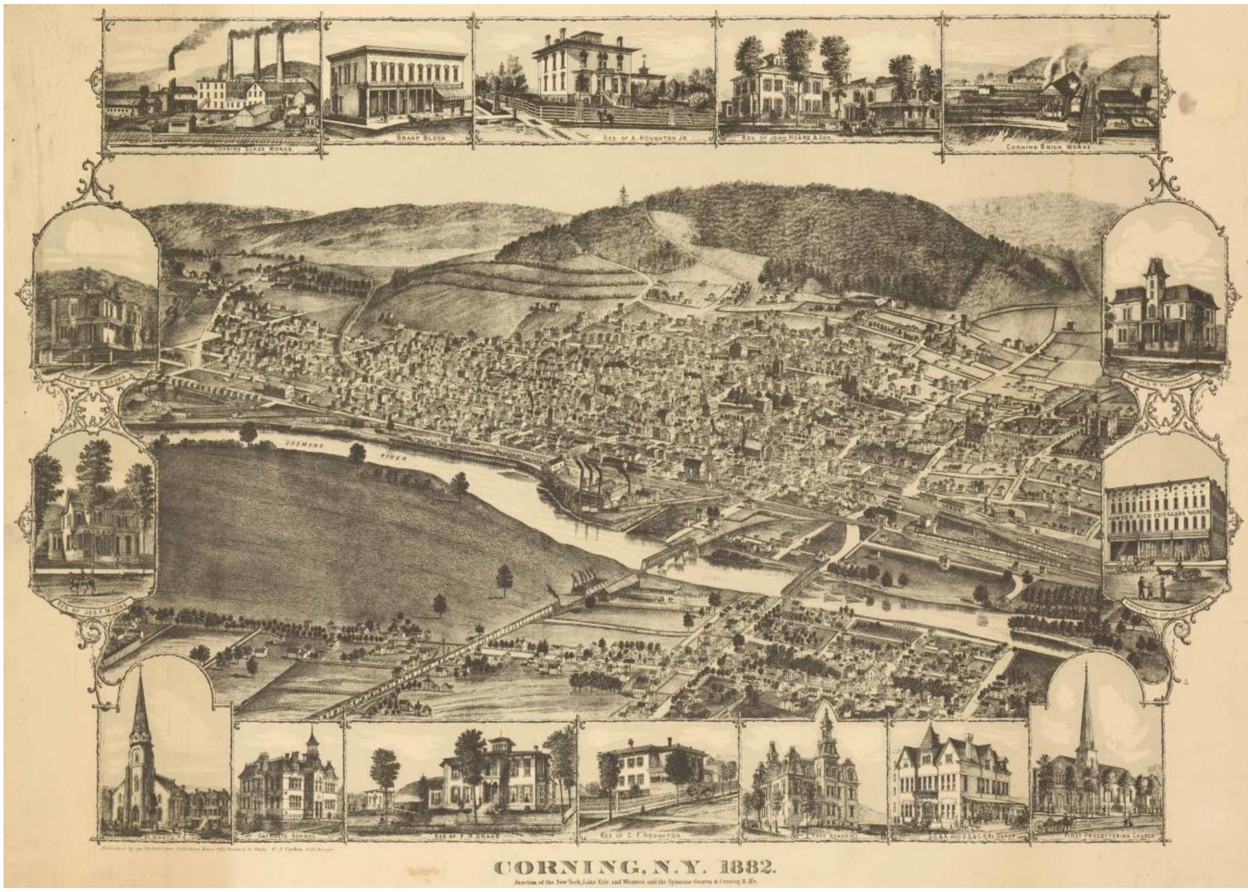

Field Trip Guide
October 9-11, 2020

-The Chemung Canal-
The Junction Canal
The Crooked Lake Canal

Canal Society of New York State

Acknowledgements

The Canal Society is extremely grateful to Gary Emerson, Mary Ellen Kunst, Gwen Chamberlain and the Friends of the Outlet for their assistance in the preparation of this guide and tour. Their dedication, passion and hard work have ensured that much of our historic canal legacy is preserved on the ground, in writings and in our spirit.

Cover Illustration. Bird's-eye View of Corning, looking south, 1882.

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Geology and Geography of the Chemung Canal

Tom Grasso

Introduction

The Chemung Canal slices into the Allegheny Plateau which is locally New York State's southern tier. A region of moderate to moderately high relief, approximately 900 feet separates the valley floor at Elmira from the surrounding nearly uniformly high hilltop peaks (summit elevations near 1800 feet). The region is underlain by mostly Upper Devonian shales, siltstones and sandstones of the West Falls Group that dip (slope into the earth) approximately a half degree to the south. The strata drop about 53 feet per mile southward. This same unit is found at the Upper Falls in Letchworth State Park.

The region is furthermore distinguished by a major watershed, which is in fact a Subcontinental Divide. This drainage divide is between the Lake Ontario- Saint Lawrence Drainage basin north and the Susquehanna Drainage Basin south to the Chesapeake and resides within this region of nearly uniform terrain **(Figure 1)**. Interestingly the subcontinental divide is on the crest of a glacial deposit located on a valley floor, known as the Valley Heads Moraine. It is especially curious because one would expect major watershed divides to be located along the crest of lofty mountain ridges, not on valley floors.

I use the term Subcontinental Divide because there can only be one Continental Divide per continent. This means a watershed that conveys waters not only in opposite directions (East-West or North- South) but more importantly **streams on either side of the divide eventually reach separate oceans.** The Continual Divide in the USA's Rocky Mountains separates waters heading toward the Atlantic (Gulf of Mexico) from those ending in the Pacific. Here in Eastern North America we are discussing streams that end in the Gulf of St. Lawrence (Atlantic Ocean) from those that end in Chesapeake Bay or the Gulf of Mexico (Atlantic Ocean). All three of these termini are **extensions of the same ocean**. Therefore I use the term Subcontinental Divide and although it is greatly significant it doesn't rise to the level of a Continental Divide.

The Chemung Canal exhibits many close parallels with its western and eastern neighbors, the Genesee Valley and Chenango Canals. All three canals vaulted the subcontinental divide, although the Genesee Valley Canal did so with the highest summit elevation of any canal worldwide. All three canals cut across the Allegheny Plateau by utilizing natural corridors of glaciated valleys, all of which presented similar problems, not the least of which was overcoming dramatic differences in elevation in a short distance.

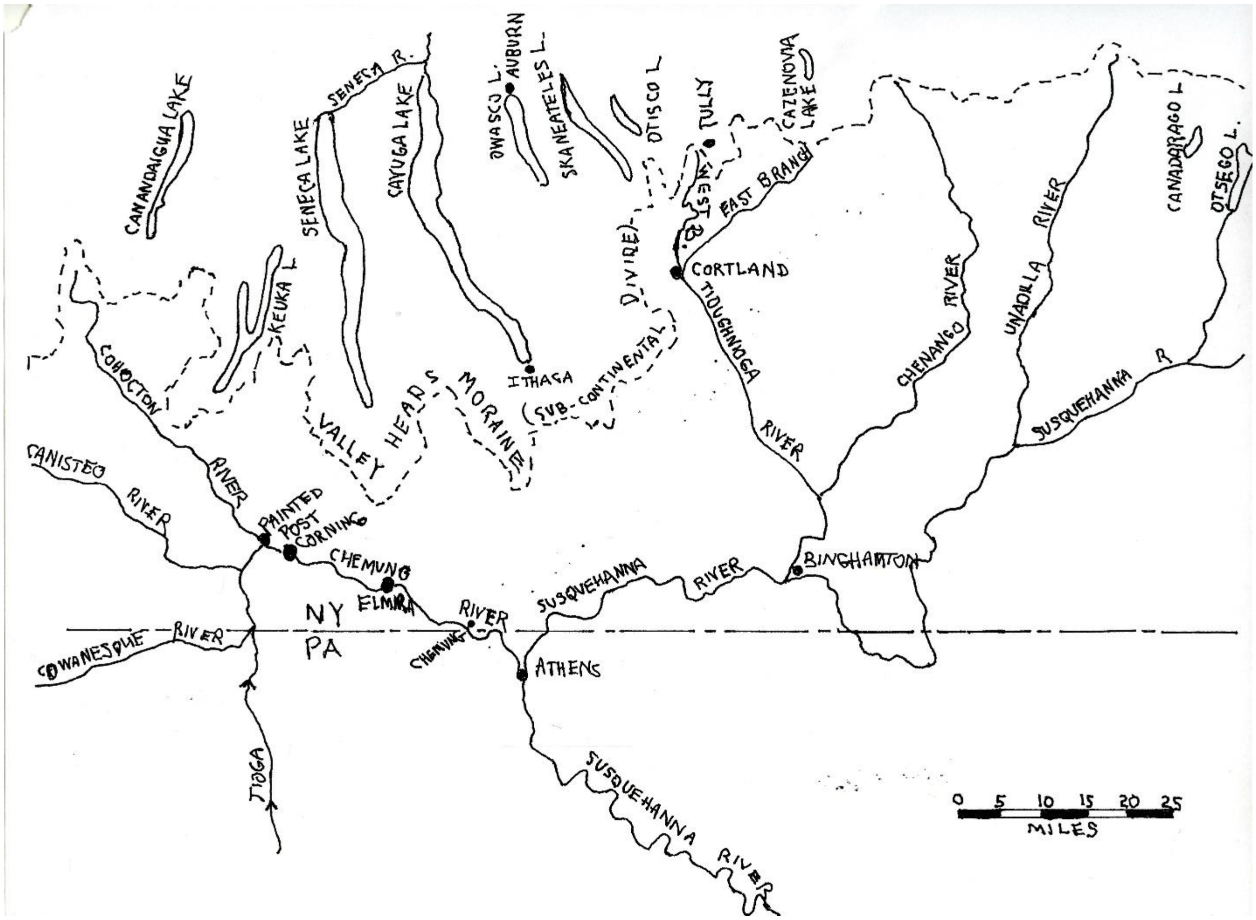

Figure 1 ***Upper Susquehanna Subbasin and its major tributary the Chemung Subbasin*** *(After Coates, D.R.*, *__Geomorphology__ __of South-Central New York:__ NYSGA Guidebook 53rd Ann. Mtg. 1981, p.172)****.*** The Valley Heads Moraine is shown by the dashed line. Flowing south off the moraine are the major tributaries of New York State's portion of the Susquehanna River: (from west to east) the Cohocton/Chemung, Tioga, Tioughnioga, and Unadilla Rivers. The Tioga is further distinguished by taking the long way around-rising about 40 miles south of Painted Post near Blossburg, Pennsylvania and flowing north, through Mansfield, PA., to comingle with the waters of the Cohocton and return south as the Chemung and eventually the Susquehanna at Athens, PA..

The Chemung Canal climbed 443 feet from Lock 1 at Havana (now Montour Falls), south of Watkins Glen, to its summit at Pine Valley (north of Horseheads) in a mere eleven miles of horizontal distance for an average gradient of approximately **40 feet per mile (Figure 2)**. This steep rise eclipses average gradients of other lateral canals as follows:

CANAL	AVERAGE GRADIENT FROM ERIE CANAL JUNCTION TO SUMMIT LEVEL
Black River Canal	35 feet per mile
Genesee Valley Canal	11 feet per mile 18 feet per mile south from Sonyea
Chenango Canal	30.5 feet per mile

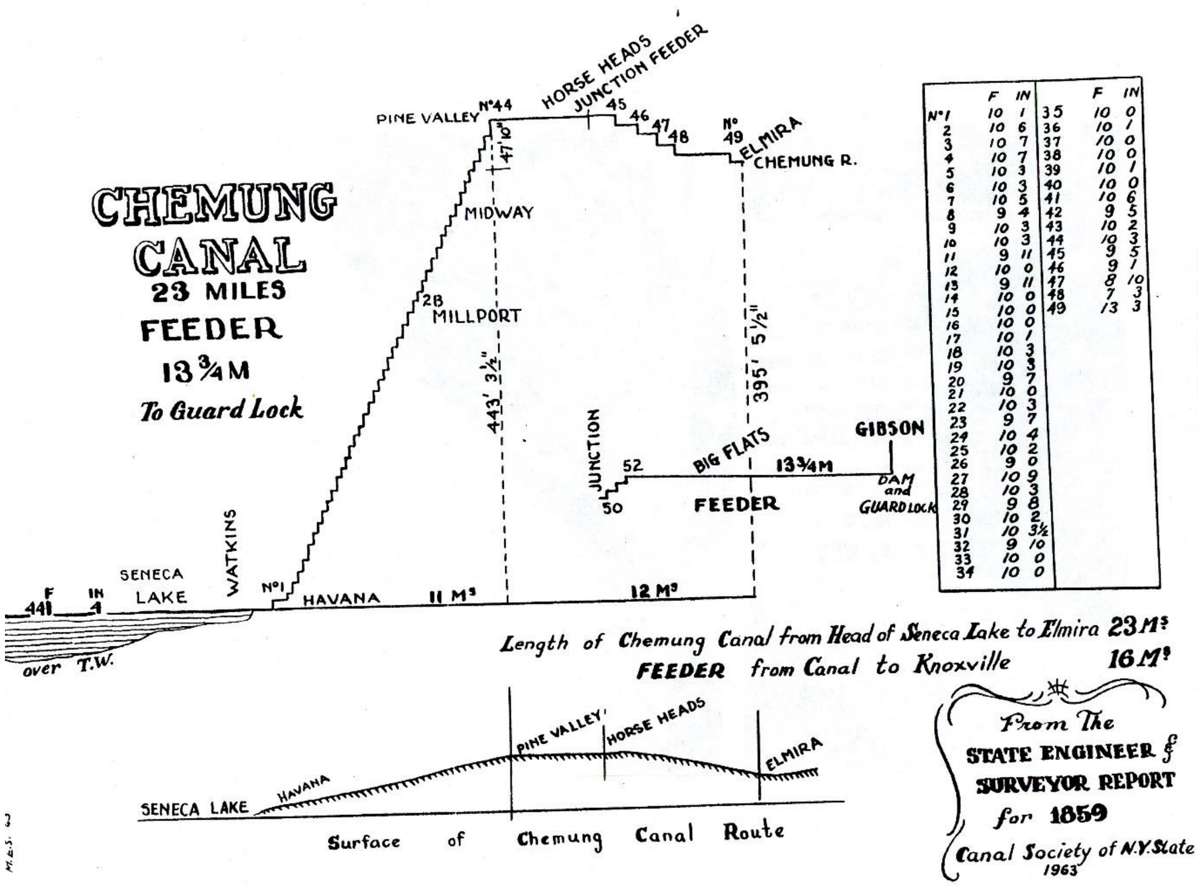

Figure 2. Chemung Canal profile from the 1963 Field Trip Guide.

