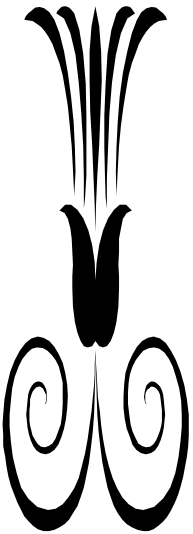
The Story of the New York State Canals

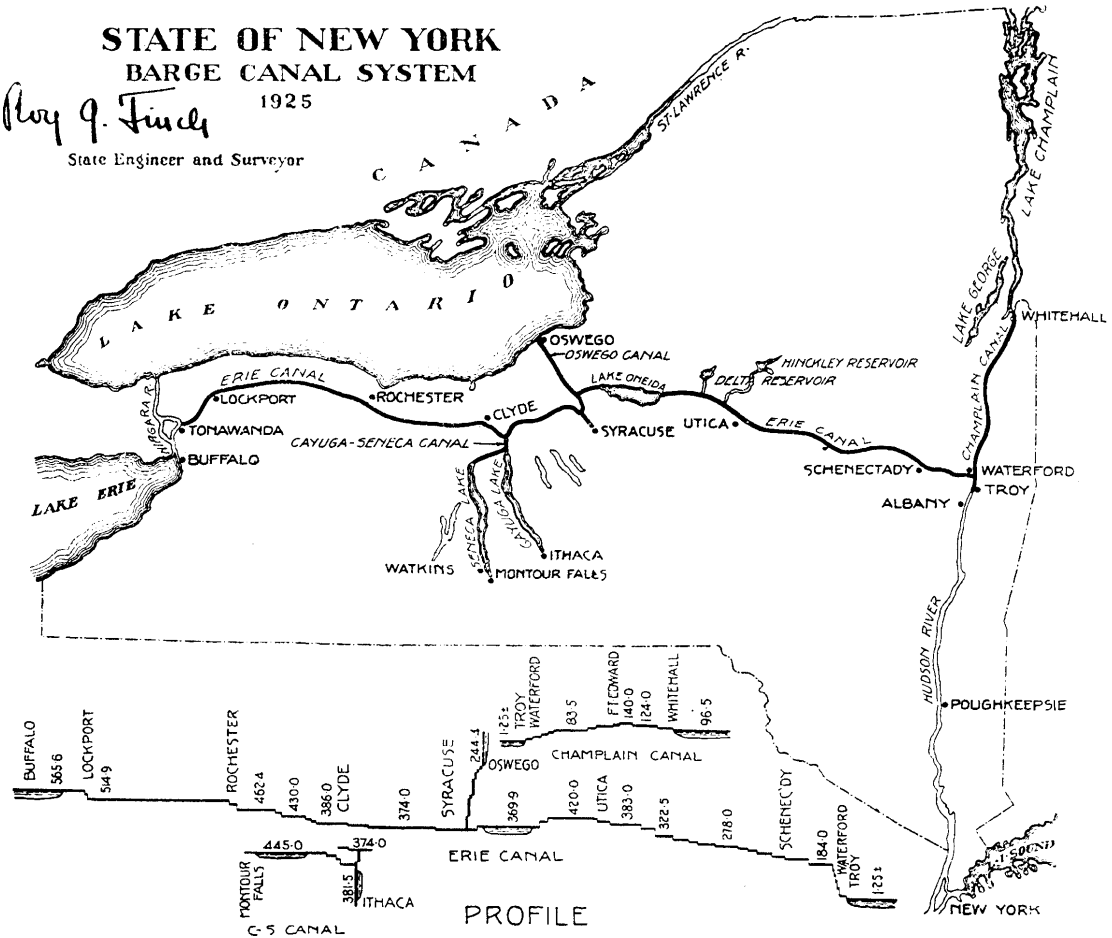
Historical and Commercial Information

ROY G. FINCH
State Engineer and Surveyor



STATE OF NEW YORK
BARGE CANAL SYSTEM
1925

Roy J. Finch
State Engineer and Surveyor



Forward

The account of the history of the Erie Canal and the "lateral" canals, as referenced by Roy Finch, was written in 1925 in celebration of the 100th anniversary of the Erie Canal. Mr. Finch was employed with the New York State Engineer and Surveyor, a defunct governmental agency that managed the Canal System from the 1850's to the mid-1900's. He was intrigued by the canals and, in celebration of the birth of the canal, thought it useful to share his knowledge and experience with all.

The Afterword provides readers with a description of the Canal System from a late 20th century perspective.

THE STORY OF THE NEW YORK STATE CANALS

GOVERNOR DEWITT CLINTON'S DREAM

"As a bond of union between the Atlantic and Western states, it may prevent the dismemberment of the American Empire. As an organ of communication between the Hudson, the Mississippi, the St. Lawrence, the Great Lakes of the north and west and their tributary rivers, it will create the greatest inland trade ever witnessed. The most fertile and extensive regions of America will vail themselves of its facilities for a market. All their surplus productions, whether of the soil, the forest, the mines, or the water, their fabrics of art and their supplies of foreign commodities, will concentrate in the city of New York, for transportation abroad or consumption at home. Agriculture, manufactures, commerce, trade, navigation, and the arts will receive a correspondent encouragement. The city will, in the course of time, become the granary of the world, the emporium of commerce, the seat of manufactures, the focus of great moneyed operations and the concentrating point of vast disposable, and accumulating capita, which will stimulate, enliven, extend and reward the exertions of human labor and ingenuity, in all their processes and exhibitions. And before the revolution of a century, the whole island of Manhattan, covered with inhabitants and replenished with a dense population, will constitute one vast city."

