

The Beginnings of the Second Enlargement of the Erie Canal 1858-1895

Introduction

I think everyone understands that the Erie Canal has gone through many changes between the time it was first built in 1817-1825 and the building of the Barge Canal 1905-1918. When the canal was opened from Albany to Buffalo in 1825 it suffered from many imperfections that made the day to day operation and it's use by the boaters difficult at times. The manner in how the canal was constructed following contours of the land made for many twists and turns. In 1834 the State decided to enlarge the canal from the four by forty feet dimensions to seven by seventy feet between Albany and Syracuse, and then in 1835, the State had decided to enlarge the full length of the canal from Albany to Buffalo. The goals were many but mostly centered around getting bigger boats on the canal. The locks were enlarged and doubled (two locks side by side), and new aqueducts were built. Since a larger canal needed more water, more reservoirs and feeders were constructed. This process of enlargement would last for the next twenty-seven years. Before the first enlargement had been completed, there were calls for a still larger canal which would allow for larger loads. In time this would be called the second enlargement, and that in turn would lead to the building of the Barge Canal. This article began its life as a look at the Second Enlargement of the Erie Canal. It has turned out to be an examination as to what factors led up to the second enlargement. As with everything about the canal, the more I dug into the history, the less clear things became.

When did the Second Enlargement Begin?

We can flip the question about the beginning of the second enlargement to read, "when did the first enlargement conclude?" I am finding that an answer to this question is not as clear as one might think. For help, we might look to Whitford and his order of chapters. He places the beginning of the second enlargement at the same time as the Nine Million Dollar Act of 1895 since that is when the enlargement was written into the law. Another person might look to at when the shipper could move more tons of goods as an enlargement. So I set out to find a time when someone who had the power and the influence to make a call for a deeper canal made that call. Certainly demands for a deeper canal are not the same as actual digging, but other things did take place as a result of these calls, and these increased the capacity. As a result of this study, I decided to use the beginning of steam on the canal as my benchmark in a timeline of enlargement projects.

1858- The Steam Boat and a Deeper Canal

It is difficult to pinpoint the date of the first steam powered canal boat as many seem to claim the honor. It tends to circle around; "who built the first boat?", and "who built the first successful boat?" In early August 1858, a trip was taken by New York State Governor King, Canal Commissioners Ruggles and Jaycox, and many others, to attend a celebration of steam on the canal. From Rochester to Buffalo they took part in a flotilla of steam boats that included the *PS Sternberg*, the *Charles Wack*, the *Governor King*, and the *SS Whallon*.¹ In one of the many speeches he gave, Governor King told the crowds

that the *Sternberg* was the first successful steam boat and that the ongoing experiments with her and the others would show that steam was practical for use on the canals. He also said that it only remained for the State to, "Enlarge and deepen the canal, and make it what it was intended to be." This was not a call to deepen the canal to more than seven feet; it was a call to deepen the canal to seven feet, as the canal enlargement had yet to be completed. Adding to the quote above, the Governor said, "Then you may put on the steam, and defy competition, from whatever source it may come." The newspaper article went on to report that the boats often hit bottom on their tour, which is backed up by the annual reports of the time.²

Although the railroads had yet to surpass the canals in tonnage of goods carried the men promoting the steam boats could see the future. In an extensive article about steam on the Erie Canal in Hunt's Merchants' Magazine and Commercial Review, the writer said; "It should be borne in mind that the railways are 'up to time' under the shrewdest competitive management, whilst the canal managers and forwarders have stuck like leeches to the tow-path, until they have sucked the financial blood from this great artery, so that she requires powerful stimulants in loans to reinvigorate her; hence, it wants an energetic and expeditious policy to meet the activities of the railways and redeem her from the sluggish habits of the past."³ The point was that the railroad and the steam engine were evolving, while, even though the first enlargement process was ongoing, the canal had stopped growing. Clearly steam was the future, if only the canals would embrace it.

So let's step away from the parade for a moment. One of the men on the *Sternberg* was temporarily appointed canal commissioner Samuel B Ruggles.⁴ He was a member of the State Assembly in 1838 and a canal commissioner from 1839-1842. Ruggles had been asked to fill the vacancy of Samuel Whallon. In this position he learned first hand about the condition of the canals and the progress of the enlargement. In 1858 the enlargement had been going on since 1835. Even with the missed Stop and Tax years (1842-1847), the work had been going on for eighteen years and it was far from complete. He wrote that, "It was soon discovered that the Erie Canal, the enlargement of which had been supposed to be nearly complete, had not a uniform depth even of six-feet of water, to which it had been limited during the progress of the enlargement, causing great dissatisfaction, delay and loss to the numerous persons engaged or interested in its navigation."⁵

Let's get back to the parade of steam in August 1858. Unlike Governor King who looked to the future, Samuel Ruggles looked back, "I have not time to speak to you of the future of this great work, and I desire only further to allude to the past, by calling to mind those to whom we are indebted for the grand canal, which has brought to you and the State so full a measure of prosperity. Let me in parting, point you to one memorial of those benefactors who have passed away, and whose monuments we see all along the line of this canal. Yonder, (pointing to a single arch of the old aqueduct) stands a monument to their wise forecaste and patriotism. Preserve that, fellow citizens, as a memorial of the triumphal accomplishment of a great enterprise. In Europe, and among all civilized nations, a mouldering ruin like that, illustrative at once of the art and enterprise of the past, would be cherished with religious care. Let it be your aim to secure it from the

vandal hand, and preserve it for your children to contemplate as a memento of the opening of a new era to internal commerce.”⁶ This speech is interesting as it takes place during a tour of the new age of innovation, in which the central point is to push the State to finish the first enlargement. Ruggles is saying in effect, “The reason you are here is due in large part to the great canal. Let that arch be a reminder of this. Don’t forget it!” You can read similar reminders through all the yearly Annual Reports which all seem to start with a reminder of the past glory days of canals and the Empire State.