Figure 2 Chemung Canal Profile from CSNYS 1963 Field Trip Guidebook

Bedrock Geology

Three major rock units of Lake Devonian age make up the bedrock sequence from the south end of Seneca Lake to Elmira. They are in ascending order (from oldest to youngest) the **Genesee, Sonyea and West Falls Groups**. Because of the southerly dip mentioned in the Introduction, they are also exposed at the surface in the same order, from the oldest north to youngest south. The same rock formations are exposed along the Genesee Valley Canal from Sonyea to Portageville and along the Chenango Canal from near Norwich to Binghamton.

The **Genesee Group** makes up the floor of Catherine Creek Valley from its mouth at Seneca Lake south to the Chemung-Schuyler Counties line north of Millport and also the lower slopes of the Seneca Lake valley at the south end. It is well exposed in the lowest portion of Watkins Glen gorge.

The **Sonyea Group** is well exposed upstream in Watkins Glen and makes up most of the rock exposures in the Glen. It may also be found making up the lower slopes and floor of the valley north and south of Millport.

The **West Falls Group** comprises the exposures from “hill top” to valley floors from Pine Valley on the north to either side of the Chemung River in Chemung County and along the Susquehanna to Binghamton. Rock exposures from Painted Post to Waverly are in the West Falls Group. It was was once known as the Chemung Group to 19th- and early-20th-century geologists and paleontologists.

These aforementioned rock units record a shallowing upward sequence. The Genesee Group is the deepest marine deposit. The overlying Sonyea Group represents deposition in marine waters of intermediate depth while the West Falls Group represents a relatively shallow continental shelf deposit. Therefore, the West Falls Group contains the highest fossil content of the three rock units as the paleoecological conditions that prevailed during West Falls time, in the Elmira-Corning area, were most favorable for a rich marine invertebrate assemblage to thrive - sponges, brachiopods, bivalves (clams), snails and crinoids (starfish relatives) constitute most of the assemblage.

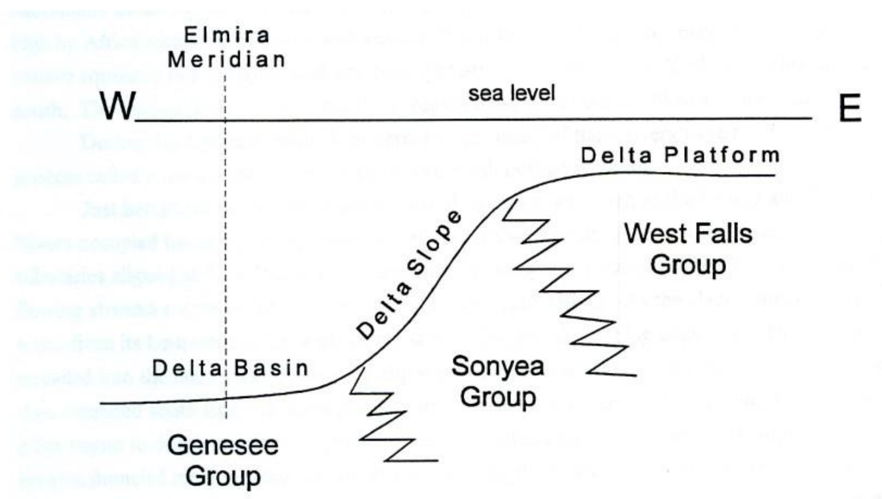

Figure 3 Diagram of Late Devonian Catskill Delta in Chemung County. Showing the time equivalent environments of deposition for each rock unit from deep water in the west to shallow water in the east. The West Falls Group contains the most diverse assemblage of marine invertebrate fossils.

All three units were deposited simultaneously at the margin of a westward migrating delta called the Catskill Delta. The Genesee Group was deposited in a deep basin setting outward most from the delta, the Sonyea Group was deposited on the delta slope to the east and the West Falls Group yet farther east on the delta platform as shown on the diagram below.

As the delta shifted west with time, first the Sonyea then later the West Falls Groups came to overlie the Genesee Group in succession along the dashed line representing the Elmira meridian. A very well-defined shallowing upward sequence indeed.

Glacial Geology

During the Ice Age (Pleistocene Epoch - 2 million years to 6,000 years ago) at least four separate ice sheets covered northern North America. The last glacier was at its maximum extent nearly 20,000 years ago. The ice's waxing and waning left its unmistakable “finger prints” on the landscape, revealed today in the stunning beauty and shape of the southern tier’s landscape. In broad strokes the glacier’s imprint on the landscape produced striking - erosional features, depositional features and high level proglacial (in front of the ice) lakes along with their outlet meltwater channels that once held high volumes of rapidly flowing water but today hold streams that are mere dwarf vestiges of their once former and dynamic selves.

Erosional Features

In preglacial times all of the Finger Lakes as well as the Great Lakes were river valleys. In central New York the original flow of these streams was south coming with the rise of the Appalachian Mountains about 200 million years ago. The Appalachians were folded, faulted, contorted and raised high by a three-way head-on collision between Africa, Europe, and eastern North America. However since central New York is quite distant from the tectonic convulsions of eastern New York State and New England, the land and rock formations in central New York were given the ½ degree dip south. The original flow of the rivers in the region must have been south as a consequence.

During the Age of Dinosaurs, or perhaps later, many of these rivers were reversed by a process called stream piracy. North flowing streams cut through the ancient divide and captured the upper ends of the south flowing streams diverting their flow north instead of south.

Just before the onset of glaciation, north flowing trunk streams such as the Seneca and Cayuga Rivers occupied broad, relatively shallow, valleys. All of these major streams had tributaries aligned approximately ninety degrees to the main streams. This is called a **trellis drainage pattern** Some tributaries flowed east into the primary or trunk streams, while others flowed west. Other north flowing streams occupied the remaining preglacial Finger Lakes valleys such as Canandaigua, Owasco and more. As the glacier slowly crept south from its Laurentian Mountains source area in Quebec, the leading edge of the glacier was funneled into the main valleys that were aligned nearly parallel to the flow of the ice. Lobes of ice then extended south from the main glacier into the valleys like giant horizontal icicles pointing south, as viewed from above. The lobes began to deeply erode the north-south aligned valleys into deep U-shaped troughs. This erosion funneled more ice into the troughs lengthening the lobes but also making them thicker resulting in even greater erosion. Eventually the entire region was overrun by the main ice sheet further deepening the troughs. At the maximum extent of ice, the sole of the ice sheet rested on solid rock several hundred feet below sea level. The present u-shaped profile of Seneca and Cayuga Lake valleys had now formed.

Post Glacial Gorges

The east-west tributaries were, in contrast, only slightly effected by glacial erosion as they were aligned ninety degrees to the general flow of the ice sheet. When the ice eventually melted away and the Finger Lakes formed in the deeply scoured U-shaped troughs, the tributary streams that once joined the preglacial Seneca River, at an accordant elevation, now had to flow down the side of an overly steepened trough, of the newly formed valley that now houses Seneca Lake. These tributary valleys are called hanging valleys since their valley floors were left hanging above the main valley floor. The view across the valley from Glacier Point in Yosemite National Park is a definitive example. Waterfalls were then initiated along both the east and west sides of the valley. These waterfalls then migrated upstream, as all waterfalls do, leaving behind deep bedrock gorges and canyons. They formed after the Ice Ages and are therefore Post Glacial Gorges. Plus they have no glacial deposits in them and if they were in existence before the glacier surely these deposits should be there. Watkins Glen and Hector Falls came into existence and these are but two of the many spectacular post glacial gorges throughout the Finger Lakes region and beyond.

Another kind of post glacial gorge comes into existence when a portion of a river's course is completely relocated from its preglacial location to a new one in postglacial time. The Chemung River between Big Flats and Elmira is a perfect example. Before the ice ages the Chemung flowed east to what is now Horseheads where it then turned south. The glacier plugged the valley east of Big Flats forcing the postglacial Chemung to escape east through a new channel that it carved, the one it occupies today. This hypothetical sequence is show in **Figure 4.**

Truncated Spurs

Another erosion feature that reveal the glacier's "finger prints" are the prominent truncated spurs that mark all of the U-shaped valley walls of the Finger Lakes region and in particular those of Chemung County. These are very steep, nearly vertical, bed rock cliffs that are found on each side of the Cohocton, Chemung, and Susquehanna Valleys. Examples include the cliff north of Gibson east of Corning (The Narrows) and the one south of East Corning. (**Figures 5A and B).** The tightly packed, brown, contour lines south of the word *Gillette* **(Figure 5A)** are so close together they appear as nearly one heavy brown color. This signifies a nearly sheer vertical cliff oriented in a northeast-southwest direction.

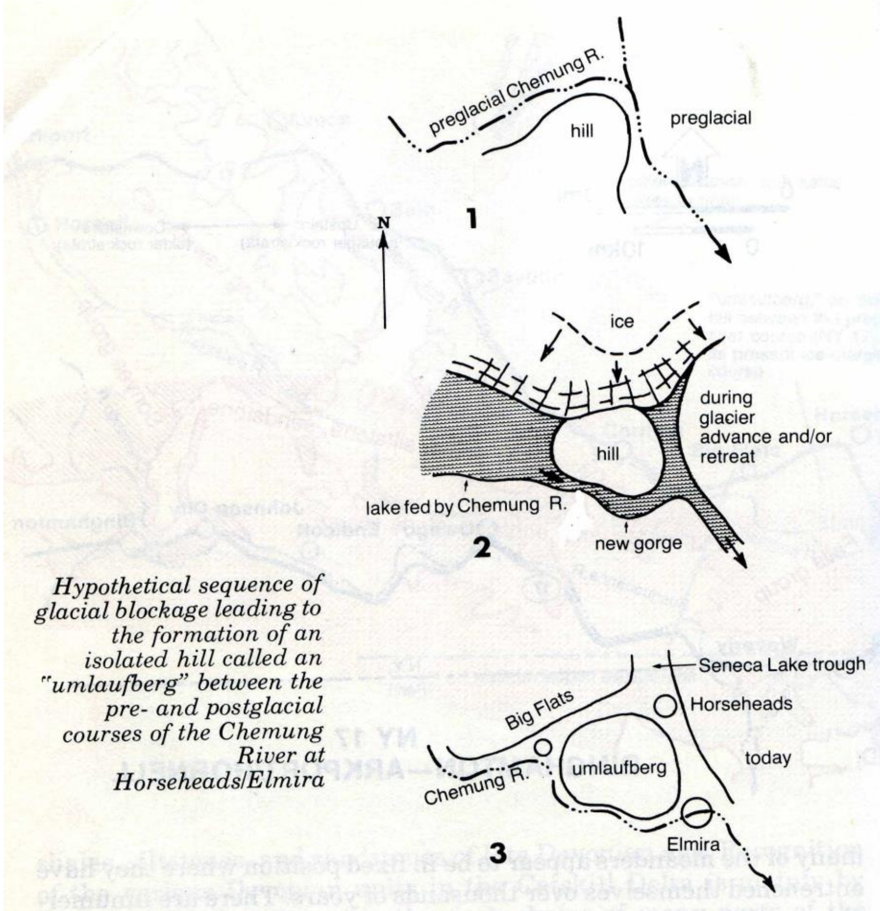

Figure 4 Pre- and Post Glacial Chemung Rivers Northwest of Elmira. (*From Bradford B. Van Diver; Roadside Geology of New York, 1985, Page 166.*

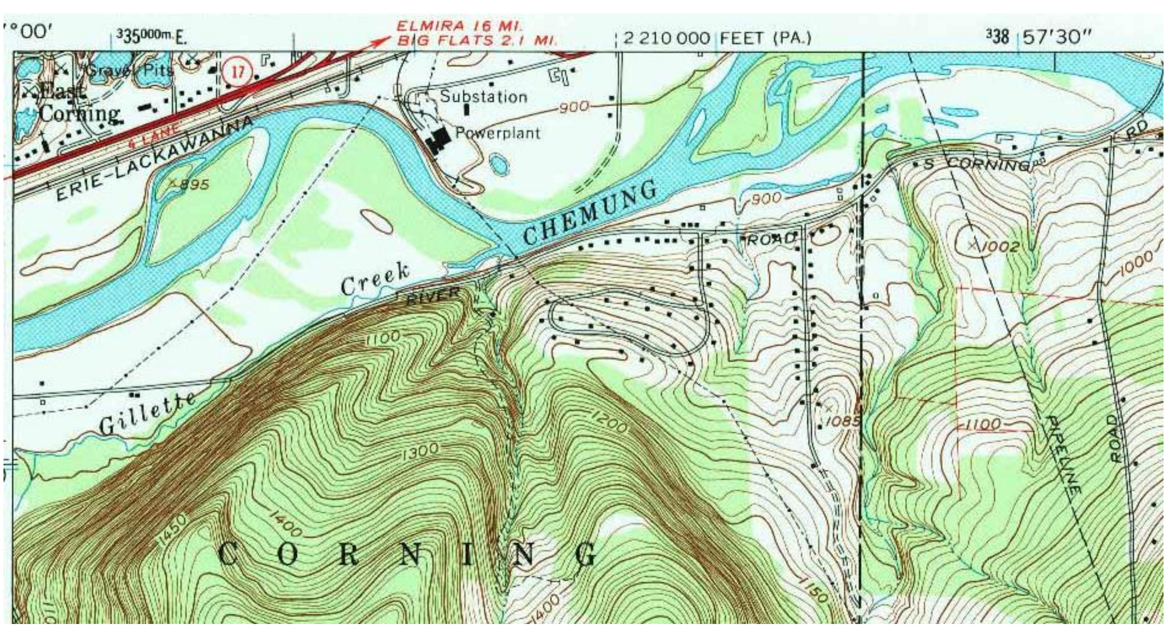

Figure 5A Truncated Spur south of East Corning. Gillette Cree**k** hugs the base of the steep bedrock cliff *(portion of the Seeley Creek 7.5 minute Series, 1969)*.

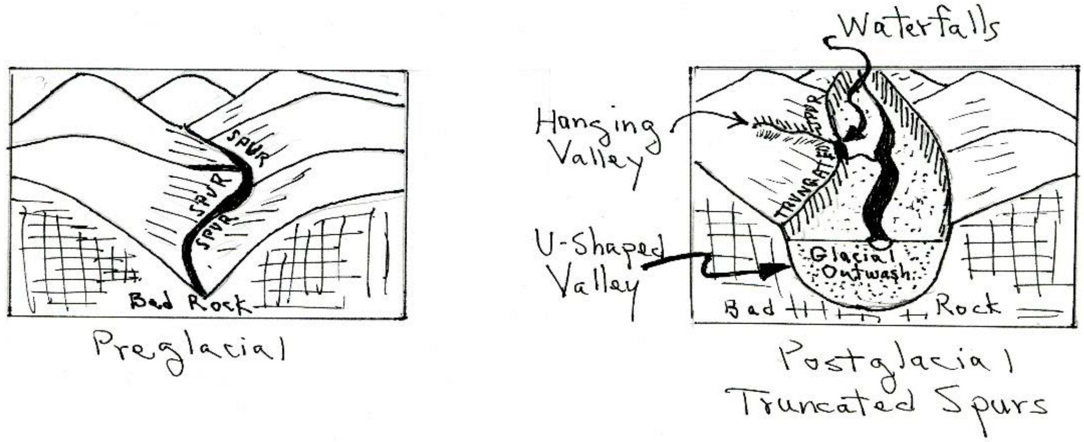

Figure 5B Formation of Truncated Spurs

As shown in the left image (preglacial time) the valley's side walls slope down and inward toward the center of the valley and close to the stream. The glacier shaves these off resulting in a wider valley floor and uniform steep, nearly vertical sides (right drawing).

