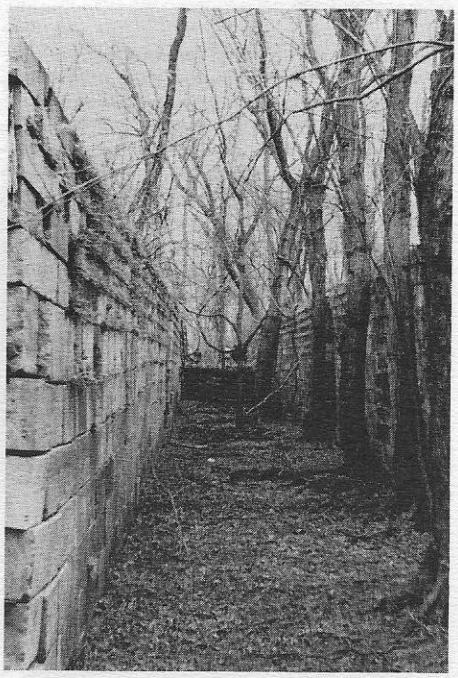
PENNSYLVANIA CANAL SOCIETY SPRING FIELD TRIP



Recently restored and cleaned-up lift lock on the Eastern Division below Middletown.

A full bus-load of members of the Pennsylvania Canal Society traveled out of our headquarters at the Penn-Harris Convention Center in Camp Hill, Pa. on Saturday, April 23rd, 1988 to see a number of well preserved ruins along three different central Pennsylvania Canals.

First stop in the morning was the Aqueduct on the Eastern Division Canal at the south end of Bainbridge; then the Collins Lock a few miles further north at Falmouth. Next we visited the Middletown Lock, quite recently restored by a local historical group, and then viewed the junction of the Eastern Division and Union Canal in Middletown.

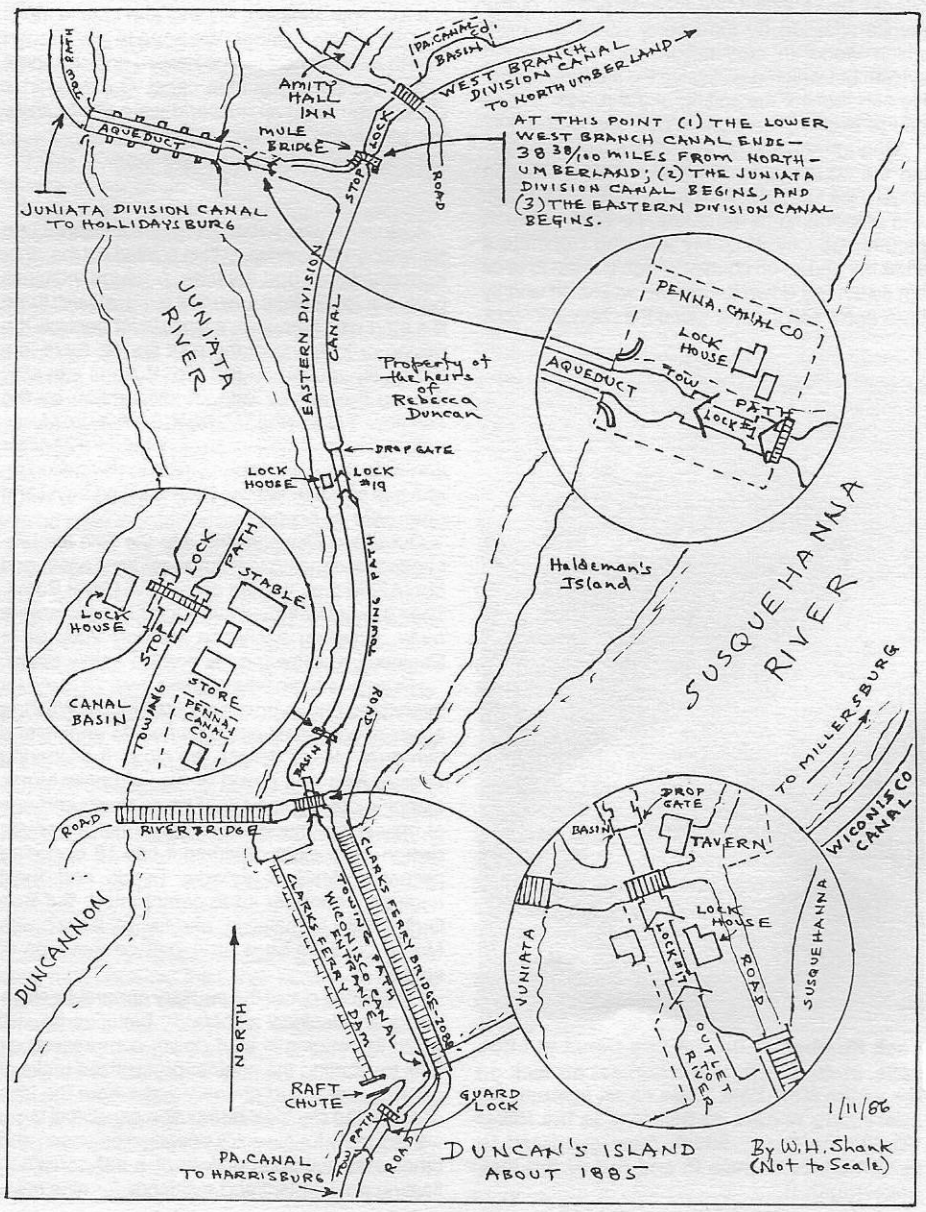


One of the best preserved locks on the Susquehanna Division is the Mahantongo Lock. The canal crossed the creek of the same name on an Aqueduct, just above this lock, whose piers are still standing.

After traveling along a watered section of the Eastern Division in Steelton, we drove north to Clarks Ferry Bridge and then along the entire length of the Wiconisco Canal. We stopped for our picnic lunch at the canal park in Millersburg, where the Lykens Valley Railroad delivered coal to canal boats in the north terminal basin of the Wiconisco.