A push was made for the completion of the canal enlargement. Up to 1859, \$29,800,000 had been spent on the enlargement. Engineers estimated that only one-million more would finish the work. On April 19, 1859, the Legislature passed a bill, Chapter 495 which in part gave money to survey the entire canal by boat, taking measurements of the actual depth, and publishing the results for all to see.

1860’s

Thomas Colden Ruggles was appointed to carry out the survey, the first readings to be taken in 1860.⁷ A second test run was to be made in 1861. Ruggles found that the canal was between 5.9 to 6.7 feet deep. In addition there were large earthen benches that stuck out into the channel decreasing the width of the navigation channel and decreasing the amount of water in the canal. Ruggles also discovered that no surveys of the canal existed to aid him in his calculations of clearing out the canal channel. In the 1861 Annual Report, (the same one in which T.C. Ruggles report was published), the Canal Commissioners were quick to point out that this testing was a waste of money. On April 10, 1862 the State Legislature also reacted to Ruggles report by passing Chapter 169 of 1862, which declared the canal’s first enlargement complete as of September 1, 1862. What this meant was that if the canal was to be worked on after September 1, the money would need to come out of the general fund. The enlargement was complete.

Whitford noted that the policy change “left the enlargement of the canals far from actual completion.”⁸ As it stood in 1862, thirteen locks west of Syracuse only had one chamber; earthen benches remained along much of the canal; and over time, the canal had been getting shallower as soil, sewage, and trash filled up the canal prism. The depth was far from seven feet. And aside from the steam parade of 1858 little advancement was made in terms of non-animal towage.

The supporters of the canal only had to look to the loss of business to the railroads and see what the future held. In 1865 the canal hauled about a million tons more than the railroads. In 1867, the tonnage of freight moved by the canal and the railroad was about equal at about five-and-a-half-million-tons. In 1868 the canal hauled slightly more, and then after that the railroads pulled ahead never to lose ground again. The railroads were improving their steam engines which made it possible to move more freight in each train. In 1869 the Westinghouse air-brake was introduced and in 1873 the knuckle coupler was introduced. Meanwhile, the majority of boats on the Erie and other canals were being pulled by animal teams.

Little would happen along the canal during the next seven years. The locks west of Port Byron remained as singles. In his 1869 message, Governor Hoffman said it was the duty of the state to “foster and protect” the canal, and to restore it to full dimensions again, meaning seven feet of water.⁹ In May 1869, money was given to restart the lock doubling.¹⁰

1870’s

The Governor repeated his message in 1870 and another \$200,000 was given to the lock doubling effort.¹¹ The Canal Commissioner stated that another \$126,000 was needed to finish the work. One of the reasons to support the canals was that they acted as a check on the railroad’s freight prices. Even if the canals were not carrying great amounts, the fact that they were in business helped to regulate prices.

It was recognized that steam had not made the inroads along the canal as the people on the 1858 parade had expected. And in 1871 the Governor pointed out that Canada was actively enlarging their canals to allow for larger boats. The State reacted by encouraging any sort of towing system, saying that they wanted to see the use of steam, caloric, electricity or any motor power other than animals for the propulsion of boats.¹²

In 1873, the newly elected Governor John Dix said that the State had been far too generous with its money over the Hoffman years and needed to make cuts. However, he did give his support for the canals and that the need to have full dimensions and steam. In 1874 Governor Dix mentioned the Canadian canals and the fact that ships of 1600-tons will soon be using the St. Lawrence River. He said that the State must respond by providing a canal that will cheapen the cost of moving goods or the State would lose its place in commerce. However, he warned, 1874 was not a time to even think about a ship canal across the State, since even as Governor Dix gave his 1874 message, the world had been in a financial depression since September of 1873.

In 1873, people selected from around the state met to discuss changes to the New York State Constitution. One of the big changes was to create the position of the Superintendent of Public Works, and to abolish the Canal Commissioners. Once recommended, and with the approval of the Legislature, the amendment would be placed on the fall ballot. Even with the change favorably voted upon by the voters, the change from Canal Commissioners to Superintendent would not happen until 1876.

In 1875, newly elected Governor Tilden made very favorable comments toward the canals, saying that the canal had enough capacity to do the job asked of it and more but that the canal needed to be cleaned out to seven foot.¹³ His tone was measured, in light of the depression that was ongoing. “Economy from the best group of adaptations”, was his message. Then he wrote; “I may be excused for repeating here what I said in the Constitutional Convention eight years ago: “What the Erie Canal wants is more water in the prism; more water in the waterway. A great deal of it is not much more than six feet, and boats drag along over a little skim of water; whereas it ought to have a body of water larger and deeper even than was intended in the original project. Bring it up to seven feet-

honest seven feet- and on all levels, wherever you can, bottoming it out; throw the excavation upon the banks; increase that seven feet toward eight feet, as you can do, progressively and economically. You may also take out the bench walls.”¹⁴

There are a couple of remarkable items in the Governors message. The first is that the Governor had made the argument for an honest seven feet in 1867, some five years after those in 1862 said the enlargement was complete, and here he was again making the argument again in 1875 some thirteen years after 1862. He also made statements concerning the way that boats move in the canal and this message may be the first serious call for a canal deeper than seven feet. But in doing all this, he also made it clear; “No Rash Innovations.”¹⁵ Complete the canal to seven feet, give steam a chance, study the results. In short, don’t do any thing else in a time of depression.

Governor Tilden was not done. On March 19, 1875, he released a special message to the Legislature. He began by saying that he had received a communication from the boatman, forwarders, and others concerned with the business of the canals asking for cheaper tolls and ways to cheapen the movement of freight. He then said he started his own investigation into the canals of the State, and that this investigation had found that many millions of dollars had been spent on useless improvements and repairs. He said that the canal must be cleaned out and gradually deepened so the boat is moving through more water. (more on this later) He asked for a measurement of the canal depth. He then pointed out the fraud in the canal bidding system and said that engineers, contractors, and commissioners have been ripping off the State for years. He finished with, “It is clear that, under the present system of canal management, the people will not be relieved from taxation, the boatmen from high tolls, or the needed improvements of the Erie and Champlain Canals will be finished.”¹⁶ As a result, the Legislature set up an investigating committee which was given a year to study the management of the canals and make a report.