Depositional Features

<u>Moraines</u>

The ice margin began to retreat north from its terminal position approximately 20,000 years ago. As it did so the melting edge would periodically re-advance south and then pause. At this time the rate of melting at the edge of the glacier equaled, or nearly equaled, its rate of internal flow. Therefore the melting edge of the glacier remained relatively stationary. When this occurred the rock debris in the ice, ranging from fine clay, silt and sandstone to larger rock and boulders, was dumped at the melting edge as a linear ridge parallel to the ice front composed of a series of irregularly shaped mounds crudely resembling large "eggs-in-a-basket". This feature is called a moraine.

In the Seneca Lake valley the moraine took the form of a valley plug as it was deposited by a lobe of ice on the floor of a deep valley. Today the moraine is located at the north edge of Horseheads and continues north to Millport. This moraine and its equivalent in the other Finger Lakes valleys to the east and west is called the Valley Heads Moraine.

The Valley Heads Moraine (**see Figure 1**) forms the earth dam at the south end of the U-shaped trough that impounds Seneca Lake and its earlier high level ancestors. Another moraine at the north end would complete the task thereby trapping lake waters between the two moraines.

Of greater significance is the fact that the Valley Heads Moraine in central New York forms the sub-continental divide as described in the Introduction. Therefore in the Horseheads vicinity Newtown Creek flows south off the moraine to Elmira and the Chemung River which eventually reaches the Chesapeake by way of the Susquehanna while Catherine Creek flows north to Seneca Lake and ultimately the St. Lawrence.

When the moraine was forming at Horseheads great volumes of meltwater gushed from the glacier. The meltwater flowed south from the ice spreading an apron of nearly horizontal well-bedded sand and gravel called outwash plain. That is why the floors of the valleys of Newtown Creek to Elmira, the Chemung River, and the broad flat valley at Big Flats are so level compared to the valley floors north of the moraine.

<u>Kettle Lakes</u>

The glacier's melting edge is a complex of gushing meltwater, varying sizes of thick ice blocks calving and breaking off the glacier and other phenomena such as dumping of large masses of rock debris. As the melting edge retreats many blocks of ice are dropped along the way—some small and insignificant and others quite large. The larger residual blocks of ice get surrounded, if not buried, by glacial outwash sand and gravel. When these blocks finally melt a depression remains where once the ice so proudly stood. These depressions are called **Kettles**. If the water table is high enough these depressions fill with water like a bathtub, but from below. As the water table rises and lowers due to plentifull rainfall or lack thereof so does the level of the water in the kettle. These are called **Kettle Lakes** and **Lowes Pond** on the feeder west of Kahler Road and now a park, plus **Eldridge Lake** and **Weyer Pond** in Elmira are probably some examples. One must be cautious as abandoned sand and gravel pits can lead an observer astray.

<u>Alluvial Fans</u>

Alluvial Fans are more prominent in western states where arid and semi-arid climates prevail. They form when rapidly flowing, sediment charged, streams emerge from the base of a mountain or steep valley. Once the stream hits the valley floor and is no longer confined to its narrow channel in the highland it spreads out into a broad fan shaped structure (like a Victorian period ladies hand-held fan). Its velocity is also greatly reduced and so the sediment is deposited in a similar pattern **(Figure 6)**.

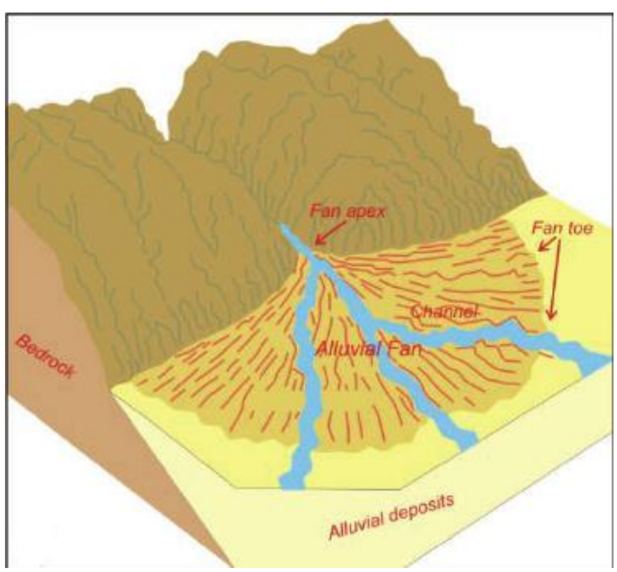

Figure 6 Diagram of an Alluvial Fan (from the internet)

There are a number of these structures on the north side of the Chemung Valley between Gibson and Horseheads. The Corning Feeder slices through a portion of two of these and therefore accounts for the Deep Cut, at least in part **(Figure 7)**.

Proglacial Lakes

Proglacial lakes are high level lakes in front of the ice well above the elevation of present day Lake Ontario which stands at 250 feet above sea level. They came into existence because glacial ice acts as a dam and the land in central and western New York slopes north. Therefore, as long as ice occupied the Lake Ontario basin and the Thousand Island outlet, waters from the north flowing streams and glacial melting were impounded in front of the ice as proglacial lakes.

One of the first and highest proglacial lakes to form in the Elmira area was Lake Newberry at an elevation of approximately 900 feet above sea level. The Valley Heads Moraine formed its southern shore and its northern shore was the ice margin located well north of Watkins Glen at this time **(Figure 8)**. Lake Newberry drained south past Elmira and was the antecedent of all the present day, major, Finger Lakes.

Continued withdrawal of the ice margin north exposed successively lower outlets and Lake Newberry quickly lowered. Lake Newberry was therefore followed by a sequence of proglacial lake stages each at a lower elevation than the preceding one. These lakes eventually found outlets to the ocean either west past Chicago and down the Mississippi or, more commonly and longer lasting in time, out the Mohawk-Hudson Valleys. Eventually the proglacial lakes lowered to their final levels, as we know them today, forming Seneca, Cayuga and the other Finger Lakes of central New York.

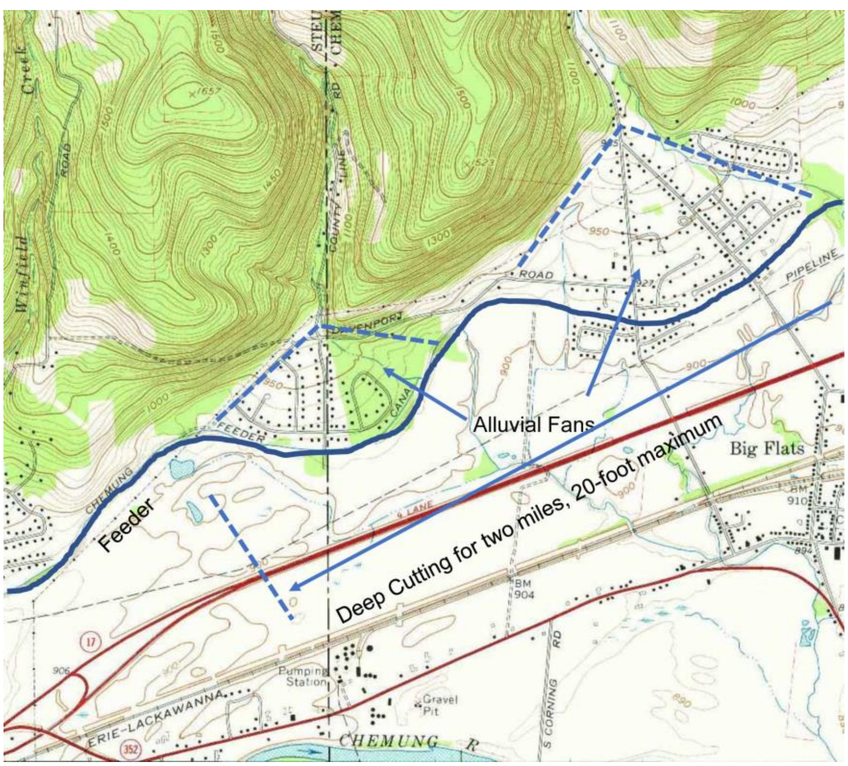

Figure 7 Portion of the Corning Feeder Northwest of Big Flats Showing Two Alluvial Fans *(portion of the USGS Big Flats Quadrangle 7.5 minute Series)*

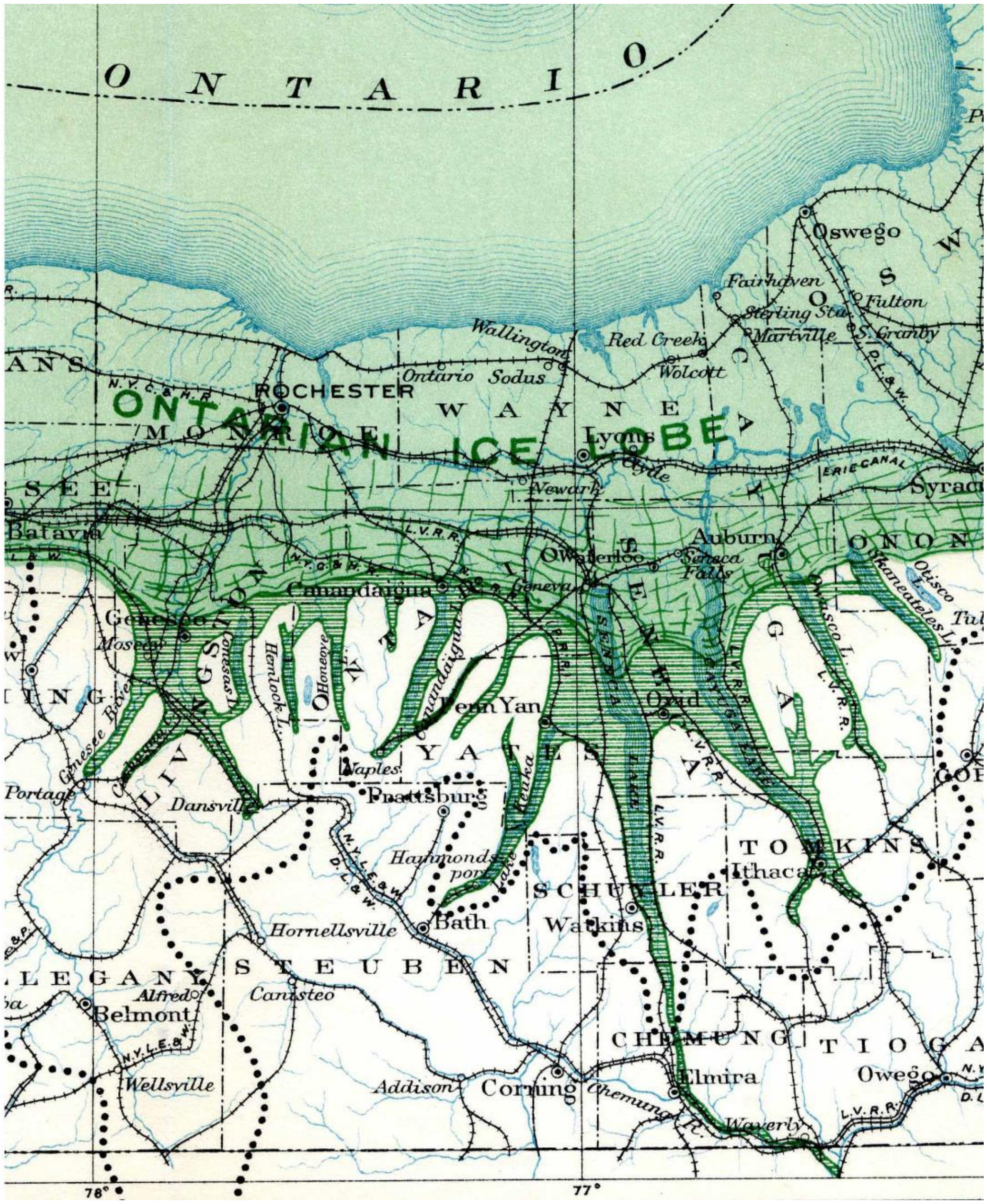

Figure 8 Lake Newberry in the Seneca Lake Basin. *(From Herman L. Fairchild; Glacial Waters in Central New York. NYS Museum Bulletin 127, 1908, Plate 35.)* At 900 feet elevation the outlet at Elmira was the lowest pass across the sub-continual divide in Central New York. Therefore most of the proglacial lakes here, then in existence, funneled their waters into Lake Newberry. The Chemung Canal and the Junction Canal artificially recreated what nature did about 10,000 or so years before. The black dotted line is the divide.

Figure 9 Hector Falls looking east, 2018 (Courtesy of Bill Hecht). Note the silt coming down the falls, filling into Seneca Lake. It was from here that the *Mary and Hannah* left in 1823 to become the first commercial vessel to bring goods to New York City through the just completed portions of the Erie Canal.

Chemung Canal
1833 – 1878

Bruce Schwendy

This little canal, twenty-three miles long with its sixteen-mile feeder, was a loss when considering toll revenue in comparison with construction and maintenance costs. And because it was built at a time when other lateral canals were competing for funds, it was built with cheaper wooden locks, forever to be a reliability and maintenance problem. Historian Gary Emerson wrote, "Yet the canal provided a vital service at an important time --- the Chemung Canal opened a market economy that brought prosperity and economic growth."[1] Emerson is the author of an excellent history of the Chemung Canal titled "A link in the Great Chain." The Chemung Canal will be remembered as one of the briefest and most tenuous but certainly as important as any of the lateral canals in New York State.

It was a giant economic engine for that southern part of upstate New York, responsible for populating Jefferson (Watkins Glen), Havana (Montour Falls), Newtown (Elmira), Fairport (Horseheads) and Corning with both people and industry. It is interesting that the names of these towns and villages changed over the years. The canal and the businesses it spawned were responsible for creating thousands of jobs and profits to many as it served as an important part of the link between the canal systems of New York State and Pennsylvania. Because of the canal's strategic location, it also contributed to the overall commerce everywhere the Erie Canal reached throughout the State. The canal carried Salina salt southward to Pennsylvania, anthracite and bituminous coal northward to the cities of New York State and lumber and timber both ways. It enjoys a colorful and important place in the overall story of northeast canals.