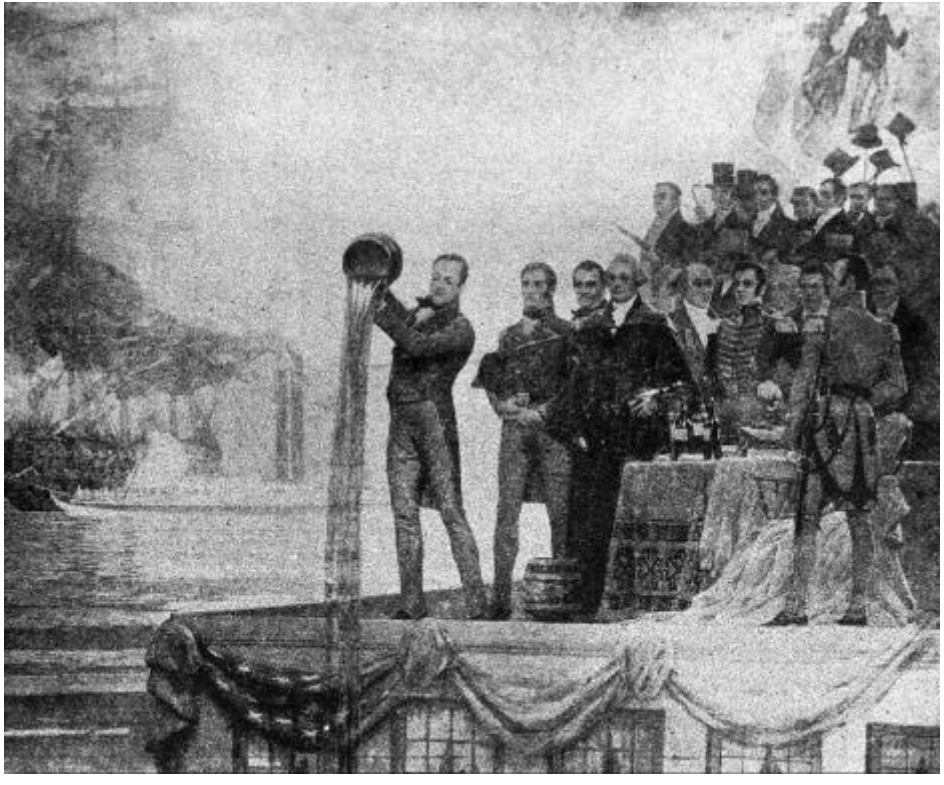
SUCH was Clinton's dream concerning the original Erie Canal–the canal which seems so small to us not but which was the Grand Canal of our forefathers–the canal which for many years was the model for canal-building throughout the world–the canal which more than any other single agency was responsible for the unprecedented development and prosperity that came not alone to New York State but to the states beyond its western border and even to the whole country in the first half of

the nineteenth century. When Clinton wrote these words they seemed to many as the vain imaginings of a most visionary dreamer. But the dream came true, and every loyal New Yorker has reason to feel pride in that the canals have done for his State.

The history of transportation reads much the same in all lands– first came the highways, then the waterways and later the railways– but in America, which was not settled until the waterways of Europe had been in use for years, the opening of waterways closely followed the cutting of roads through the wilderness and in turn the railroads antedated the canals by only a short time. These are circumstances which have given to America a peculiar history of rapid development. Our early highways were few and poor, and travel over them was very costly and beset with difficulties. Waterways had been improved for the benefit of the people of foreign lands, and accordingly progressive minds in America were busy with plans for like improvements here. George Washington, a surveyor and an engineer before he became a soldier and a statesman, was acclaimed by early writers as the father of American canals. Before the Revolutionary war he had succeeded so far as to obtain official sanction for one of his projected plan At the close of the war, but before peace was declared, he started from his headquarters at New burgh ad made a journey through central New York, especially to view the possibilities for inland navigation.

The first waterway improvements in New York were made by a private company, chartered in 1791. Within five or six years the natural streams had been improved so as to facilitate traffic to a considerable extent, but the need of something better was felt, although the people were not then ready to commence the great undertaking which the situation demanded. The population west of the Genesee valley and even farther east was small, not because those section os the state were not fertile and attractive, but people were slow to go far inland, where the bringing in of supplies and the carrying out of products could be accomplished only at heavy expense and with great risk.

In order to open the western country to settlers and to offer a cheap and safe way to carry produce to a market, determined efforts were made to provide for the construction of a canal across



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"The Marriage of the Waters"