The Governors special message had the intended effect. The New York Herald ran a full page devoted to the message, the need for investigations, and the need for seven feet of water.¹⁷ Thurlow Weed, no friend of Tilden, gave his support to the Governor.

Samuel Ruggles, the ardent canal supporter and member of the New York State Chamber of Commerce, joined the fight for the canals. Maybe not surprisingly, in May, 1875, the Chamber hired Thomas Colden Ruggles to run his depth survey/tests again, examining the speed of the boats on the canal, and the depth of water. Ruggles rode along on the *City of Utica*, a Baxter Steam Canal Transportation boat. He submitted his report to the Chamber on October 7, 1875.¹⁸ Ruggles condensed his report down to three points; 1) that delays in navigation cause the boaters to waste money, 2) that in many places the canal is not more that thirty feet wide, and 3) that the boaters would be better served with eight feet of water. He also points out that in many places the canal has not been improved since his 1861 survey. On March 30, 1876, the Chamber passed a resolution in favor of making the canal seven-foot-deep, and deepening where ever possible.

The Canal Ring

In 1876, Governor Tilden called for a special investigation of “the canal ring”, and the waste and fraud connected to canal work. The conclusions of this investigation had an impact on what happened next with the canal enlargement. It is not the purpose of this article to investigate what was called “the canal ring”. But it is important to note what happened as it has such a bearing on what would happen next.

In March, Governor Tilden delivered the findings of the investigation which found; 1) almost fifteen million dollars had been spend over the last five years on canal repairs and improvements, 2) almost all the work done had little value to the State and was only done to enrich the contractors, 3) most of the bids and contracts were handed out illegally, 4) most of the work was useless. He then recommended that; 1) close all contracts, 2) make \$400,000 available to close out any payments on closed contracts, 3) make \$400,000 available to restore the canal so it could have seven feet of water, plus make \$15,000 available for a complete survey of the canal, 4) use any non-expended balances left from prior appropriations on the Champlain Canal, 5) direct the canal board to come up with a set of recommendations for next year. These recommendations became law as Chapter 425 of 1876.¹⁹ The “canal ring” had been broken.

When the 1876 fall elections rolled around the voters had a chance to respond to the news of the canal ring by way of the Constitutional changes recommended in 1873. They were well prepared to change the management structure of the canals. The State would have its first Superintendent of Public Works, and the Canal Commissioners were to be gone. But change was to come slowly and political shenanigans would postpone the appointment of the Superintendent until late January 1878.

In 1877 newly elected Governor Lucius Robinson pronounced that the fraud on the canal was gone but that the boatmen had been harmed by the waste over the last years. And because of the ongoing depression the only way to help the boatmen was to cut the tolls.

At the heart of the matter for the boatmen was moving more freight at a faster speed. Whether it was a horse boat or a steam boat, the owner needed to get from Buffalo to Albany or New York City as fast as he could with as many tons of goods as the canal would let him carry. What stopped him was the depth of the water and the size of the enlarged locks. No boat could be larger then 98-feet-long and 17-feet-wide, with a maximum draft of six-and-a-half-feet (if the canal had seven feet of water). This is why all the arguments made on behalf of the canal up to this point was to give the boaters a full seven feet of water, and to get the boats moving faster by allowing steam instead of animal towage.

As they had just finished enlarging the locks, it was unlikely that the State would enlarge the locks a second time, so every improvement had to work around the size restriction. Pennsylvanian William Frick had developed a device to allow two full size Erie Canal boats to be coupled so that one crew could safely steer the two boats. Most likely he based this on what he saw some of the Pennsylvania canals, with two small boats

coupled together using a hinge device. In effect, his invention created one very long boat so the owner could move 400 tons instead of 200 tons. This greatly saved time and money as one crew could move twice the amount. But at the locks the boats had to be uncoupled and each boat passed through on its own. And lockage time was at least twice as working a single boat. And the work load on the horse was almost doubled. So it made sense to promote the use of a steam powered boat to pull or push a non-powered boat.

To drive home this point, in 1877, State Engineer John Van Buren, went into great detail as to the workload of the canal horse. He reported that despite all the efforts to get steam on the canal, the primary movers of boats was still the canal horse. He then gave an overview of the costs of running a horse boat and a steamer, an overview of the Belgium system of towage, an overview of the Frick coupling system, and the workload of either animal or steam to move a boat in the canal. He wrote that the animals would be better served to be owned by a large company and used in stages along the canal with proper food and rest, and then he concluded by saying, "The condition in which the horses employed on the canals are kept is very bad economy, to say nothing of its being a disgrace to our civilization."²⁰

In his 1878 message, Governor Robinson announced that traffic was up on the canal, as all available boats were in use. The depression was over. However, since the State had cut tolls so deeply the revenue in 1877 did not cover the cost of running the canal which was higher because more boats were now using it. The State operated the canals under a constitutional article that said that the expenses for the coming year could not exceed the previous year's revenues. If the expenses did run over the money had to be taken out of extraordinary repairs fund. With this restriction the State had to make cuts to the upcoming years budget. The Governor stated that governance of the canal under the auspices of the new Superintendent of Public Works would be able to cut the annual budget in half from 1877 and run a successful canal.²¹ No mention of improvements was made. No mention would be made in 1879 either, however, it may have been that the Governor was giving the new Superintendent some time to get his bearings. The Governor also had other concerns to occupy his time. In a time of consolidation and cuts, the State had spent over nine-million-dollars on a new State Capitol building which was far from finished. The Legislature had moved in to the sections of the capitol that were usable. The Governor wished them well in their home hoping that it would lead them to pass only wise and good laws, but he feared that the new building was built in the fashion of European Courts and would lead to more dishonesty and corruption and he thought maybe the voters might wish that the earth would open and swallow it up.²²