Throughout this narrative, reference will be made to the Cohocton, Tioga, Chemung, and Susquehanna rivers. Please see Figure 1 as it is helpful to know the flow of these rivers and how they interconnected, creating a watershed that generally takes water south into the Chesapeake Bay. Also note that Catherine creek does not connect into these rivers but rather is in a watershed that flows north into Seneca Lake. Sing Sing Creek, crossed by the feeder, flows into the Chemung River.

Early Suggestions for a Waterway Link

Sullivan’s campaign of 1779 took his troops into the valleys of the Tioga and Chemung Rivers and to the place where the Chemung River flows into the Susquehanna River. "During this expedition, General Sullivan addressed a letter to General Washington on the subject of uniting the northern and the southern waters."[2] And in George Washington he

[1] Gary Emerson, A Link in The Great Chain - A History of the Chemung Canal (Purple Mountain Press, 2005), p.92.

[2] Nobel Earl Whitford, History of the Barge Canal of New York State (Albany, 1922), p.405.

found a willing listener, since Washington believed that improved transportation provided the means to a great nation.

That this link had the strategic value to connect waterways in New York State through an interior route all the way to Chesapeake Bay was also noted by Elkanah Watson. Watson, a merchant, banker, traveler, writer and visionary canal promoter, traveled from Albany to the Seneca Lake in 1791 and from his journal entry for September 15, 1791 he writes "Providence has happily placed this great source of comfort, and wealth, precisely in a position accessible by water in every direction. *When the mighty canals shall be formed, and locks erected, it will add vastly to the facility of an extended diffusion, and the increase of its intrinsic worth.* It will enter Ontario, and the other great lakes, and find its way down the St. Lawrence, by Oswego;---into Pennsylvania, and the Chesapeake, up Seneca river, to the head of the Seneca lake, and by a portage, (perhaps eventually a canal) of eighteen miles, to Newtown on the Susquehanna river;---And through the canals in contemplation, up Wood creek, and down the Mohawk river, into the Hudson."[3] The portion in italics was added when Watson included this journal in his 1820 book.

Charles G. Haines writing in 1818 said "The contemplated Canal between Seneca Lake and Tioga river, which will constitute the Junction between the Western Canal and the Susquehanna, presents an improvement that imports weighty consequences to the States of New-York and Pennsylvania. It will immediately give rise to a profitable trade in the articles of salt, gypsum, coal and iron."[4]

Legislative Approval

The New York State legislature worked for years, considering many petitions that were presented by local businessmen and landowners for a water route in that part of the state. As early as 1812, James Geddes was directed by the canal commissioners to survey the route. Governor Clinton in his 1819 annual message to the legislature also promoted this canal. In 1825 it was very obvious to everyone that with just a short canal it was possible to link up the Erie Canal with the approaching canalization of northern Pennsylvania, along a route very close to the Susquehanna River and ultimately allowing New York boats to reach the eastern seaboard at Chesapeake Bay. It was noted in 1824 that such a canal would extend the salt market and western plaster supply to the extent of the country bordering on the Susquehanna shores and that Pennsylvania coal would be able to feed New York's growing manufactories and cities.[5]

In 1825 the legislature passed an act (Chapter 236) for surveys of several canal routes, including the one from Seneca Lake to the Chemung River, at or near the village of

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[3] Elkanah Watson, History of the Rise, Progress, and Existing Condition of the Western Canal in the State of New-York from September 1788 to the Completion of the Middle Section of the Grand Canal in 1819 (Albany, 1820), p.43.

[4] Charles G. Haines, Considerations on the Great Western Canal, From the Hudson to Lake Erie (Brooklyn, 1818), p.36.

[5] Nobel E. Whitford, History of the Canal System of the State of New York (Albany, 1906), Volume 1, p.609.

Newtown. James Geddes also conducted this survey and in his 1826 report he said that "to make the communication required, a canal should be constructed from Seneca lake to Newtown, eighteen miles and a navigable feeder from the Chimney Narrows, on the Chemung river to the summit level of the canal, thirteen miles, making a navigation by canal of thirty-one miles."[6]

Progress on canals to the north and south at that time made the Chemung Canal even more attractive. In November 1828 the Cayuga and Seneca Canal had been completed to allow boat access from Seneca Lake to the Erie Canal and in 1829 the Pennsylvania Legislature approved plans to connect Harrisburg on the Susquehanna River to Athens, also on the Susquehanna River. Athens was only eighteen miles from Newtown (Elmira) along a relatively flat route that eventually required only 75 feet of lockage.

Construction was finally authorized by the New York State Legislature with the approval of bills in both the Assembly and the Senate in April of 1829. This was followed by Governor Throop's approval a few days later.[7] To illustrate how tenuous this link was, after the New York State approvals, there were those who tried to prevent progress. Member of the Assembly Abajiah Mann, Jr. tried to stall the beginning of construction and one of the New York State Canal Commissioners, Samuel Young, voiced his opposition because he favored spending money on other lateral canals.

Construction

Construction on the Chemung Canal began in July 1830 with Holmes Hutchinson serving as chief engineer. Hutchinson had again surveyed the route in 1829 and determined that the summit would be at Horseheads, 443 feet above the level of Seneca Lake. The summit would be fed with a navigable feeder originating thirteen miles to the west at Gibson, just east of Corning, where the Chemung River was dammed up seven feet to create the head of water. That water would flow through a guard lock at Gibson and, as it approached the summit at Horseheads, drop 57 feet through three locks to feed the summit. On the way, this feeder required deep excavation along a two mile stretch to maintain the level prism. Once the feed water reached Horseheads it would flow in two directions. To the north, down through 44 locks in a distance of 11 miles, generally following the Catharine Creek valley to Seneca Lake. By comparison, the Erie Canal had 83 locks spread over a distance of 363 miles. To the south, feed water dropped down 48 feet through 5 locks and back to the Chemung River at a point nearly 100 feet in elevation below where the water had been diverted into the feeder upstream.

A very good description of the construction appears in Nobel Whitford's Chapter XIV of the 1906 work, History of The Canal System of The State of New York. "In general, except in the valley of Catharine creek, the configuration of the ground and the character of the soil were considered favorable for the cost of construction of the canal and its feeder and also for their maintenance. The most expensive parts would be the dam at the head of the feeder, the deep excavation on its summit level and the large number of locks from the summit level

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[6] Ibid., p.610.

[7] Emerson, p.21, 22; Albany Argus, April 15, 1829, p.2.

of the canal to the head waters of Seneca Lake. The deep excavation of the feeder extended about two miles, ranging from a cutting of ordinary depth to one of twenty feet. The character of the soil was ascertained by sinking shafts at the deepest point to within four or five feet of the required depth. This soil was course gravel, mixed with sand and loam. It was expected to find places where these materials would be cemented and hard to excavate. The line from the summit level to Seneca Lake passed along the narrow valley of Catharine creek, a distance of about nine miles, with a descent of four hundred and forty-one feet. In this valley the surface of the ground was broken and uneven, and the creek, in several places, crossed the line, thus rendering it necessary to alter and straighten the course of that stream, and to protect the banks of the canal against the destructive effects of its floods. It was proposed to connect the canal with the inlet of the lake a few rods below the village of Havana. This inlet intersected the lake near the east shore and its entrance was obstructed by a bar near its mouth, which presented the greatest obstacle to natural navigation. In order to obviate the enormous expense of excavating and maintain a navigable channel through this bar, it was planned to cut a canal of nearly half a mile in length from a bend in the inlet to the lake near the west shore, where the entrance would be in deep water and less liable to obstructions by alluvial deposits. At Elmira the canal would begin at the river with deep excavation through a street, then rise eleven feet by a lock, thence for the remaining distance to the summit level the excavation would be easy. The engineer planned for locks to be constructed of wood, connected with a breast wall of masonry extending across the head of the lock. This wall would terminate the upper level, and be so united with the lock as to admit of any part of the wooden structure being repaired without disturbing the stone work or the earth. To protect the timber from destructive contact with the earth, the embankment upon each side of the lock was to be so formed as not to allow the earth to come in contact with any part of the woodwork, but the water of the lower level would be permitted to flow around the outer sides of the lock."[8]

Completion of the canal was accompanied by fits and starts. We have records of shortages of labor, incomplete contracts, and disputes between the state and contractors over changes made from the initial design. Most of the work was completed by July 1832 but some locks leaked and required further work to correct the problem. Alterations went on throughout the winter and by May 1833 everything was finally ready. Then, a natural disaster struck in the form of very heavy rains May 5, 6 and 7. Rivers and creeks flooded to overflowing and the canal along Catherine Creek suffered the most damage with washouts of embankments and towpaths. Sing Sing creek overflowed its banks and deposited gravel in the feeder. The feeder dam at Gibson also sustained damage and it took until November 1833 before the entire canal was open for business.[9] The completed canal cost $314,395.51 and repairs from the 1832 flood were estimated to cost between $11,000 and $15,000. Locks were 90-feet long and 15-feet wide. The canal prism was 42-feet wide at the surface, four feet deep and 26-feet across the base. Structures included 53 wooden locks, 3 aqueducts, 6 culverts, 70 bridges and one stone guard lock at Gibson and the adjacent feeder dam. The feeder dam was constructed of wood with stone abutments. See Figure 10 for an overview of the completed canal and feeder.

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[8] Whitford, 1906, p.613-614.

[9] Emerson, p.45.

Locks

Because the Chemung Canal was competing with the other lateral canals in New York State that were under consideration at the time, funding was always a problem and to get legislative approval the planners incorporated wooden locks to keep the initial cost estimate close to $300,000. That seemed to be the cost point at which the legislature was willing to approve. This decision plagued the canal throughout its lifetime. The wooden locks had a practical life of around ten years.

In 1840, the cost to sustain them with repairs was proving to be poor economy. Over the next three years all the locks were built new except lock 49 and the 1841 legislature appropriated $200,000 for this work. Lock 49, to let boats into the Chemung River at Elmira did not get much use because at the time there was little advantage to get to the river and often the river level was not sufficient to float boats out of the lock. When the Junction Canal was finally built to connect the Chemung canal to the Pennsylvania canals, it left the Chemung Canal in Elmira between locks 48 and 49, further reducing the need for lock 49.

By 1850, the second set of locks were beginning to decay and for the next six years were repaired as well as possible. It was not until 1856 that the legislature finally approved another round of rebuilt wooden locks and they were gradually replaced over the next eleven years with the last being completed in 1867. This time, the sides of the chambers in the new locks were reinforced with piles and bracing to be more secure. The third set of locks served the canal to the end of its life in 1878. It was good that when the first locks were constructed, the top of the lock, called the “breast wall” by Whitford, was made in masonry. That way, when the top lock gates were closed, and with secure masonry quoins, the entire wood portion of the lock could be rebuilt while the top gates acted like a cofferdam to isolate any water above the lock from the construction area.

Through all the discussions about lock repair and or replacement, timber locks, composite locks and stone locks were considered, along with the comparative costs and each time the low cost of the wooden lock prevailed. In these discussions, the question arose about whether the locks should be made larger to match the work currently underway to enlarge the Erie Canal and the Cayuga and Seneca Canal. Additionally, the locks on the North Branch of the Pennsylvania Canal were 17 feet by 90 feet, adding further incentive to build larger locks. That discussion delayed the building of the third set of locks. Along with cost, another factor in this discussion was water capacity to run the canal. Nearby lakes were surveyed as possible reservoirs. Towns downstream complained about the lack of water power to run their mills during dry periods. The State also received complaints from Pennsylvania officials for depriving them of needed water for the North Branch.[10] Ultimately the commissioners decided not to enlarge the Chemung canal and it operated with 90 by 15 foot locks made of wood throughout its entire existence.

Design of the wooden locks created problems over the years and in attempting to mitigate the decay that goes with wood structures they went from one problem to another. In the first set of locks built between 1830 and 1832, the engineers left the outsides of the lock

[10] Annual Report of the Canal Commissioners (1836), p.29.

walls open to minimize decay from contacting earth. The design was to become problematic. "The locks were constructed of wood, supported on the sides with braces, with a stone wall of masonry at the head, and a dry wall on the sides, resting on the foundation timbers, and were of ten feet lift, and the defect consisted in their not being properly supported on the sides to resist the great pressure of water within the chamber of the lock when it was filled. Those locks on which the work was well executed were frequently filled with water without producing any material injury, while others, on which the work was badly executed, gave decisive evidence of being imperfect. An experiment was made upon one of the most defective, and it was ascertained they could be made sufficiently strong by more securely bolting to the bottom sill the longitudinal sill, into which the short upright posts were framed; by additional braces, and by increasing the dry wall to the extent of about fifty cubic yards for each lock."[11] One interpretation of the statement "into which short upright posts were framed; by additional braces" is they created overhead braces for the lock walls to secure them against the water pressure. To substantiate this, we have the view of an 1837 Crooked Lake lock shown in Figure 32. This view is just four years after the time when this reinforcing was done and is located in close proximity to the Chemung canal. These changes apparently made the first set of locks more secure and they remained operational, with repairs, for a few years.

When the second set of locks were built, 1841-1843, they were constructed conventionally with earthen backfill used to support the outsides of the lock walls. That led to a different problem. This time, the pressure of the earth eventually pushed the lock walls in. As early as 1850 the locks were repaired by "removing the embankment from the back of the timber work and by filling locks with water to force back the sides of the chambers to their original positions."[12] By 1856, we find "the chief defect of the locks had been the springing in of the sides to such an extent as to require the faces of some to be hewed off six inches, or about half of the original thickness of the timber, so as to give the necessary width for the passage of boats."[13] The third set of locks with improved piles and bracing lasted through to the end of the life of the canal.

The Corning Feeder

Before the Chemung Canal was built, timber and lumber had been transported down the Chemung and Susquehanna Rivers, in arks and rafts, especially in the spring season when water flow was at its highest. The engineers planned a seven foot high dam in the river at Gibson to create a head of water for the feeder, and they needed to accommodate the river traffic as well. Therefore they devised a wooden chute on the north end of the dam forty seven feet wide and one hundred and eighty feet long with entrance wings and an apron on the down side. This created a fairly steep descent in the chute of four feet over that length. Over the years water coming down the chute wore away the stream bed to a depth that caused the descending rafts to plunge deep into the water and sometimes break up. In 1839, the chute was improved to four hundred and fifty feet long with a more gradual pitch for the

[11] Whitford, 1906, p.616.

[12] Ibid., p.629.