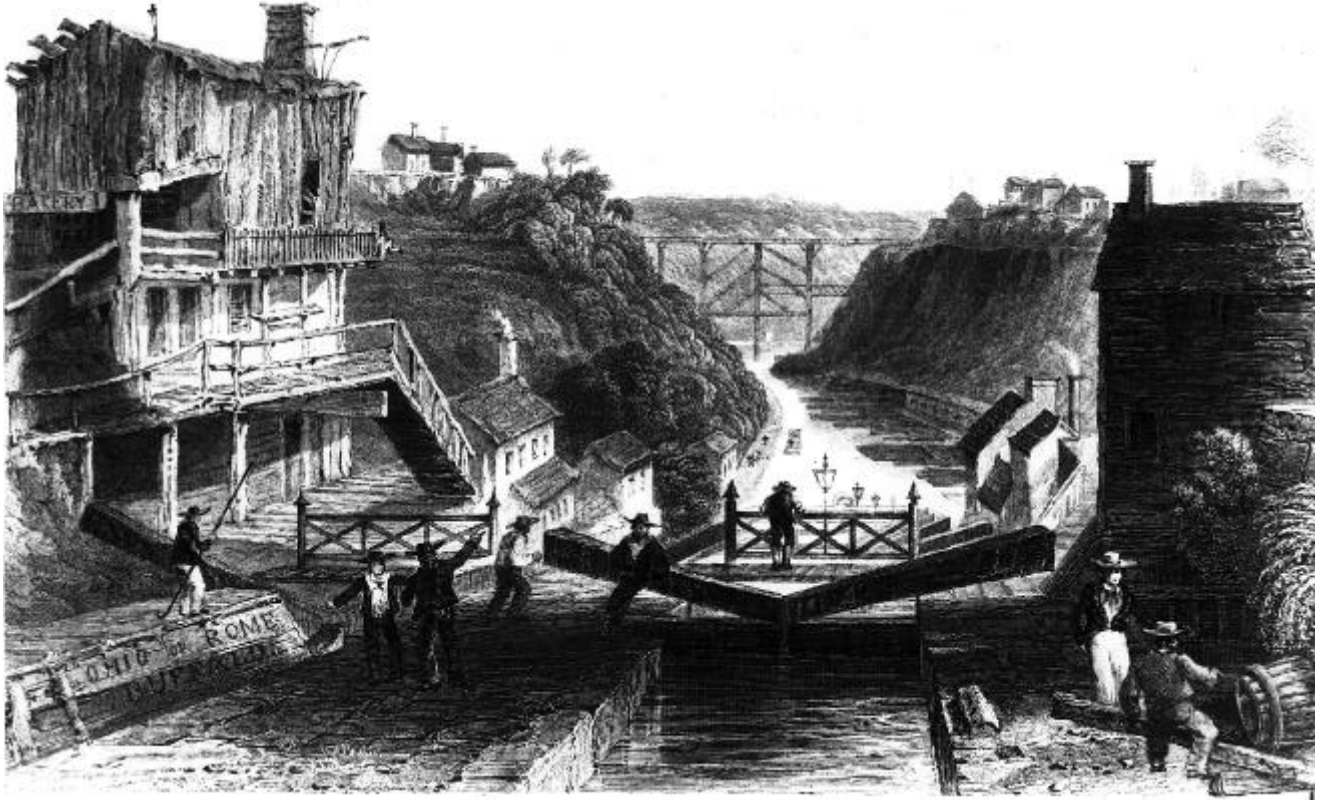
A mural decoration in the DeWitt Clinton Hight School, New York, showing a scene connected with the ceremony of opening the Erie Canal in 1825.

the state. It was generally recognized that such a canal was greatly needed, but the magnitude of the undertaking and the doubt of the State's ability to cope with the difficulties developed much strong opposition. For years the project struggled along before sufficient public sentiment could be aroused to demand its fulfillment, and it was not until 1817 that the State actually undertook the construction of this canal. In those early days it was often referred to, in derision, as "Clinton's big ditch."

This waterway, called the Erie Canal and famous the world over, was opened October 26, 1825. It was four feet deep and 40 feet wide, and at the beginning floated boats carrying 30 tons of freight. The first fleet to travel its full length was headed by the boat "Seneca Chief," bearing Governor Clinton, the Lieutenant-Governor and a company of distinguished citizens; the start from Buffalo on the morning of October 26 was accompanied by the firing of a cannon and this was echoed by the booming of a line of cannons stationed at suitable intervals all the way across the state to Albany and down the Hudson to New York City–a grand salute from a battery five hundred miles long, announcing to the people of the state the completion of the most stupendous undertaking of their time. The "Seneca Chief" bore two barrels of water from Lake Erie, which Governor Clinton emptied into the ocean at New York in a formal ceremony, generally referred to as the "Marriage of the Waters" between the Great Lakes and the Atlantic Ocean.

The Erie proved to be America's greatest canal. Its effect was soon felt, not only through the state but throughout the east and the Great Lakes region. Settlers flocked westward, forests gave way to sawmills and hamlets and these in turn grew into villages. Prosperous towns were established on the Great Lakes and a splendid chain of cities sprang up along the line of the Erie Canal.

At a time when we have ceased to wonder at great engineering feats, which furnish this continent with the means of rapid and easy transportation, it is difficult to realize the conditions that prevailed in America a century ago; we are likely to forget the magnitude of the undertaking which was the chief instrument in retaining for New York the proud title of the "Empire State." We lose sight of the tremendous difficulties overcome and the strenu-



Artistic rendering of life on the Erie Canal at Lockport's flight of five locks.

