AMERICAN CANALS

BULLETIN OF
THE AMERICAN CANAL SOCIETY

BULLETIN NUMBER 17 Editorial Address — Box 842, Shepherdstown, W. Va. 25443 MAY 1976

CANADA'S WELLAND CANAL

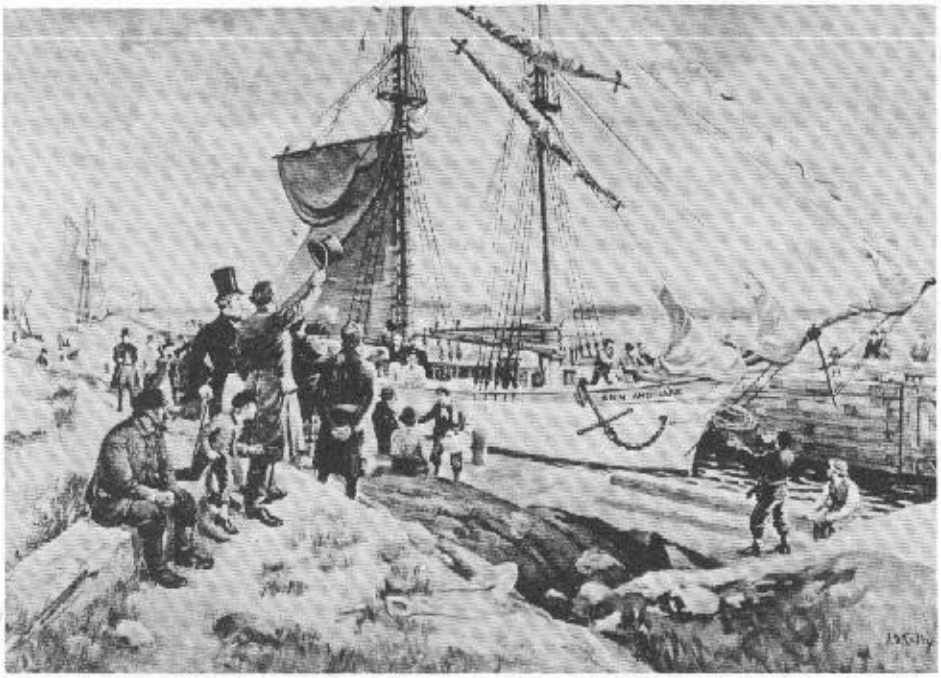
It is generally known that the modern Welland Canal in Ontario, Canada connects *Lake Erie* with *Lake Ontario*, to provide an essential link in the *St. Lawrence Seaway System* of navigation, and direct access from the St. Lawrence-Lake Ontario section to the Upper Great Lakes and the heart of the North American continent. This route of navigation was designed to avoid the falls, gorge and rapids of the Niagara River, and has taken shipping across the severe slopes of the Niagara Escarpment from 1829 onwards up to the present day.

Less well-known must be the numerous features of interest which exist along this waterway and its predecessors, the intense cultural heritage that is involved, the great historical significance of a major Canadian achievement, the plentiful nature of surviving relics from the past, plus the fascination of passing ships, and the operation of the locks. *A much greater positive and constructive advantage could be taken of such man made resources in the future than at present.*

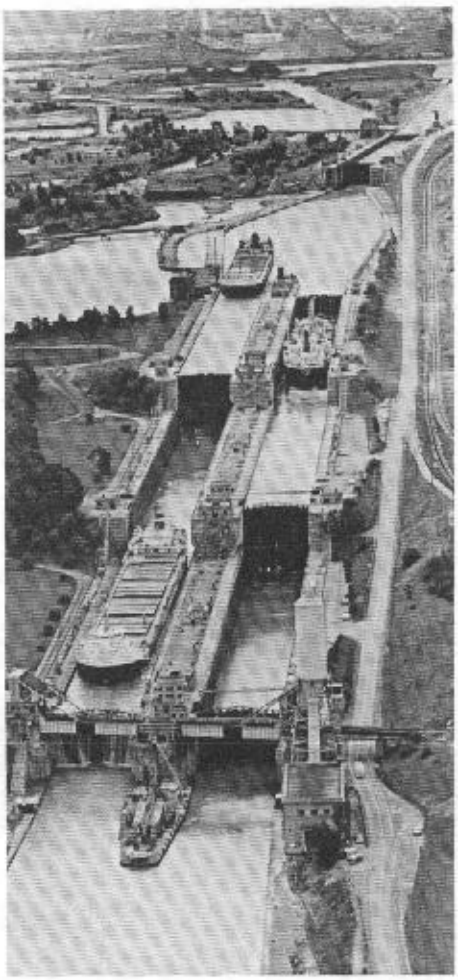
There was thought about a canal across the peninsula during the French regime, and again during the early days of pioneer British settlement, but progress towards its successful achievement really stems from after the War of 1812-1814. Business leadership was provided by a country merchant in St. Catherines, *William Hamilton Merritt*. Born an American, Merritt was only three years old when he came to Canada with his parents in 1796. With the outbreak of the War of 1812, Merritt joined the Niagara Dragoons. He was taken prisoner in 1814 and held in the United States for eight months. Transportation had been a real problem during the war and the Niagara Portage Road had fallen into enemy hands on a regular basis. Merritt could see a need for a canal system that would bypass Niagara Falls at a safe distance from the border. Moreover, the Erie Canal was under construction and Canada could not afford to lose its commerce to a more progressive neighbor.

In 1818, Merritt made his first survey, and in 1824, the Welland Canal Company, as a private enterprise endeavor, was formed for the construction of the canal. Though the original plan called for a combined rail and canal route, the company changed its plans and decided on a canal alone, making the ascent of the escarpment by a series of locks.

The first vessels to pass between the two lakes on 30 November 1829 were the Canadian schooner *Annie & Jane* and the *R. H. Boughton* of New York. The route at that time was the lower length of Twelve Mile Creek, a canal cut across the brow of the escarpment, the Welland River, and up the Niagara River to Buffalo. A direct route of 27½ miles from Port Dalhousie on Lake Ontario to Port Colborne on Lake Erie was achieved in 1833. At this time transit through the canal was accomplished by a series of 40 wooden locks with a total lift of 258½'.



A reproduction of the 1829 painting "Linking the Great Lakes" from the *Confederation Life*, showing the ANN and JANE making the first passage through the then completed first Welland Canal on 30 November 1829.



The world famous double combined locks of the Welland Canal where in three giant steps maximum size 730-foot Seaway vessels are raised and lowered approximately 150 feet in the Welland Canal transit between Lake Erie and Ontario. The locks are situated partially in Thorold and St. Catharines. Numbering from the lower portion of the photograph, these are Locks 4, 5 and 6. Two ships are making the downbound transit and the other the upbound.

With a canal between the two Great Lakes now existing, this in turn provided a significant new resource for the Niagara Peninsula

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American Canals

BULLETIN OF THE AMERICAN CANAL SOCIETY

AMERICAN CANALS is issued quarterly by the American Canal Society, with headquarters at Box 842, Shepherdstown, W.Va. 25443. Objectives of the Society are to encourage the preservation, restoration, interpretation and use of the historic canals of the Americas; save threatened canals; and to provide an exchange of canal information.

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CAPTAIN'S CORNER

Another round was recently lost in the fight to retain the terminus of the Delaware & Raritan Canal in New Brunswick, New Jersey. At issue is the question of parties concerned not considering alternatives which would permit a bridge crossing at other locations, thus saving the end of the canal. The question is a very involved one, but I think the situation facing historic preservationists is well put by one leader in the fight for the preservation of the Delaware & Raritan, Capt. Cooper R. Bright, USN (Ret), who said in a letter to the Chairman of the Advisory Council that the following important lessons have been learned from previous controversies involving historical places:

1. Private agencies and individuals must be involved early and deeply in planning and throughout in compliance with administrative processes and procedures. Experience has established that laymen can make valuable contributions which professionals might overlook.

