

AMERICAN CANALS

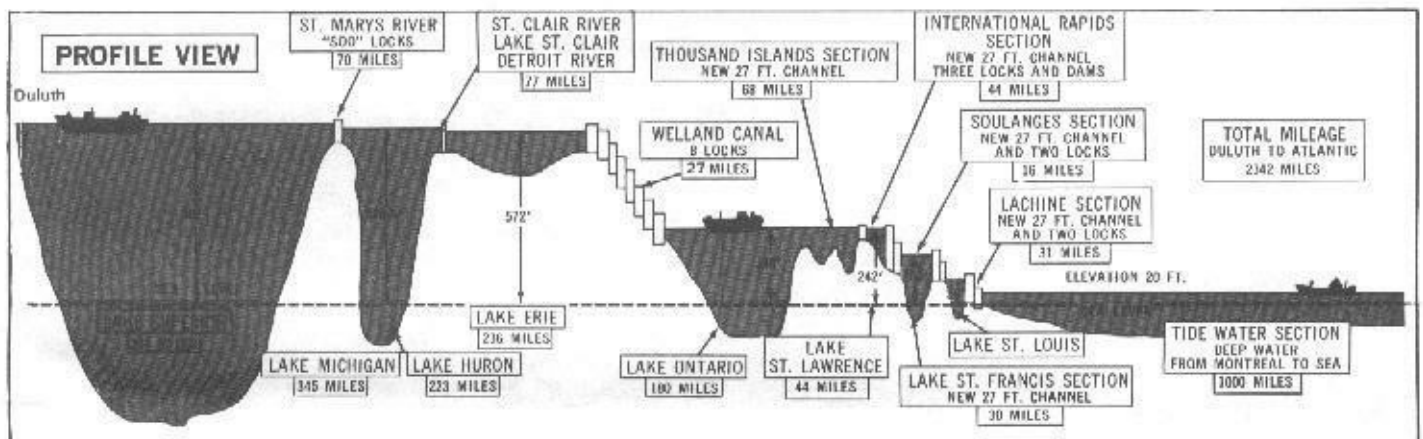
BULLETIN OF
THE AMERICAN CANAL SOCIETY

BULLETIN NUMBER 30

Editorial Address - Box 310, Shepherdstown, W.Va. 25443

AUGUST 1979

WELLAND CANAL VITAL "LINK" IN ST. LAWRENCE SEAWAY



(The combined visit of members of the American Canal Society and the Marine Historical Society of Detroit to the four Welland Canals the week-end of September 14-16 causes us to investigate the history of navigation along the entire St. Lawrence to Great Lakes Waterway. The major impediment to "through navigation" has always been the Niagara Escarpment. Thus, the history of the Welland Canal is closely associated with the history of the St. Lawrence Seaway. We are indebted to the St. Lawrence Seaway Authority in Ottawa, Canada, and the

Saint Lawrence Seaway Development Corporation in Massena, New York, for the following article. Editor).

The natural waterway formed by the St. Lawrence River, the Great Lakes and their connecting channels stretches more than 2,300 miles (3,700 km) from the Atlantic Ocean to the heartland of North America. With the completion of the present Seaway system in 1959, the waterway has become an important international trade route.

When the St. Lawrence River was first explored by Cartier on his second voyage to the New World in 1535, the Lachine Rapids, a few miles past Montreal, proved to be an impassable barrier. Further upriver, even more tumultuous waters awaited later explorers. Between Lake Ontario and Lake Erie, the 328-foot (99.4 m) drop on the Niagara River ruled out any movement by natural waterway between the two lakes; and in the Upper Lakes, St. Mary's Falls blocked water transportation into Lake Superior.

The concept of canals on the St. Lawrence to improve upon nature originated as early as 1680. By the early 1700's, work had begun to provide a canal with an average 3-foot (0.9 m) depth between Lake St. Louis and Montreal. In 1780, a series of small locks 40 feet (12.1 m) long, 8 feet (1.8 m) wide and 2 - 1/2 feet (0.76 m) deep were put in operation between Lake St. Louis and Lake St. Francis.

The first major navigation works on the St. Lawrence made their appearance in 1825, with the completion of the Lachine Canal comprising seven locks, 100 feet (30.5 m) long, 20 feet (6 m) wide and 5 feet (1.5 m) deep, to by-pass the Lachine Rapids. Some fifteen years later, the Long Sault Rapids were circumvented with the building of the Cornwall Canal.

With the union of Upper and Lower Canada in 1841, a broader financial base permitted the

Government to invest in larger scale transportation facilities and an active canal construction program was embarked upon. Completed in 1845, the Beauharnois Canal, 200 feet (61 m) long and with a draft of 9 feet (2.7 m) made it possible for vessels to avoid the Soulages Rapids. The navigational difficulties between Long Sault and Prescott were overcome by 1847 with the opening of the Williamsburg Canal system. During this period also, the original Lachine Canal was

(Concluded on Page Eight)

Reynolds Metals' Grant to Permit Publication of American Canal Guide

A grant of \$1,000 from the Reynolds Metals Company of Richmond, Virginia will permit the American Canal Society to proceed with the publication of Part Three of the **American Canal Guide**. This section, which covers all the states along the lower Mississippi and on the Gulf of Mexico, is a comparatively lengthy one of about 22 pages. The **American Canal Guide** continues under the general editorship of William E. Trout, III, PhD, one of the world authorities on canals.

The grant from Reynolds Metals is typical of the assistance it has given to canal restoration and other worthy projects in the Richmond area and elsewhere. The American Canal Society is very grateful for the generosity of this public-minded corporation.

It is anticipated that each American Canal Society member will be provided with part three of the **American Canal Guide**. Copies will also be available for general sale to the public.

Roger Squires New ACS Director in the United Kingdom

We are pleased to announce that Dr. Roger W. Squires of England has just accepted our invitation to become the **AMERICAN CANAL SOCIETY** Director for the United Kingdom. Dr. Squires is the author of various publications on the restoration work being done on the English Canals, and has supplied us with an excellent slide-audio tape show in this connection, which is available for use to ACS members in the United States. He has also written articles on canals in Ireland and the United States. An active member of the Inland Waterways Association, Dr. Squires works in London, and offers his personal services to any ACS members visiting England who wish to observe or travel on the British Canals. He will also act as a coordinator and reporter of the activities of our ACS members in the U.K. His home address: Bailiff's Cottage, 4 Manor Way, Beckenham, Kent BR3 3LJ, England.

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.

Annual subscription to "AMERICAN CANALS" is automatic with a minimum ACS dues payment of \$8.00. Individual copies may be purchased at \$2.00.

EDITOR - Capt. Thomas F. Hahn, USN (Ret.), Box 310, Shepherdstown, WV 25443.

PRESIDENT - William H. Shank, P.E., 809 Rathton Road, York, PA 17403.

VICE PRESIDENT - Dr. William E. Trout III, 1932 Cinco Robles Dr., Duarte, CA 91010. Editor, AMERICAN CANAL GUIDE.

SECRETARY-TREASURER - Charles W. Derr, 117 Main Street, Freemansburg, PA 18017.

Editor's Column

It hardly seems possible that thirty issues of *American Canals* have come and gone. Though this does not necessarily call for a celebration, it does cause me to reflect briefly on the nearly eight years which have gone by since the first edition.

The United Kingdom has had for many years a concern for the preservation of its national industrial monuments. The Inland Waterways Association and the Waterways Recovery Group have had a direct part in creating an interest in the study, preservation and use of the historic waterways of the U.K. Moreover, there is an official arm of the government, The British Waterways Board, which has national control of the maintenance and restoration of many of the waterways of the U.K.