Following this we enjoyed a trip east-west across the Susquehanna on the 150-year old Millersburg Ferry, only operating ferry in this part of the country. On the west bank of the Susquehanna we visited Lock Five of the Susquehanna Division Canal, then north to the Mahantongo Lock (and Aqueduct) returning along the Susquehanna Division to Duncan's Island, where this Division joined the Juniata Division, west to Lewistown and Hollidaysburg. Enroute we caught several excellent views, (both sides of the river), of the world's longest stone-arch railroad bridge at Rockville.

The entire week-end was planned by Bob Keintz, President of PCS, who also presided at the two evening meetings and the Saturday banquet at the Penn Harris.



THE WICONISCO CANAL

By Robert Kentz

The Wiconisco Canal is perhaps one of the most overlooked canals in Pennsylvania. Its short run of 12.26 miles from Clarks Ferry to Millersburg nevertheless provided an important transportation link to the major coal fields of Dauphin County.

Tanner's description of the canal is as follows: "It extends from Wiconisco Creek, at the western terminus of the Lykens Valley Railroad to the pool of Clark's Ferry Dam, at Duncan's Island. Length — 12.25 miles, it has one guard and six lift locks; three aqueducts, two culverts, one dam, five waste weirs, and 18 bridges. It descends 35 feet."

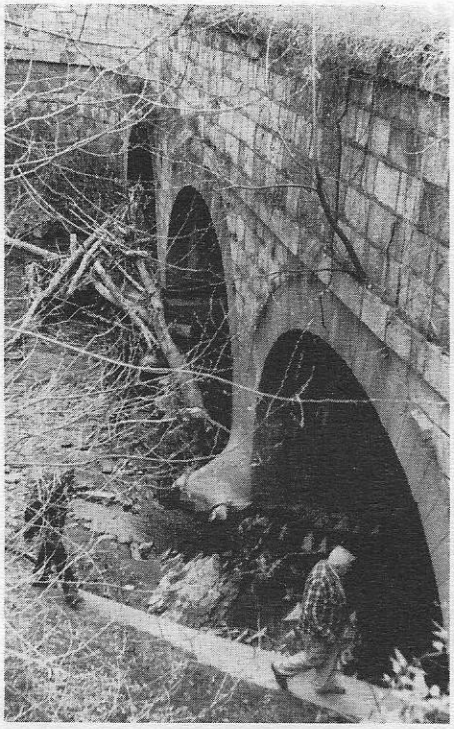
The seven locks had the following lifts:

Lock #1 at Clarks Ferry	1.85 feet
Lock #2	8.15 feet
Lock #3	5.99 feet
Lock #4	5.79 feet
Lock #5	5.03 feet
Lock #6 at Halifax	5.38 feet
Lock #7 at Millersburg	9.41 feet

The Canal was started in 1838 under the direction of Anthony Warford. It ran until 1890 when it was transferred to the Northern Central Railroad Company. It was acquired by the Pennsylvania Canal Company in 1872. The Flood of 1889 caused considerable damage to the canal and hastened its closure in 1890.

It is interesting to note that the canal was completed by a private company in 1845. By act of the legislature July 13, 1842, The Wiconisco Canal Company was incorporated to take over the entire works to the canal. Here was a case where the Wiconisco Canal was taken from state ownership and placed under private control and operation.

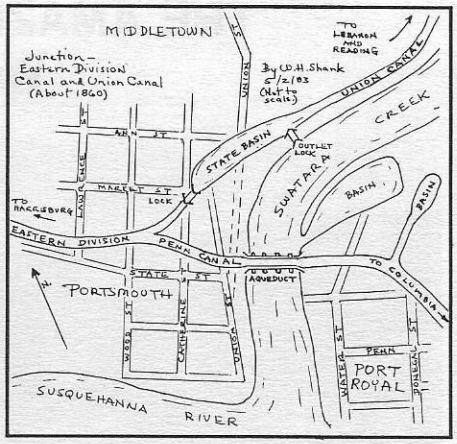
Today only a few sections of the Wiconisco Canal remain. There is a fine culvert in Halifax. In Millersburg the canal is preserved by a town park.

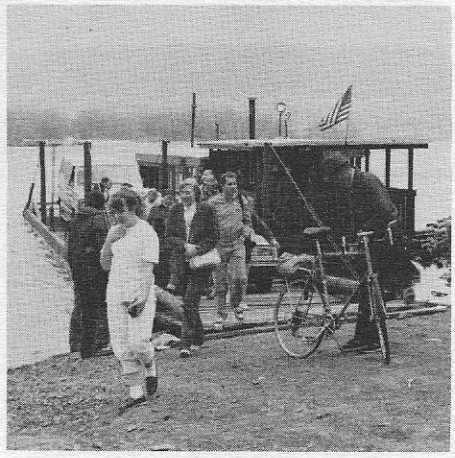


Inglenook Aqueduct, on the Wiconisco Canal is an exceptionally wide structure, so strong that the main highway now runs over it.

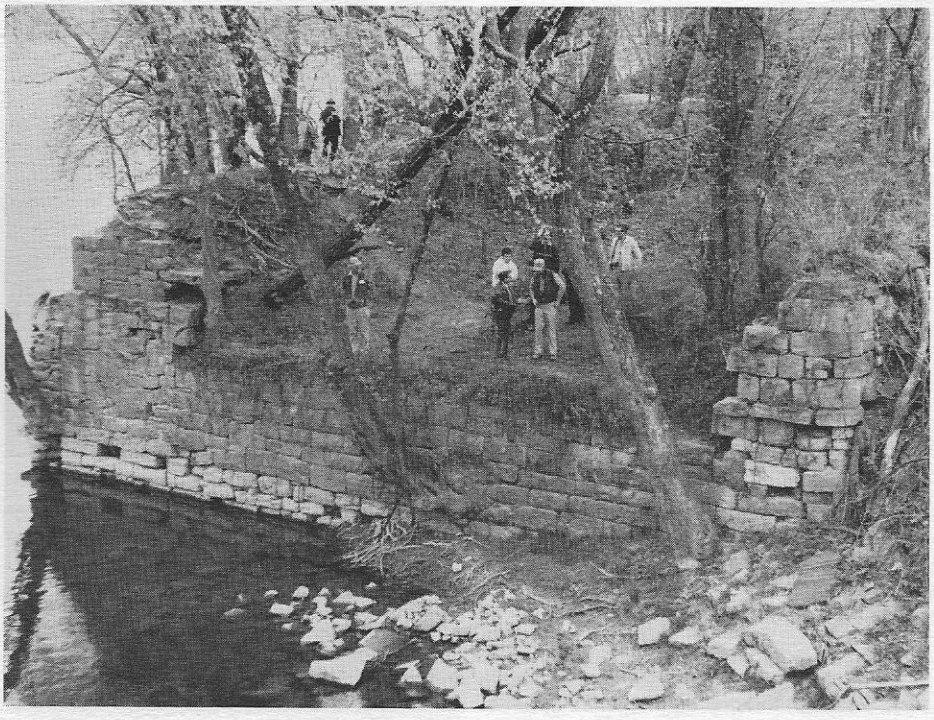
The location of the Pump House and lock #7 is in this park. The remains of two aqueducts may also be viewed from Rt. 147.