[13] Ibid., p.631.

four-foot drop. At the bottom end, they placed heavy brush timbers with their butts securely fastened to the lower timbers of the chute to keep the stream bed from washing out.[14] Based upon this description, we envision that there was a three-foot depth of water at the top end of the chute for the rafts to enter and the question arises about this opening allowing water in the river to fall below the level needed to operate the canal. We find no reference to this but there must have been some way, using timbers, to block the entrance to the chute when the canal was operating and there was no river traffic.

The dam remained a source of worry and controversy. Many petitions were received by the State calling for its removal along with an extension of the Feeder channel further west, benefitting from taking water at a higher elevation along with facilitating the growing commerce. Nature often coaxed these feelings along as the dam was repeatedly pummeled by freshets and high water. Not much more than a decade after its construction, the Canal Commissioners reported that "although it is an old and weak structure, and liable to failure, still, its want of permanency and stability can in a measure be guarded against by constant watchfulness and timely repairs." In 1881 and with the canal closed, the dam was described as "much decayed and in several places fallen down." It was removed later that year, also removing the State's liability from high water damages that it may have aggravated.

In 1850 an improvement was made to the feeder by extending the towpath from the head of Chimney Narrows to Corning, a distance of nearly one mile. Though the State had acquired a towpath right-of-way years earlier, it has not been constructed. In commenting on the need the Commissioners reported that "since the construction of this canal, tolls have been charged from the river bridge above Corning on all property shipped to or from this village, but the State have not furnished conveniences for towing farther than the head of the narrows, and from this point, a distance of nearly a mile, boats have been pushed by hand against the current up to the village, and in times of high water serious delays have been experienced, and boats coming down the stream at these times do so at great risk of going over the dam, and in extreme floods some have gone over. The construction of this towing path will obviate both the delay and dangers now experienced in the navigation of this portion of the canal."[15] It would have been along this towpath in 1868 that boats were towed carrying the machinery and tools needed in glassmaking from the Brooklyn Flint Glass Works to form the Corning Flint Glass Works, the predecessor of Corning Incorporated. They traveled the Hudson river, Erie Canal, Cayuga and Seneca Canal, Seneca lake and the Chemung Canal and Feeder to get to this point!

Other attempts were made to improve access to Corning easier, including the construction of an independent channel in the 1860s only to have it soon lost to severe floods. Perhaps the most satisfactory solution came in 1870 with the State's purchase of the steam tug *Anna Shaw*. Perhaps until the canal's closing a few years later, it towed boats back and forth between the Narrows and Corning.

Alongside the feeder dam was the Gibson guard lock, providing no lift but functioning as a guard for the canal against floods in the Chemung River and accommodating minor

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[14] Ibid., p.618, 622.

[15] Ibid., p.628.

differences in elevation. When the chute in the dam was opened to allow lumber and timber rafts or "arks" (think Arkville, NY!) to pass through, this guard lock would have prevented a temporary lowering of water in the canal. From the topography of the map, the guard lock and the first mile or so of the canal was tucked into a narrow flat between the Chemung River and a very steep hill.

According to James Geddes who examined this route in 1812, the feeder would leave the river shore where Big Flats commenced and would be conducted on favorable ground until it would encounter a piece of deep cutting of almost two miles. He reported that from wells in the vicinity they would find clay but far below the proposed bottom of the canal.[16] He also noted on his survey map "Rowley's Tavern" in Big Flats. The canal bed was dug five feet deep on the west end and as deep as twenty feet on the east end and they encountered water that had to be constantly bailed out. Horses became stuck in the mud and the workers resorted to using wheelbarrows for the excavation.[17] Continuing eastward, the feeder would cross Sing Sing Creek on an aqueduct. Just before the feeder came to the summit at Horseheads, it would drop down with three locks, 50, 51 and 52.

A dramatic example of this deep cutting is still very visible off of Kahler Road. This Deep Cut was encompassed by Section 10 of the original letting. The contract was taken by Luke Hitchcock of Madison County, an Erie contractor. He petitioned the State for extra allowances on several grounds. He noted that "about the time of our commencing work... it was found necessary to alter the line... from an old cleared field to very heavy timbered land". That same realignment now brought the canal across Sing Sing Creek. Water became a unplanned for headache. "Our teams frequently got mired down so that they could not get out without help" and "that it was extremely difficult to obtain hands even by paying high prices after the nature of our work was known". The resident engineer backed up Hitchcock's claims. He had started on the line in April 1832 when the worst part of the deep cutting still remained. He pointed out that "the water was very cold, so that men could not well work in it." The "cutting was about 20 feet deep on the east end and 5 and 6 on the west". The earth was taken out with scrapers. "Wheelbarrows were used where the teams could not work" for fear of getting stuck. He concluded that is was "one of the worst excavations we had, entirely the worst". The section was one of the last completed, not being done until the end of August 1832.[18]

Perhaps because of the difficultly and the need for quick completion, Hitchcock apparently cut corners. Nearly a decade later, it was reported that the deep cut "was left in an unfinished state" having a bottom plane from three to eleven inches to high and being in several places five to seven feet too narrow. In order pass much needed water, the local

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[16] Ibid., p.611.

[17] Gary Emerson, A Link in the Great Chain - A History of the Chemung Canal (Purple Mountain Press, 2005), p.30.

[18] Series A1140, 1833, Packets 26, 27, New York State Archives; Annual Report of the Canal Commissioners (1832); (1833), p.25.

superintendent widened and deepened the cut in 1841. Several more times over the next ten years, such work was found necessary.[19]

Boat and Boatyards

Boats constructed in the Chemung canalside towns were designed to fit the 90 foot by 15 foot locks. When the canal opened, the area was heavily forested. Sawing hemlock planks for boatbuilding that were 70 feet long, 3 inches thick and 14 to 16 inches wide was practical, a size that would be unheard of today! Millport was the hub of canal operations with a half dozen boat yards and a couple of drydocks, according to an article in an 1891 Elmira Telegram. With nearby Catherine Creek the village was flush with mill seats and boasted 17 mills at its peak, mostly sawmills. The State erected its regional shop at Millport, near the locktender's house in 1837.[20] Boats were also built in Havana, Corning, Gibson, and Elmira to keep up with the demand for them on the Chemung canal and other state canals.

Businesses, Trade and Banking

The canal brought a business boom to the area. The local towns changed from a bartering economy to a cash economy and to serve the trade, banks were established in Elmira, Corning, and Havana. The area soon became dotted with groceries, hotels, and taverns. With lumber and coal being the principle commodity carried on the canal, lumber yards and coal yards were established at the terminus points Watkins Glen, Havana, Elmira and Corning.

The grocery stores thrived as they met the demands of boaters and local residents. Now the canal brought connections to goods from far away places. "In 1835 George G. Pattison's dry goods and grocery store advertised that it had Cuban and Puerto Rican molasses for sale. By 1836 the Haight and Holmes grocery store in Elmira invited customers to visit its store to buy Jamaican and St. Croix rum, Holland gin, mackerel, and codfish, as well as molasses from New Orleans. Also in Elmira, Luce and Perry Grocers had fresh oysters, cocoa, figs, raisins, coffee, codfish, cloves, cinnamon, and mackerel. In Havana, S. C. Ayers advertised in 1839 that his store had oranges and lemons for sale and that his wife had a variety of fashionable millinery from New York for the ladies to buy. A Millport grocer had India rubber overshoes, Brazil nuts, almonds, codfish, and mackerel for sale."[19]

Montour Falls

Montour Falls was called Havana in the early canal days. Today's Canal Street, running south from South Street is on the alignment of the canal. North of South Street, the canal route went through the site of today's Post Office and North of Main Street, the canal route

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[19] Annual Report of the Canal Commissioners (1842), p.90; (1848), p.114; (1850), p.86; (1851), p.53.

[20] Annual Report of the Canal Commissioners (1838), p.29.

went through the present building housing Montour Pharmacy. See Figures 21 and 22. The Montour House, at 401 West Main Street is less than 200 feet west of the canal route. It was built in 1854 by Charles Cook. Cook was a contractor on the Delaware and Hudson Canal along with the Chemung, a State legislator and a State Canal Commissioner. Cook built a flouring mill, a sawmill, a coal yard and opened the Montour Iron Works in 1850. When in Montour Falls, a view of the scenic Shequaga Falls is a must see. It is located just off the west end of Main Street and is about 800 feet west of the canal route.

Lock 1 was located just south of North Catherine Street (Ayres Street), following the line south of the current Barge Canal line on the north (See Figure 24). Lock 1 initially let boats down to the level of Seneca Lake, into Catherine Creek, the inlet to the lake. This was problematic in that the three-mile distance between Lock 1 and the lake would fill with silt and constantly require dredging. Consequently, in 1841 an independent canal was dug north from lock 1 for about a mile and a quarter where it entered the inlet below the point of difficulty. This proved to be an imperfect solution and in 1848 the Legislature authorized the Canal Commissioners to construct the "Chemung canal from its intersection with Catharine creek, by an independent channel northerly to the Seneca lake, west of the mouth of said creek."[211] This work was completed in 1849.

When the Barge Canal System was built, the 12 foot deep channel was constructed as shown on the 1974 map, Fig. 11. The Lock 1 location is about 1500 feet south of the Montour Falls boat ramp shown in the lower right hand corner of that map. This section of canal is maintained today by the Canal Corporation, complete with navigation buoys all the way to the boat ramp at the Montour Falls Marina.

A Postscript

It was a modest proposal. Taking advantage of the new enthusiasm for canals early in the 20th century, New York State actively reconsidered reestablishing a route to Waverly. The portion of the old Chemung, between Montour Falls and Seneca Lake, had been kept in operation since the 1880s. It was substantially improved with the Barge Canal. In 1913, while this latter work was underway, the State authorized a survey for canal of Barge Canal standards to Waverly. In May 1914 the engineering report was submitted, concluding that the canal was feasible. A series of 20-foot plus Barge Canal lift locks would climb the valley of Catharine Creek to a summit south of Pine Valley. Locks would then lower to the Chemung River which would be canalized to Waverly. In 1916 a bill was proposed for bonding the estimated cost of over $26 million. The project went no further.[22]

[21] Whitford, 1906, p.628.

[22] Series B0390, New York State Archives.

The Junction Canal

Bruce Schwendy

The primary reason for this canal was to serve as a link between the canal systems of New York and Pennsylvania. Completed in 1858, it was eighteen miles long between Elmira and Athens, Pennsylvania, the northern terminus of North Branch of the Pennsylvania Canal. The alignment followed the valley of the Chemung River and by building three dams the engineers used the river for five miles of slackwater navigation. It was very unusual for a New York canal to use slackwater navigation on a canal, unlike Pennsylvania canals that often used rivers above dams as part of the route. On the upstream end of navigable depth, these canals would then lock boats up to the level just above the next dam. A prime example of this is the Lehigh Navigation Canal in Pennsylvania.

The Junction Canal was the second of three efforts to build a New York State canal that would be part of a waterway that would reach into Pennsylvania. The first was the Delaware and Hudson canal, opened in 1828, from Kingston, NY on the Hudson River to Honesdale, PA. At Honesdale, a gravity railroad brought coal from the mines to the canal but this canal did not connect into other Pennsylvania canals. The third was a planned Chenango Canal Extension that would start at the southern end of the Chenango Canal in Binghamton, NY and end at Athens, PA alongside the Junction canal. It was built as far as Vestal, NY but never completed.

The idea of a junction canal to connect the canal systems of New York and Pennsylvania was attractive to many and was advocated for a long time before it was finally completed in 1858, long after the Chemung Canal had been in use. It ceased operations in 1871. The North Branch of the Pennsylvania Canal flooded in 1865 but was never repaired and that ended the time of a continuous canal link between the two states. Therefore the canal route between New York and Pennsylvania served boat traffic for only seven years. In 1869 a railroad was completed along the berm bank of the flooded North Branch.

Building the Junction Canal was not funded by the New York State Legislature but in 1846 it authorized the incorporation of the Junction Canal Company to build a navigable communication to unite the canal systems of New York and Pennsylvania. A private company with John Arnot of Elmira as the chief stockholder built the junction and managed it during its entire existence. It was known locally as “The Arnot canal” or “Arnot’s canal.[23]

Prior to establishment of the private company Two routes had been surveyed by the direction of the canal commissioners, on the north and south sides of the Chemung valley. The north route was chosen and involved both dug canal and slackwater navigation on the river. Stock was subscribed and the canal was constructed with a sixty-five foot by twenty-six foot prism four feet deep with eleven wooden locks measuring 90 feet by 15 feet, three dams and two aqueducts, costing $530,637.[24]

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[23] Whitford, 1906, p.752.

[24] Ibid., p.758.

As the Chemung Canal was being planned, the stated advantage was always that it would connect the Erie Canal with the Pennsylvania Canals. When the Chemung canal was completed, the North Branch Pennsylvania Canal was still over 50 miles as the crow flies from the border, much farther in canal distance. A year later, 1834, it was extended 17 miles past Wilkes-Barre to Pittston. A further extension along the north branch of the Susquehanna River to Athens and the state line was begun in 1836 and not completed until 1856. The entire North Branch was 169 miles long between Northumberland, where it joined the Susquehanna Division, and the state line. This canal used 43 locks to overcome 334 feet of elevation.[25]

Early on, this canal became one of the first to have commercial traffic solely fed by a railroad and together these two modes of transport created a continuous route. In 1840, just seven years after the Chemung Canal was completed, the Corning and Blossburg Railroad brought coal from Blossburg, PA mines to the pool in the Chemung River above the dam in Corning, at the beginning of the navigable feeder. Here coal was loaded on Chemung Canal boats for travel to Watkins Glen. These boats were then towed north on Seneca Lake to Geneva where they entered the Cayuga Seneca Canal to travel to the Erie Canal at Montezuma. This railroad link for coal was important because it would not be until 1858 when the Junction Canal was completed between Elmira and the state line that Pennsylvania coal could be brought by boat into the Chemung Canal.

The Corning and Blossburg Railroad initially covered the route between Corning and Lawrenceville. Earlier, coal interests in the Pennsylvania legislature had authorized the Tioga Navigation Company to make the Tioga River navigable to bring coal into Corning. This proved impractical and so the Tioga Navigation Company amended its charter to build a railroad. The Tioga Railroad became the link that extended from Lawrenceville to Blossburg. The first steam engine on the Tioga Railroad called the Tioga, built by Philadelphia's Baldwin Locomotive Works, was transported by canal boat from Albany to Corning.[26]

Other railroads soon came to the area. Some connected to the canal and brought business while others followed the canal route and eventually prevailed upon the canal business. The New York and Erie Railroad came to Elmira in 1849 and connected Elmira, Horseheads and Corning on its way from New York City to Dunkirk, on Lake Erie. This was another railroad that fed business to the canal system. It brought logs and lumber from Allegany and Cattaraugus counties to Corning to be loaded onto canal boats for shipment into the Erie Canal system. The peak year for tonnage on the Chemung canal in 1854 was due in part to this collaboration.[27] Then, in 1850, the Chemung Railroad opened between Horseheads, on the New York and Erie line, and Watkins Glen (then known as Jefferson). Now we have rails connecting the three ends of the Chemung canal and feeder. The advantage here is that as time went on, coal delivered by rail to Watkins Glen could be loaded into larger canal boats than those on the Chemung canal for passage on the enlarged Erie Canal and the Cayuga and Seneca Canal, completed in 1863.