Until the formation of the American Canal Society in 1972, the United States and Canada had no national organization interested in historic canals of North America. While attending functions of individual canal organizations I noted that some were fighting for the preservation of individual monuments that were less important (from an engineering, architectural, and historical point of view) than others. Some individuals had a broader outlook than the individual canal or canal structure, but there was no place where they could channel their interest and activity. At the time, Canada had no canal organizations, though there was an interest in the historical canals by the provincial historical societies.

I began correspondence with Bill Trout and Bill Shank in 1971 about the formation of an international canal organization which would provide a clearing house for the study of canals. This resulted in the American Canal Society. Canada (and the rest of the Western Hemisphere) was included because of the absence of other national canal organizations.

C & O CANAL ART



Earl Minderman, Maryland Canal Artist, poses with several of his paintings of Chesapeake and Ohio Canal operations. In the foreground are shown several canal boats locking through the highest lock on the series of locks by-passing the rapids at Great Falls, Maryland. The old canal hotel, now preserved by the National Park Service as a canal museum, is shown behind the lock.

A most intriguing way to view old canals is through the eye of the artist. A large number of canal enthusiasts have had the good fortune to view the water color paintings of old scenes of the 184½-mile-long Chesapeake and Ohio Canal through the public exhibitions of landscape artist Earl Minderman (ACS) of Bethesda, Maryland. His exhibition last year at the Georgetown (D.C.) Canal Visitors Center sponsored by the National Park Service, and his exhibition at the Georgetown University Hospital in June of this year, drew many thousands of visitors. The exhibitions were entitled "Visions and Vistas: Today and Yesterday on the Chesapeake and Ohio Canal." The collection contained paintings done by Mr. Minderman over a period of some 35 years. Each painting is accompanied by a detailed caption, making the works both historically and artistically interesting.

Before turning his full time to painting, Earl Minderman was a newspaperman, a government information officer, and a general communications consultant. His address is 5010 Jamestown Road, Bethesda, MD 20016.

We discovered that no one really knew how many canals we had, or the relative physical condition or importance of their respective structures. We began a study into these matters, which continues, but it has been a difficult job operating on a volunteer basis, in spite of the high quality of the individuals who have cooperated in these efforts. There just doesn't seem to be a practical way to match government funds with small, national organizations like ours. We tried: one federal agency couldn't afford the \$2500 we estimated would be needed to catalog the canals of the United States; another couldn't provide funds to help us because we didn't operate a museum!!

It was therefore with much appreciation that we received a recent grant of \$1,000 from Reynolds Metals Company of Richmond, Virginia so that we could proceed with Part Three of the American Canal Guide. Reynolds Metals realizes that it's good public relations to support historical preservation. U.S. Federal agencies could learn a lesson from industries such as Reynolds Metals.

Canal restoration activities have improved in Canada recently with the transfer of many of the historic canals to Parks Canada, under the Department of Northern and Indian Affairs. In Parks Canada we see good research being done by capable people, followed by good examples of

PRESIDENT'S MESSAGE

As we go to press, we are pleased to report that the response to our Welland Canal Tour indicates that this will be the best-attended meeting of the American Canal Society since its formation in 1972! We are particularly pleased at hearing from so many members of the Marine Historical Society of Detroit, co-sponsors of this event, both in the United States and Canada.

I am sure all of us are sick to death of the gloomy predictions emanating from Washington these days and are ready for a weekend of optimism and good fellowship with our associates in Canada. We are particularly indebted to Lou Cahill, our Canadian Director; Colin Duquemin of the St. Catharines Historical Society; and Dave Glick of the Marine Historical Society of Detroit for all the work they have done to make this event an unparalleled success! I look forward to greeting many of you in person the weekend of September 14-16 at the Holiday Inn, St. Catharines, Ontario.

Bill Shank

canal restoration. In some of the U.S. States (usually under their conservation of environmental resource departments) such as South Carolina (the Landsford Canal) and Illinois (the Illinois and Michigan Canal) we also see good examples of careful canal research and restoration.

One would expect the same kind of technical leadership on the part of the U.S. Federal Government, but this is often not the case. One would expect to walk into any national park and be met with the highest kind of professional in keeping with the nature of the park. Where are the historians, archeologists, and naturalists that were assigned to the parks many years ago? Where are the industrial archeologists who could help the busy park manager and his superiors in prudent, historically authentic, and sensitive preservation decisions?

Perhaps with the publication of *American Canals* #50 all this will have changed. In the meantime, let's all hang in there and accomplish what we can with the means at our disposal.

Tom Hahn

(Twenty-five States)

CANAL DEVELOPMENT IN EARLY AMERICA (Part 1)

by Richard G. Waugh, Jr.

Early in his life, and long before he became our first president, George Washington advocated building canals to connect the East with the interior regions of the United States as a means of expanding trade and settlement.

Interest in canals preceded the American Revolution. It is known that small land cut canals existed in Ipswich, Massachusetts on the Chebacco River in 1652. In 1673, Louis Joliet explored the upper Mississippi River Basin and then, in 1674, advocated a canal that followed the route of the later Illinois and Michigan Canal. Proposals were made for a Cape Cod Canal in 1676. By 1690, William Penn proposed a canal to connect the Schuylkill and Delaware Rivers with the Susquehanna River in Pennsylvania. In 1716, governor Spotswood of Virginia suggested a canal connecting the Ohio and James Rivers. Ben Franklin advised the Mayor of Philadelphia, in 1772, that a canal connecting the Schuylkill and Susquehanna Rivers would have advantages over river navigation. Canals on the Mohawk and Hudson Rivers in New York were proposed by governor Henry Moore of New York in 1768 and by George Washington in 1784.

In the first 75 years of the Nation, over 4,000 miles of canals – that is, man-made artificial waterways through land cuts – were built, almost all either by private companies or States. The period is significant in that Federal investments were minor, railroad competition was not yet overwhelming, and few major new canals were started after 1851.