The real jewel of the canal is to be found at the Ingelnook Aqueduct. The Aqueduct is one of the best preserved in the state. It is a prime candidate for the National Historic Engineering Record. The structure consists of three spans covering 110 feet. The Aqueduct today supports all the daily traffic on Rt. 147.





A highlight of the PCS Tour was our leisurely ride on the 150-year-old Millersburg Ferry. Our group is shown leaving the Ferry on the west bank of the Susquehanna.



Well-preserved masonry of the Bainbridge Aqueduct, first stop on the PCS Tour.

Hon. J. Bennett Johnston, Chairman
Energy & Water Develop. Subcommittee
Senate Committee on Appropriations
Washington, D.C. 20510

I was delighted to learn from Tom Grasso, president of the Canal Society of New York State, that a $10 million appropriation for New York State's famous canal system has been included in the 1988 energy and water development appropriations bill, thanks to the work of Senator Moynihan.

New York's canal system is a vital part of America's historic inland waterways network which deserves the nation's support. Canada and Britain, for example, have long recognized the recreational value of their canal systems. Over three thousand miles of their historic canals are maintained for recreation and tourism alone; their economic value is well established. They are, in effect, national parks, and very successful indeed.

It is time that America took a good long look at its dwindling historic waterways heritage, to maintain or to restore to operation the canals which we, too, should zealously guard as part of our national recreation and tourism network. It is hard to beat the combination of history, water, and boats as a national resource worth saving. By helping to save New York State's canals you shall have made a good beginning.

William E. Trout, III, Ph.D.
President, American Canal Society

THE AMAZING PONTCYSYLLTE AQUEDUCT
Wonder of the Waterways

A view of the Pontcysyllte Aqueduct from the valley of the River Dee in northwest Wales. This 1007-foot long structure is similar in appearance to the Starrucca Viaduct of the Erie Railroad in northeastern Pennsylvania. (Bruce Russell photo)

By Bruce J. Russell

The canal system of England and Wales was built between the 1760s and the early 1830s as a means of furnishing economical transportation for those commodities such as coal and iron ore needed to fuel the British industrial revolution.

By 1780 canals were being built all over England, and since so much good quality coal was located in the Welsh mountainous region it was only a matter of time before the canals would penetrate into these areas. Nevertheless to plan a waterway to tap the Welsh coal resources, and to actually build it were two different things.

Work began on the Llangollen Canal in 1790 which was designed to penetrate the northern portion of Wales, providing a convenient way to get much needed coal to its logical markets in the industrial region around Manchester.

The most challenging obstacle to the construction of the Llangollen Canal was the valley of the River Dee. The first solution was to construct two flights of locks to get the canal from the top of the valley to its bottom and up on the other side. This method was deemed impractical as the time it would take for the canal boats to descend one flight and ascend the other was far too long and tremendous quantities of water would be used in the operation of the many individual locks.

In 1795 it was decided to construct a 126-foot high aqueduct at canal level on both sides of the valley. Although a structure of such magnitude had never been built in the British Isles, there were similar ones in Europe. During the Roman era numerous aqueducts had been constructed for the purpose of insuring a supply of water for entire cities.

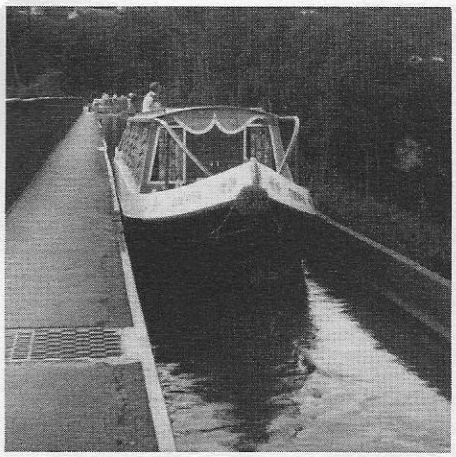
Thomas Telford had established a reputation for himself as one of Britain's greatest engineers, and in 1795 this brilliant Scotsman was hired by the directors of the Llangollen Canal to build an aqueduct cross the Valley of the Dee. Telford decided to incorporate the use of arches for the Aqueduct, but in a radical departure from all other aqueducts he chose to build them out of metal rather than stone. Masonry would be employed for the piers, most of which would exceed 120 feet in height. However the arches, at their summit, would be fabricated out of wrought iron, as would be the trough carrying the water upon which the loaded canal boats would travel. Although the entire aqueduct could have been made out of stone, the use of two materials was far more practical. Among other things it would reduce the weight of the structure, and would also result in easier maintenance. Had an all stone option been chosen, there would always be the problem of water seeping down into tiny crevices and then freezing.

Telford arranged for a contract to be awarded to William Hazeldine who owned a large foundry in Shrewsbury, England to cast the giant metal sections which when bolted together would form the arches and trough of the aqueduct. (The name "Pontcysyllte," pronounced Ponti-sil-tee, in the Welsh language simply means "water bridge.") One by one the huge plates were forged and then transported by canal and horse-drawn wagons to the site. (The Llangollen Canal had been completed to the eastern end of the valley by this time.) A quarry was set up at a nearby rock outcropping in order to obtain stone for the blocks which would be used in building the tall piers. In the days before the use of poured concrete, the art of the stone mason was very highly developed, and by using saws and chisels, blocks of almost any size and dimension could be made by skilled cutters and craftsmen. As the enormous blocks were quarried and fashioned into shape they were dragged to the Pontcysllte site and numbered in proper sequence. A total of 19 piers were made. Before they were erected Telford had to take extraordinary steps to insure that they were resting on firm footings in the river valley.