2. Citizens must be alert to bureaucracies that will not automatically move to comply with existing laws. Having a law and its supporting guidelines, in itself, is not enough.

3. The Advisory Council on Historic Preservation cannot alone halt the irreversible and irretrievable destruction of historic places. It needs friends and the help they can provide. It also needs to know and understand the very real every day concerns and problems encountered by these friends in assisting to preserve historic places.

I agree with this position. When it comes to experts on the significance of historic canals, the best judges are those who are acquainted with the history of a canal, its engineering and architecture, and its relationship to other historic canals and waterways. We should not hesitate to question the destruction or talk of destruction of historic structures; if we do, they will be gone before we next have a chance to think about it. I urge each of you to know the canal structures in your area and to take a stand when they are threatened. Turn to your local or state historical society, to your national congressmen or state legislators, to the newspapers. If federal funds are involved, and the structure is on the National Register of Historic Places, inform the Advisory Council on Historic Preservation, Washington, D. C. Our voices must be heard and our views made known; otherwise the wanton destruction of historic canals and other structures in the United States will continue without due consideration of each as to its significance and meaning within the total context of our history and our culture.

Tom Hahn, Editor

Can You Top This One?

Readers might like to check the latest edition of the *Guiness Book of World Records* to see if they have any record-breaking canals and locks to offer. According to the 1975 edition (Bantam paperback, $1.95) the oldest canal remains date back to 5000 B.C., in Iraq; the longest canalized system is the Volga-Baltic Canal (1,850 miles, opened in 1965); the longest ancient canal is the Grand Canal of China (1,107 miles, 540 B.C. – 13th Century); the longest big ship canal, the Suez Canal (100.6 mi., begun in 1859); the longest artificial seaway, the St. Lawrence Seaway (189 mi.); the longest irrigation canal, the Karakumskly Kanal in Russia, expected to be 870 mi. long by 1975, and navigable for at least 280 miles.

The largest lock system is the Miraflores Lock on the Panama Canal, two locks each 1,050 x 110' (1914); the largest single lock is the one connecting the Schelde with the Kanaaldok System west of Antwerp (1,640' x 187'); the deepest lock is at Wilson Dam on the Tennessee River (100' lift, 1959); the highest lock elevator is the Arzwiller – Saint Louis in France (146', replacing 17 locks, in 1969).

The largest cut is the Gaillard Cut on the Panama Canal, 270' deep and 300' wide at the bottom; the longest canal-tunnel is on the Rove Canal in France, 4.53 miles long (1927).

Any disagreements or new world records? Send them to Guinness Superlatives Ltd., 2 Cecil Court, London Road, Enfield, Middlesex, England. (Bill Trout)

MODEL BOAT BUILDER

William Etzel, 325 Denniston Avenue, Pittsburgh, PA 15206, a member of the American Canal Society, is a well-known Pennsylvania boat model builder whose models were featured in the Pittsburgh Press in the 1940s. Mr. Etzel is a retired U.S. Steel worker.

AASLH LISTINGS

One of the small projects of ACS has been to see that canal societies are listed in the *Directory of Historical Societies in the United States and Canada*, published by the American Association for State and Local History (AASLH) of which ACS is an institutional member. The 1975-76 edition has 4,036 societies in its 434 pages and a separate listing by special interest – the canal societies are under "Transportation Societies". Unfortunately, of 14 societies in the main listing, at least four did not return the questionnaire sent by AASLH so were not listed under specialty, and if they don't return the questionnaire for the next issue, 1977-78, they will be left out entirely! This directory is *the* reference work on historical societies, available in any good library, so if your society was or is about to be left out, be sure you make the next edition. The directory is published by AASLH, 1400 Eighth Avenue South, Nashville, TN 37203, at $20 ppd., $15 to members of AASLH. Be sure it gets on the reference shelf of your library.

A New Jersey Canal Never Finished

On February 21, 1860, the New Jersey Legislature passed an Act incorporating the *Morristown, Hanover and Pequannock Canal Company* with authority to "make, construct and complete a canal or artificial navigation, commencing at or near Morristown, in the county of Morris and running through the townships of Hanover and Pequannock, to the Morris Canal, so as to intersect the same at the most convenient and accessible point in the township of Pequannock". The Act stated "it shall be lawful for said Company, by means of a raceway or canal, to connect the water of the Rockaway River with the said canal; *provided* that the waters so taken from the Rockaway River or any of its tributaries, be not in any way mingled with or emptied into the Morris Canal, but it shall be returned into said tributaries or into the Passaic River, above the Great Fall of the Passaic."

A capital stock of $200,000 was authorized and George T. Cobb, William C. Baker, William G. Lathrop, Ephraim Marsh, William H. Talcott and Augustus C. Cutler were named commissioners. Among these names are those of men active in the Morris Canal and the New Jersey iron mines and iron works. The Company was authorized to charge no more than three cents per ton mile, on the passage of coal, lime, gypsum, iron ore and stone with a proportionate charge on other materials. Permission was given to employ all kinds of people to conduct the affairs of the Company and to construct "such locks, planes, works, devices, wharves, toll houses and offices necessary for the use of said canal."

The Civil War put a halt to such expansion schemes and by the war's end the Morris and Essex Railroad had been completed across New Jersey starting the Morris Canal on its slide toward extinction. Since the men named as commissioners were experienced in canals and iron works it would be interesting to know if the route was surveyed and any plans prepared. (Submitted by ACS Member, Kenneth R. Hanson, 1973 Wood Road, Scotch Plains, NJ 07076.)

THE HIWASSEE CANAL

by L. W. RICHARDSON

Tennessee escaped the "canal fever" that infected nearly all of the country in the early 1800's. There were many reasons for this immunity but there is no doubt that the principal factor was the peculiar topography of the Volunteer State. A glance at a relief map of the region will make this clear. Populous enough to become a state by 1796, settlement had largely concentrated in a few favored areas. The most important of these was the section known as "East Tennessee," the rich coves and valleys of the upper Tennessee River and its many tributaries, from the Virginia line down to the border of the Cherokee Nation, below present Athens.

The East Tennessee settlers were effectively cut off from the outside world. To the north there was the long, expensive haul by wagon up the Valley of Virginia and on to the eastern markets; to the east was the forbidding wall of the Blue Ridge mountains; to the west an almost impassable plateau. The obvious solution was the river, flowing southwest into Alabama, then north to the Ohio and down to the Mississippi and the port of New Orleans. This was not only a long trip (it required from three to as long as five months), but it was a very dangerous journey. Below the site of present Chattanooga, boatmen were confronted with over a hundred miles of shoals, rapids and whirlpools. Only when the river was full could these obstructions be passed with any certainty. Upstream navigation was nearly impossible at any level of the river.

Sometime after 1800, a partial solution to this dilemma began to be recognized. In that part of the Cherokee country that is now Polk County, Tennessee, an age-old portage came to the attention of the rivermen. The way was from the Tennessee, eastward up the Hiwassee and the Ocoee Rivers to the head of navigation on the latter stream. From this point, a portage path of less than a dozen miles over a moderate height of land, led south to the Conasauga River. Once in the Conasauga, a boatman could voyage safely into the Oostanaula, the Coosa and the Alabama Rivers to the Gulf coast at Mobile. Except for the laborious unloading, hauling and reloading at the portage and the problem of building or trading boats, this route was quicker, safer and possibly, less expensive.