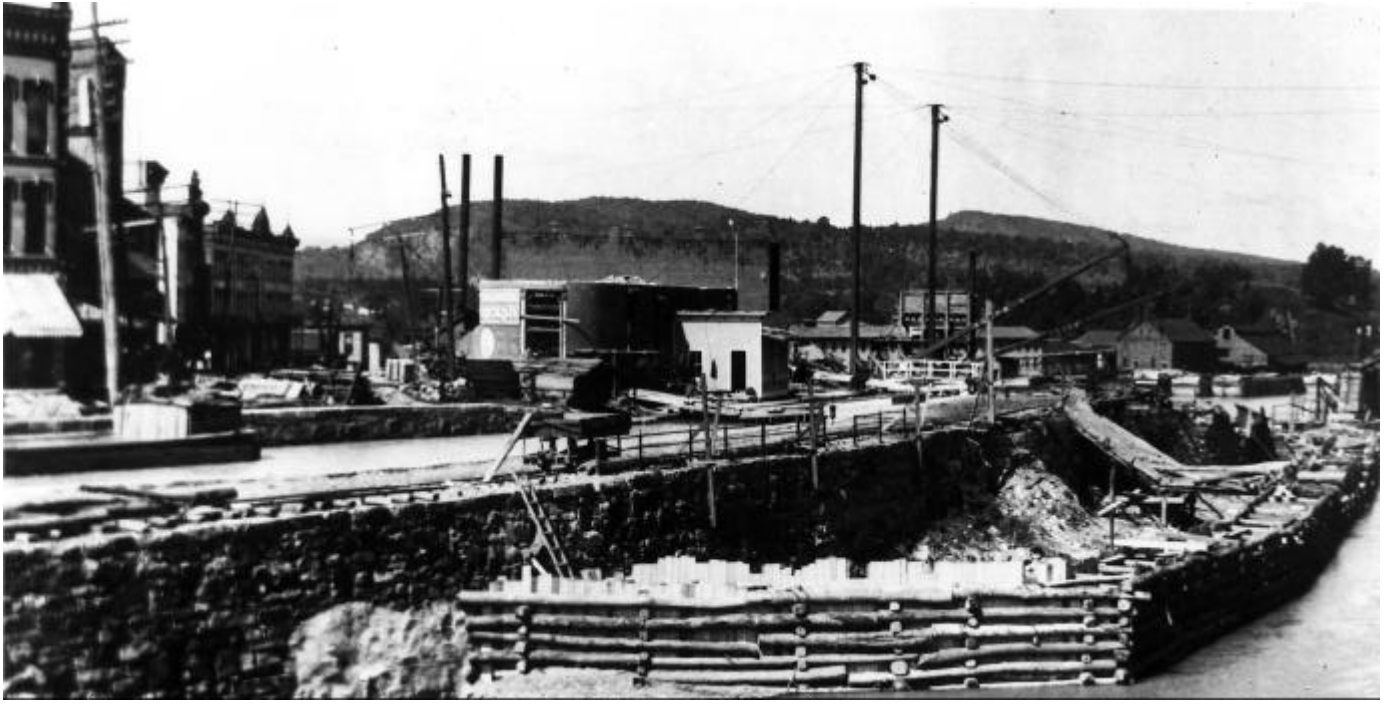
ous efforts exerted by the men who gave to the State her canal policy.

When we recognize the many adverse conditions and review the difficulties, we do not wonder that the people of the struggling Republic stood aghast at the vast enterprise and were slow to begin improvements which have proved to be the making of the State. It is well that at that period that were men guiding the interests of the canals who had a strong faith in their ultimate success and who clearly foresaw the benefits follow. To their energy, bravery, perseverance and dauntless resolution is due the era of prosperity and development which followed the building of the canal.

The writer of the "New York Memorial," the chief instrument to mold public sentiment for the early canal, was gifted with prophecy when he said: "It remains for a free state to create a new era in history, and to erect a work more stupendous, more magnificent and more beneficial, than has heretofore been achieved by the human race."

After the building of the original canal the city of New York grew by leaps and bounds. Before the canal was built Philadelphia had been the nation's chief seaport, but New York soon took the lead and too late Philadelphia made heroic but futile efforts to regain its supremacy. Massachusetts had been another rival, having been about on a par with New York State in exports, but sixteen years after the opening of the canal its exports were only one-third those of New York. In that period, too, the value of real estate in New York increased more rapidly than the population, while personal property was nearly four times its former value, and manufacturing three times as great. There were then five times as many people following commercial pursuits in New York as there were before the completion of the Erie Canal.

So marked was the success of the Erie Canal that a veritable frenzy for canal-building spread over the whole country, which manifested itself in New York state in the surveying of hundreds of miles of proposed routes and in the building of several lateral canals, six within the first decade after the Erie was completed and four more within the next four years. In order to keep pace with the growing demands of traffic, the Erie and its main branches