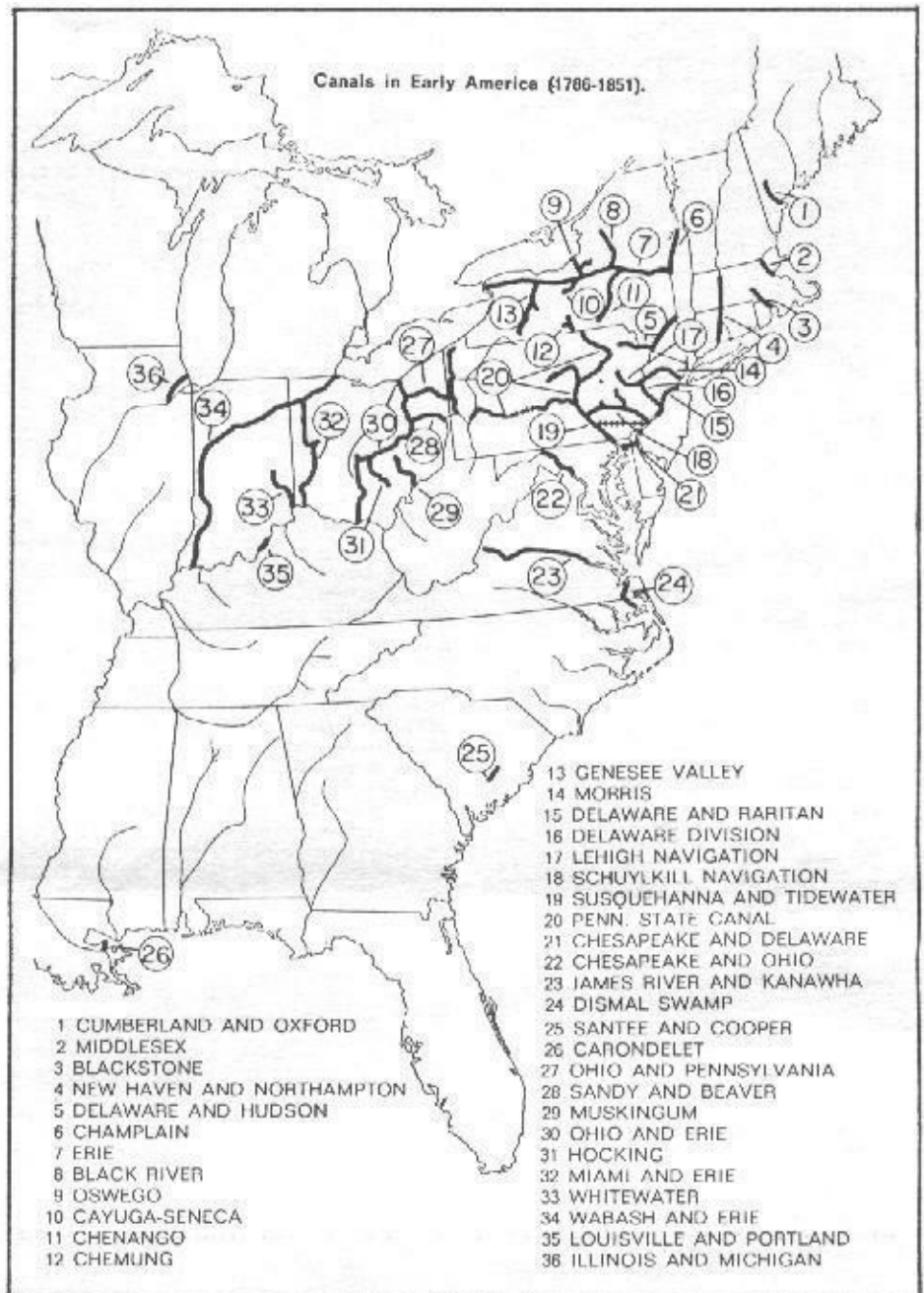
It has been said by many that canal construction provided the first practical school of civil engineering in this country. To overcome such problems as severe and long grades, waterway crossings, and water shortages, many ingenious and monumental engineering works were devised. Remarkable feats were accomplished with locks, inclined planes, portage railways, aqueducts, and tunnels. Several of the major works are discussed in this article.

EARLY CANALS 1786-1808

At the age of nineteen, George Washington was already an experienced surveyor and a large landowner. For his participation and leadership in the French and Indian War, Washington was granted 20,000 acres of land, much of it in the Ohio and Kanawha River Valleys. Washington eventually acquired about 30,000 acres along the waters of the Ohio and Kanawha Rivers. It was to his financial interest to pursue a water connection between those rivers and the Eastern seaboard. In the 1750s, Washington surveyed the route of a Chesapeake and Ohio Canal on the Potomac River and, in 1763, he inspected the route of the proposed Dismal Swamp Canal. In 1770, 1772, and 1774, he inspected the route of a proposed James River and Kanawha River Canal.

Washington promoted the charters of private companies to open the first major canals in the United States. In 1785, charters were granted to the James River Company and the "Patowmack Company" for canals on the James and Potomac Rivers. The following year, a charter was granted for the Santee and Cooper River Canal and, in 1787, a charter given to the Dismal Swamp Canal Company.

The first major canal construction began in 1786 on the Patowmack Canal, the forerunner of the Chesapeake and Ohio Canal. George Washington was the president of the company that started the canal. Rather than one long canal, this effort consisted of several short canals with locks to navigate around the several falls on the Potomac River from Georgetown to about 8 miles above Harpers Ferry. The next year, another enterprise in which Washington



had an interest, the Dismal Swamp Canal, was initiated in construction. By 1808, the following canals were completed:

Appomattox, Va.	Mohawk and Ontario, N. Y.
Baldwinsville, N. Y.	Montague Falls, Mass.
Cape Fear, N. C.	Patowmack, Va.
Carondelet, La.	Pawtucket Falls, Mass.
Conewago, Pa.	Santee and Cooper, S. C.
Dismal Swamp, Va.	Schuylkill and
James River, Va.	Susquehanna, Pa.
Middlesex, Mass.	South Hadley Falls, Mass.
	Susquehanna, Md.

The total length of these was only about 115 miles. Canals of major importance in this period are the Dismal Swamp, the James River, the Middlesex, the Patowmack, the Santee and Cooper, and the Schuylkill and Susquehanna. The Middlesex Canal was the largest at 27 miles and had the most locks (22), overcoming a total lift of 136 feet. The Dismal Swamp was 22 miles long and had 5 locks originally. These locks were

the largest of the period, 100 feet long and 18 feet wide, as were three of the locks on the Patowmack Canal. The Santee and Cooper Canal was also 22 miles long and had 13 locks. The James, Patowmack, and Schuylkill and Susquehanna Canals were forerunners of more important later canals.

THE GALLATIN REPORT

In 1807, the United States Senate, in response to many demands for internal improvements, asked the secretary of the Treasury, Albert Gallatin, to study the matter. His report of 4 April 1808 on "Roads and Canals" contained his proposals for major canal improvements, including a series of great canals along the Atlantic Coast connecting New England with the South; connections between the Atlantic Ocean and Western waters; and connections between the Atlantic Ocean, the St. Lawrence River, and the Great Lakes. On the coastal route, Gallatin proposed canals across four necks of land: (1) Barnstable in

(Continued on Page Four)

Canal Development in Early America

(Continued from Page Three)

Massachusetts, (2) New Jersey from the Raritan River to the Delaware River, (3) the peninsula between the Delaware River and the Chesapeake Bay, and (4) the Chesapeake Bay to Albemarle Sound.

At the time of his study, the Cape Cod Canal route to the north had been proposed, the Delaware and Raritan route had been investigated, the Chesapeake and Delaware Canal was authorized, and the Dismal Swamp Canal was complete.

Gallatin also proposed inland canals from the Atlantic Coast on the Susquehanna River, the Potomac River, the James River, the Roanoke River, and the Santee River, and, also, a canal from Muscle Shoals connecting the Tennessee and Tombigbee Rivers. In time, all but the canal on the Roanoke River were realized.

Next, Gallatin proposed the connection between the Atlantic Ocean and the Great Lakes via two canals, one connecting the Mohawk River in New York with Lake Ontario, and one connecting the Hudson River with Lake Champlain. Both these routes had been discussed at length previously, and both soon came into existence as part of the canal system of the State of New York.

Finally, Gallatin proposed that four major inland rivers - the Allegheny, the Monongahela, the Kanawha, and the Tennessee - be connected to the nearer Atlantic rivers by four roads. This was, then, the first proposal for a national system of integrated transportation.

Canal Construction 1786 - 1851

Period	Mileage Built During Period	Total Mileage to Date	Mileage Under Construction End of Period
1786 - 1808	115.0	115.0	None
1809 - 1811	None	115.0	None
1812 - 1815	None	115.0	10.6
1816 - 1820	1.4	116.4	562.6
1821 - 1828	564.1	680.5	1000.5
1827 - 1830	626.9	1317.4	1407.9
1831 - 1835	1097.1	2414.5	2151.1
1836 - 1840	325.2	2739.7	1042.9
1841 - 1845	488.3	3169.0	1378.9
1846 - 1850	308.6	3497.6	1069.3
1851	760.5	4258.1	307.5

Of no little importance to the early national interest in canals is their value in time of war. Joshua Gilpin, writing to Gallatin as a director of the Chesapeake and Delaware Canal Company on 4 January 1808 stated:

"I should beg leave to mention one object more which renders the canal of great and increasing importance, that is, as a military work during the revolutionary war this importance was severely felt, as it must again in any hostile contest with any other nation . . . The chief, and indeed, the only safe conveyance for [the Army] was by the route I have mentioned, where it often occurred that the want of wagons and badness of the roads occasioned such delays as reduced the army to great distress. These delays were also severely felt on the march of the army southward, particularly on that to Yorktown, and must be again felt in similar circumstances."