Traffic became brisk over the portage and it soon attracted the attention of two Cherokee entrepreneurs. John Hilderbrand, a German with a Cherokee wife (by tribal law, this made of him a Cherokee), opened a boatyard and trading post at the northern, the Ocoee end of the portage. About the same time, David McNair opened a similar enterprise on the Conasauga. McNair was half Scot and half Cherokee. These men built boats, traded in boats and cargoes and together, supplied the teams and wagons needed on the portage. The teamsters and other employees of the two firms were largely, if not entirely, Cherokee tribesmen.

Sometime in 1820-1821, an unknown frontier genius conceived the idea of building the running gear of a wagon of a size and strength to haul boats, with cargo, over the portage road. Ramps were built at the boatyards and the wagons were put into the water just as our motor boat trailers are today. These rigs usually demanded the power of six spans of oxen to move them but they worked. It must have been the first such commercial operation in this country! Exactly when it began is not certain, the earliest documentation is found in Niles Weekly Register, March 24, 1821, quoting the Montgomery (Ala.) Republican.

"We this day announce the arrival of a boat, the *Tennessee Patriot*, from East Tennessee with flour and whiskey, the history of which no doubt will seem almost incredible to strangers. She is a keel boat 50 feet long, 6 feet deep, and is capable of carrying near 100 barrels. She was built at West Point (Kingston) in East Tennessee, where she was loaded for this place, and proceeded down the Tennessee River a hundred miles to the mouth of the Hiwassee, thence 65 miles to the entrance of the Wocoa (Ocoee), up the latter a certain distance, whence she was transported, with her cargo, 10 miles by land to the Connusago (Conasauga), thence to and down the Eastonulla (Oostanaula) through the Coosa into the Alabama River, a distance of near 1,000 miles from the interior."

The activity at the portage and the prosperity of the Indians who controlled it, brought it to the attention of the white power structure of the state. It was inevitable that charges of monopoly and high fees would surface. Responding to the complaints, in 1826 the Tennessee Assembly granted a charter to the Hiwassee Canal Co. Federal assistance was requested to obtain permission from the Cherokee Council to build a canal at the portage and to assure the right of free passage for white boatmen through the Indian country. As this would be a tri-state project, the Governors of Alabama and Georgia were asked to help promote the project and to improve the rivers within their jurisdiction. Alabama responded and stated that a program was then under way to improve the Coosa. Georgia, at the time more interested in her own Northwest Canal plans, expressed no interest.

The plea of the Tennesseans for Federal help was answered in April, 1827, when Lt. Jefferson Vail and civilian engineer James Swift arrived in Knoxville. In the next few months the two surveyed and mapped the canal route. Lt. Vail's report to General Bernard, March 22, 1828, states that three possible routes were examined and that it was found that the portage haulway was the shorter, slightly less than ten miles. He proposed a canal 50' wide and 5' deep with ten locks on the Ocoee side of the summit level and five locks down to the Conasauga. This difference in lift was occasioned when the Ocoee was found to be 46.6' lower than the Conasauga. Vail could forsee no difficulty with the excavation of the canal, the only real problem was in obtaining a proper water supply for the summit level. He resolved this by running a line for a feeder five miles up the valley of the Ocoee to Round Mountain. Here, the river passed through a narrow mountain gap and Vail proposed a dam, 134' high! This was the most vulnerable part of his report, a dam of that height would have strained the engineering skills of the time. Today however, the Parksville (Ocoee #1) Dam of the TVA, only a little higher than Vail proposed, stands in the gap. Their work on the Hiwassee completed, Vail and Swift went down the river into Alabama, there to begin the first Federal surveys of the Muscle Shoals region.

After the surveys were made public, Federal Commissioners were sent to treat with the Cherokees. The Indian Council refused to grant any rights of canal construction or to stop collecting toll on boats passing through the Nation. It is not hard to understand this intransigence. Both McNair and Hilderbrand had become wealthy from the portage trade and both men could exert considerable influence on Indian affairs. They did not want to lose a profitable business. Just how profitable is evident from a remark by McNair to one of the Commissioners. He stated that in one year, over 12,000 gallons of whiskey had been taken over the portage! And that was only one of many products being shipped from

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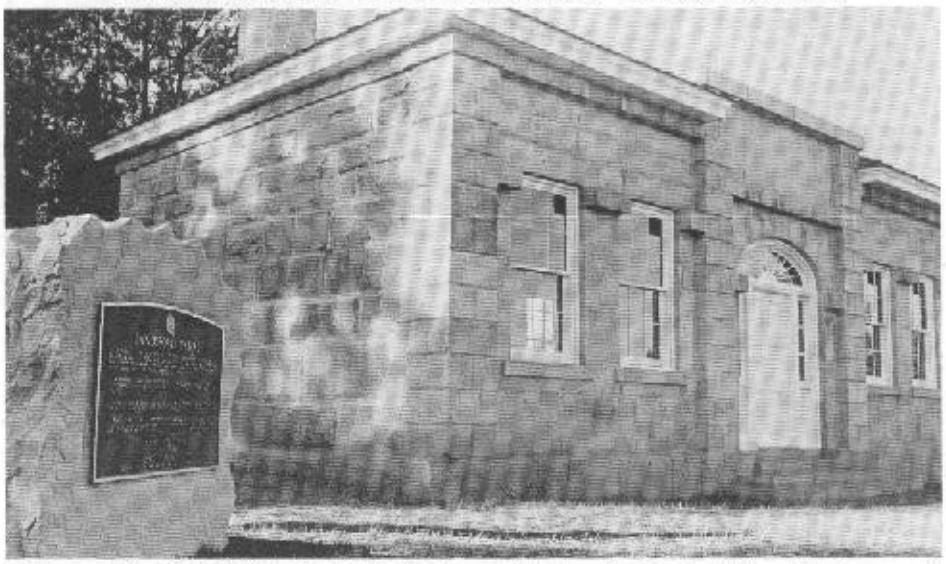
Landsford Canal Park Dedicated



The Landsford Canal State Park (Jim Work, ACS, Superintendent) at Catawba, SC, was dedicated on 18 November 1975. A part of the project was the removal of the granite lock house on the Rocky Mount Canal at Great Falls, SC to this site. The photo above, (taken by Joel Nichols and provided by E. T. Crowson, ACS), shows the lock house in place at the new park.

Text of the commemorative plaque (shown above) is as follows: "Landsford Canal – A vital link in South Carolina's Internal Improvements Program of the 1820's, the canal stands as a monument to the following men who typified the South Carolina spirit during this first great era of public works building:

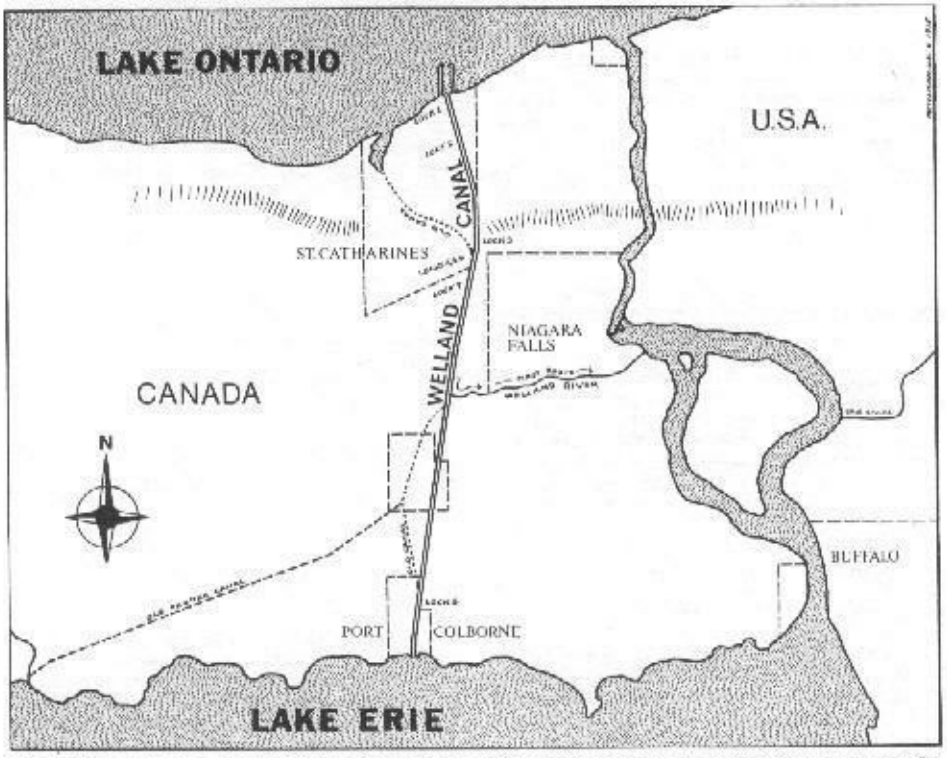
"William R. Davie, distinguished general, lawyer, educator, and statesman, who dreamed of the canal and donated the land for it.

"Robert Leckie, engineer and master stonemason, who designed the canal and supervised its building.

"Robert Mills, Joel Poinsett, and Abram Blanding, who were planners and builders for the South Carolina Board of Public Works during this significant period of the state's growth.

"A Bicentennial Project, erected November 18, 1975, by The South Carolina State Society, Daughters of the American Revolution."

CANADA'S WELLAND CANAL



The Welland Canal, connecting Lake Ontario with Lake Erie, is an essential part of the St. Lawrence Seaway. (M. Killman, ACS)

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and attracted mills, industry and towns to its banks. In 1841 the canal was purchased from its private stockholders by the government which made improvements in the canal. The canal (called the *Second Welland Canal)* was widened, deepened and straightened, being completed in 1848. In the process the number of locks was reduced from 40 to 27, the wooden locks being replaced by cut stone locks of a larger capacity. Ships carrying 750 tons of merchandise (previously 165 tons) were now able to pass through the canal system.

These modifications, in their turn, became redundant. Steam ships had begun to replace the old wooden sailing vessels and an 1870 Royal Commission determined that ¾ of the tonnage on the lakes could not go through the existing locks. Consequently, a *Third Welland Canal* was constructed during the 1870s and the 1880s. Port Dalhousie remained as the northern entrance, but the previous meandering course was forsaken in favor of a diagonal approach and a new canal cut to cross the escarpment. The locks were again increased in size and reduced in number from 27 to 26, and the depth of the canal was increased from 9 to 14'. The route above the escarpment (south of it) was straightened in its route to Port Colborne. At this point in time, a distinctive new type of lake vessel was being developed to take advantage of the canal system. The result was the Great Lakes "Canaler"; a bulk carrier that literally was a self-propelled barge.

The present or *Fourth Welland Canal* was constructed to an even larger scale and a broader set of dimensions. A new alignment was followed across the Ontario Lakeshore Plain to the escarpment, forsaking Port Dalhousie and the Twelve Mile Creek for a new entrance at Port Weller, now following an almost direct north-south route. These works were initiated in 1913, suspended during the First World War, and became operational in 1932. The Fourth Canal included seven new lift locks and a new guard lock at Port Colborne. The latter is 1,380' long and, until recently, the largest in the world. The canal now had a controlled depth of 27' and the lock dimensions became the standard for the entire Seaway. This in effect made the Welland Canal the first link in the St. Lawrence Seaway. The entire cost of the first Seaway link was borne by the people of Canada.

The latest event in this intriguing succession of improvements to modify and increase the capacity of the system was the building of a new canal by-pass between 1966 and 1973. The bypass speeded up transits by approximately ¾ of an hour. Included in a 1966 proposal for the enlargement of the system was a new alignment at the replacement of all lift locks at the escarpment with locks of larger lift and dimensions. While certain of these works were initiated for a brief period all is at a standstill, now awaiting Federal decision as to future canal requirements of ship size, traffic and general tonnage demand. Therefore, since its inception, there have been a whole series of operations to re-dig, widen, deepen and re-align the canal. The signal importance of such alignments is that many of the earlier features of canal endeavor remain etched into the landscape. They provide visible, and often highly attractive reminders, of former canal circumstances. *They are capable of renewed and constructive use in the recreational circumstances today, both as historical – cultural assets and in terms of passive and active recreational pursuits, for both Canadians and visitors from the United States, the latter of whom visit nearby Niagara Falls in numbers of approximately 15 million annually*. Already over ½ million people annually visit the Lock 3 Park at St. Catharines.

In terms of engineering and technological achievements, some magnificent stretches of the Second and Third Canal lock systems survive in St. Catharines. Some of the First Canal locks have been buried and perhaps could be unearthed or reconstructed. Locks are often the most exciting of canal structures, but the interest of other engineering features should not be ignored. For example, the sheer task of digging the First Canal, organizing the supplies, attracting the labor force, and overcoming the difficulties of terrain, is a pioneer saga of great renown.

The bridges and tunnels that cross the canal are also of great interest. The First, Second and Third Canals were taken over the Welland Canal by aqueducts, with each being a noted feature of the period, and with the Second Canal aqueduct now surviving as a unique and distinctive municipal swimming pool. There is even a delightful curving railway tunnel (now abandoned) under the Third Canal (now abandoned) east of St. Catharines. *Only one village existed on the line of the canal before its inception, namely St. Catharines.* The sheer presence of the canal, its associated raceways, the opportunities for trade and the abundance of power for mills transformed the small village to an important industrial town. In addition, a recent report identified 6 of 15 sites having a high recreational potential in St. Catharines. *Of all the towns now along the present or earlier versions of the Welland Canal, St. Catharines is the one which should be the most proud of its canal history and its present-day cultural, historical and recreational national treasures, and the canal is truly the major formative element in its past and present credentials.*

(Compiled largely from an article by Murray Killman in the *Buffalo Courier-Express* and "The Recreational Potential of the Welland Canal System in the Niagara Peninsula of Southern Ontario" by John N. Jackson, Ph.D.)

Seaway Sailing

For those *canal watchers* who will be visiting the many parts of the *St. Lawrence Seaway* from Montreal to Welland to Sault St. Marie, there is a new brochure that shows where all the observation platforms are. It is called *Welcome to the Seaway*. Americans may write: St. Lawrence Seaway Development Corporation, Seaway Circle, Massena, NY 13662. Canadians may write: St. Lawrence Seaway Authority, Information Office, Transport Canada Building, Place de Ville, 330 Sparks St., Ottawa, Ontario, K1R 7R9.

Another very nice brochure, *Sail the Seaway and Save,* showing all the deep water ports and describing the economics of the St. Lawrence Seaway, is obtained from: Massena, NY. All publications named are free.

There is no cost to take a pleasure boat through any of the locks at Sault St. Marie. The cost through the Welland Canal for eight locks is $24.00. The cost for the Locks on the St. Lawrence River part of the Seaway is $2.00 each lock.