The Jervis Plan

Soon after VanBuren's report was made public in January of 1878, John Jervis wrote at length of the need for a canal railroad.²³ This may have been in response to the various methods of towage that VanBuren reported on which left out any sort of railroad / canal connection. In the 1878 International Review, Jervis wrote an article titled "The Future of the Erie Canal", in which he attempts to make the case for canal boats to be pulled by steam engines on rails that would run along the towpath. His logic was that if the trains

on rails were still pulled by horses as were the canal boats, the canal would be the dominate transportation of the times. However, since steam engines pulled train cars and horses pulled canal boats, the canal could not compete. Then he suggested that steam engines could tow five boats at one time. Nothing would come from this paper other than the fact that a well respected engineer had weighed in onto the future of the Erie Canal and added some facts to the discussion.

Sweet's Tractive Force Study of 1878²⁴

In the 1878 Annual Report of the Surveyor and Engineer, Division Engineer Sweet included the results of a study he conducted for State Engineer Horatio Seymour Jr. The purpose of the study was to determine "the commercial value of the proposed improvement of the Erie Canal by deepening it a foot." In his remarks Sweet made reference to a survey of 1876, "which was undertaken for the purposes of this improvement". This appears to point back to Governor Tilden's address, and the resulting act of the legislature (chapter 425 of 1876) which authorized \$15,000 for this study. Although Governor Tilden did not call for a deeper canal it appears that Sweet's instructions were to investigate this. Was this an improvement or an enlargement? [And I pose the question, "Is this the start of the second enlargement?"]

Sweet's tasks were; 1) to determine the cost to the State of enlarging the canal, and 2) to determine the savings to the boat owners if the canal was made eight-foot-deep. The first task was relatively straight forward. How much would it cost to either dig out the bottom of the canal another foot, or, raise the banks a foot? The second task was a bit more involved and centered on determining how much energy was needed to move a canal boat in the narrow confines of a canal. The energy thus expended is called the tractive force.

At its very basic level, a boat, whether it is being towed or pushed, will resist being moved. Whatever is pulling or pushing the boat the animal or engine will need to overcome this resistance. The amount of water around and under the boat, the shape of the hull, the draft and length of the boat, the current, the shape of the canal, all serve to have an effect the amount of force needed to move the boat. Both Engineers Sweet and VanBuren tried to quantify this force, although Sweet seems to have taken it a bit further. Interestingly, Sweet seems to have only looked at horse boats while VanBuren studied both. In the end he wrote that if the canal was one foot deeper (eight feet), a boat could carry about 50-tons-more, and still have less drag than the boats operating in the seven foot deep canal.²⁵

Seymour's Plan

In his first Annual Report, State Engineer Seymour outlined the challenges faced by the New York State canals.²⁶ The railroads and the Canadian canals were the major focus. Studies showed that the St. Lawrence route was a shorter route to Europe and when complete, the locks along the Canadian border would allow much larger boats access to the Great Lakes. The Erie had to innovate and improve, or lose most of its water borne traffic to the Canadian canals. He then turned his focus to how to help the Erie Canal.

For Seymour it all came down to the ease of transportation and how to cheapen the cost of moving goods. He reasoned that the State could either increase tonnage, or increase speed. He noted Sweet's study as to how to increase the size amount of tonnage a boat could move while decreasing the amount of time that a boat remained in transit across the state. He also suggested that locks could be lengthened and that machinery be installed on the locks to assist boats through the locks. He also suggests deepening the canal to eight feet.

Deepening seems to suggest that the canal should be dug deeper. That is not what Seymour wanted to do. He wanted to raise the banks one foot. This could be done by adding a foot of earth to the top of the banks, adding some boards to the various feeder dams, and adding structure to the top of locks and aqueducts. Some bridges might need to be raised. Digging out the bottom of the canal would be much more difficult as the floors of the locks and aqueducts would need to be reconstructed. And the culverts that passed under the canal might need to be lowered or reconstructed. But the main reason to add to the top of the canal was that this would greatly increase the amount of water in the canal prism, since the top of the canal was seventy feet wide, and the bottom was only fifty-two. More water meant reduced drag. This plan of improvement was called the Seymour Plan, a name that would stick up through the Nine Million Dollar Enlargement.

1879- T.C. Ruggles and the Ten Foot Canal

Inspired by the Jervis' article, Thomas C Ruggles responded with his own argument for a deeper canal. Ruggles agreed that a extra foot of water in the canal would help but an extra three-feet would allow steamers to run faster at an improved economy.

"I will speak first of the length of boats, then of the bottom of the canal. All vessels that go by steam require length; they are now being made about ten times as long as broad. This makes room for machinery, for cabins, and for cargo. The only way left to do on the canals, as the locks would not admit longer boats than those in use, was to fasten one boat before the other, taking them apart at the locks. This in fact, has doubled the capacity of the steamer, and enabled the same crew to bring down twice the load for the same price, and has made steam a success. I recommended this plan in 1861, and left models with Auditor Benton. The plan was approved of by Governor Hunt and Canal Commissioner Hiram Gardner, and the press along the line of the canal. It was adopted in Illinois on a smaller canal than the Erie, and is now approved on the Erie. As I passed along the canal in 1875, captains of canal boats told me if one horse canal boat was fastened before another, the two were towed with less effort than separately."²⁷ Ruggles made the case for a deeper canal and longer locks of twice the current length, if possible.

Ruggles seems to have then taken a step that others had not. He reached out to the newspapers who then used his facts and figures in various articles to publicize the idea. Not all the press was favorable but many picked up on the idea of a deeper canal.