This prompted Gallatin to note in his report: "It must not be omitted that the facility of communications constitutes, particularly in the United States, an important branch of national defense. Their extensive territory opposes a powerful obstacle to the progress of an enemy; but, on the other hand, the number of regular forces which may be raised, necessarily limited by the population will, for many years, be considerable when compared with that extent of territory. That defect cannot otherwise be supplied than by those great national improvements, which will afford the means of a rapid

concentration of that regular force, and of a formidable body of militia on any given point."

Possibly, then, it might not have been a coincidence that, in 1809, the first Federal appropriation of funds for canal construction was \$25,000 for deepening and extending the Carondelet Canal to the Mississippi River from Lake Pontchartrain to New Orleans "to admit an easy and safe passage of gunboats . . . to the more effectual defense of [New Orleans] . . ."

CANALS FROM 1812 TO 1851

Although Albert Gallatin had strongly urged canal development, there was little immediate response in building. No canal building took place between 1809 and 1811 and, by 1812, only small short canals were started at the several falls of the Merrimack River in Massachusetts and New Hampshire. Certainly, the War of 1812 inhibited development, although the war did demonstrate some of the shortcomings in transportation available at the time. However, in 1815, canal construction was initiated on an unprecedented scale. Construction began on the first of the so-called coal canals - the Schuylkill Navigation - a 90-mile long link between Philadelphia and the anthracite coal field at Port Clinton and Port Carbon in northeastern Pennsylvania, which would have 44 locks when completed in 1825. Then, after years of heated debate, the State of New York, in 1817, started the Erie and Champlain Canals that would provide the long-sought connection between the Atlantic seaboard and the Great Lakes. The Erie would be 363 miles long and the Champlain 66 miles.

The magnificent plan for the Erie Canal sparked the most active period of canal construction in the United States. In the West, steamboats operating on the Mississippi River and its tributaries were helping to develop a lively trade between the Northwest farmers and the Southwest cotton planters. Eastern states were looking to expand their trade with the West. Transportation needs and the fear of strong competition from the Erie Canal forced adjacent states to consider canal construction. Nine years after the beginning of the Erie Canal - 1826 - 680 miles of canals were completed and 1000 miles were

Dismal Swamp Canal Company.

PROPOSALS for cutting a Canal from the waters of Elizabeth River in Virginia, to those of Pamlico in North-Carolina, or for conducting the work, will be received until the ninth day of April next, by Robert Andrews, of Willsborough; Thomas Newton, junr, and Daniel Badinger, of Norfolk, in Virginia; by John Cowper, of Gates County; and Benjamin Jones, of Camden County, in North-Carolina. The length of the Canal will be about sixteen miles; the country through which it will pass, is swampy, free from bones, and covered with heavy wood. The Canal is to be thirty-two feet in width, and eight feet at least in depth, below the surface of the earth, and capable of being navigated in dry seasons, by vessels drawing three feet water. Good security will be required of contractors; and persons making application to be employed as managers, must produce certificates [from characters of respectability] of their qualifications for a business of this kind.

By order of the President and Directors,
WILLIAM A. BAYLEY, Clerk.
Norfolk, January 21, 1792. (p.19)

This advertisement in the March 31st, 1792 edition of the "Gazette of the United States", published in Philadelphia, indicates plans for an early canal in the USA. (Courtesy of Robert Vogel of Washington, D.C.)

under construction. The accompanying table presents the mileage constructed at intervals during the period 1786 to 1851. The year 1851 is added because during this single year three major canals were completed - the Chesapeake and Ohio at 185 miles, the James River and Kanawha at 196.5 miles and the longest canal ever built in the United States, the Wabash and Erie in Indiana at 379 miles.

CANAL INVESTMENT

The first canals were undertaken by private interests, generally as canal companies chartered by the respective states. In 1817, construction began on State canals with the start of the Erie Canal in New York. Only the States of New York, Pennsylvania, Ohio, Indiana, Illinois, Louisiana, and South Carolina undertook canals. Nevertheless, by 1851, 2400 miles of state-owned canals were built, which represents more than half of all construction to that point. (To be concluded in future issues of AMERICAN CANALS. The author, Richard G. Waugh, Jr. is Special Assistant, Board of Engineers for Rivers and Harbors, U.S. Army, Fort Belvoir, Virginia.

Manayunk Canal in 1979



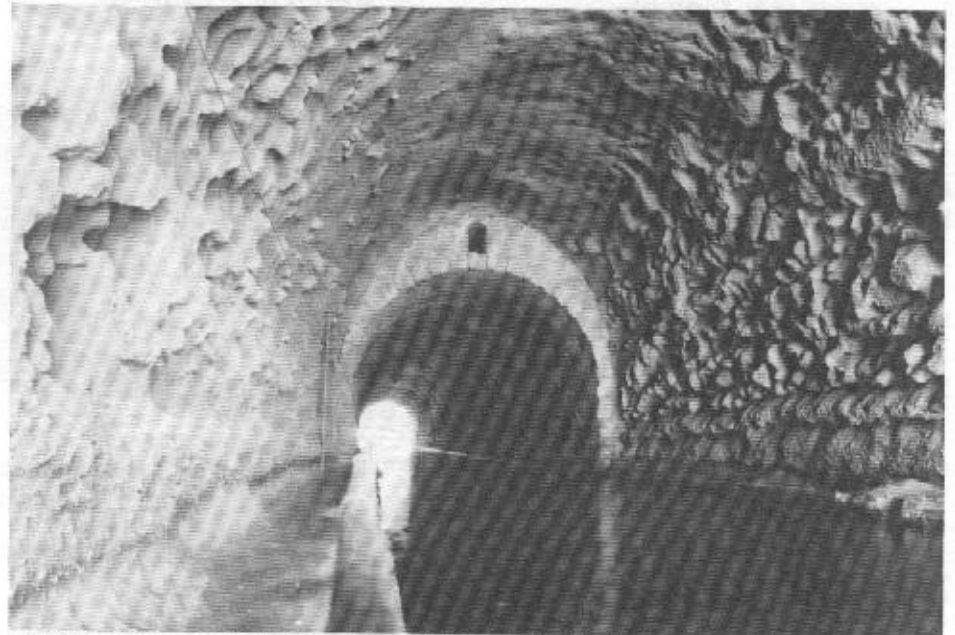
Our last issue mentioned the restoration work being done on the Manayunk Canal along the Schuylkill above Philadelphia. This article prompted Bill Etchberger, of Lebanon, Pa., to visit the area and make this photo of the cleared-out channel of the Manayunk Canal, now partially re-watered. For a story and photos of the Manayunk Canal during its operating days in the early 1900's, see Issue Number 45 of CANAL CURRENTS, quarterly publication of the Pennsylvania Canal Society.

AVEC THOMAS JEFFERSON SUR LE CANAL DU MIDI

by William E. Trout III

"There is nothing in France so well worth your seeing as the canal and country of Languedoc, and the wine country of Bordeaux," wrote Jefferson to a friend 200 years ago (Boyd's *The Papers of Thomas Jefferson*, v. 14, p. 702). Jefferson was a canal enthusiast, and the Canal du Languedoc – also known as the Canal Royale, Canal des Deux Mers, and the Canal du Midi – was one of the first modern canals and one of the greatest post-roman engineering wonders of the world. Already a century old, it had been completed in 1681 to link the Mediterranean with the Atlantic, across southern France. In 1754, the young Duke of Bridgewater had travelled its length and had gone on to begin England's Canal Era. And now Jefferson, in France in 1787 as U.S. Ambassador, realized that the canal could also become an inspiration to the Americans. "I propose," he wrote, "to make a tour into the South of France, as far as the Canal of Languedoc which I have a great desire to examine minutely as at some future time it may enable me to give information thereon to such of our states as are engaged in works of that kind" (Boyd 10:362).