There are two ways of going through the Iroquois Lock at the Western end of The St. Lawrence part of the Seaway. One, you can go through the lock in the normal manner by waiting for the lock master to call you in and make your passage or if you are a small boat you can go through the chute. You say, what is a chute? Well, in this case it means that one of the gates in the dam is lifted and you may go over the dam. This is not as bad as it sounds but for a few seconds one does run through the dam pretty fast. When you arrive at this dam, dock your boat and use the transient boater telephone for instructions. There are two gates, one for downstream traffic and one for upstream traffic. Each gate is marked: black for downstream and red for upstream. This is a fun trip but ask the lock master for dimensions of the chute; I do not recommend that a large boat get stuck in this gateway!!

(Bev W. Murant, Chairman, Navigable Canals Committee, 61 W. Bonita, Sierra Madre, CA 91024. Canal navigation information welcomed!)

San Antonio's Spanish Aqueduct

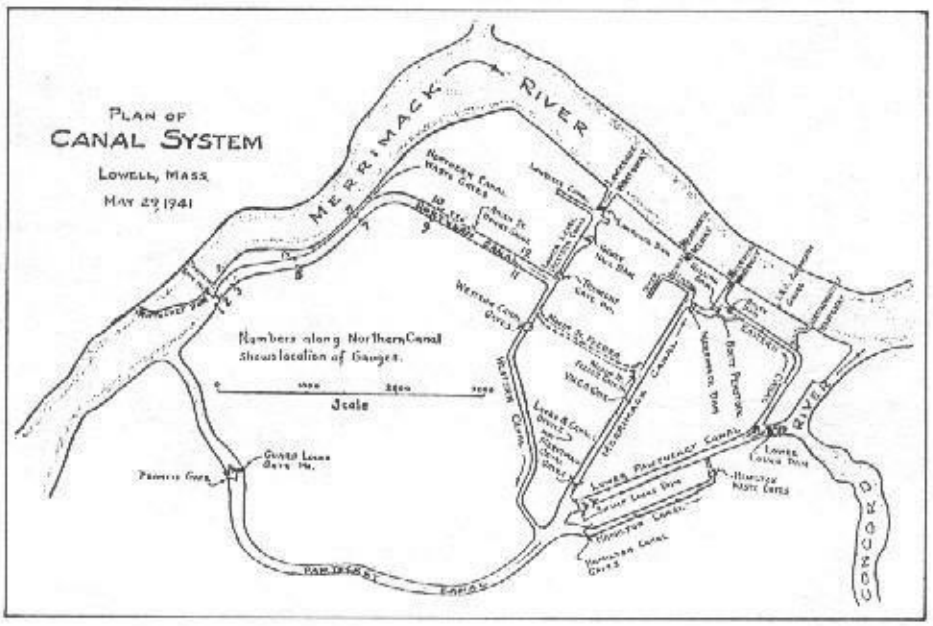
The Espada Acequia (a ce' kya) which still carries water for two miles from the San Antonio River to the Mission San Francisco de la Espada, was constructed between 1731 and 1745 and is the best preserved of its kind in Texas. Take Loop 13 on the southern outskirts of San Antonio, turn south immediately west of the bridge over the San Antonio River, and stop at the dam. The smaller Espada Dam is on the right, built of flagstones which over the years have been cemented together by calcium deposition from the water. There is no trail at present along the acequia, or canal, from the dam. Drive across the river on the low-water bridge and follow it south to the next road (Ashley); turn right on it to re-cross the river and then the acequia, then left down Espada Road a few yards to the Espada Aqueduct (UTM 14.552330.3244730, Southton Texas 7½' quad). The spanish built so well two and a half centuries ago that one can still walk across the 3-arched stone aqueduct, and it still carries water – clearly one of the most important early water engineering structures in North America. All of the acequias around San Antonio have been declared a National Historic Civil Engineering Landmark by the ASCE, and the aqueduct has been placed on the National Register of Historic Places. Now what we need is a map clearly showing where all these acequias were and how to get to the remaining ones.

Espada Aqueduct, San Antonio, Texas. (Photo by Bill Trout)

The Espada Acequia is just one of the many canals featured in *Water for the Southwest*, 206pp., illustrated and documented, available at $5 ppd. from the American Society of Civil Engineers, 345 E. 47th Street, N.Y., NY 10017. Here you can read about the break in the Imperial Valley Canal which produced the Salton Sea in California; the 12th Century Hohokam canals near Phoenix, at Montezuma Castle National Monument (NPS) which have been preserved because they have become lined with calcium deposits, and the Hohokam canals at Pueblo Grande (NPS) which were lined with clay for waterproofing; the 5.8 mile Gunnison irrigation tunnel (1905-9) in Colorado; the "Big Ditch" for hydraulic mining in the gold fields of New Mexico (1868-69), 41 miles long, 5 miles through solid rock, which leaked so much that only 1/6 of the water made it to the far end; the Hondo Reservoir in New Mexico (1904-7) which also leaked so much that it was never used; and the Santa Fe waterworks earthen dam (1893) which was puddled by a herd of 115 goats on a regular schedule. Now what we need is a thorough review of what is known about prehistoric and early canal engineering techniques – an exciting exercise in prehistoric industrial archaeology.

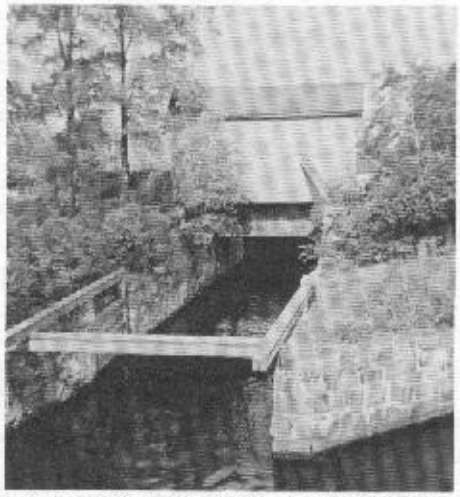
Water for the Southwest is part of the work of the Historic Engineering Site Inventory of HAER and ASCE (History of Engineering Program, Box 4089, Texas Tech University, Lubbock, Texas 79409) which has initially concentrated on the Southwest but may eventually cover the entire U.S., and very definitely enter the field of historic navigation canals. (Information from T. Lindsay Baker, Research Associate, History of Engineering Program) (W. E. Trout, III, Ph.D.)

LOCKS AND CANALS CORPORATION



The forest-covered shores of the Merrimack River in Massachusetts gave rise in the 18th century to the rafting of logs downriver to Newburyport for the shipbuilding industry and for shipment to other ports. However, the Pawtucket Falls and the rapids below made an overland journey necessary. To overcome this obstacle, a canal was proposed and planned around the falls. An act was passed on June 27, 1792 incorporating a group of prominent residents into "a body politic and corporate forever, by the name of the *Proprietors of Locks and Canals on Merrimack River.*"

The *Pawtucket Canal* was "cut on the side of Chelmsford beginning near the 'Great Landing Place' thence running to 'Lily Pond' from thence by 'Speen's Brook' to Concord River." Four sets of locks were involved – the Guard Locks (at Broadway), the Minx Locks (near Joan Fabrics), the Swamp Locks (just below the Thorndike Street bridge) and the Concord River Locks (at the rear of the old Rex or Prescott Mill Property on East Merrimack Street). A footbridge passes directly over the latter and permits an excellent view of the lock construction.