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[25] William H. Shank, The Amazing Pennsylvania Canal (American Canal and Transportation Center, York, PA, 1981), p.52, 53.

[26] Emerson, p.58.

[27] Ibid., p.73-75.

The Crooked Lake Canal

Bruce Schwendy

"Canal Fever" followed the success of the Erie Canal. Those surrounding Keuka Lake (Crooked Lake) were no exception. Not only did they wish to be connected to the Erie Canal system but also southward from the head of Crooked Lake to the navigable Cohocton River. Surveys were ordered by the canal commissioners and two routes were explored, from Penn Yan to Dresden on Seneca Lake and from the head of the lake to Bath. The Bath route required a two mile feeder and nothing more came of it. The route for "the Penn Yan canal" would use slack water navigation from the existing mill dam for one mile to the foot of the lake and thereafter follow the deep ravine through which the outlet flowed. There was always the question of water supply since there were several mills along the outlet which were using the same supply of water from the lake that the canal would use. Eventually, it was necessary to raise the level of the lake by 2.5 feet. By using waste gates to regulate the flow to the mills and a separate feeder from the outlet of the lake to the canal, conditions were improved.

Canal construction was authorized on April 11, 1829 "to construct a waterway of such a size as to admit of the passage of boats then navigating the Erie Canal, and authorized the locks to be constructed with chambers of wood.... The line of the canal, as located by [Holmes] Hutchinson, began a little above the upper mill on the outlet, about a mile below the foot of Crooked lake and was conducted down the valley, independent of the stream and disconnected with the mill-ponds or hydraulic works, to the point of its intersection with Seneca lake. This plan was preferable to a slack-water navigation which, if adopted, would have to be connected with the hydraulic works."[28]

The canal was completed on October 10, 1833. The prism was forty-two feet wide at the water line, twenty-six feet wide at the bottom, four-feet deep and the locks were ninety feet long by fifteen feet wide. The wooden locks were kept in operation with repairs until 1846. New locks were built in 1847 and 1848 with a composite structure where the head of the lock and the sides of the chambers for a length of six feet below the upper quoins were made of rubble masonry laid in hydraulic cement. The remainder of the chambers were faced with a framework of timber and plank. In 1850 a new stone lock was built at the termination of the canal at Seneca Lake. In 1863 the guard lock at Penn Yan was replaced by a stone lock having a miter sill lowered by eighteen inches to accommodate lowered water in the lake during the dry season. After 1865 the locks again required much work and it appears as though they were partially rebuilt as necessary to the end of operation on the canal.[29]

By 1872 the question arose about whether the canal had served its usefulness. Traffic trickled down and the commissioners reported that this canal was not necessary as a feeder to the Erie. On June 4, 1877 it was formally abandoned. Whitford noted in 1906 that the line was occupied by the Penn Yan branch of the Pennsylvania division of the New York Central Railroad system. At the time, he reported that a few vestiges of the prism and structures still remained.

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[28] Whitford, 1906, p.642, 643.

[29] Ibid., p.648, 650.

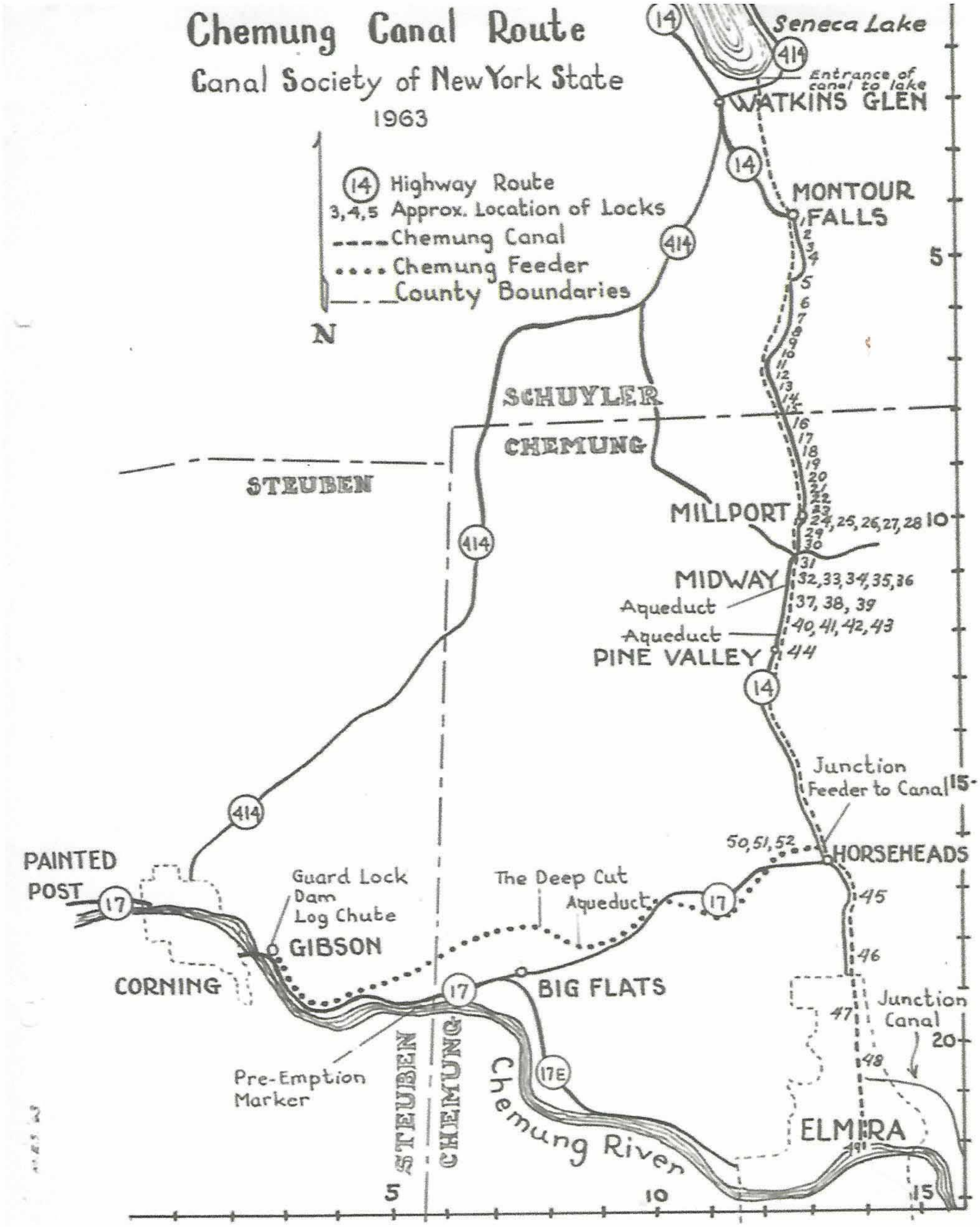


Figure 10. Chemung Canal Map from the Society's 1963 Tour.

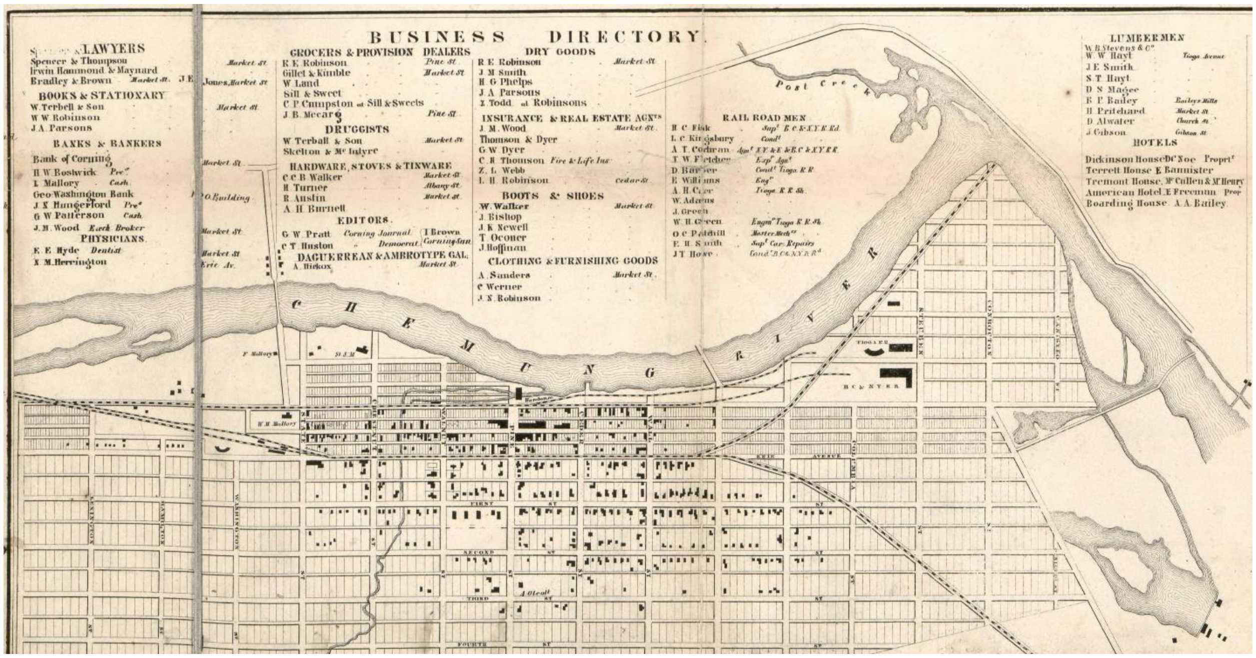


Figure 11. Corning in 1857 with canal feeder dam on far right.

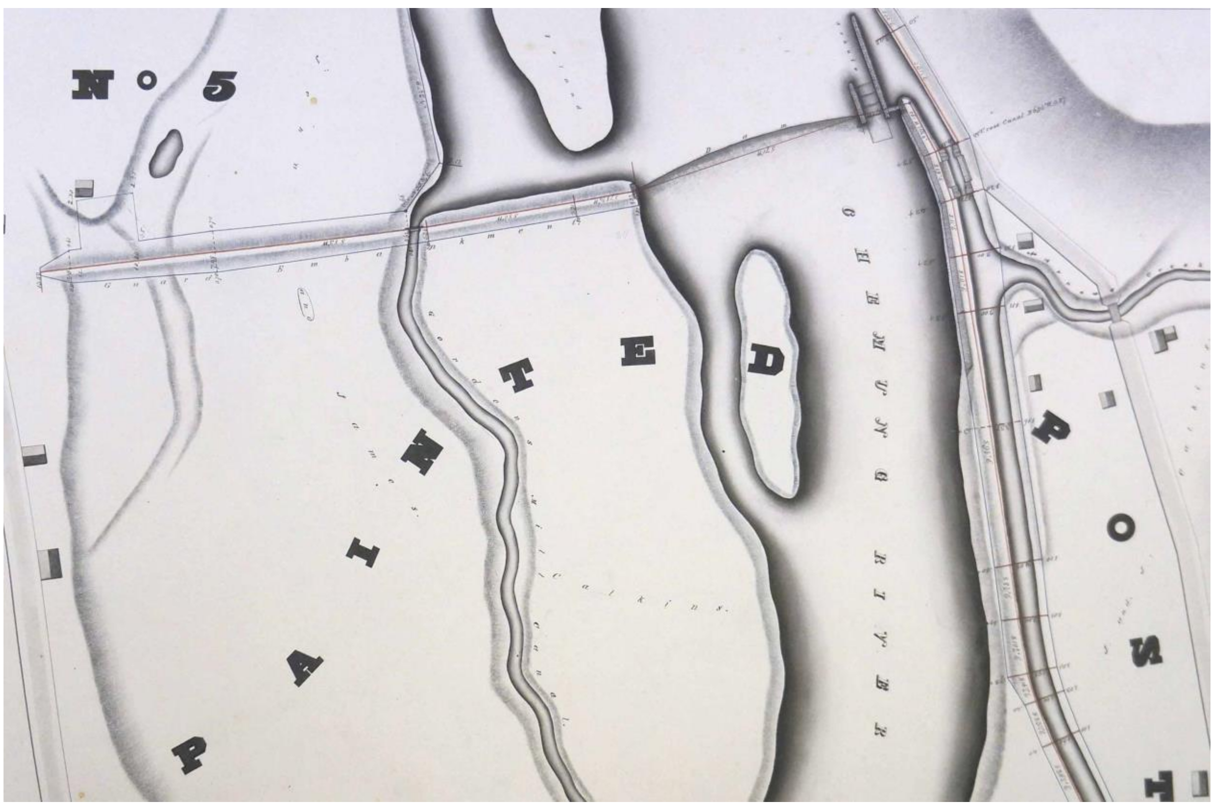


Figure 12. 1843 Holmes Hutchinson Survey of the Chemung Canal, showing feeder dam with canal along right side. Note the narrow channel parallel to the river on the left that fed water-powered mills.