Jefferson took his canal trip in May, 1787, a leisurely eight-day, 150-mile voyage from Cette on the Mediterranean, to Toulouse at the head of river navigation to the Atlantic; plus 40 miles by horseback in the mountains to see the extraordinary network of feeder canals and dams, and the tunnel, which supplied water to the summit. With typical Jeffersonian imaginativeness he made his voyage a Great Adventure by placing his glassed-in carriage (his phaeton, brought from America) on a 35-foot bark, and had it towed along the canal. His letter written on board his carriage, "approaching Toulouse" (reproduced by the Monticello Gift Shop) tells the story: "I have passed through the Canal from its entrance into the Mediterranean at Cette to this place, & shall be immediately at Toulouse, in the whole 200 American miles, by water; having employed in examining all its details nine days, one of which was spent in making a tour of 40 miles on horseback, among the Montagnes noires, to see the manner in which water has been collected to supply the canal; the other eight on the canal itself. I dismounted my carriage from its wheels, placed it on the deck of a light bark, and was thus towed on the canal instead of the post road. That I might be perfectly master of all the delays necessary, I hired a bark to myself by the day, & have made from 20 to 35 miles a day, according to circumstances, always sleeping ashore. Of all the methods of travelling I have ever tried this is the pleasantest. I walk the greater part of the way along the banks of the canal, level & lined with a double row of trees which furnish shade. When fatigued I take seat in my carriage where, as



Looking east through the first canal tunnel in the world. The Maipas Tunnel has a towpath and is only partially lined with masonry. (Bill Trout, 1978)

much at ease as if in my study, I read, write, or observe, my carriage being of glass all round, admits a full view of all the varying scenes thro' which I am shifted, olives, figs, mulberries, vines, corn & pasture, villages & farms. I have had some days of superb weather, enjoying two parts of the Indian's wish, cloudless skies & limpid waters: I have had another luxury which he could not wish, since we have driven him from the country of Mockingbirds, a double row of nightingales along the banks of the canal, in full song" (Boyd 11:371).

Jefferson sent a report to President Washington (a fellow canal enthusiast), who thanked him for the information and said it would be of at least theoretical interest. "When America will be able to embark in projects of such pecuniary extent, I know not," he replied "probably not for many years to come"; for in 1788 America was still in the frontier stage of transportation development and Washington's canal companies were doing well by merely clearing obstructions from the James and Potomac rivers.

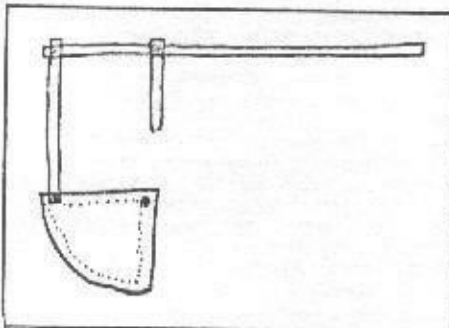
Unfortunately for us, Jefferson's report is primarily a translation of a seven page mileage chart and historical summary, made up for him by Mr. Pin of the canal office in Toulouse; there are few personal comments about the canal and its engineering, so we can only dream that he had a separate engineering note-book which has not yet been rediscovered. But in compensation there is a golden Jeffersonian nugget in Jefferson's notes, reproduced by Boyd on p. 449 of Volume 11: a sketch of a sluice gate, perhaps Jefferson's own invention, which he proposed to the authorities of the Canal du Midi. "The small gates of the locks of this canal have six square peds [French feet] of surface. They tried the machinery of the jack for opening them. They were more easily opened, but very subject to be deranged, however strongly made. They returned therefore to the original wooden screw, which is excessively slow and laborious. I calculate that 5 minutes are lost at every bason by this screw, which on the whole number of basons is one eighth of the time necessary to navigate the canal: and of course, if a method of lifting the gate at one stroke could be found, it would reduce the passage from 8 to 7 days, and the freight equally. I suggested to Monsr. Pin and others a quadrantal gate turning on a pivot, and lifted by a lever like a pump handle, aided by a windlass and cord, if necessary. He will try it and inform me of the success" (Boyd 11:449). Evidently nothing came of Jefferson's suggestion because some of the

sluice gates are still operated by a tedious and time-consuming screw, although now of metal. One wonders if the design is practical. Did he see it in use in Italy, which he had just visited? A somewhat similar mechanism is now used successfully on the Leeds & Liverpool Canal in England, but there the lever lifts up a sliding gate.

Another nugget was discovered in the microfilmed Library of Congress papers of Thomas Jefferson, on the back of a letter sent to him dated April 24, 1788. Evidently Jefferson used the blank side to show someone how a lock works, just as we still do today, by showing boats at different water levels. A little study shows the sketch to be of a two-lock staircase, a common sight on the Canal du Midi. Does this reflect a special interest in staircase locks, and did it influence American canal technology? There are also other rough plans of staircase locks amongst his architectural drawings, and we know he had a hand in the construction of the three-lock staircase which the Rivanna Navigation Company built in his mill canal at Monticello, in the 1810's. In his papers is a list of materials for this staircase, and measurements which he made in 1817. Did he have anything to do with, for example, the large number of two-lock staircases in South Carolina?

What was Jefferson's influence on the Canal Era in America? Did he introduce or invent any canal technology, or affect the progress of canal development? Jefferson himself, when taking stock of his early accomplishments, headed the list with his pioneering work in the 1760's to improve the Rivanna River for navigation – his Declaration of Independence was only second on the list! One of his inventions was a dry dock lock designed to keep warships in good condition between wars, ready for instant use – an idea from his visit to Venice. He kept a model (where is it now?) in the Presidential mansion to show to congressmen but the idea was never taken up. (see *Thomas Jefferson: Scientist*, by H. Schuman). Also while President, it was his Secretary of the Treasury, Alexander Gallatin, who prepared the famous 1808 REPORT ON PUBLIC ROADS AND CANALS which outlined plans for a national transportation network. David McCullough, in *THE PATH BETWEEN THE SEAS* speculates that while Alexander von Humboldt was

(Concluded on Page Seven)



Jefferson's sketch of the sluice gate which he proposed to the canal authorities in 1787. From *THE PAPERS OF THOMAS JEFFERSON* edited by Julian P. Boyd, 1955. Reprinted by permission of Princeton University Press.

Hotel Boats on English Canals

by Grace Elliott

Hotel Boats on the English Canals and Rivers have really not had the coverage in **American Canals** that they deserve. There are many of us wishing a boating holiday but unwilling or unable to manage the navigation, lockages or the shopping logistics of a hire boat. A holiday for us is a canal trip with all the enjoyment and none of the headaches, responsibilities or emergencies. The lock-wheeling is on an optional basis.

For travel on the narrow canals there is nothing like a pair of hotel boats. These are usually converted working boats equipped with all the conveniences of a hotel and with the advantage of a changing weekly route. There are several hotel boat companies. The pair is necessary – the motor and the butty.

A different kind of hotel boat does operate on the canalized rivers and wide canals. During two trips we have sampled these holidays and have found them also very satisfactory.

Two years ago we cruised for a week with the Trent Valley Cruising Hotel. This is a boat built to order for wide locks. Most cruises are from Burton-on-Trent to Leicester to Newark to Lincoln or back to Burton. Early in May there is a cruise to Boston for tulip time. These cruises cover the Fossdyke Navigation (originally Roman built) as well as the Rivers Trent, Witham and Soar and the wide lock end of the Trent and Mersey Canal. The River Soar is the wide lock portion of the Grand Union Canal.