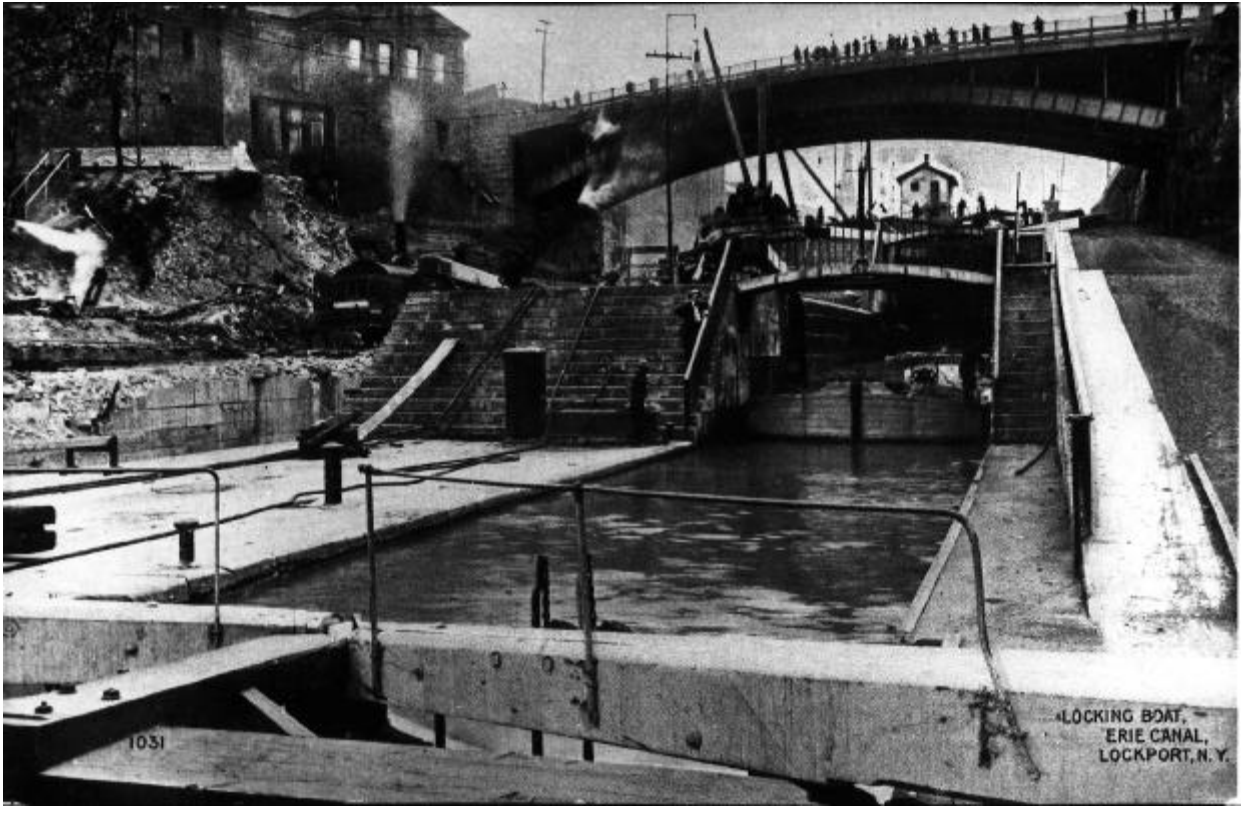


Enlarging the Barge Canal, Whitehall, NY.
Source: The Gayer Collection - NYS Canal Society

were enlarged from time to time. In 1862 the Erie Canal had a depth of seven feet; it could handle boats carrying 240 tons, a large increase over the first boats of 30 tons capacity on the original canal. Up to 1882, the year in which it was made a free canal by the abolition of tolls, it had earned forty-two million dollars over and above its original cost and the expense of enlargement, maintenance and operation. In 1903, almost ninety years after the beginning of Clinton's canal, the people of the State decided again to enlarge it by the construction of what has been generally termed the "Barge Canal."

Before the State of New York entered upon the Barge Canal project, the relative merits of ship and barge canals were most carefully considered by various Federal and State boards of engineers. As a result of the study by these eminent engineers, the conclusion was reached that a barge canal, rather than a ship canal, would best serve the interests of navigation and commerce between the Great Lakes and the ocean. It was shown that vessels built for ocean service could not be operated to advantage either in the Great Lakes or in a long narrow channel connecting the Great Lakes with the Atlantic seaboard; that the capacity of a ship canal for handling freight would not greatly exceed the capacity of a barge canal, and that it would be cheaper to transfer cargoes at the ends of the canal and move freight across the state in barges, than it would be to attempt to navigate ocean-going vessels through a narrow channel of such great length. It was upon this determination that the State of New York bonded itself for the purpose of constructing the Barge Canal.

The Barge Canal consists of the Erie Canal and the three chief branches of the State system–the Champlain, the Oswego and the Cayuga and Seneca canals. The Erie is the main line and reaches across the state from Troy on the Hudson River to Tonawanda and Buffalo on the Niagara River. The Champlain runs north near the easterly boundary of the state, from Troy to Whitehall, at the southern end of Lake Champlain; the Oswego, from a point near Syracuse, connects the Erie Canal with Lake Ontario; and the Cayuga and Seneca Canal, which leaves the Erie west of Syracuse, runs southward, connecting with Cayuga and Seneca lakes.



Locking boat through, Erie Canal, Lockport, NY.

The Erie Canal is about 340 miles in length; the Champlain 63 miles; the Oswego 24 miles and the Cayuga and Seneca 27 miles. Including with these the Hudson River and the lakes connected with the canal at various points and actually forming part of the system, the total length of the Barge Canal System is a little more than 800 miles.

The Barge Canal is a great improvement in the way of inland waterway navigation and has been pronounced by many eminent authorities to be one of the greatest engineering works of the present age, rivaling from an engineering viewpoint the work done by the Government at Panama. It is ten times as long as the Panama Canal; it has many more structures than the Panama, and some of its structures are the most notable in the world. The burden of constructing this, the world's greatest waterway system, devolved upon the State Engineer and his corps of assistants. Not only did this department make the original surveys and estimates and prepare the designs, plans and specifications, but it also had supervision and direction over all construction work.

The system differs from the canals previously built in that the underlying idea has been to use the lowest watercourses in the valleys wherever possible rather than to build an artificial channel along the higher ground. From Troy to Rome, the Barge Canal is largely in the Mohawk River, the old canal which paralleled the Mohawk having been abandoned and the river made into a canal. West of Rome the canal passes through Oneida Lake and the Oneida River; thence through the Seneca and Clyde rivers to a point near the city of Rochester. From that city westward it has been necessary to build an artificial channel, or "land line" canal,* to a point west of Lockport. From there westward to the Niagara River, Tonawanda creek is used. From Tonawanda traffic proceeds to Buffalo by way of the Niagara River.

On the Oswego branch the Oswego River has been canalized to Lake Ontario. The Cayuga and Seneca branch is partly river canalization and partly artificial channel; the southerly portion of the Champlain Canal is a canalization of the Hudson River; the northerly part occupies Wood creek valley but does not follow the windings of the stream.

**See definitions at back of booklet.*

Motorship “J.R. Hutton” at Lock 2 in Waterford.
Source: Waterford Historical Museum

From tide-water level at Troy, the Erie Canal rises through a series of locks in the Mohawk Valley to elevation 420 feet above sea-level at the summit level at Rome. Going westward it descends to elevation 363 at the junction with the Oswego Canal, and thence rises to elevation 565.6 at the Niagara River.