Several hundred men were involved in the building of the Pontcysllte Aqueduct in addition to those digging the Llangollen Canal itself. Giant cranes were utilized to lift the heavy blocks into position and finally the iron sections for the arches. As the work progressed people came from great distances to observe and to heap praise on Thomas Telford, the chief engineer. By 1803 the work was essentially complete. However the last hurdle to be cleared was the method of keeping the metal trough watertight, especially at the joints between the bolted segments. (Welding had not been perfected) Several materials and methods were tried, but the one discovered to be most satisfactory was a mixture of ox blood and linen. Apparently the animal blood when mixed with the cloth fibers coagulated in such a manner as to form a watertight seal. Regardless of its bizarre origins, this substance was used to make the entire structure watertight. In later years pitch (tar) was utilized, but in 1800 petroleum products were unavailable in England.

The Llangollen Canal opened for its entire length in 1805, and coal immediately began to flow out of the valleys of northern Wales and over the 1,007 foot long Pontcysyllte Aqueduct. The latter is awe inspiring from whatever angle one looks at it. From far below, in the valley of the River Dee, its magnitude can be fully appreciated. From its approach channels you sense the excitement of crossing it and on its water-trough or towpath there is the nerve-tingling thrill of sailing high above the Welsh countryside. The towpath is cantilevered over the water on one side of the trough, and the width of the canal carrying the water across the structure is 8 feet. The towpath side of the aqueduct has a cast iron guard railing but the opposite side has no such luxury. From the rim of the trough it is a sheer drop to the bottom of the valley. From an artistic viewpoint, the combination

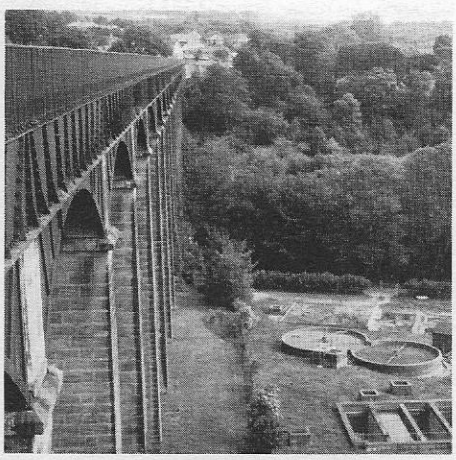
We are indebted to "Waterways News", March 1988, for this photo of the method now in use to check the basic soundness of the Pontcysyllte Aqueduct structure. Stats (UK) Limited has been engaged to carry out a visual and photo study of this two-century-old structure. An engineer is shown here using a visual inspection method known as "abseiling" (similar to mountain climbing) which permitted Stats to conclude their initial survey in three days!



A traditional narrow-boat passing over the 8-foot wide channel of the Aqueduct. One-way traffic is mandatory. (Bruce Russell photo)

of stone and wrought iron is an engineering accomplishment of artistic beauty which blends in nicely with the valley it spans.

The Pontcysyllte Aqueduct served as the inspiration for numerous other structures in Britain. A few years later a canal aqueduct was built at Marple which involved almost as high a crossing of a river valley. Once the era of the railway began in England the same principles perfected by Telford were made use of to construct innumerable viaducts which carried the tracks over major valleys and rivers.



The view of the Dee Valley from the Aqueduct Abutment is breath-taking. (Bruce Russell photo)

Commercial use of the Pontcysyllte Aqueduct continued for about 150 years until the post World War 2 period when use of coal declined, and improved motorways captured most of the remaining traffic from Britain's waterway system. Nevertheless well into the 20th century it was quite active, with horse drawn canal boats slowly inching their way across it. In the 1920s some of the boats were equipped with compact steam engines and pulled trailers called "buttys", and in the late 1930s primitive diesels called "Bolinders" were utilized. However by 1955 commercial transportation of goods on the canals was finished.

The Aqueduct has held up extremely well after almost two centuries of continuous use. From time to time repairs are undertaken, and the British Waterways Board now is responsible for it as well as the Llangollen Canal. All of the original masonry and iron work is still in place, and periodic inspections spot minor problems so they can be corrected before they grow to unmanagable proportions. In the 1980s the Llangollen Canal is used extensively by pleasure boaters who thrill to the experience of passing over Pontcysyllte and peering down at the cows in the valley below. In the summer of 1987 this writer was able to pass over it in a "narrowboat" and the exhiliration was something not easily forgotten. Since the channel is wide enough for only one 7 foot wide boat at a time, a vessel must wait if when it reaches the end of the aqueduct another has already begun to make the crossing.

Pontcysyllte Aqueduct is truly one of the "Wonders of the Waterways" in Britain's inland navigation system.

SLOPED LEVELS

By William Dzombak

The February issue of American Canals (No. 64, page 12) contains the statement that canal channels were not "level" but were sloped, one inch per mile. I find that assertion impossible to accept, for a number of reasons.

First, an obvious reason: a slope of one inch per mile is a fall of 0.0002 inch per foot. That's less than the thickness of a sheet of paper. We're talking about a flat roof, folks, and on my flat roof water doesn't go anywhere — except straight down, into my sitting room. My experience with slopes of low gradient is that the flow of water is not determined by he slope of the "ground" but by leakage. My "sloped level" roof leaks almost as much as canals did.

A surveyor's line of sight may be determined to be horizontal by "leveling" the instrument to within a few thousandths of a foot, but we must not confuse the precision of optical sighting with the ability to produce, on the surface of puddled clay, a "level" that slopes one inch per mile. Even if mud could be rolled with that precision (even with a laser beam, a rice field can not be leveled with that precision), that pristine clay surface would not long remain in that ideal state. The bottom of a canal was a bumpy mess of puddled clay, random sediments, pond lilies, and who knows what else. It surely is too much to expect to maintain a slope of one inch per mile when it was almost impossible to keep the canal open at all!