The week cruise we took was Lincoln to Burton. With low water we left Lincoln in the afternoon and cruised several hours. It was necessary to be at Torksey Lock at high tide the next day because the lock operated only at high water. We moored for meals and it was always possible to walk. Some of the moorings were extremely interesting – Newark, Swarkestone and Shardlow stand out in my memory. Food is delicious, mooring points well chosen, locks are interesting and informality is the thing.

Last year we reserved two cruises on the Thames of three day lengths. In our case it was Oxford to Reading to Windsor. This was with River Barge Holidays Ltd. It was a delightful time. We moored for meals but only cruised half the day. The other half day we toured by mini-bus the villages and interesting scenes nearby. One of the crew acted as tour guide. It was a nice change of pace as it combines the best of both water and land travel.

While it is possible to take just one cruise in either direction, the 24-hour-plus time between cruises at Reading allows ample time to hire a car and see the Kennet and Avon canal. We walked the flight at Devizes and were impressed by the restoration being done. We also stopped at Crofton even though the beam engine was not 'in steam'.

On the boats the accommodations are more than adequate. Cabins are more spacious than on narrow boats. All cabins have hot and cold running water. On the boats there is an open bar with a bar bill presented at the end of the cruise to those who do indulge.

In both cases we were reluctant for our cruise to end. We had had a good trip. We had seen interesting canal features and we had met interesting people. We would like to go back and do it again.

If any of you would like to take advantage of a hotel boat the addresses for these cruises are: Trent Valley Cruising Hotel, 41 Hornbrook, Burton Upon Trent, Staffordshire, England; River Barge Holidays Ltd., 122a Castle Street, Reading, Berkshire, England. The narrow boat Hotel that I would recommend is Inland Cruising Co. Ltd., Braunston Marina, Daventry, Northants.

(Grace Elliott, ACS, 300 Ohioville Rd., New Paltz, NY. 12561 is active in the Delaware and Hudson Canal Historical Society.)

ALEXANDRIA CANAL ARCHEOLOGY



Vivienne Mitchell of the Alexandria Archaeological Commission at work on the excavation of a portion of a wall of the Tidelock of the Alexandria Canal.

The Alexandria Canal, which was in operation between 1843 and 1886, connected Alexandria, Virginia with the Chesapeake and Ohio Canal at Georgetown, D.C. When completed in 1843, the canal was approximately seven miles long. It crossed the Potomac on an aqueduct bridge over 1,000 feet long between Georgetown, D.C. and Rosslyn, Virginia, then ran on level land to Alexandria, crossing Four Mile Run on a smaller aqueduct bridge, and reaching the Potomac River in Alexandria by means of four locks.

Recognizing the importance of this canal to the history of Potomac River navigation, the Alexandria Archaeological Commission has submitted the necessary information to the Virginia Landmarks Commission to request nomination of the canal's tidelock to the National Register of Historic Places.

In the fall of 1978, Alexandria City archaeologists cut trenches through the rubble across the area of the basin and tidelock. Confirming the existence of the stonework was the final requirement of the Virginia Landmarks Commission.

A backhoe trench was placed in the supposed area of the tidelock. The backhoe uncovered the north wall at about 65cm below the surface. Hand excavations extended the trench to the south, and the south wall was also found. The walls of the holding basin were found about two meters below the surface.

The basin and lock walls were found to be made of cut granite stone and the lock mechanism itself was of wood. The basin walls consist of a facing of large cut granite blocks which are dry laid with stone rubble of varying sizes behind it. The lock walls are made of very large granite blocks set in mortar, smooth dressed on the lock's interior and rough on the exterior.

The work of the archaeological excavation was done under the direction of Pamela Cressey, Alexandria's City Archaeologist, and staff members, Terry Klein and Paul Davidson. They were aided by Herman Becker, Canal Authority, as well as fifteen dedicated volunteer excavators. (This item was submitted by Vivienne Mitchell (ACS), 625 Pomander Walk, Alexandria, VA 22314)

A Footnote to "Champlain to Chesapeake"

by Alexander C. Brown

I should like to add my own endorsement of ACS Director Bill McKelvey's splendid new profusely illustrated book, **Champlain to Chesapeake: A Canal Era Pictorial Guide**, ably reviewed in the May, 1979 *American Canals Bulletin* (No. 29) by Ernest H. Schell. However, I beg Bill McKelvey's indulgence to be permitted to pick a nit or two. In the first place, a canal with a double name giving its respective terminals would be equally descriptive no matter which name appeared first. However, undoubtedly there would be loud lamentations if, for example, we should see in print something like the Raritan and Delaware Canal (Perish the thought!). Take then, both Author McKelvey and Reviewer Schell, a smack with a moist noodle for reversing the name of the time honored Albemarle and Chesapeake Canal connecting those regions of northeastern North Carolina and southeastern Virginia.

In the interests of absolute historical accuracy, however, it must be admitted that, briefly between 1859, when the A & C Canal opened, and today, actually it did have for a two-year period the company name of Chesapeake and Albemarle Canal. Defaulting on the payment of bonds, the A & C Canal Company was sold on the steps of the Norfolk County Courthouse at Portsmouth, Virginia, on November 10, 1910. Sole bidder was a holding company acting in behalf of the mortgage holders. This company, then, when the sale was confirmed January 30, 1911, reversed the sequence of the original name. This lasted only a short period for, on May 1, 1913, Uncle Sam became the canal's proprietor and the original name was restored. And the Albemarle and Chesapeake Canal has been so continuously designated for the past 65 some years of its operation by the U.S. Army Corps of Engineers.

The proposal for a canal to connect Chesapeake Bay and Albemarle Sound is also of far greater antiquity than Bill McKelvey's Canal Chronology in the front of his book would have you believe. Colonel William Byrd II, squire of Westover, Virginia, recognized the potential usefulness of connecting Chesapeake Bay and Albemarle Sound as early as 1728, and the enterprising Virginia colonial assembly of 1772 actually passed an act for "the opening of a canal from the head of the southern or eastern branch of Elizabeth River, to the head of the North [Landing] River." The two projected alternate routes leading respectively from Great Bridge and Kempsville were then surveyed, as extant plans attest. Steam dredges had to be invented, however, before excavating through a primeval swamp forest at sea level could be carried out and, meanwhile, the rival Dismal Swamp Canal connecting the same major bodies of water came into being with slaves providing the required labor. Limitations of the Dismal Swamp's narrow, lock canal became all too obvious as traffic increased, so paving the way for the more or less parallel Albemarle and Chesapeake Canal at sea level, opened January 9, 1959, with its remarkable reversible head lock, then second only in size to the Sault Ste Marie. It still provides, dating from 1932, the only large reversible head lock in the United States. (Alexander C. Brown, ACS, 228 James River Drive, Newport News, VA 23601.)

Alec Brown's book, *Juniper Waterway: A History of the Albemarle and Chesapeake Canal*, has recently been accepted for publication by the University Press of Virginia under the joint sponsorship of the Mariners Museum of Newport News and the Norfolk County Historical Society of Chesapeake, Virginia.

Canal Du Midi (Concluded from Page Five)

visiting Jefferson, they must have talked about future canals across the Isthmus of Panama - including the "Lost Canal of the Rappahannock." (Even before his trip to France, Jefferson had been thinking about the possible effect on America's climate of a sea-level canal across Panama!) Jefferson's library is also known to have had at least eight books on canals - one of which was an 1808 pamphlet proposing a wooden flume linking New York and Philadelphia. It must have been tact rather than his experience with canals which prompted him to reply to the author, "it is not in my power to give any definite opinion of its national importance"! Someday scholars will investigate Jefferson's role in the American canal era, and will perhaps discover that we have been affected in some small way by Jefferson's voyage along the Canal du Midi two hundred years ago.