The 1880's

After many years of Governors saying nothing about the future of the Erie Canal, in his address of 1881, Governor Alonzo Cornell may have been forced to address the situation by the soon to be completed enlarged canal of Canada. He said that the new Canadian canal rendered; “the future of the Erie Canal a subject of much concern, and well worthy of your intelligent consideration.”²⁸ He said that the State Engineer wanted to raise the banks to increase the water to eight feet, and then said that the Engineer goes into much greater detail in his Annual Report.

In the 1880 Annual Report, State Engineer Seymour devotes many pages to the question of a deeper canal. He outlined the “Danger To Our Commerce” by the St. Lawrence route. He wrote; “The British are so confident that they will wrest the trade of the west from us, that they have nearly completed works that will cost more than thirty millions of dollars. This is in addition to about twenty-millions spent in early improvements, making about fifty-millions paid out to gain the great prize they seek, the control of the carrying trade from the heart of our country to the markets of the world. They do not fear our railroads. While we are neglecting our water-routes, they spare no cost to perfect theirs.”²⁹

He then moved into ways to improve the Erie Canal. He used letters from Engineer Van Richmond, George Geddes, and free-tolls promoter Alonzo Richmond to emphasize the need for a deeper canal. In a complicated tangle of letters, Alonzo asked Van Richmond about the practicality of adding one foot to the banks and digging out the canal bottom, who then cited the opinion of George Geddes. Geddes endorsed the idea of a nine foot canal and then said; “The engines must be on the boats, and able to move them backward as well as forward, and for this reason, if for no other, all schemes of railroads on the banks of the canal, or cables laid along its bottom to move the boats, have appeared to me idle, and but divert the public mind from a full investigation of the true plan of improving our means of transportation.”³⁰ This was certainly a criticism of the Jervis Plan and the other towing plans. He closes with this statement; “The path of improvement is now so plainly marked out that it most certainly will be followed. The opinions of all experts, who have given investigation to this matter, may be said to be alike, and the time for prompt action has fully come. In addition to the financial advantages that would flow from the improvements you advocate, there is a moral consideration worth the attention of all lovers of men and animals. It will be a great advance in this direction, to give the galled and jaded horses and mules of the tow-path an honorable discharge from that service, and it would be a great thing to substitute for the drivers, facing storms and hardships on the bank, educated mechanics, managing steam engines in the comforts of sheltered cabins.”³¹

By law the State Engineer was given the authority to make some improvements to help the canal without having to ask for an appropriation.³² In 1880 machinery was installed into the Port Byron Lock 52, to assist in moving boats through the lock. Once the success at Lock 52 was seen, the other four locks that lifted boats from the west (47,48,49,51) were fitted out with the water powered machinery.³³ The State Engineer estimated that

two and a half hours would be saved, which was part of his plan to increase the overall time that boats spent in transit.

In his message for 1882 Governor Cornell points out the obvious that by continued cutting of tolls, there was not enough revenue generated to cover the expenses of operating the canal. If the canals were to stay in operation a new method of paying the bills would need to be found. The Legislature passed an act that would be presented to the voters in November that would abolish the tolls and raise the money needed from direct taxation.³⁴ This amendment passed and September 30, 1883 would be the last day that tolls would be collected on the canal.³⁵

The last day of 1883 would end the service of Engineer Silas Seymour. Silas seems to have had held a different opinion of the canals than his predecessor Horatio Seymour. Silas' Annual Report is full of gloom, from the washing of the banks from the passing steamers, to the filling of the canal bottom due to sediment and sewage, he stated that the idea of a free canal, even though it had only been in operation for a year, was a failure. He then gave three pages of his report extolling the expanding railroad system of the country, and why the canal was a drain. He wrote; "The last named alternative [selling the canals] would, in light of past experiences, appear to be the wisest of the three; for the reason that Pennsylvania, Ohio and other States, have found it for their interest to dispose of their canals; and thus reimburse their treasuries to some extent, for the capital invested in them; and there can be no doubt that the canals of this State can readily be sold for a sufficient amount, to liquidate the entire canal debt of the State; and thus relieve the people from the burden of any further taxation on that account."³⁶ His last word about the subject was that "THE CANALS MUST GO".³⁷ It was, as he wrote, his last official act to submit these opinions to the Governor and the Legislature.

Elnathan Sweet was to replace Seymour as the next State Engineer. Sweet, you will recall, wrote the report regarding the tractive force needed by the boats in 1878. Unlike Silas Seymour who had been a railroad man most of his life, Sweet had worked for many years on the canals. He knew the difficulties faced by the State and the boatmen. The divide between the railroads and the canals had grown so that in 1884 the combined railroads had moved over twenty-two million tons, whereas the canal had moved just slightly over five-million-tons. Sweet is notable for his publication The Radical Enlargement of the Artificial Water-way Between the Lakes and the Hudson River.³⁸ Sweet proposed a ship canal one-hundred-feet-wide and eighteen-feet-deep, with locks four-hundred-fifty-feet-long and sixty-feet-wide. Sweet wrote that it would need to step down from Lake Erie to the Hudson, so that water from Lake Erie could be used to fill its entire length. The valley of the Seneca River near Montezuma would have an embankment fifty-feet-high. From Utica to Albany the canal was to use a canalized Mohawk River. He not only proposed this idea through his Annual Report of 1885 (which covered 1884), but also submitted the idea to the American Society of Civil Engineers. It is amazing that some thought the idea grand for the fact that ships of war could be quickly moved into the Great Lakes in case Britain was to move their ships of war into the lakes.³⁹ Others had opposing opinions saying that as a nation we should be using the St. Lawrence route, "If the same facilities, and even better, can be got by the

expenditure of thirty-three millions [what the Canadian Canals had cost] than by the expenditure of two hundred millions, where is the ground for hesitation and doubt as to the course for prudent sensible men to adopt? Simply this- reluctance to depend in any way upon a foreign nation- pride in our own country- the sentiment which we call patriotism. If the object is to gratify this sentiment- to enforce a Chinese like national exclusion- to build up New York City- then by all means let us enlarge the Erie Canal. But if the object is, as we first stated it, to secure cheap, rapid and reliable transportation from the lakes to the seaboard, then let us take the route that God, the great engineer, has laid out for us.”⁴⁰ Sweet estimated the cost of his ship canal to be between \$125 and \$150 million dollars.