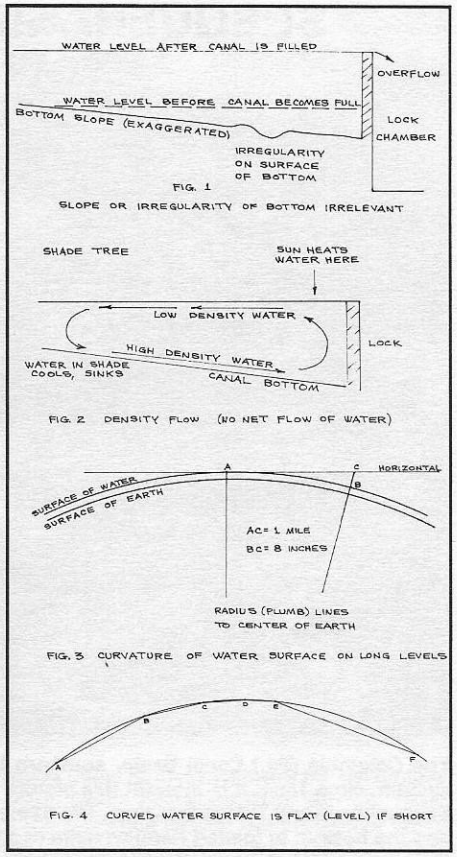
Furthermore, the flow of water in a canal is not affected by any slope on the bottom or any irregularity on the surface contour of the bottom, as Figure 1 shows.

There is only one situation in which a sloping bottom could promote the flow of water in a canal: a "density current" could slide down such a slope if the density of water were different at different places in the canal, as Figure 2 illustrates.

Density gradient (convective) flows occur even if the canal bottom is or is not flat, level, horizontal, smooth or bumpy; to set fluid into motion, the only requirement is some means to create a difference in density. Unequal solar heating, or difference in salinity or in suspended solids, will do.

When we speak of canal "levels", just what are we talking about? We all know that the surface of a lake is not flat (even in the absence of a wind) but in fact follows the curvature of the earth, which is about 8 inches per mile, as Figure 3 illustrates.

That rudimentary fact complicates any discussion of "levels". The surface of a body of water (in a lake or canal) can be treated as a horizontal plane only if the water surface is "not very wide" because, as Figure 4 shows, a curved surface can be approximated by a series of straight lines, and the shorter the straight line chords, the less difference there is between flat plane and the actual, curved surface of the water.



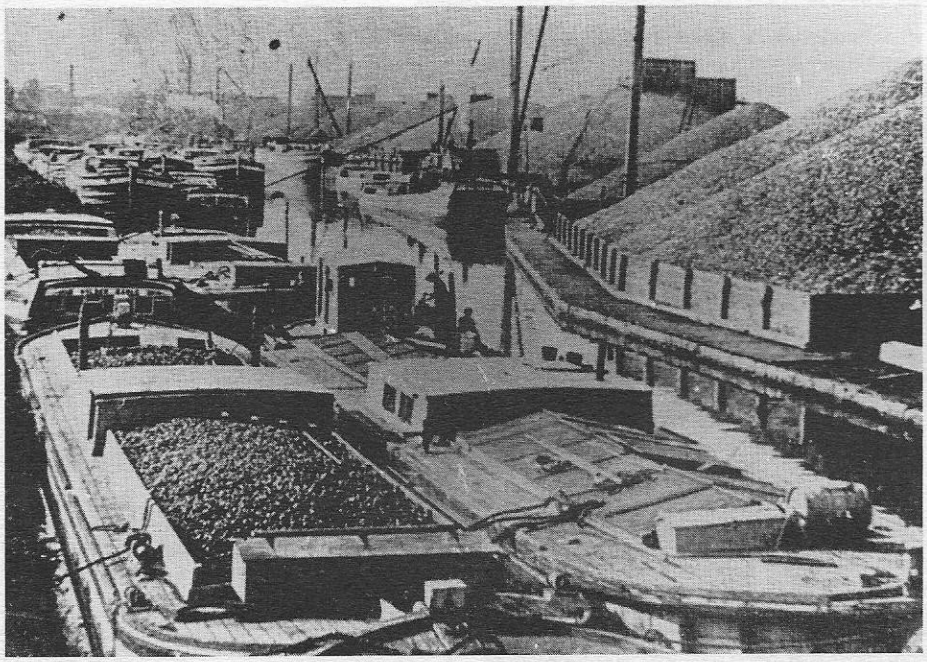
In a canal, if the distance between two locks is one mile, the water surface at one end of that one-mile canal level (point B) is 8 inches below a horizontal line drawn tangent to the water surface at the other end of that canal level (point A). Experience confirms that water is not moving in the canal between those two locks, because the water is "level" in the sense that water at point A is at the same elevation as the water at point B — that is, points A and B are both at the same elevation above sea level or the center of the earth — water at both sites has fallen as far as possible (given the restraining walls of the canal prism) toward the center of the earth, under the influence of gravitational attraction.

There is no need to complicate our discussion even more by trying to take into account the variations of gravity with latitude and longitude, nor need we address the problems associated with using a surveyor's instrument to attain the precision required to level a rice field, or slope a long level on a canal so that the elevation of the canal bottom at pont B is one inch lower than the elevation at point A. That exercise is a useless digression if, in the first place, sloping the bottom has nothing to do with causing water to flow "down" the canal.

Three factors governed the flow of water in a canal: the first was leakage; the second was the setting (elevation) of the top plank in a waste wier located anywhere between locks; the third was evaporation. Obviously, operation of locks caused water to move into the canal from reservoirs and feeders.

(Editor's Note: We would be glad to have any additional comments from our readers on this matter of "sloped levels" in our historic, or currently operating, canals.)

SUSQUEHANNA AND TIDEWATER CANAL, Part II



The Columbia (Pa.) Canal Basin, southern terminus of the Pennsylvania Canal Company system, circa 1894. It is thought this picture was made about the time of the closing of the Susquehanna and Tidewater Canal. The tremendous stock piles of Nanticoke coal to the right, and the backup of loaded Pennsylvania canal boats in the foreground may be indicative of the chaos which developed when these boats could no longer deliver their cargos by water to Baltimore and Philadelphia.

By William H. Shank. P.E.