My own trip along the canal and into the mountains was on a bicycle rented in Toulouse (Locauto, 53, Rue Matabiau, 31000 Toulouse), sleeping in hotels and on the canal bank, and returning from Sete via France's thriving railway system. There are railway stations all along the canal route, permitting a flexible train/cycle adventure. The other way to see the canal is of course by water.

In Toulouse, be sure to follow the canal from the station down to the junction with the Canal Lateral a la Garonne, to see the canal sculpture between the Twin Bridges at the basin, and follow the short Canal de Brienne back to its entrance lock on the Garonne, past some weirdly decorated floating restaurants. Pierre-Paul Riquet, Baron of Bonrepos, to whom we owe the Canal du Midi, is buried under a pillar in St. Etienne Cathedral, and his statue is at the end of a bridge. High points along the canal include the basin at Castelnaudary, the walls of Carcassonne, Repudre Aqueduct and inscription near Paraza, the Malpas tunnel (first canal tunnel in the world), the aqueduct at Beziers, the barrage above Agde, and the famous round lock. Try to spot the stone siphons designed to rapidly release flood water in the canal; one is above Marseillette. These are more efficient than spillways, but are they used on other canals?

But as Jefferson knew, the "piece de resistance" is Riquet's amazing feeder canal network, worth studying for at least a day even if it means leaving your boat, or some agonizing cycling (It isn't called the Haute Languedoc for nothing). The 40 miles of feeder canals, and nearby roads are shown on Michelin maps 82 and 83, available at gas stations. There are two main canals, the Rigole de la Plaine, and the Rigole de la Montagne. The first carries water from the River Sor near Revel, to the canal summit level at Narouze, where there is an octagonal canal basin and an obelisk to Riquet. This feeder was originally intended to be navigated by small boats, and once had 14 locks; the towpath is still cyclable but hard going at times. An unnavigable branch without a towpath taps the famous St. Ferreol Reservoir, in a park-like setting still appreciated by vacationers, complete with a high-sputting fountain at the base of the dam. The Rigole de la Montagne brings water to the reservoir from another watershed, passing through a tunnel with inscription and path at les Cammazes. Above the tunnel there is an excellent cycle path leading up to the Lampy Dam (past more inscriptions) and to the head of the feeder at la Galaube where there is yet another memorial to Riquet! The feeder network, designed by Riquet and extended by others, is the secret of the canal's success, and a fascinating and recreational study in its own right. On my next trip to the canal I would like to take a rubber boat down the feeder system; hunt for the Roman tunnel which is underneath the Malpas Tunnel; spend the night, as did Jefferson, in the Hotel de Notre Dame in Castelnaudary; and visit Riquet's estate, Bonrepos, near Toulouse, where he (like Brindley after him) had a model canal in the back yard. If the model remains still exist they ought to be worth a careful study by French archaeologists.



The Weigh-Lock building on the Erie Canal at Syracuse, New York in the late 1890's. A canal boat can be seen at the left, entering the weigh-lock, at the rear of the building. The canal is gone, but the building is now the headquarters for Canal Museum Associates, used primarily for canal displays and exhibits. The new administration annex is located out of the picture to the right.

The Canal Museum at Syracuse, N.Y. acquired a new building in 1977 (adjacent to the old Weighlock Building) now called the Canal Museum Administration Building. After repairs on the building and extensive planning, the major part of the move was made on October 28, 1978, when all of the library and archive materials were moved from the second floor and basement of the Weighlock Building to the first and second floors of the new building. All the books, manuscripts, and maps were boxed prior to the move, using over 1,000 boxes to do the job. On the 28th, we had about 15 volunteers and the museum staff move in all of the library and archive materials and shelve about 80 percent of it.

During the next week professional movers moved all of the desks, tables, chairs, files, and map cabinets into the new building, with only one day's disruption of the offices. The library was moved in such a way that researchers were inconvenienced very little. In fact, they were able to take research requests the day before and the day after the move was completed. Everything went very smoothly.

The new location provides added office space and work space. The area for the library materials is nearly doubled, and there is new shelving to house the huge manuscript collections. The space that the library and offices had taken up in the Weighlock Building is being turned into exhibit space. They have already opened up a new large gallery for rotating exhibits on the second floor of the Weighlock Building. There are other galleries being designed right now. They hope to eventually have a classroom for audio-visual shows and a "period" room on the second floor.

The Canal du Midi has now come into its own as a recreational waterway. Unfortunately, it is now in the process of modernization, with bridges to be raised and staircase locks to be replaced by deep ones. To accommodate longer commercial craft all the locks are being lengthened at the lower end - but with concrete, not the original stone, in German bunker style. In time, we will find out if this is a horrible mistake, or a great boon to commercial traffic, as the canal approaches its 300th birthday in 1981. You'd better visit it soon!

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CANAL MUSEUM EXPANSION

The Lachine Canal

In 1972 Parks Canada assumed responsibility for certain historic, federally operated canals. This occurred on the understanding that future management would emphasize not only transportation but the protection, enjoyment and interpretation of associated natural and cultural values. Today Parks Canada's system of "Heritage Canals" includes the Rideau, Trent-Severn and Murray Canals in Ontario; the Carillon, Ste. Anne, Chambly and St. Ours Canals in Quebec; and the St. Peters Canal in Nova Scotia. The most recent addition to this system is the Lachine Canal which bisects the south-east portion of the Island of Montreal between Lake St. Louis and the Harbour of Montreal.

The Lachine Canal was originally constructed during the years 1821-1825. It was used primarily for commercial shipping and played a substantial role in the growth of Eastern Canada. In respect of this role the Historic Sites and Monuments Board of Canada, in 1929, declared the Lachine Canal as a National Historic Site. The importance of the canal culminated during the 1940's when the area it served became the largest industrial centre in Canada. Ironically the Canal's demise followed shortly afterwards. In 1959 the St. Lawrence Seaway opened and the Lachine Canal was closed and became literally abandoned.

After 15 years of virtual inactivity, the canal began to attract attention from a variety of agencies, citizen groups and committees. Subsequent investigations concluded that the historical values of the canal were worthy of preservation and the area exhibited potential for the development of recreational facilities. Ultimately, on the recommendation of a Federal Interdepartmental Committee, the Lachine Canal became part of Parks Canada's system of Heritage Canals.

Within the Lachine's urban industrial setting Parks Canada, in concert with other public and private organizations, is undertaking to conserve and redevelop this historic waterway. Restoration projects will focus on existing canal resources, specifically locks, retaining walls and historic bridges. Public access will be improved by constructing walkways to connect neighboring residential communities and by linking into the regional bikeway network. Other proposed developments include picnic and leisure areas, essentially to serve the 335,000 people residing within one mile of the canal, and reception centres for welcoming and orienting visitors to the area.

(Provided by Parks Canada.)

Welland Canal Vital "Link" in St. Lawrence Seaway

(Concluded from Page One)

widened and deepened to match the Beauharnois Canal and, by the middle of the nineteenth century, the principal natural obstacles to transportation on the St. Lawrence had all been surmounted by man-made waterways.

Efforts to by-pass the falls at Niagara had gone on concurrently with the work on the St. Lawrence River and the first Welland Canal, begun by William Hamilton Merritt in 1824, was opened in 1829. The canal, 27½ miles (44 km) in length, contained forty wooden locks measuring 110 feet (33.5 m) in length, 22 feet (6.7 m) in width and 8 feet (2.4 m) in depth. The original depth was increased to 9 feet (2.7 m) by 1850 with the construction of the second Welland Canal and the number of locks reduced to twenty-seven, each built of cut stone and with a length of 150 feet (45.7 m) and width of 26½ feet (8.1 m). In 1855, when the State of Michigan completed a canal around the St. Mary's Falls at Sault Ste. Marie, a navigable waterway with a minimum depth of 9 feet (2.7 m) was available from the Atlantic Ocean to Lake Superior.