Sweet’s Ship Canal proposal was the last of the big ideas when it came to the canal. Sweet had Gere’s Lock 50 lengthened so that two boats could be locked through at one time and then after seeing the success seen at Lock 50, the effort to increase the capacity of the canal centered around lengthening the locks and dredging out the canal to return it to seven feet. Over the years, sediment, sewage, trash and anything else that could be poured or thrown into the canal decreased the working depth. It proved hard enough to keep seven feet of water, let alone eight or nine feet.

The Governors seem to be ready to move on or perhaps away, from the canals. As we have seen, most at least made some mention of the canals in their yearly message. But with the canals free as of 1883, there seemed little reason to push for any improvements. Whitford made note of this, writing “The annual message of Governor Hill, covering the period of 1885, is worthy of note from the fact that it did not contain a single word of direct reference of the canals.”⁴¹ Governor Hill did mention the canals in his 1885 message, where he said that no substantial improvements had been made in years.⁴² But then after that, canals were absent from the messages covering 1886 to 1891.

The State Canal Union

This does not mean that the canals had lost all their friends and supporters. The State Canal Union was formed around 1885 to bring together interested parties and support the canals. Governor Seymour was the first president of the Union, replaced by George Clinton after Seymour’s death in 1886. In an interview in 1892, President Clinton said that, “The Union was formed for the purpose of lengthening the locks on the canal and deepening the channel so as to give two feet more water; also to clean it out and in part construct vertical walls. The great object was to give a broader and deeper bottom, making it nine instead of seven feet.”⁴³ The state-wide union would later try to organize smaller “local” canal unions that would advocate for canal improvements from a local perspective. It appears that the Union disbanded in the mid 1890’s.

The New York Produce Exchange

The New York Produce Exchange was a commodities exchange that could swing lots of power. It advocated for the canals but, at times found itself in conflict with other pro-canal organizations that wanted lower grain elevator prices in New York and across the

state. It is notable that TC Ruggles sent his proposal for a ten foot canal to this organization before he mailed it out to the media at large. When it came to the deepening of the canal, the Exchange was on the side of the canal men.

The 1890's

1892 was the one hundred year celebration of the canals in New York, going back to the first small canals around the rapids of the Mohawk River. The men of the State Canal Union would seize upon this centennial to serve as a backdrop to the question of what to do with the canal system. The State Canal Union set a date of October 19, 1892 in Buffalo for men to gather to show their support. Canal Union President Clinton said that "the main object of the convention, is to arouse public interest in this matter of canal improvement and to make the convention in a sense educational."⁴⁴ Over three hundred people attended the celebration.

For the first time in years, the 1892 Governor's message mentioned canal improvements, continuing the lock lengthening project that had been going on since 1884. In the previous two years, little had been done as the Legislature had not given any money for the locks. In 1893 money was given to restart the work. The Governor also stated that he felt electricity should be used to propel the boats and asked for funding to install poles and wires along the canal. This was done under Chapter 499.

Again, in 1894, the Governor makes extensive comments about the canals, but takes an interesting twist. At first he states that a ship canal is out of the question, then says that the lock lengthening project has been a failure and that even the deepening would be useless. Then he suggests that electricity is the way of the future and that the State should continue with the experiments and infrastructure started in the prior year.⁴⁵

The question of the canals came to a head at the 1894 Constitutional Convention. Since the canals are written into the constitution, each convention gave the State the opportunity to make changes such as the amendment to sell off many of the lateral canals in 1873. The canal men knew that this was their chance and held meetings to discuss the resolutions to be passed along to the Convention. They adopted the plan that had been in the works all along, the Seymour Plan.⁴⁶ Their estimate for the work of lengthening the remaining locks, and making the canal a uniform nine-foot-deep was between \$10,000,000 and \$12,000,000. This plan was rejected and instead, the Legislature was given the power to enact laws in regard to the improvement of the canals. Article 7, Section 10 of the NYS Constitution does not give any number in regards to the enlargement of the canal. It merely states; "The canals may be improved in such manner as the Legislature shall provide by law. A debt may be authorized for that purpose in the mode prescribed by section four of this article, or the cost of such improvement may be defrayed by the appropriation of funds from the state treasury, or by equitable annual tax."⁴⁷ This was no change in the Constitution, as the Legislature held this power already, however, the question was put on the ballot as a sort of public referendum on the canals.

A investigating Canal Commission later wrote that before the convention, there was a “general impression” that the work could be done for \$7,000,000 to \$9,000,000. The convention delegates asked for a revised estimate from the State Engineer and gave him just twelve days to estimate the entire work of deepening and enlarging the 350-miles of canal. The last real physical survey of the canal had been made in 1876, and with so little time, this is what the Engineer used. Without leaving the office he estimated the cost to be \$11,573,000. As the Commission later wrote; “It was merely the best guess which the State Engineer could give, based upon such facts as he had at hand.”⁴⁸ For some reason, the Legislature, State Engineer and friends of the canal came to a \$9,000,000 figure for the Seymour Plan enlargement. The Commission wrote; “It was, in fact, an amount fixed without sufficient data and upon the theory that there would be no unusual difficulties and that the best plan was to do the work as cheaply as possible.”⁴⁹

With the affirmative November vote, the canal men jumped into action wishing to get their resolutions in order before the Legislature opened its 1895 session. A canal conference was held on December 21 where as the men resolved that; a liberal amount of money be allocated for the enlargement of the canals; that the money be expended in 1895 and 96; a plan be made to continue and complete the work already in progress, with surveys and estimates; that bonds be secured in the least time, commensurate with the economy.⁵⁰