***Francis Folly* at Lowell, Massachusetts, built in 1848 and reconstructed in 1870 was built to hold back flood waters. Lowered in 1936, it held back a 28 foot wall of water, saving the city of Lowell. (Photo by Alden Gould)**

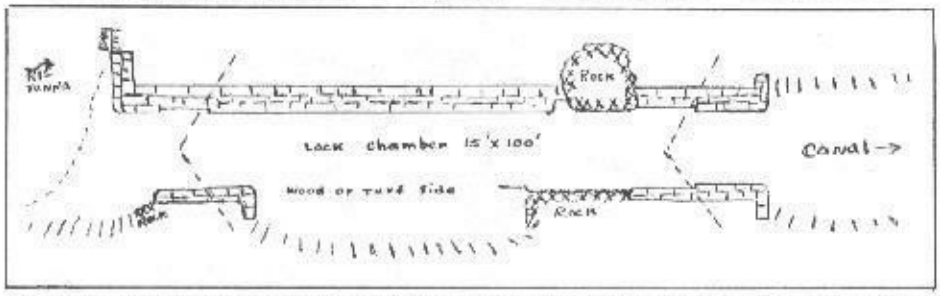
The canal was completed in 1797 and was the first in the country. But the opening ceremonies would today be a press agent's nightmare. As the first boat passed through the first lock, the sides gave way and officials, passengers and spectators found themselves in the water. Fortunately, no lives were lost and the canal was put into use. But even before the canal was opened, another nearby construction project, the Middlesex Canal was sounding the death knell for the fledgling waterway. The Middlesex canal soon found itself in the same position with the construction of the Boston and Lowell Railroad.

One of the dramatic points of interest is a dam known as the *Francis Gate* on *Broadway Street*. It is a guard lock consisting of a massive timber gate 27 feet wide, 25 feet deep and two feet thick, built in 1848. James B. Francis, then chief engineer of Locks and Canals, built this dam to prevent recurrence of damage caused by floods in 1785. Unfortunately, many of his contemporaries did not appreciate the wisdom and foresight of their local genius and his dam was greeted with scorn and derision and was long regarded as a monumental waste. During the many years that the gate remained suspended, it was known as *"Francis' Folly"*. Then in March, 1936, the treacherous Merrimack went on a rampage. The massive gate was at last ordered dropped and together with a sand-bag reinforcement, it held back a 28-foot wall of water and saved the City. (By Joseph V. Kopycinski, Librarian, Lowell Technical Institute.)

Cape Cod Canal Collection

The Massachusetts Maritime Academy has established an historical collection of information and artifacts on the Cape Cod Canal. The Academy is at the west end of the Cape Cod Canal in Buzzards Bay, an ideal location. So far, included are various documents and publications obtained from the National Archives and Record Service, such as: "Operation of the Cape Cod Canal, 1920"; "Atlantic Intracoastal Canals, 1918"; "Notes on the Cape Cod Canal, Dec. 14, 1921" by Charles Maass, Secretary, Boston, Cape Cod and New York Canal Company, and numerous reports and correspondence from 1907-17. For information contact Richard D. Poisson, Massachusetts Maritime Academy, Buzzards Bay, Mass. 02532. (Information supplied by Barbara Ann Holley, Lippencott Library, Philadelphia.)

VIRGINIA'S FIRST SCENIC RIVER



The Union Mills Lock, built for mule-drawn canal boats in the 1850's, was primarily of cut stone, but incorporated bedrock as well, and part of one wall was of wood. (Drawing by Bill Trout)

The twenty miles of the *Rivanna River* in Fluvanna County, Virginia – from 10½ miles below Charlottesville to the mouth on the James River at Columbia – has been declared Virginia's first Scenic River by the state legislature.

Navigation improvements on the Rivanna date back to *Thomas Jefferson*, whose famous home, Monticello, is near Charlottesville. When Jefferson completed his education at William and Mary and returned to Albemarle County, he set afoot plans to make the Rivanna navigable. In 1763 he and some of his friends collected 500 pounds to clear the river of obstacles and build small wing dams at shallow riffles. This civic project won him a seat in the Virginia legislature, the beginning of his political career. Before he became president he made a list of his "undertakings" that had benefited his country, and making the Rivanna navigable topped the list. He was also interested in the plans to make the *James River* navigable, and while in France he placed his carriage on a canalboat for awhile and explored the Canal du Midi.

In 1805 the Rivanna Navigation Company was organized, and by the 1830's there was a series of some eighteen wooden locks and thirteen dams for batteaux, powered by poles and oars. This navigation system extended to Charlottesville and above, for there were several wooden locks at the mill dams on the Rivanna above Charlottesville. In the 1850's the navigation system in Fluvanna was rebuilt for mule-drawn canal boats, with nine stone locks and two long canals, the *Union Mills Canal* at the upper end and the *Rivanna Connection* at the other – the latter connecting with the *James River and Kanawha Canal* at Columbia. There was another short canal below the dam at Broken Island. The Scenic River section includes all of the best remains, including some good sites from the old batteau navigation, and they have been written up for the National Historical Register.

By car, the most accessible lock is at Palmyra, just below the U.S. Highway 15 bridge near a mill foundation; piers of a covered bridge are above the bridge. The Old Stone Jail Museum in Palmyra has some material on the navigation and can furnish additional information on request. There are stones from the James River-Kanawha Canal in the yard and a set of paddle wheels from a sunken canal boat found on the Rivanna.

The Union Mills canal is crossed by county route 600. To reach it, take U.S. 15 north, turn left on route 616, and left on route 600 to the west bank of the river. The towpath can be followed upstream two miles to the unusual Union Mills lock, and ½ mile downstream to a well-exposed lift lock. We hope this canal will be protected from further encroachment by the nearby housing development called Lake Monticello. We hope the developers and the homeowners will come to realize what a great asset the canal can be, as a quiet riverside trail, connected, after all, with Jefferson himself.

At the lower end of the navigation, the 4½-mile-long Rivanna Connection Canal is crossed by State route 6 west of Columbia, just before the road crosses the river. This canal is in private ownership at this time, but would make a perfect trail, park or even a restoration, greatly benefiting the small canal town of Columbia. The last one-half mile of the canal near Columbia can be seen from route 6. Further details of the canal at Columbia will appear in a future edition of the *American Canal Guide*.

For the convenience of those who wish to put a boat in the Rivanna, the Virginia Commission of Inland Game and Fisheries has boat ramps at the route 600 and highway 15 bridges, and one on the James River at the mouth of the Rivanna on route 690 (at the James River bridge at Columbia). The minimum canoeing time from route 600 to highway 15 (Crofton to Palmyra, 6½ miles) is two to three hours, and from highway 15 to route 690 (Palmyra to Columbia, 15 miles) is about 6½ hours.

For a detailed discussion, with maps and diagrams, of the Rivanna navigation remains see the essay by Bill Trout at the JR & K Canal Library in the Reynolds Metals Packaging Division at 11th and Byrd Streets in Richmond, or in the Old Stone Jail Museum at Palmyra.

The citizens of Fluvanna County are to be congratulated for their far-sightedness in supporting the Scenic River designation. To congratulate them and urge conservation and future development, write the Editor, *The Daily Progress*, Charlottesville, Virginia 22901. (Bill Trout and Minnie Lee McGehee, Box 132, Palmyra, VA 22963.)