The Oswego Canal descends to Lake Ontario, the mean elevation of which is 244.4. The Champlain Canal ascends from tide-water at Troy to elevation 140 at the summit level and thence descends to elevation 96.5 at the entrance to Lake Champlain. The Cayuga and Seneca Canal has a total lift of 71 feet.

The channel of the waterway has a uniform bottom width of 75 feet in earth sections of the land line; 94 feet where solid rock was encountered, and 200 feet or more in the beds of rivers and lakes. The depth of the canal is 12 feet.

The locks along the rivers and those on the land lines are of similar design and standard dimensions. The maximum usable width and length are 44½ and 300 feet, respectively, with a depth of 12 feet over the mitre sills.

In order that any canal may be successfully operated it is necessary to have an unfailing supply of water. The Niagara River furnishes an adequate supply for the canal in the western part of the state, but the problem of obtaining a suitable supply for the eastern part of the canal was one of the most serious questions to be solved. It required most careful study, research and examination because it was necessary to overcome the danger of having traffic tied up between Rome and Troy through lack of water during the dry summer months. The problem was solved by the building of two very large storage reservoirs, one of which is on the headwaters of the Mohawk River, where formerly stood the village of Delta, and the other is on a branch of the Mohawk at Hinckley. The Delta Dam forms an artificial lake with a surface are of 4½ square miles, while the lake formed by the dam at Hinckley is 4½ square miles in area. The combined capacity of these two reservoirs furnishes an amount of water greater than is neede for any known period of drought in the Mohawk valley.

Making the Mohawk, Hudson, Seneca, Oswego and Clyde rivers into canals (“canalizing them”) is one of the most interesting

Dock Street, Schenectady, NY.

features of Barge Canal construction. The method adopted consists in obtaining the proper depth by the combined process of building dams and locks and dredging channels. The dredging provides uniformity in the width and depth of the channels; the dams maintain the surface of the water at a fixed elevation above the beds of the streams, making the rivers into a series of pools, or lakes; and the locks provide for passage from one level to the next.

The dams which have been built as a means for controlling the canalized rivers are of two distinct types -- fixed and movable. The most notable of the fixed type are those located on the Mohawk River between Schenectady and Cohoes. The larger of the two is at Crescent and is nearly semicircular in shape. The top of this structure is 39 feet above the river bottom and the length is nearly one-half mile. In general appearance the Mohawk movable dams look like steel bridges. They have concrete piers and abutments with spans made of heavy structural steel. From the downstream side of the lower bridge chords steel uprights are hung by a hinge-like connection. One end of the uprights rests on a concrete sill in the river bottom. Against these uprights slide steel plates, called gates, which may be raised and lowered by the aid of machinery. When the gates are lowered, or closed, the structure is in operation as a dam and whenever it is desired to permit the escape of more water than would flow over the crst, the gates are partly raised, allowing more water to pass through. During the winter season or in the event of a severe flood, the gates and uprights are entirely removed, being swung up under the bridge floor and leaving a perfectly clear channel. Eight structures of this kind are visible to travelers between the cities of Schenectady and Little Falls.

There are 57 locks on the Barge Canals, and the lifts of the locks vary from 6 to 40½ feet. The greater number of the locks, however, have a lift of 16 to 20 feet. They are all built of concrete and are operated by electricity. They are filled with water and emptied by means of culverts in the side walls. The water enters the lock chamber through ports, or openings, located just above the lock floor. The lock gates are massive steel doors swinging on steel pivots. Some of these lock gates weigh more than 200,000

Panorama of Waterford Flight of Locks depicting Locks 4, 5 and 6. Waterford, N. Y., New York State Barge Canal.
Three of the Waterford series of five locks. Because the locks are so close together, there are wide pools between them and bypasses around them.
The canal in this locality is a land line joining the Mohawk and Hudson rivers

pounds each and are of the so-called "mitre" type. A pair of gates may be opened or closed in about 30 seconds. Their operation, as well as the operation of the vertical lift valves which control the water in the feed culverts, the operation of the power capstans, the buffer beams and all other lock machinery, is controlled by a series of switches collected together in a small controller box located on one of the lock walls.

The most wonderful of the locks are the five at Waterford near Troy. They are the world's greatest series of high lift locks. The total lift is 169 feet, which is twice as much as the total lift from sea-level to the summit of the Panama Canal. Each of these locks cost a quarter of a million dollars. The big lock at Little Falls is remarkable because it has a lift of 40½ feet and this is a greater lift than any single lock on the Panama Canal. The siphon lock at Oswego is the first lock of this type to be built in the United States and is the largest of its kind in the world.

There are 306 railroad and highway bridges crossing the canal. The greater number of these bridges are fixed, or stationary, but in a few towns and villages local conditions have made it necessary to construct highway bridges of the lift type, which are raised to allow boats to pass under them. The clearance under the bridges is not less than 15½ feet.

Other structures which present a striking appearance are the guard gates. They are solid steel gates hung from steel towers resting on heavy concrete foundations and they are placed at intervals of about ten miles on the land line sections of canals. They are used to close certain portions of the canal for repair work or to prevent damage in case of a break in the canal embankment.

A large number of walls, culverts and spillways have been constructed; taintor gates have been extensively used, and over three million yards of concrete have been placed. One hundred million yards of earth and rock have been removed in the construction of the Barge Canal and nearly every known kind of excavating machinery has been used. The deepest cut on the Barge Canal is in the vicinity of Rochester where the bottom is 65 feet below the original surface of the ground.