1895

The next couple months would serve as the beginning of the second enlargement and at the same time mark the end of the second enlargement. At the beginning of the 1895 Legislature, newly elected Assemblyman Edward Clarkson introduced a bill that would allow the voters, who had just voted in favor of the canal enlargement, to vote again in the fall election. One might view this as a stalling tactic of the opponents of the canals, but Clarkson was a canal man. The newspapers reported, “Hon. Edward M. Clarkson, secretary of the Boat Owners and Commercial Association, was elected member of the assembly from the eighth assembly district, Brooklyn. He will make a capital worker for canal interests.”⁵¹ Clarkson was also a member of the New York Produce Exchange.⁵² The bill that Clarkson introduced was for \$9,000,000, a sum that was attributed to the canal union.⁵³

The first odd thing about this step is that the law did not require that the voters re-vote on a sum. The 1894 vote allowed the Legislature to move ahead with the enlargement as they saw fit and never before had the Legislature gone to the people for a vote on a appropriation even though millions had been spent on the canal improvements since 1884. The second odd thing is the \$9,000,000 figure that Clarkson had used, since it came from the canal interests. Even the State Engineer had reported that at least \$11,500,000 would be needed. Other estimates ran even higher. Clarkson’s bill also required that Superintendent of Public Works be required to enlarge and improve the canals within three months of the issuing of bonds. And it said; “The work called for by this act shall be done in accordance with plans, specifications, and estimates prepared and

approved by the State Engineer and Surveyor.”⁵⁴ The bill moved through the Legislature and was approved to move onto the voter at the fall election.

The canal men and other commercial interests met in June to plot their campaign to get the voters to give their approval a second time. The campaign worked, as enlargement was once again given the nod of the voters, with a majority of 250,000. The newspapers wrote; “The great improvement will begin this year, and three years’ time will see the completion of a wonderful change in the condition of the canals. It means work for idle workmen, a low rate for the transportation of merchandise, grain and coal, and a movement for the general prosperity of the State.”⁵⁵

1896

With the approval of the voters work could begin. However, before a shovel could be put to earth, much work had to take place. A survey of the canal had to be made so that the engineers could decide what work was needed. Survey men had to be hired and trained, and assistant engineers hired. There were not enough available men on the civil service lists so more had to be found. The canal was divided into thirty-bid-sections, and into each section estimates for improvements had to be made. Test cores had to be taken to judge if the soil was rock, clay, or earth. Measurements had to be made as to whether to raise or lower the canal, what structures were present. An engineer and assistant was needed for each section. Once the estimates were complete, the work needed to be advertised in all the papers along the canal. And then the contractors would submit their bids, and from these, work was awarded. All this was supposed to take place within three months. It took a year.

By July 1896 it became clear that the work for the enlargement of the canal using the Seymour Plan would cost \$13,500,000. And this did not include engineering, advertising or inspection, all things that the State had to do. The enlargement law as written did not apply to existing structures, say when a bridge had to be raised or if a culvert had to be rebuilt. In fact all the structures that were in poor condition could not be repaired under this law.⁵⁶ And it was clear to the Superintendent that the canal would suffer if any part of it was disturbed. He wrote the banks were likely to collapse if any work was done around them, say when digging out the bottom or adding soil to the top.⁵⁷ The State Engineer was told to make cuts to bring the work in alignment with the \$9,000,000.⁵⁸ Wholesale cuts were made to structures, bank work, excavations. And the work was bid out.

Bibliography

¹ Albany Evening Journal, August 9, 1858

² Annual Report of the Canal Commissioners of the State of New York, Albany 1857, pg 42. This report covers the year 1856. In it, it was stated that the canal, although enlarged to seventy feet wide, only held five feet of water.

³ Hunt's pgs 537-538

⁴ Wikipedia contributors, "Samuel B. Ruggles," Wikipedia, The Free Encyclopedia. The name Ruggles was well known in New York City. He donated the land in NYC for Gramercy Park, Irving Place, Lexington and Madison Avenues.

⁵ Report on the Canals of New York, Committee of the Chamber of Commerce of State of New York, New York, 1875, Pg 21.

⁶ **Need reference for speech**

⁷ I have not been able to ascertain if Samuel and Thomas Ruggles were related.

⁸ Whitford, Noble E., History of the Canal System of the State of New York, Albany, NY., 1906, pg. 258

⁹ Message of Governor Hoffman from 1869. State of New York, Messages From The Governors, edited by Charles Z. Lincoln. Albany, 1909. Volume 6- pg 16. There is a volume series of annotated messages edited by Charles Lincoln dating between 1683 to 1906. All messages used in this article come from these volumes.

¹⁰ Chapter 877 of 1869. Annual Report of State Engineer and Surveyor, Albany, 1892. This Report, which covers the year of 1891, contains a wealth of information about the canals, boats, and improvements. There is a list of the various laws passed in support of the canals beginning on page 75. Laws are also noted in Whitford and the messages of the Governors.

¹¹ Chapter 767 of 1870.

¹² Chapter 868 of 1871.

¹³ At this time, Governors served two year terms.

¹⁴ Message of Governor Tilden from 1875. State of New York, Messages From The Governors, edited by Charles Z. Lincoln. Albany, 1909. Volume 6- pg 743.

¹⁵ Ibid- pg 745

¹⁶ Ibid- pg 808

¹⁷ New York Herald March 24, 1875

¹⁸ Ruggles, Thomas Colden, Report to New York Chamber of Commerce. Eighteenth Annual Report of the Corporation of the Chamber of Commerce, New York, 1876. Pg 47

¹⁹ Message of Governor Tilden from 1876. State of New York, Messages From The Governors, edited by Charles Z. Lincoln. Albany, 1909. Volume 6, pg 994.