HIWASSEE CANAL

(Concluded from Page Three)

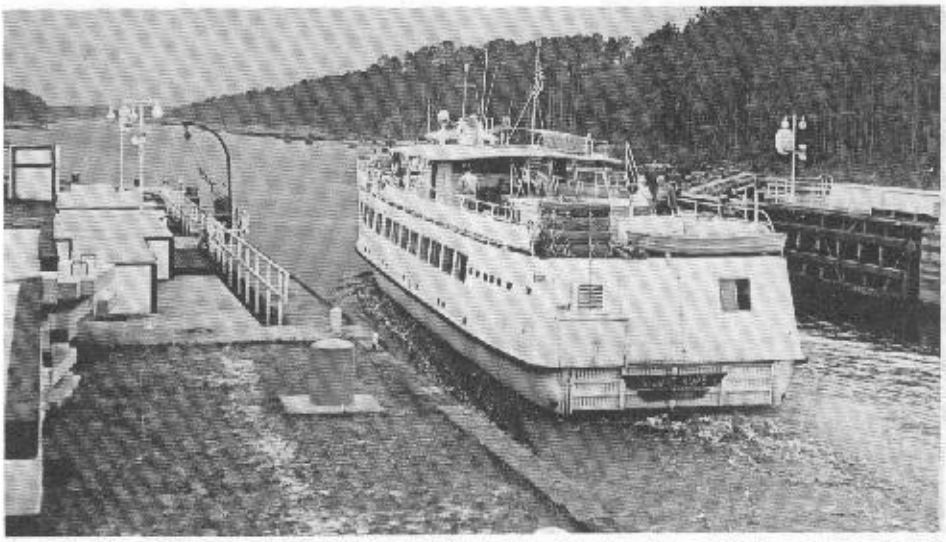
the upper Tennessee country. Though it must be admitted that the manufacture of spirits was the leading "cottage industry." In East Tennessee, every "rill had its still."

In this prosperous period, both boatyard owners built fine homes, each within sight of his respective business. The Hilderbrand place was a two story, frame mansion, said to be the most luxurious in the Nation. It still stands, though in very bad condition in recent years. It has recently been sold and moved a short distance from the original site. The new owner has announced plans for a full restoration of the historic building. Those who would like to see it (from the road, it is not open to the public), should enquire at Ocoee (5 miles south of Benton on U.S. 411) for directions to the "Old Portage House." It is about two miles northeast on an unnumbered road. Traces of the old portage haulway remain in a few spots but are hard to find without a local guide.

The McNair home was a substantial, two story brick but it succumbed to the wreckers some years ago. Only one relic remains to tell of the McNairs, a small burial plot, near the site of their home. This is located about a hundred yards west of Rt. 411, opposite the village of Conasauga, Tenn. An historical marker stands on the east side of the road. In this plot are the graves of McNair and his wife. (This is private property, keep gates closed.) Set in the low stone wall that surrounds the little cemetery is a stone tablet with this inscription:

> "SACRED – To the memory of David and Delilah A. McNair, who departed this life, the former on the 15th day of August, 1836, the latter on the 31st day of November, 1838.
>
> Their children, being natives of the Cherokee Nation and having to go with their people to the West, leave this monument not only to tell of their regard for their parents but to guard their sacred ashes from the unhallowed intrusion of the white man."

A pathetic reminder of the tragic story of the Cherokee Removal!



The Albemarle and Chesapeake Canal at Great Bridge, Virginia, showing the mini cruise liner *Mount Hope*, which is now renamed as the *Arkansas Explorer* which plys the Arkansas River. (Photo by Alexander C. Brown, ACS)

FORT FRANCES CANAL

To the uninitiated, the rivers on the international border of Canada and the United States are an enigma. A casual map inspection of the area between The Lake of the Woods and Lake Superior near Grand Portage, Minnesota, gives the impression that The Lake of the Woods drains eastward and discharges into Lake Superior. Close examination shows just the opposite to be true; Rainy Lake, Rainy River and The Lake of the Woods all drain north into the Arctic Ocean!

While attempting to locate vestiges of the little-known Fort Frances Canal, I was confronted with a topography in which everything was reversed. The Rainy River between Fort Frances, Ontario, and International Falls, Minnesota was flowing in the wrong direction. However, after getting oriented on the Canadian bank of the river, the pursuit of a canal prism began in earnest, but with little results.

In a city park, on the banks of the Rainy River, is a plaque placed by The Archaeology and Historical Sites Board of Ontario which reads as follows:

"Fort Frances Canal 1878. Constructed 1875-1878 during Alexander Mackenzie's administration, as part of a larger project intended to improve communication with the West, the Fort Frances Canal provided unbroken communication between Rainy Lake and The Lake of the Woods. In conjunction with land and water stretches of the 'Dawson Road' between Lake Shebandowan and The Lake of the Woods, it provided temporary connection with completed sections of the C.P.R. [Canadian Pacific Railroad]. The importance of the canal diminished when the C.P.R. route was altered to follow a more northerly direction. The nearby waterway facilitated steamship navigation until 1908, when it was incorporated into the adjacent dam and power development."

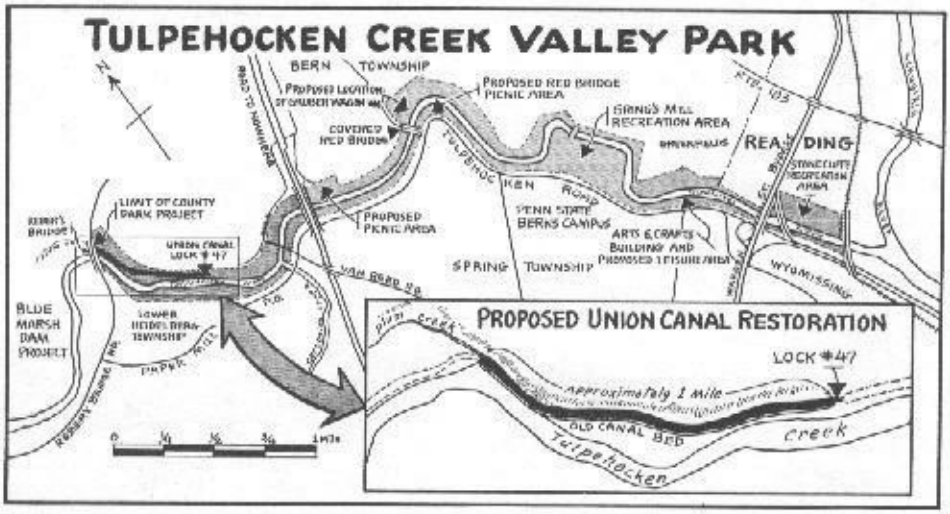
A search of the general area of the plaque showed no evidence of a canal. The open spaces in the park and in an adjacent cemetery revealed no traces of a canal prism. A small railroad yard upstream from the burial grounds could have obliterated any canal facility there. The hydro power plant beyond could have finished the job. Judging from the rapids in the Rainy River, canal locks would have been necessary to overcome the swift waters encountered at this point. The American city across the river from Fort Frances is named *International Falls*. The elevation of Rainy Lake at Fort Frances is 1108 feet above sea level; The Lake of the Woods, about 60 miles downstream is 1060 feet above sea level thus the two lakes have a difference in elevation of 48 feet. If there were locks in the canal, they would have to be opposite the rapids at Fort Frances.

From the wording of the historical plaque, it is safe to infer that a canal was completed and used for 30 years. How long the canal was and how many locks it contained are mysteries that will require additional research to determine. A map entitled "Historical Canals of Canada" compiled by W. Naftel and L. Friend and produced by the Survey and Mapping Branch, Ottawa, shows the Fort Frances Lock (singular) as being abandoned, unfinished. Thus we have contradictory information about this "lock" or "canal" as the case might be.

(Submitted by Herb O'Hanlon (ACS), 1003 Fairplay St., Aurora, Col. Additional information concerning this canal would be welcomed by the Editor, *American Canals*.)

CANAL PARK UNDER CONSTRUCTION

A recent grant from the Bicentennial Commission of Pennsylvania has spurred great activity along the old Union Canal in the Tulpehocken Creek Valley Park, just west of Reading, Pa. Operated by the Berks County Parks and Recreation Board, the park runs northwestwardly for five miles along the Union Canal Route from its junction with the Schuylkill River, including the site of six locks. One of the requirements of the State Grant is that a mile of the old Union Canal, and one of the best-preserved locks at the west end of the Park, be re-watered and restored during the year 1976. The above photo shows George Wills of Lebanon (left) with Bill Semmel and Richard Pawling, of the Berks County Park and Recreation Board, inspecting Lock Number 47, which is to be completely restored, mitre-gates and all. Bill Shank, who took the photo, is scheduled for a talk on "The Amazing Pennsylvania Canals" at the park May 9th.