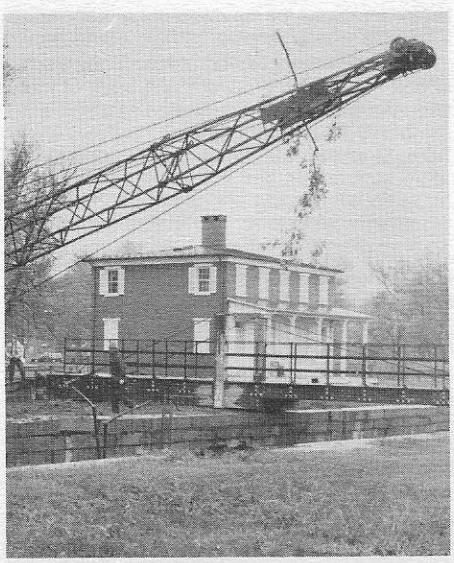
The May 1894 flood did such damage to the S. & T. Canal that the Reading Railroad, lessees of the canal, decided in 1895 not to invest any further money in repairs and abandoned the property to the original owners, who also declined to repair the canal.

By this time the Pennsylvania Canal Company had become the main user of the S. & T. Canal to transport coal and lumber from upper central Pennsylvania to tidewater and thence to their markets in Baltimore and Philadelphia. When the S. & T. closed, the Pennsylvania Canal Company was caught with 58 of its boats in Chesapeake Bay, and to recover them advanced $6000 to the S. & T. Company to put just enough water into the canal to bring the empty boats back to Pennsylvania. This was done. However, the most serious problem for the Pennsylvania Canal Company, was the fact that their only navigable outlet to Chesapeake Bay was gone. This, plus flood damage to their own canal lines in Pennsylvania, forced the decision by the stockholders of the Pennsylvania Canal Company to abandon all further operations as of April 11, 1901. Water was maintained in some portions of the system for the use of local municipalities and industry, but boat navigation ceased.

The Power Companies take Over

In the early days of the Twentieth Century the infant electrical industry was trying to introduce its product into the factories and homes in the eastern metropolitan areas. Many of the first electric power plants were fueled by coal. However the invention of a practical, water-powered turbo-generator turned the attention of power engineers to the lower Susquehanna River. The unusually steep gradient in the sixty miles below York Haven, if properly harnessed, could become a source of power to generate electricity.

When it became clear that neither the Pennsylvania Main Line Canal nor the Susquehanna and Tidewater Canal would ever again be rejuvenated, the new power companies began acquiring river shorelands, including some of the former canal right-of-ways.



Outlet Lock, restored swing-bridge and Canal Museum at Havre de Grace are all shown in this view made during the pulling of the old lock gate on November 4th, 1986.

The York Haven Water and Power Company

This company was incorporated in 1895, and after land and water rights had been purchased, began in 1901 to construct a hydroelectric plant utilizing the fall of the York Haven rapids, entrapped by a diversion dam reaching 8000 feet upstream. 16,000 cubic feet per second of water are drawn into huge turbines which produce 20,000 kilowatts of electricity. When the plant went into full operation in 1904 it became the third largest hydroelectric plant of its kind in the world! It began immediately serving York, Steelton, Harrisburg and Middletown and is today part of the Metropolitan Edison system in central Pennsylvania.

Holtwood Dam

The second hydroelectric facility on the lower Susquehanna went into operation in 1910 and was enlarged in 1914 and 1924. This turbine-operated hydro plant generates 101,000 kilowatts, while an additional coalfired plant on the east shore end of the dam generates an extra 102,000 kilowatts. The two plants are owned and operated by the Pennsylvania Power and Light Company.

Conowingo Dam

This mighty structure, built in 1928 several miles below the Mason-Dixon Line, harnesses a water-level differential of approximately ninety feet to develop an original generating capacity of 252,000 kilowatts. An expansion in 1964 brought its total capacity up to 512,000 kilowatts. An interesting feature of its construction was a special railroad, laid along the old S. & T. Canal towing path, to bring building materials and turbines from a connection with the Pennsylvania Railroad in Havre de Grace. The rails of this track may still be seen at many points south of the dam. This facility is operated by the Philadelphia Electric Company, which also operates the Muddy Run Pump-Storage generating plant 12 miles upstream.

Safe Harbor Dam

This most recent of the power dams on the lower Susquehanna was built in the early 1930's and additional generating facilities were installed in 1933, 1934 and 1940. It is all hydroelectric, putting forth 228,000 kilowatts. It is owned and operated by the Safe Harbor Water Power Corporation, which in turn is owned by the Pennsylvania Power and Light Company and the Baltimore Gas and Electric Company. It is here that most of the original maps of the Susquehanna and Tidewater Canal are stored.

Recreational Sites Created

Canal buffs decry the fact that many of the old S. & T. Canal Locks and channel have been "drowned out" by these power dams, but credit must be given to the power companies for preserving at least a few canal relics in name or actuality. One of the best of these is Lock Twelve Park, about one mile below Holtwood Dam and just north of the west end of the Norman Wood Bridge. In this multi-acre park area, owned and operated by the Pennsylvania Power and Light Company, are the well-preserved and stabilized remains of Lock Twelve itself, plus a restored Lime Furnace and the foundations of an old lumber mill, originally

run by water power. The park is open to the public without charge and includes picnicking facilities, rest rooms and running water. Another, smaller park area operated by P.P. & L., is Lock Two Park, six miles below Wrightsville (the lower end of the "Five-Mile Long Level") where there is a boat-launch built on the filled-in lock. Further South, Philadelphia Electric Company has provided a Fisherman's Gallery just below Conowingo Dam, where a variety of anadromous fish, such as American Shad, Hickory Shad, and Herring are caught in April, May and June, as they come upstream to spawn. Other species are available year-round. Above Conowingo Dam some 9000 acres of open water are available for fishing and boating. Here Largemouth Bass, Smallmouth Bass and Walleyes reign as premium game fish. Most of the tributary streams are stocked with Trout by the states of Maryland and Pennsylvania.

Susquehanna State Park

This park maintains a well-preserved section of the old S. & T. Canal Channel, including river-access to Lock Eight and the Port Deposit Outlet Lock. There is also a boat launch nearby and a water-powered grist mill, which has been completely restored to operating condition. Remains of a small canal aqueduct and the old Deer Creek Guard Lock may also be seen at the north end of the park.