²⁰ Annual Report of the State Engineer and Surveyor, Albany 1878, pg 62. This report covers the year 1877.

²¹ Message of Governor Robinson from 1878. State of New York, Messages From The Governors, edited by Charles Z. Lincoln. Albany, 1909. Volume 7, pg 144

²² Message of Governor Robinson from 1879. State of New York, Messages From The Governors, edited by Charles Z. Lincoln. Albany, 1909. Volume 7, pg 273

²³ Jervis, John B., The Future of the Erie Canal, The International Review, New York, Volume 5, 1878, pg 379. John B Jervis was a engineer of note, with projects on the Erie Canal, the Delaware and Hudson, and many other civil works projects.

²⁴ Sweet, Elnathan in a report to Horatio Seymour, Jr., Increasing the Depth of Water in the Erie Canal, Report of the State Engineer and Surveyor, Albany, 1879, pg 54. Sweet's report was dated October 1, 1878. There appears to have been two completely separate studies carried out in regards to the workload of a motor, be it animal or mechanical, when moving a canal boat. VanBuren's report appears to have been carried out in the fall of 1877, and Seymour had another made in the summer of 1878. Why two studies were made is unknown.

²⁵ Documents of the Assembly of the State of New York, 58th Session, Volume 2, 1835. See Hutchinsons' report on the enlargement of the Erie Canal. He first submitted it in 1834 as Assembly Document #88. It was resubmitted in 1835 as Assembly Document #143. Tractive force may have not been considered when the first Erie was designed, however, it is clear that that Engineer Holmes Hutchinson did consider the tractive forces when designing the first enlargement. If all had been equal between the first and second versions of the Erie Canal, the boats on the second Erie would have been twenty-six feet side. But they were only seventeen, which reduced the tractive resistance and allowed three boats to pass side by side. Governor Tilden referenced Hutchinson in his 1875 address when he called for canal improvements. Later Sweet and others will credit Hutchinson and Jervis for making use of the work of Frenchman Chevalier DuBuat, who in the late 1700's, studied the way that boats moved in canals. This is all to say that as early as the mid 1700's engineers realized that increasing the size of a canal boat was not always the best way to increase canal capacity.

²⁶ Horatio was the son of John, and was not a junior at all. He appears to have been named for his uncle, Governor Horatio Seymour.

- ²⁷ Ruggles, Thomas C. Letter of T.C. Ruggles on the Erie Canal. Report of the New York Produce Exchange for the Year 1879, New York, 1880, pg 72. Ruggles may have been making reference to a boat lashing system designed by William Frick. Frick applied for his patent on March 11, 1878, but some type of system was in use by 1875. Most of the engineers referred to the lashing system as the "Illinois system".
- ²⁸ Message of Governor Cornell from 1881. State of New York, Messages From The Governors, edited by Charles Z. Lincoln. Albany, 1909. Volume 7, pg 516.
- ²⁹ Annual Report of the State Engineer and Surveyor, Albany 1881, pg 8. This report covers 1880.
- ³⁰ *Ibid.* A letter from George Geddes to Engineer Seymour, pg 12
- ³¹ *Ibid.*, pgs 12-13
- ³² Chapter 99 of 1880 allows the Superintendent of Public Works and the State Engineer to make repairs and improvements.
- ³³ Annual Report of the State Engineer and Surveyor, Albany, 1882. pg 140. This report covers 1881.
- ³⁴ Message of Governor Cornell from 1881. State of New York, Messages From The Governors, edited by Charles Z. Lincoln. Albany, 1909. Volume 7, pg 685. Chapter 229 of 1882.
- ³⁵ This law would remain in effect until 1994, when lockage fees were applied.
- ³⁶ Annual Report of the State Engineer and Surveyor, Albany 1884, pg 32. This report covers 1883.
- ³⁷ *Ibid.*, pg 33
- ³⁸ Sweet, Elnathan M., The Radical Enlargement of the Artificial Water-way between The Lakes and The Hudson River, American Society of Civil Engineers Transaction #299, Vol 14, New York, February 1885 p
- ³⁹ *Ibid.*, pg 66
- ⁴⁰ *Ibid.*, Comments of Willard Pope, Civil Engineer, pg 85.
- ⁴¹ Whitford, pg 327. It should be noted that the State Capital project was consuming a lot of the State budget and air in the room.
- ⁴² Message of Governor Hill from 1885, State of New York, Messages From The Governors, edited by Charles Z. Lincoln. Albany, 1909. Volume 8, pg 13.
- ⁴³ Canal Centennial, Buffalo Courier Oct 17, 1892
- ⁴⁴ *Ibid.*
- ⁴⁵ Message of Governor Flower from 1894, State of New York, Messages From The Governors, edited by Charles Z. Lincoln. Albany, 1909. Volume 9, pg 306
- ⁴⁶ Canal Men Confer, Lockport Daily Journal, June 16, 1894
- ⁴⁷ The Fourth Constitution of New York
- ⁴⁸ Report of the Canal Commission, Albany, 1899, pg 144
- ⁴⁹ *Ibid.*, pg 145
- ⁵⁰ A Canal Conference, Daily Palladium, Dec 21, 1894
- ⁵¹ Rome Semi-weekly Citizen, November 23, 1894.
- ⁵² Canal Improvement, New York Sun, September 20, 1894.
- ⁵³ The Brooklyn Daily Eagle, the report says that; "Mr. Clarkson, the canal unions \$9,000,000 bonding bill for the canals." Jan 10, 1895.
- ⁵⁴ The Bill Has Passed, Buffalo Courier, Feb 22, 1895.
- ⁵⁵ Buffalo Evening News, Nov 14, 1895
- ⁵⁶ Annual Report of the State Engineer and Surveyor, Albany, 1896, pg 16. This report covers 1895.
- ⁵⁷ Annual Report of the Superintendent of Public Works, Albany, 1897, pg 27. This report covers 1896.
- ⁵⁸ Report of the canal commission, pg 46