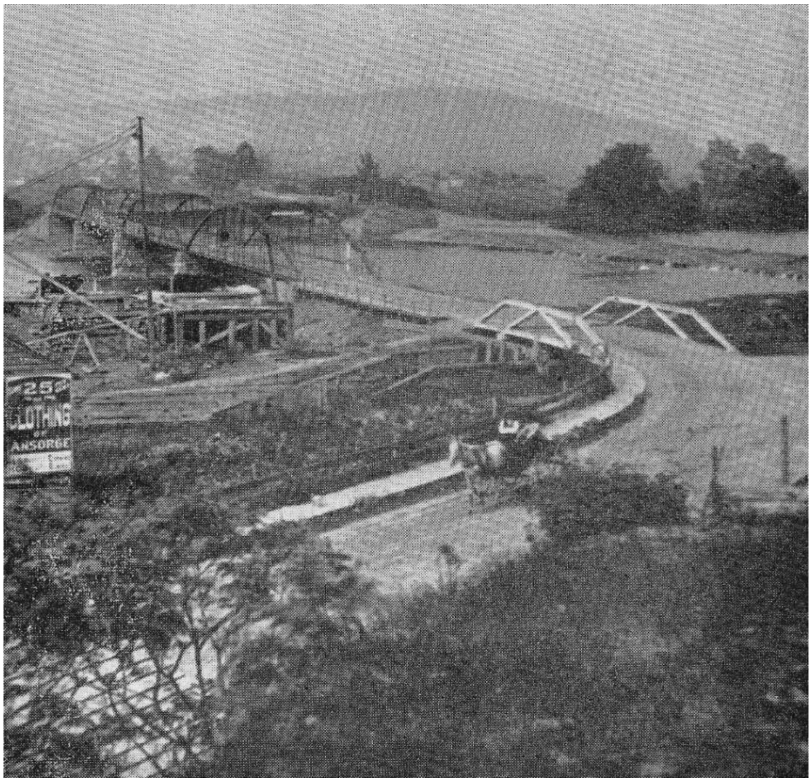


Figure 13. View west from Gibson looking over the guard lock with the feeder dam on right, c1875

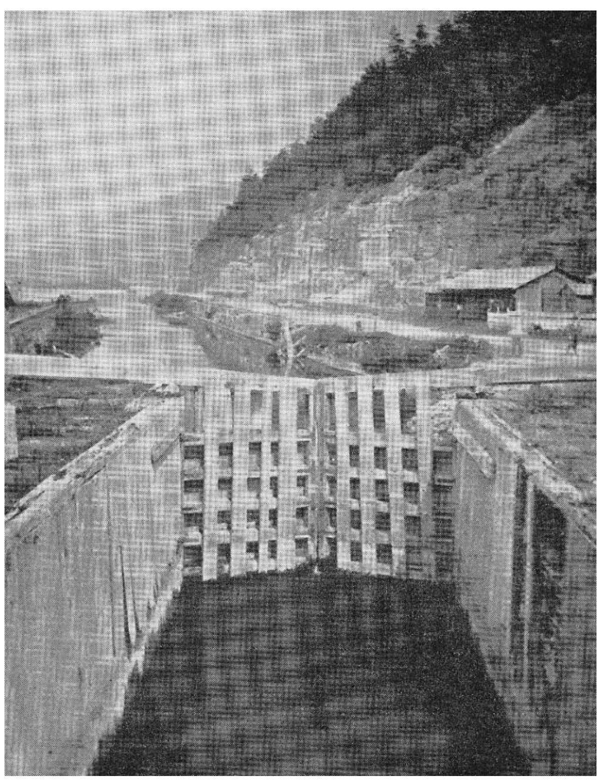


Figure 14. View north over the Gibson guard lock, c1870.

Figures 15 (top) and 16 (bottom). Top looking east towards Gibson over the line of piles that supported the feeder dam's foundation. Bottom showing dam timbers along west bank and in the center distance the pilings for the road bridge shown in Figure 13.

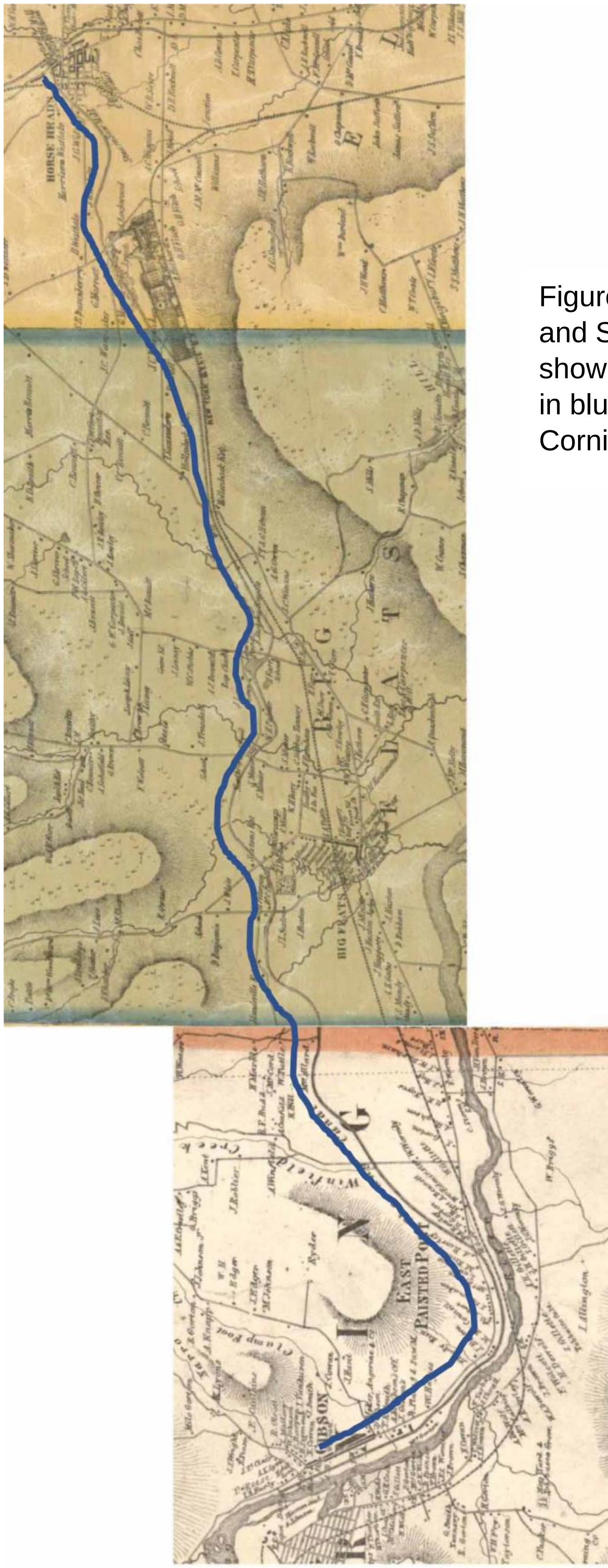
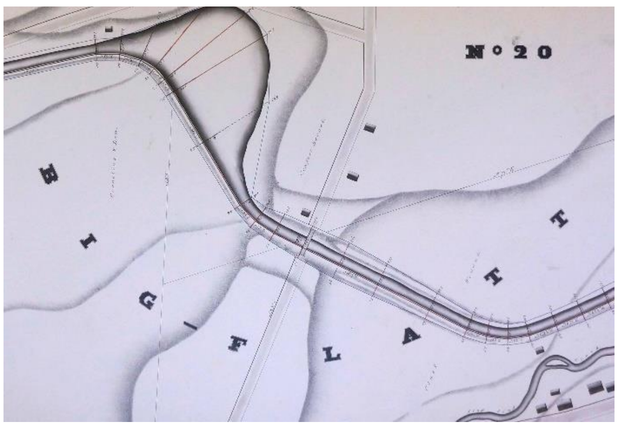


Figure 17. Chemung County 1853 and Steuben County 1857 maps showing Corning feeder highlighted in blue. Horseheads at top and Corning at bottom.



Figures 18 (top), 19 (middle) and 20 (bottom). Showing overlay of 1843 Hutchinson Survey of Lowe's Pond and the Deep Cut over a 2019 aerial view.

Figure 21. Montour Falls looking north, c1860 (Courtesy of Montour Falls Library)

Figure 22. Hutchinson 1843 Survey of Chemung Canal in Montour Falls (Havana).

Figure 23. 1853 map of Montour Falls (Havana). Note Lock 1 in the upper left, just below Ayers Street.

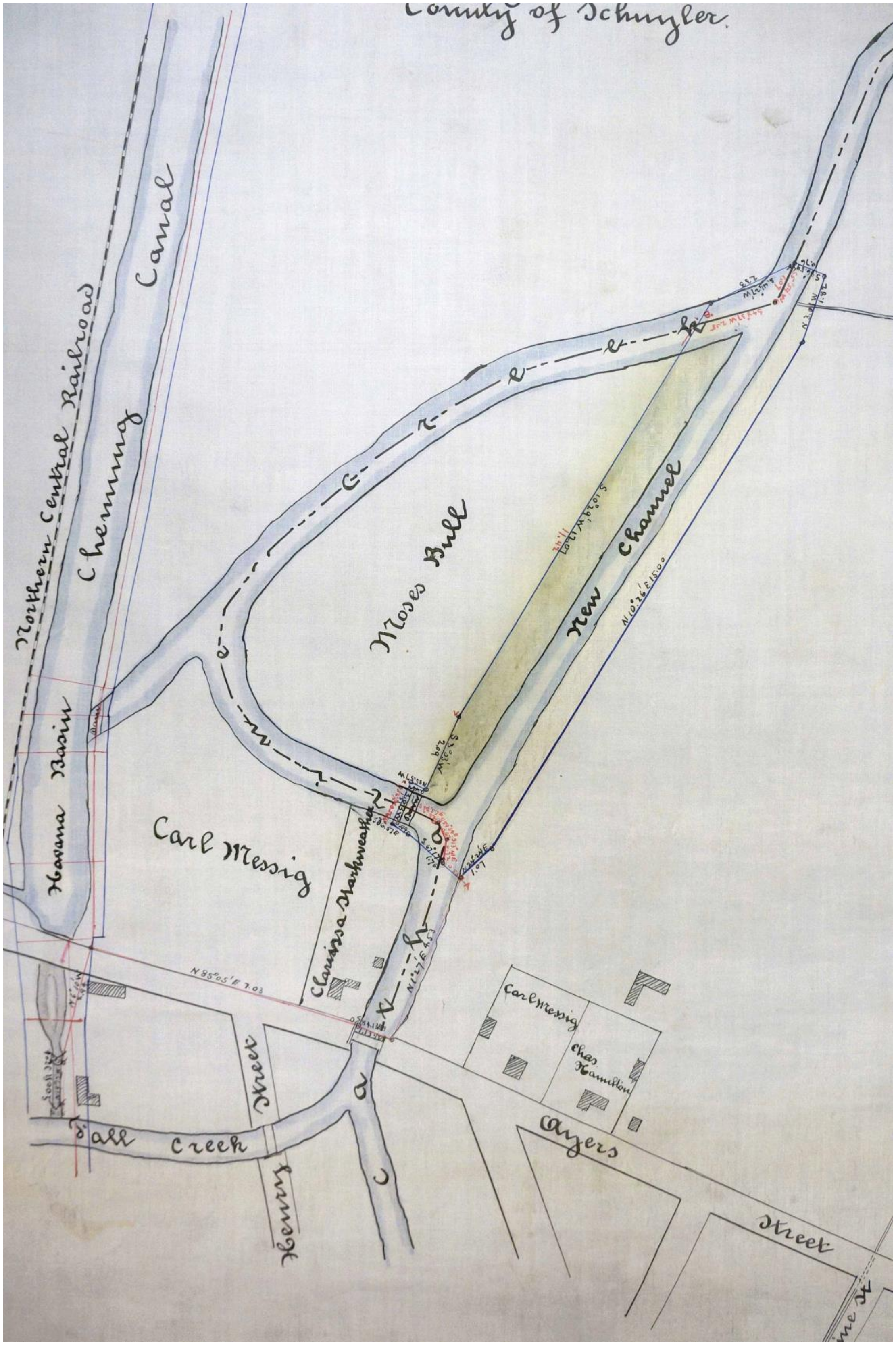


Figure 24. 1891 map of northern Montour Falls showing intact Chemung Canal channel north of Ayers Street (North Catherine) with Lock 1 between Ayers and Fall Creek.

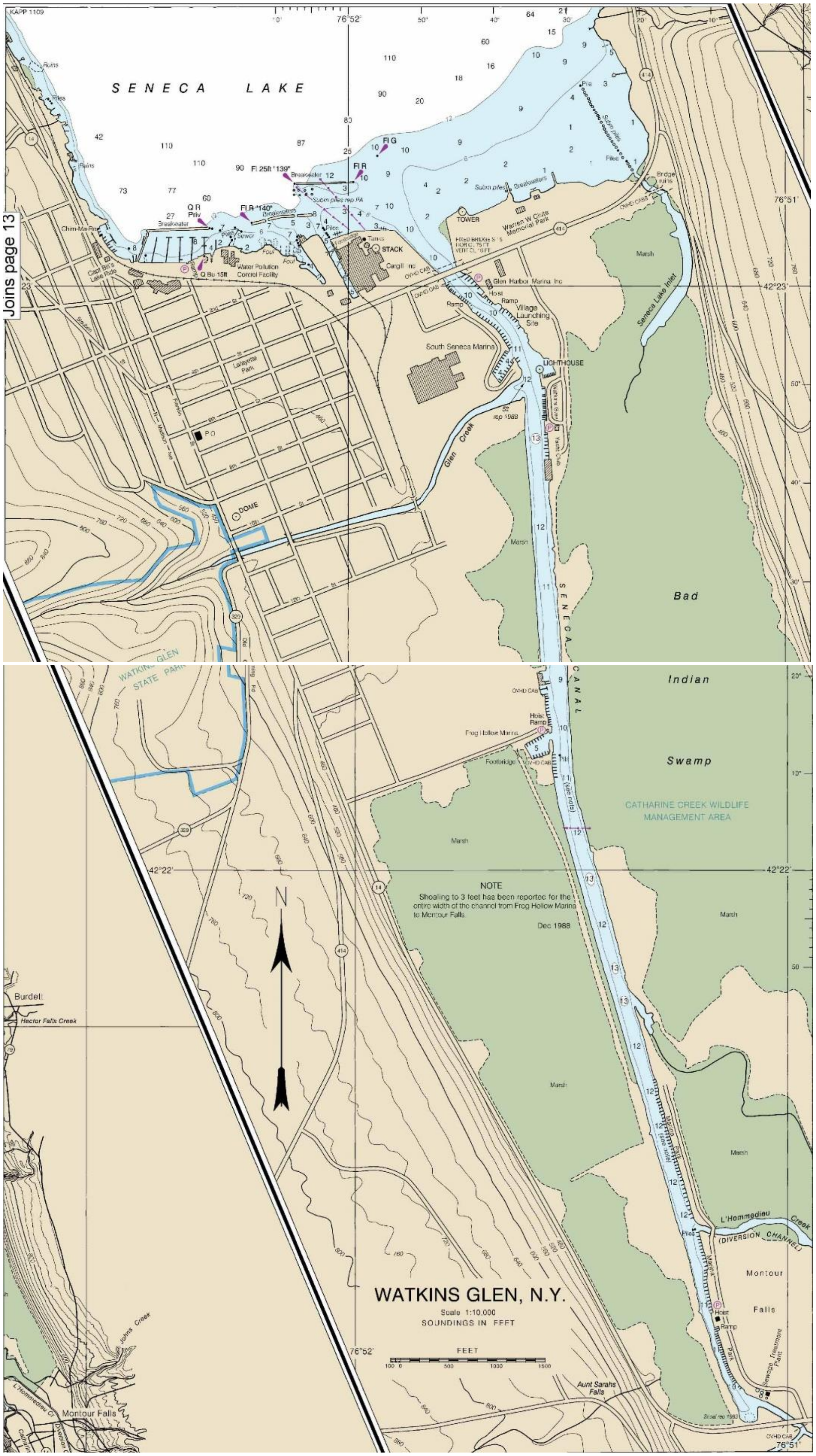


Figure 25. 2020 navigation chart showing the navigable Montour Falls spur of the Cayuga Seneca Barge Canal.