Susquehanna Museum of Havre de Grace

In recent years much attention has been focused upon the Outlet Lock area at Havre de Grace. It has been the starting point for many field trips by the Pennsylvania Canal Society, the Smithsonian Associates, and has aroused much interest on the part of the Maryland Historical Trust, which has an easement on the property.

Best-preserved of all remaining relics of the S. & T. Canal, the Outlet Lock Complex was built originally on fill-ground in the river. It included a well-built, cut-masonry lock, a two-story lockhouse on the land side of the lock, a swing-bridge across the lock, a storage warehouse on the river side of the lock, and along the river, docking facilities for boats and towing craft bound to and from Baltimore and Philadelphia.

The large canal basin, located north of the Outlet Lock, and with waterlevel originally some five feet above mean-tide level in the river, though now dry, is an area being considered by the Maryland Department of Natural Resources as a "holding pond" for young shad (after rewatering) where they can grow and periodically be released to restock the river at this point.

William H. Shank, then Secretary of the Pennsylvania Canal Society, delivers the dedicatory address at the formal opening of Lock Twelve Park, below Holtwood Dam, May 22, 1969. The lock can be seen in the foreground, part of the audience behind the protective fence on the far side of the lock. The park is a project of the Pennsylvania Power and Light Company.

In 1972 a group of local citizens formed an organization known as "The Susquehanna Museum of Havre de Grace Incorporated," whose objectives were to stabilize and restore this important historic site. Much work has already been done by this energetic group, both on a voluntary basis and with professional help.

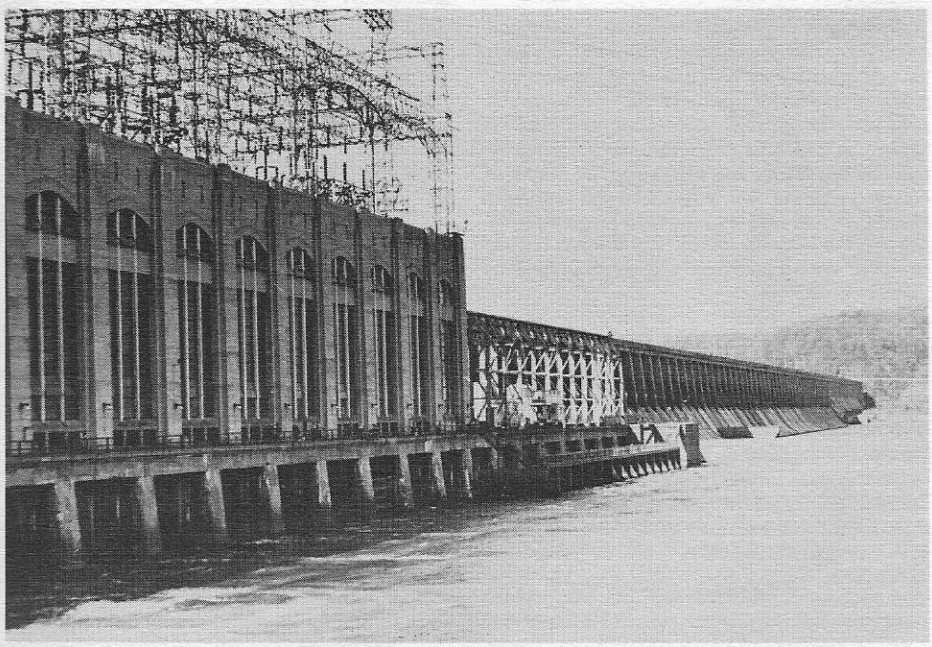
First, this organization arranged to transfer ownership of the Outlet Lock property from the Philadelphia Electric Company to the City of Havre de Grace (1970). Then, with state and federal funding and volunteer labor, they restored and rebuilt the Lockhouse and dedicated it as a Canal Museum (1982).

Then they rebuilt, in its original location, an operating replica of the old swing bridge which now once again spans the lock, securing State and federal funding to assist them.

On December 12, 1985, a meeting was held in the Lockhouse to discuss the possible rewatering of the old canal basin and the rebuilding of the outlet lock from the basin to the Susquehanna River. The meeting was called by C. Jay O'Dell, Tidewater Administrator for Maryland Department of Natural Resources, who is interested in providing a "growing area" for very young Shad in the old canal basin. The Shad would be trucked in from fish hatcheries and released to the river, through the lock, after reaching a length of about two inches.

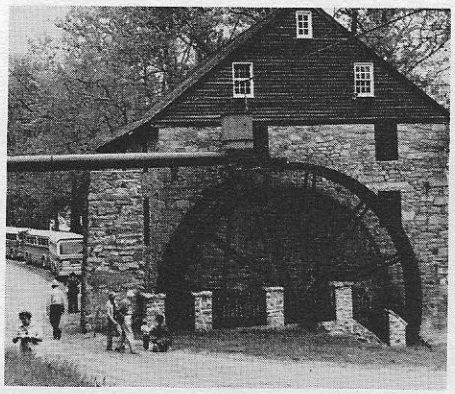
A meeting was held on July 25, 1986, also at the lockhouse, to discuss further progress of the planning for the basin and lock de-silting, plus a determination of the water level to be sought in the basin, and the method of maintaining it. It was later determined that pumping water from the river would be the most practical method of water retention.

(Concluded on Page Twelve)



Conowingo Dam, built in 1928 across the lower Susquehanna, has a "head" of over ninety feet. The fisherman's gallery can be seen at the center. This hydro-electric facility is operated by Philadelphia Electric Company.

S. & T. CANAL



In Susquehanna State Park, Lapidum, Maryland, is this restored and operating grist mill on the banks of a well-preserved section of the S. & T. Canal. An "overshot" waterwheel provides power for the mill.

(Concluded from Page Eleven)

During the summer of 1986, with the help of the Maryland Conservation Corps, a portion of the lower part of the outlet lock was desilted to a depth of seven feet in preparation for pulling one of the lower lock gates for study and ultimate duplication as the new, working gates are built. There was also a review of the tentative plans for the shad pond, as submitted by Frederick Ward Associates at a meeting September 10th at the lockhouse.