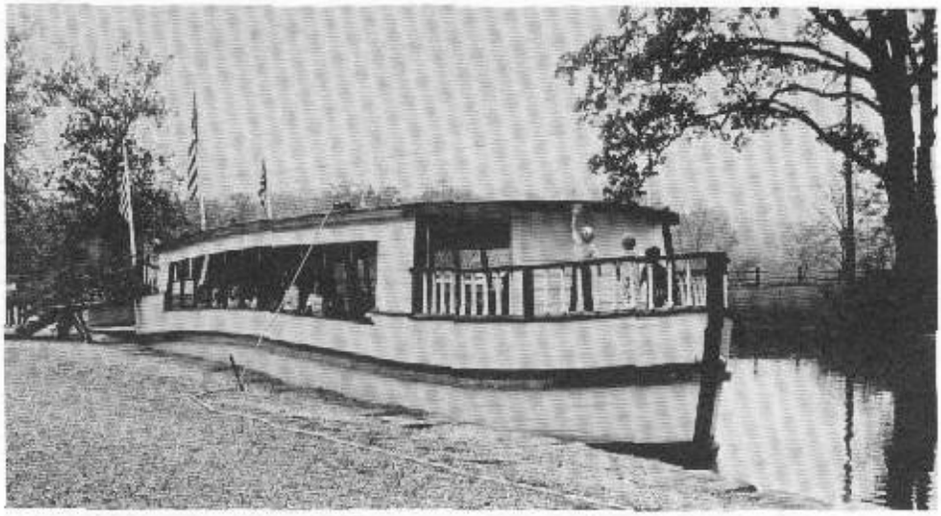
Drawn by Leroy A. Gensler of the "Reading Eagle".

Old Canal Scene at Lock No. 3 at Mauch Chunk on the *Lehigh Canal* on 3 July 1913. ACS Member Theodore (Ted) Sherman is on the left with Mule Lucy and Frank Wells is on the right with Mule Dan. (Sent by Ted Sherman. Other old scenes such as this are needed to keep *American Canals* interesting. – Ed.)

FRANK B. THOMSON

We regret to report the death of Frank B. Thomson, 42, Director of the Canal Museum at Syracuse, N.Y. Mr. Thomson was stricken several weeks ago at his home, while preparing a speech to be delivered at Syracuse University. A native of Albany, he had been Director of the Canal Museum, located in the Weighlock Building in Syracuse, since 1962. He was teacher, historian, fund-raiser, history activist and student. His recent interests included plans for expansion of the Museum and its activities, as well as the growing canal park east of Syracuse, and local observance of the Nation's Bicentennial. He was a frequent speaker before civic clubs, seminars and school groups.

OHIO CANAL BOAT TRIPS



The summer schedule for the *Monticello II* canal boat operating near Coshocton, Ohio will be each afternoon on the hour. Rates are: Adults $1.55; Students 80¢; pre-schoolers, no charge. (Photo above by Bill Shank)

The summer schedule for the *St. Helena II* at Canal Fulton, Ohio, is on the half hour in the afternoon. Fare: Adults, $1.50; Children, 3-18, 75¢.

LETTERS TO THE EDITOR

A brief note regarding the CHAMBLY, pictured in AMERICAN CANALS, Nov. '75 issue, p. 4. I did a little digging in Canadian registers, and the vessel shown is almost certainly CHAMBLY, blt. 1870 at Sorel, Que. 154' x 24' x 8', 647 tons. Cut down to barge, 1910.

Now the registered beam of a vessel is of the hull, and does not include the sidewheels and the overhang of the guards. So this boat would not clear the Chambly canal locks either in length or width. She would, however, pass the larger St. Ours lock, and her run was probably from Montreal or other St. Lawrence ports to the town of Chambly, which is below the canal locks. What little background shows in the picture appears to be the town of Chambly. (*James Wilson, ACS, 414 Pelton Ave. Staten Island, NY 10310.*)

I received a letter from a friend Mr. Warren Allen of Pardeeville that there was a move to reconstruct the old canal at Portage. Well, I would like to be counted as one much in favor of its being rebuilt, because as a child I started going up and down the canal with a canoe, and I was raised at Corning Station, we moved there in 1902. My folks ran the store there from 1902 to 1916, and in 1908 I tended the Governor Bend locks. A Mister John Johnson was the real lock tender. I was a 13 year old kid that worked for him for *fifty cents a* day, and when a boat blew the horn I had to run like a rabbit a quarter of a mile and open locks and let boat through.

Then in 1914 Byron Fink and I grew cucumbers and I had a small launch and we hauled the pickles up the river from Governors Bend to the Heinz pickle station that used to be not far from the canal, and we would lug them, or get a wheel barrow and get them over to Heinz pickle station. *(Bert J. Lang, 1517 Crystal Lane, Sun Prairie, WI 53590)*

Errata for the canal and canal structure listing included with this mailing: Mohegan Canal should be Mohican Canal. In the tunnel compilation, Sandy & Beaver Big Tunnel, last sentence, change to read " . . . steam engine and endless chain were proposed to move . . ."

I looked through my books on British Canals *searching for the highest point reached by an* artificial waterway in Britain. This is 637 feet at the Standedge Tunnel on the derelict Huddersfield Narrow Canal. The highest point currently in use must be the summit level of the Leeds and Liverpool at Fourridge Tunnel, 497 feet.

This leads me to wonder what the highest canal point was on American canals. I suppose it would be one end or the other of the Allegheny Portage Railroad. Inasmuch as Lake Erie is already 572 feet above sea level, I would expect that we must have had some canals higher than 637 feet. (*Carrel I. Tod, SCA, 1908 N. Quintana St., Arlington, VA 22205*)

This query was sent to Bill Shank, who replied as follows:

"Quoting from my own *Amazing Pa. Canals* – (Allegheny Portage Railroad): Highest point on the route was at the top of Plane Number 6 on the Hollidaysburg side of Allegheny Mountain – 2334 feet above sea level, nearly 1400 feet above the level of the canal basin at Hollidaysburg and about 1150 feet above the Johnstown Station at the west end of the Route.

"Since sectional canal boats were actually towed over the mountain, this means that the boats themselves climbed to 2334 feet. The highest watered section of canal on the route would have been at Johnstown – about 1185 feet above sea level."

While my Uncle, Dr. Lore A. Rogers, was curator of the Lumberman's Museum at Patten, Maine, he became much involved in researching the history of a gun boat which was used as a barge on the Chesapeake and Ohio Canal before being converted into a gun boat during the Civil War. Uncle Lore died last winter at the age of 100 years and I've taken on the responsibility of being the curator of the Museum.

The reason for our research is the fact that Uncle Lore's uncle moved one of these converted gun boats to the northern Maine lakes and again converted the gun boat into a powered boat to haul rafts of logs across the lakes. The conversion was made by putting in a mule-powered tread mill and side wheels on the boat so the rafts of logs could be towed. We are much interested in building either a large model of the boat or maybe even building a full sized replica for the museum.

Can you give us any help on the authenticity of the gun boat conversion or any further history of the barges which might tie us in to some other source of information? (*Richard E. Elliott, Box 201, Bridgewater, VA 22812*)

Send any info' to Editor, American Canals, Box 842, Shepherdstown, WV 25443.