The canal channel is a river often is bordered by a wide expanse

Lock 17 – Little Falls

of water. It has been necessary, therefore, to indicate the river and lake courses by buoys and other markers, which carry lights for night illumination. This practice has been extended to some of the land lines. Lighthouses supplement the smaller navigation aids on certain of the lake courses.

The Champlain Canal was opened to traffic in the spring of 1916. The Oswego and the eastern part of the Erie was opened in 1917, and the through route and all branches were opened in the spring of 1918.

Five years of operating the canal has seen four types of general carriers placed on the waterway. One is a barge 150 feet long, 20 feet beam, with 12-foot sides and a cargo capacity of 650 tons on a draught beam, with 12-foot sides and a cargo capacity of 650 tons on a draught of 10½ feet. These are operated in fleets of four, one being self-propelled and towing three consorts. The tow-barge has the same general dimensions as the consort but, due to space taken by the engines, will accommodate but 350 tons of cargo, giving the entire fleet a capacity of 2,300 tons. The second type of barge is 100 feet long, 20½ feet beam, with 12-foot sides and a cargo capacity of 400 tons on a draught of 10 feet. These are operated in fleets of five, being towed by a tug boat and having a cargo capacity of 2,000 tons. The third type is a modification of the second, in that the boats have the same general dimensions but are constructed along the box-like lines of the old type of Erie Canal boats. These have a cargo caacity of 500 tons and a fleet capacity of 2,500 tons. The fourth type of carrier is the steel motorship, five of which were placed on the waterway in 1921. Each of these vessels is 256 feet in length, 36 feet beam, with 14-foot sides and a cargo capacity of 1,600 tons on a draught of 10 feet. They are operated as single units and are devoted to the grain-carrying trade. Several other carriers of various designs have been placed on the waterway, but the majority of floating equipment still consists of the old type of canal boats with capacities ranging from 150 to 400 tons. As there re no towpaths on the new canals, all carriers must be propelled by mechanical means.

The time consumed in passing a fleet of boats through a lock depends to some extent upon the number and size of the boats and

Gowanus Bay Terminal

Piers 5 and 6 in New York City's Gowanus Bay were home to the New York State Canal Terminal. The terminal was known for its superior freight handling equipment.

is otherwise variable according to the lift. The usual time varies from 10 to 30 minutes. The maximum allowable speed of boats in the improved canals is six miles per hour, except in river and lake sections, where the limit is ten miles per hour.

The importance of the territory adjoining the Barge Canal is not generally appreciated. A study of the State's population reveals the fact that 73½ percent of the people live within two miles of the waterways. This condition was brought about by the original canals, which founded a chain of cities and villages across the state, the like of which exists nowhere else on the whole continent. As New York's population is one-tenth that of the whole country, we see that about seven percent of the people and the supplies they need shall have available a cheap means of transportation. By further study we learn that 77 percent of the State's population is within five miles of the waterways, 82 percent within ten miles and 87 percent within twenty miles. Viewing the subject from a different angle, we discover that 46 percent of the whole area of the state lies within twenty miles of the Barge Canal system, while 71 and 88 percent of the area are within 50 and 70 miles, respectively. These latter are the respectve distances which motor trucks of 32 and two tons capacity can cover in a day's run, going and returning, and on improved highways these capacities can be increased to five and three tons, respectively. The large and fertile field for a combined canal and motor truck traffic is readily apparent.

Efficient terminals, or freight depots, are of the utmost importance to any modern waterway. They are the keys that give access to the sources of supply and to the markets and connecting transportation routes. American waterways have been sadly lacking in such facilities. Early in the course of constructing the Barge Canal, the State determined to provide these aids to commerce along its waterway. Accordingly terminals have been supplied at all the cities and nearly every village along the line of the canal and its connecting navigable rivers and lakes, there being more than 60 in all. The facilities at the several sites vary, but in general, these consist of docks, piers, wharves, harbors, freight-sheds, and mechanical devices and in some cases railroad connections for the interchange of freight between rail and water carriers.

The mechanical equipment at each locality is determined by the requirements of traffic at the site. Some of the more important terminals, such as those located at New York and Buffalo, are provided with conveyor, semiportal, portal and locomotive cranes, belt conveyors, tiering machines, derricks, capstans, electric battery trucks, trailers and battery-charging outfits. In addition to the freight-handling equipment, warehouses and transit sheds of steel, brick, concrete or temporary wooden construction has been provided.

The State has gone a step farther and in order that its waterway may be of the greatest possible use has provided for the construction of two modern grain elevators. At Gowanus bay terminal, New York City, an elevator having a capacity for two million bushels has been built for the handling of grain carried by canal. This elevator has all the latest machinery for loading, unloading, conveying, cleaning, drying, weighing and storing grain. Previously New York City had virtually no facilities for canal grain traffic. The Gowanus terminal is the logical point of transfer between canal and ocean commerce. The foundations for another grain elevator have been built at Oswego. To meet an emergency, floating elevators have occasionally been provided at up-state localities, to release Barge Canal carriers for more frequent trips.

The total appropriation for the Canal System to date, including the terminals and grain elevators, is $170,729,774. This cost has not been excessive, considering the magnitude and extent of the work, and an inspection of the waterway is the best proof of the care and fidelity with which the project has been carried out.

Commerce, which depends on transportation, is the mainstay of New York State. New York's greatness in commerce, due to the excellence of its transportation facilities, has given to the State a development that is the admiration of its sister states. New York was not always first in commerce and industry. The turning point came with the completion of the original Erie Canal. The position thus attained has never been lost and that it may never be lost the State undertook and now has completed a thorough improvement and modernization of the waterways that have been so largely responsible for its greatness.