First Lock Gate Pulled

On November 4th, 1986, using a boom-crane supplied (and operated) by the owner of an adjacent marina, and a local volunteer diver, the southwest lock-gate in the outlet lock was pulled from the silt which had preserved it for the past hundred years. It was deposited on the bank of the lock for measurement, photographing and further study.

Final engineering design plans, and construction bid specifications were completed in September of 1987 by Frederick Ward Associates. A "Shallow Water Design" was adopted, with a maximum water depth of five feet. This design will permit the complete drainage of the one and one-half acre basin for fish release and maintenance.

Models of tandem canal boats, showing the chain linkage steering arrangement which made the rear boat a rudder for the front one. Note also the pilot house where the steering device was located. Built by a former canal boat captain, who after retirement lived near Lock Number Two of the S. & T. Canal at Long Level, Pa. — W.C. Olewiler.

PANAMA CANAL "NO LONGER VITAL"

ACS Member Walter L. Meseck has sent us the following item as written by Mike Billington for the Fort Lauderdale News and Sun-Sentinel, March 13, 1988:

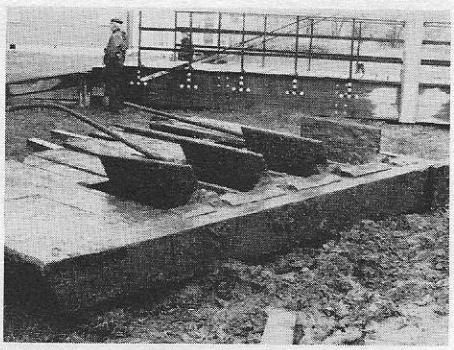
PANAMA CITY, Panama — Looking more like a department store than a ship, the "Kentucky Highway" out of Kobe, Japan slid through the Miraflores locks on its nine-hour journey through the Panama Canal to the Atlantic Ocean.

"The Kentucky Highway" carries cars, lots of them. Like other Japanese car carriers, it is a huge, ungainly vessel. It is also very efficient. And by using it and others like it to ship cars to the United States, Japanese automakers have been able to dominate much of the American car market for several years.

But do Japanese automakers need the Panama Canal to keep their shipping costs down? No.

The fact is, despite all the rhetoric about its importance, the Panama Canal is no longer very important commercially or militarily.

Commercially, the canal lost much of its luster in 1973 when the OPEC embargo sent oil prices through the roof.



The wicket-gates of this 140-year old lower gate of the Outlet Lock at Havre de Grace were well-preserved under silt in the bed of the lock. The restored swing bridge is visible in the background.

Governor Schaefer Visits the Project

Governor W.D. Schaefer of Maryland paid a personal visit to the project site on November 2, 1987. He has encouraged and promoted the development of the shad basin for the restoration of American Shad in Chesapeake Bay. Also in November a full operating and construction agreement for the facility was signed by the Mayor of Havre de Grace, the Director of the Maryland Historical Trust and the Maryland Department of Natural Resources Secretary. The Maryland Board of Public Works approved the entire project on December 30, 1987.

Lock Desilting and Final Gate Removal

Desilting of the canal lock was resumed on November 10, 1987 through the efforts of the Susquehanna Museum and a local marina owner. At the close of the season, the only lock desilting not completed was under the turning bridge, and at the northern end of the lock. The work done permitted the pulling of the remaining gate in the southeast corner of the lock, and the two gates at the north end of the lock. The entire operation was completed on November 24, 1987. It was discovered that the pairs of gates in the upper and lower sections of the lock are identical in design.

(For additional details of the Havre de Grace project see AMERICAN CANALS #56 and #59.)

Militarily, it lost strategic importance when the U.S. Navy began building aircraft carriers in the 1960s that were too large for the canal's locks.

"Is the canal strategically vital? I don't think so. Not really, not anymore," said one U.S. State Department source. As long ago as 1963, the Pentagon was recommending that it be turned over to the Panamanians because its strategic usefulness was nearing an end.

In fact, military experts said then that the presence of U.S. troops was the biggest threat to the canal because they made it a target of aggression. Additionally, the experts concluded that the biggest single threat to the canal was the possible sabotage to it by Panamanian nationalists upset with the U.S. presence here.

The Navy now has aircraft carriers stationed on both the East and West coasts, the State Department source said. "Because of that, the military value of the canal is much less than it was."

A lot has been made recently of the fact that the U.S. Southern Command is based in Panama City. From there, the command controls U.S. military actions throughout Latin America and the Caribbean.

The State Department source discounted the importance of the location of the Southern Command in Panama.

"It's here because it's convenient, but to be honest, it could just as easily be based in Miami or a dozen other places," the source said. "We live in an age of faster-than-sound airplanes, nuclear missiles, and telephones. The physical location of a headquarters is no longer as important as it once was."

Commercially, the OPEC oil embargo virtually sealed the fate of the canal and destroyed its dominant position in international trade.

"Canal traffic grew steadily every year from World War II until 1973," said Donald G. Schmidt, the deputy director of the Panama Canal Commission's Office of Executive Planning. He added that "we got hit with the oil shock and we suffered the same as everyone else did."

Until then, he said, oil-carrying ships had been a major source of traffic and income for the canal.

But with the embargo, that traffic fell off dramatically. It recovered slightly when oil was discovered on Alaska's North Slope in 1977. But, once the Alaskan Pipeline and a similar Panamanian pipeline were completed in 1982, oil tankers all but disappeared from the canal.

"That was the last big year, in fact it was the biggest year the canal ever had in terms of both volume of traffic and tolls," Schmidt said.

After 1982, he said, "We suffered a tremendous dropoff. We have been regaining some of the volume gradually, year by year, but now that's due mainly to the fact that interest rates have been low and car sales are up as a result."

The canal will probably average only about 2 to 2½ percent annual growth from now until 1999 when it is turned over to Panama under the terms of the Torrijos-Carter treaty.

"And truthfully, some years will probably be flat," Schmidt said.

In addition to pipelines, which now carry everything from oil to grain, the canal's main competition comes from the so-called "land-bridge" from Long Beach, Calif., to New York City. The land-bridge has wiped out much of the canal's competitive advantage.

(Editor's Note: The opinions expressed by Mike Billington are his own. We would be glad to hear from any ACS members who have strong feelings, pro or con, about giving away the Panama Canal to the government of Panama in the year 2000.)