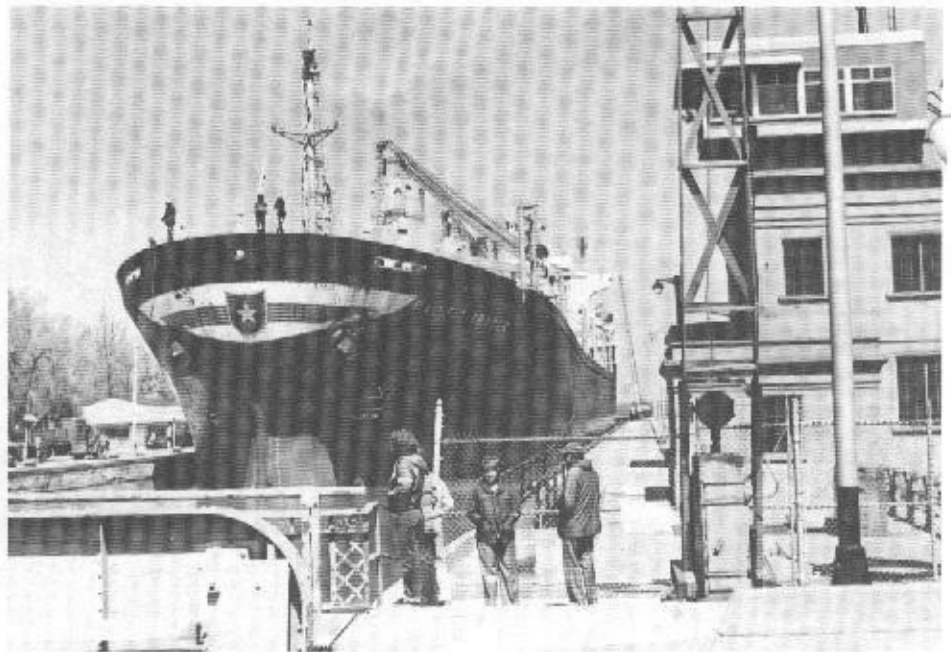
The report of the Royal Commission on Canals in 1871 recommended a deeper draft system with uniform dimensions for all locks on the St. Lawrence and Welland sections and prompted the Federal Government to embark once again on a canal building program. The new locks opened in 1883 on the Lachine Canal were 270 feet (82.3 m) in length and 45 feet (13.7 m) in width and these dimensions became the standard for the waterway as a whole.

The third Welland Canal was begun in 1873 and finished in 1887. It consisted of twenty-six stone locks of the same size as those built on the Lachine Canal at about the same time and it had a depth of 14 feet (4.3 m). When the river section was completed in 1904, a second St. Lawrence-Great Lakes system had come into operation, providing a channel with a minimum depth of 14 feet (4.3 m) from Montreal to the Lakehead. Three large U.S. locks together with a single Canadian lock had been built at Sault Ste. Marie between 1887 and 1895.

The present Welland Canal is the fourth to be built across the Niagara escarpment. Construction began in 1913 and one lock was substantially complete by 1916, when activities were stopped by World War I. Building resumed shortly after the war but it was not until 1932 that the canal was completed. The number of locks had been reduced from twenty-six to eight, with minimum dimensions of 766 feet (233.5 m) in length, 80 feet (24.4 m) in width and with 30 feet (9.1 m) of water over the sills.

The opening of the fourth Welland canal produced a waterway system which was unbalanced in the sense that ships built to take full advantage of the new canal dimensions were cut off from the Atlantic by the smaller canals in the St. Lawrence section.

Public interest in the construction of a deep waterway on the St. Lawrence was evident in both Canada and the United States before the turn of the century. Canada took the initiative in December 1951, when the Federal Government passed an act to establish the St. Lawrence Seaway Authority for constructing, maintaining and operating, either wholly in Canada or in conjunction with the United States, a deep draft waterway between the Port of Montreal and Lake Erie. Then, in May 1954, the United States Congress passed the Wiley-Dondero Act authorizing an American agency to build the navigation facilities required in United States territory in the International Rapids section of the St. Lawrence River. The project was completed five years later and through transit of the Seaway began on April 25, 1959.



A large ship passes through Lock Number One of the present Welland Canal, close to the Port Weller Dry Docks - one of our stops during the September Welland Canals Tour.

The locks built on the St. Lawrence during this period are almost identical in size to those that had been designed for the Welland Canal in the early 20th century. Five of the locks are located on the Canadian side of the river and two on the United States side. The minimum depth of the new section is 27 feet (8.2 m) and the rest of the system, including the Welland and the connecting channels, was brought to this standard. Thus, by the early 1960's, a depth of 27 feet (8.2 m) was available over the entire route from Montreal to Lake Superior and the St. Lawrence Seaway had come into existence.

Today, the St. Lawrence Seaway has become one of the great inland waterways of the World, providing a direct connection with the Atlantic Ocean for major cities in the "heartland" of North America. Large, ocean-going vessels now dock at such inland ports as Montreal, Toronto, Buffalo, Cleveland, Detroit, Chicago, Thunder Bay and Duluth, loading or unloading metallic ores, oil, coal, lumber and the industrial and agricultural products of two nations.

(For further information on the Welland Canals, please refer to AMERICAN CANALS Numbers 17, 18, 28, and 29.)

CANAL CALENDAR

Sept. 14-16 - American Canal Society Tour of the Four Welland Canals, St. Catharines, Ontario. Bill Shank, 809 Rathton Rd., York, PA 17403 (717) 843-4035.

Sept. 28-30 - Tour of C. & O. Canal, Rockville to Paw Paw Tunnel; NPS, C & O Nat'l Hist. Park, and Montgomery Co. Hist. Soc. are sponsors. Contact Mrs. Barbara Nickerson, 604 Crocus Dr., Rockville, Md., 20850.

Oct. 6-7 - Canal Days Festival, Portsmouth, Ohio.

Oct. 12-14 - Bus Tour of the Sandy & Beaver Canal, HQ Salem, OH. Canal Society of Ohio & Pennsylvania Canal Society. Jack Lanham, 235 Windsor Dr., East Liverpool, OH 43920.

Canada-USA Geography

Americans always tend to think of Canada as the "Frigid Land of the North". Yet some sections of Canada enjoy virtually the same climate as many sections of the USA. Without thinking too long about it, write down on a paper the number of States in the USA which you think extend farther north than the southernmost Province of Canada. Then compare your answer with that given at the bottom of page 2.

UNION CANAL BOAT HULL DISCOVERED

Members of the Lebanon County (Pa.) Historical Society recently reported the discovery of a Union Canal boat hull, buried in the mud near the old "Water Works" at the junction of the Union Canal and its "feeder" from Pine Grove. This is the latest of about four canal boat hulls which have been discovered in eastern Pennsylvania in recent years; another at Schuylkill Haven (along the Schuylkill Navigation) about ten years ago; and several last year at the bottom of a quarry in Northampton County, close to the Lehigh Canal.

While the discovery of such old hulls always causes a flurry of excitement and raises the question of possible excavation or preservation, the big problem is (1) how to raise the boats and (2) how to preserve them, once they are exposed to air and consequent rapid deterioration. The experience of the Danes in raising, and preserving several of the thousand-year-old Viking Ships recently discovered in the mud of an estuary near Copenhagen, tells us that it is a very difficult and expensive operation. The old vessels there were retrieved, piece by piece, treated with glucose to replace the old wood fibers, marked, cataloged, and reassembled in a large museum specially erected for the purpose. It took hundreds of archeologists, working for several years, and the expenditure of millions of dollars to accomplish this very worthwhile objective. Our advice to canal buffs - don't try it, unless you have the services of experts in wood preservation and plenty of money at your disposal.