TABULATION OF INTERESTING FACTS

A. The original Erie Canal begun in 1817, completed in 1825.
B. Enlargement to 7-foot draft completed in 1862.
C. Tolls abolished in 1882.
D. First Barge Canal work started in 1905. Barge Canal opened to traffic May 15, 1918.
E. The Barge Canal consists of:
    1. Erie — across state from Troy on the Hudson River to Tonawanda, Niagara River.
    2. Champlain — north from Troy to Lake Champlain.
    3. Oswego — Three Rivers Point, near Syracuse, to Lake Ontario.
    4. Cayuga and Seneca — branch connecting Cayuga and Seneca lakes with Erie.
F. Length of canals:
    1. Erie — 340.7 miles.
    2. Champlain — 62.6 miles.
    3. Oswego — 23.8 miles.
    4. Cayuga and Seneca — 27.1 miles.
    5. Connecting rivers and lakes — 347.1 miles.
    6. Total — 801.3 miles.
G. Dimensions:
    General bottom width in lakes and canalized rivers – 200 feet.
    Minimum bottom width in land lines- 75 feet.
    Usable size of locks — 300 feet long by 44½ feet wide.
    Clearance under bridge — 5½ feet.
H. Construction and operation of locks:
    1. Number of locks — 57.
    2. Built of concrete.
    3. Operated by electricity.
    4. Gates opened or closed in 30 seconds.
    5. Average time of lockage — 10 to 30 minutes.
    6. Lift of locks varies from 6 to 40½ feet.
I. Notable engineering features:
    1. Five locks at Waterford-combined lift of 169 feet.

2. Little Falls lock — lift of 40½ feet.
3. Siphon lock at Oswego — first siphon lock constructed in the United States.
4. Movable dams:
    a. Bridge type.
    b. Taintor gate type.
1. Concrete dams forming Delta and Hinckley reservoirs.
2. Massive steel guard-gates.
3. Curved fixed dam at Crescent.
4. 306 railroad and highway bridges.
5. Waste weirs, automatic spillways.
6. 50-foot Taintor gates.
7. Power-houses for operation of locks and movable dams.
8. High embankments carrying the canal over Irondequoit and Oak Orchard creeks; and the Erie "Culebra cut" of 65 feet depth south of the city of Rochester.
9. Barge Canal terminals at Pier 6, New York City and other points.

J. Total appropriations to date for Barge Canal purposes, including terminals and grain elevators, are $17,729,774.

TECHNICAL TERMS NOT DEFINED IN TEXT

Buffer beam. A beam placed across the head of a lock as a protection to the lock gates.

Capstan. A cleated cylinder (called a barrel) revolving around a spindle built on a wall and operated by electricity. A rope fastened to a barge can be thrown around the capstan for the purpose of towing a barge into a lock.

Controller box. A steel box located on a lock wall containing switches for the control of the lock machinery.

Dam. A structure built across a watercourse to confine and keep back flowing water. (A) A fixed dam is a permanent structure without movable parts. (B) A movable dam is one which can be set up or thrown down as desired.

Feed culverts. Hollow spaces, or tunnels, within lock walls through which water for filling, or "feeding" a lock and for emptying it is conducted.

Land line. That part of a canal which is an artificial channel-not in a river or lake.

Lateral canals. Branch canals leading into the main channels.

Lockage. The passage of a boat or boats through a lock. The raising or lowering of a boat or boats from one water-level to another water-level.

Mitre gates. Two gates which swing together into the form of a wide letter V.

Spillway. A passageway for surplus water from a canal or reservoir.

Summit level. The highest level or elevation reached.

Siphon lock. A lock in which the water for filling and emptying is controlled by an application of the siphon principle, as distinguished from a lock filled and emptied by water controlled by valves.

Tide water level. The level affected by the flow of the tide. (In the Hudson River the tide reaches as far as Troy.)

Tons capacity. The carrying content of a boat state in town.

Waste weir. An overflow, or weir, for the escape of surplus water form a canal or reservoir.

Afterword

Today, the name "Barge Canal" is no longer an accurate description of the marine activity on New York's canals. Trains and trucks have taken over the transport of most cargo that once moved on barges along the canals, but the canals remain a viable waterway for navigation. Now, pleasure boats, tour boats, cruise ships, canoes and kayaks comprise the majority of vessels that ply the waters of the legendary Erie and the Champlain, Oswego and Cayuga-Seneca canals, which now constitute the 524-mile New York State Canal System.

While the barges now are few, this network of inland waterways is a popular tourism destination each year for thousands of pleasure boaters as well as visitors by land, who follow the historic trade route that made New York the "Empire State." Across the canal corridor, dozens of historic sites, museums and community festivals in charming port towns and bustling cities invite visitors to step back in time and re-live the early canal days when "hoggees" guided mule-drawn packet boats along the narrow towpaths. Today, many of the towpaths have been transformed into Canalway Trail segments, extending over 220 miles for the enjoyment of outdoor enthusiasts from near and far who walk, bike and hike through scenic and historic canal areas.

In 1992, legislation was enacted in New York State which changed the name of the Barge Canal to the "New York State Canal System" and transferred responsibility for operation and maintenance of the Canal System from the New York State Department of Transportation to the New York State Canal Corporation, a newly created subsidiary of the New York State Thruway Authority. With this act, a new era of rebirth dawned along the Canal System as New York State and communities all along the canals embarked on a massive effort to revitalize the Canal System and transform the waterway into a world-class destination for tourism and recreation. Through a strong commitment to preservation of the canals' rich heritage and encouragement of sensitive development along these waterways, New York State has taken the essential steps to ensure that the Canal System and its historic legacy will be preserved and fostered into the 21st century as a vital resource to be enjoyed for generations to come.