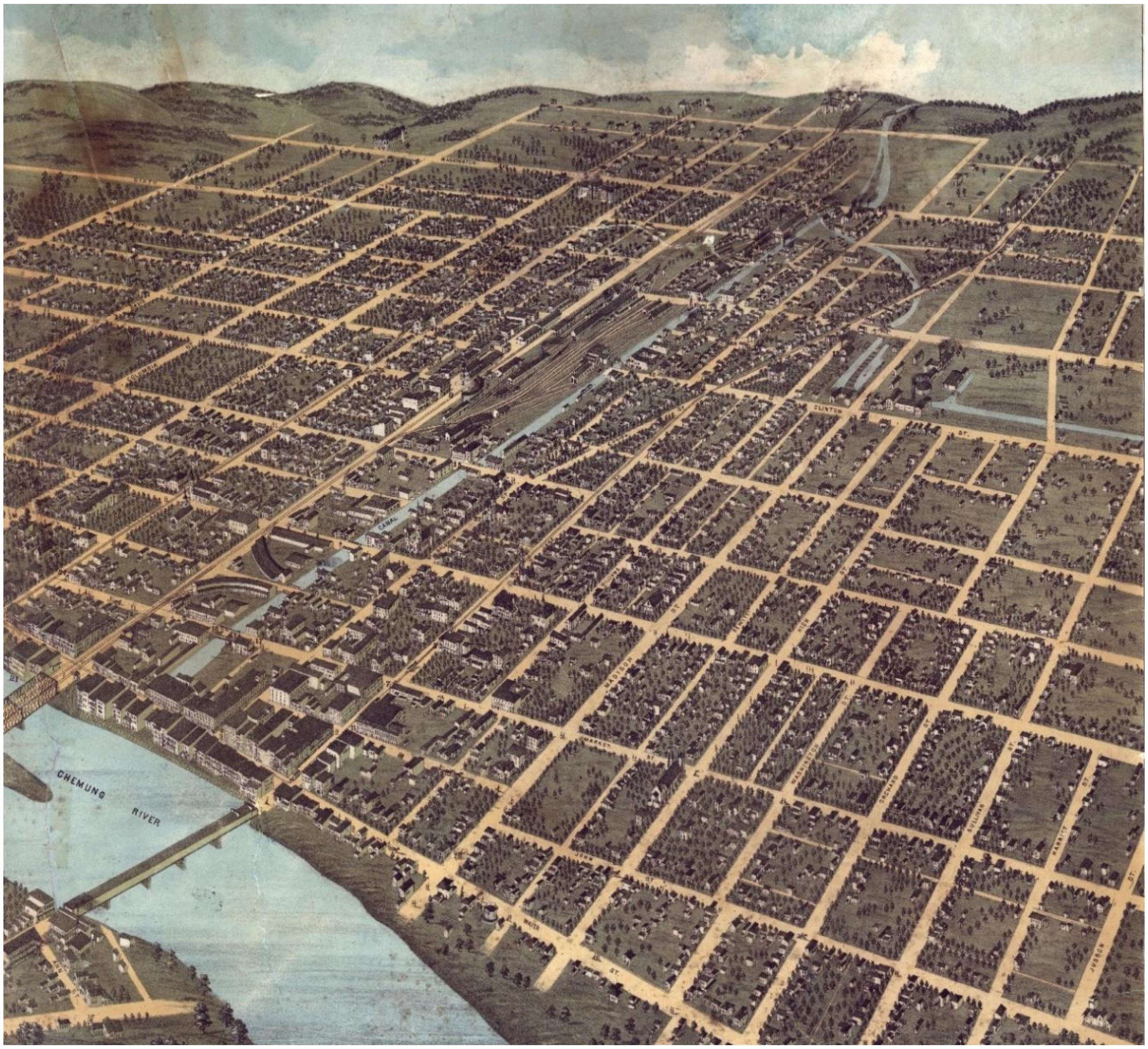


Figure 26. 1873 view north over Elmira with the Chemung Canal in blue running diagonally from upper right to the river and the Junction Canal heading east in upper right.

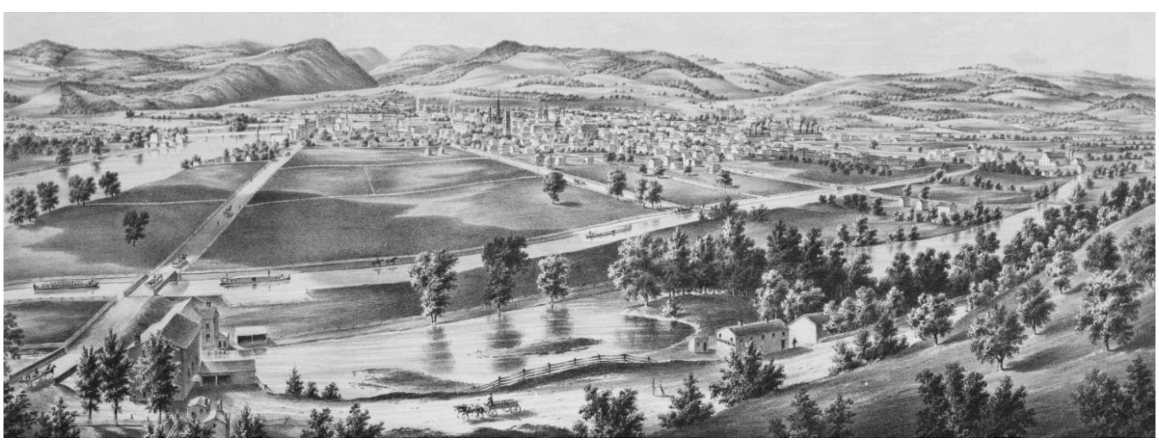


Figure 27. 1862 view looking west over Elmira showing boats in the Junction Canal in the foreground.

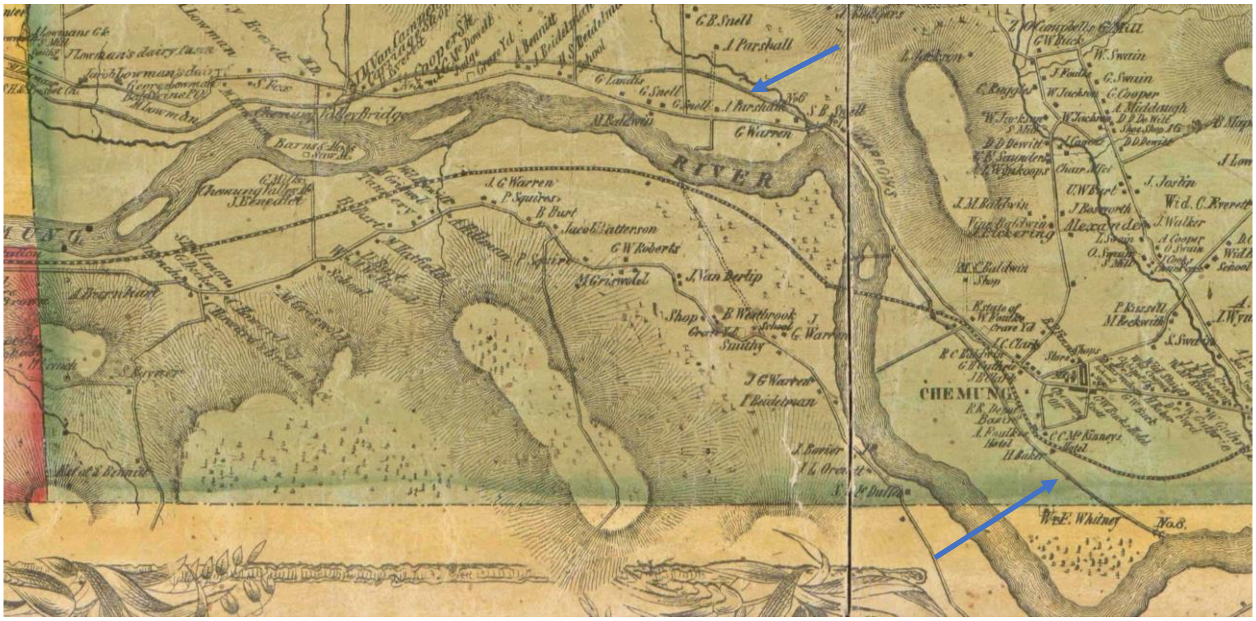


Figure 28. 1853 map of Chemung County showing route of Junction Canal

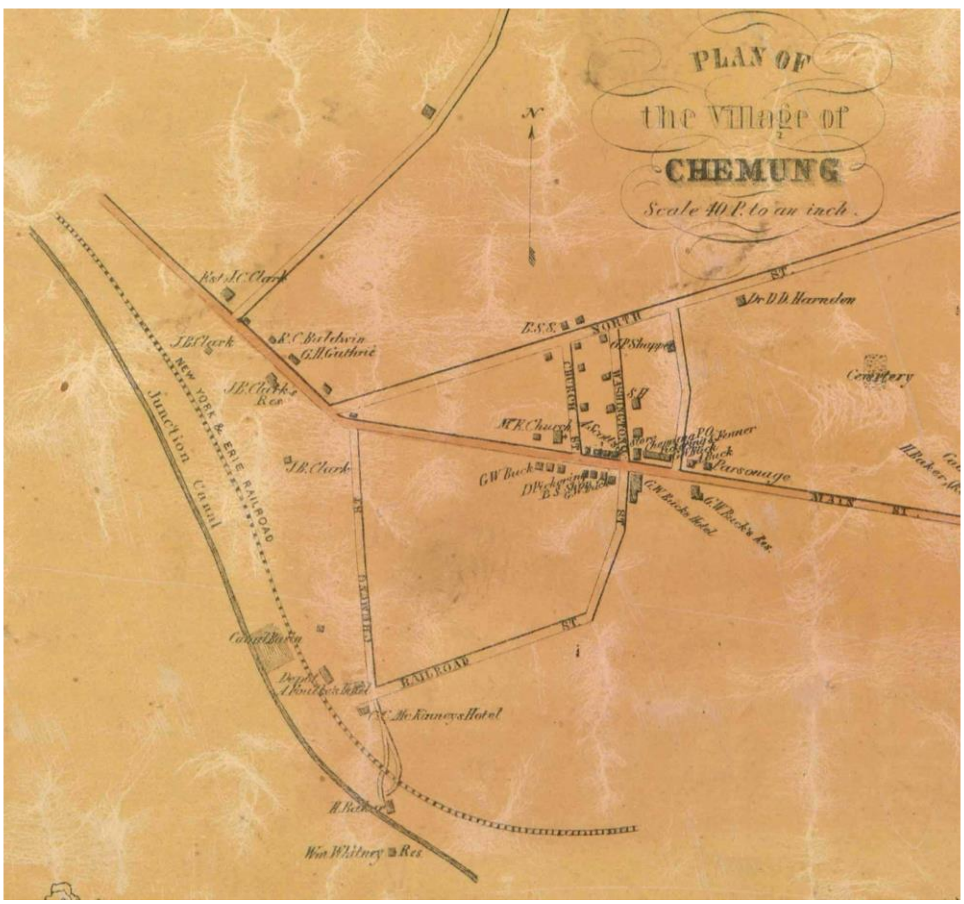


Figure 29. 1853 map of Chemung, NY showing the Junction Canal along left side.

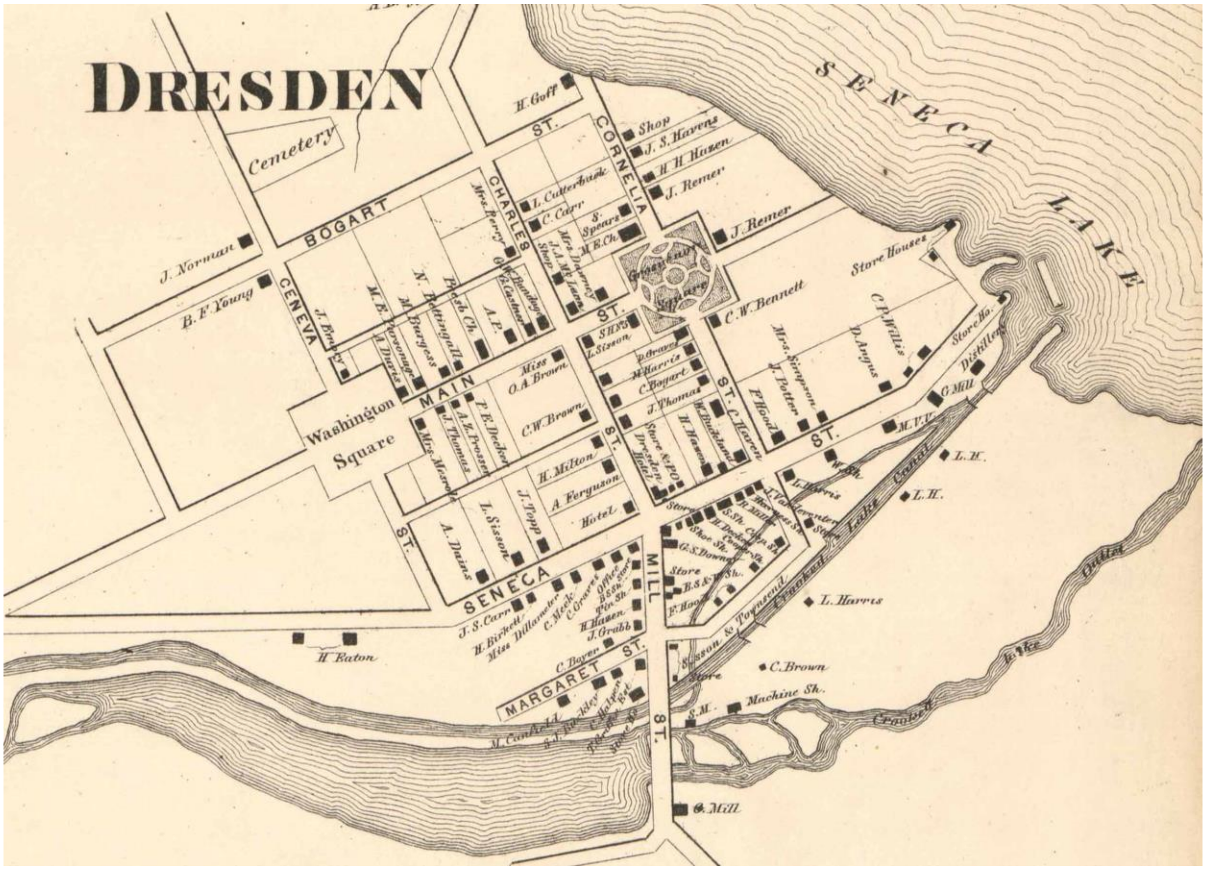


Figure 30. 1857 map of Dresden, NY with the Crooked Lake Canal just above outlet creek.

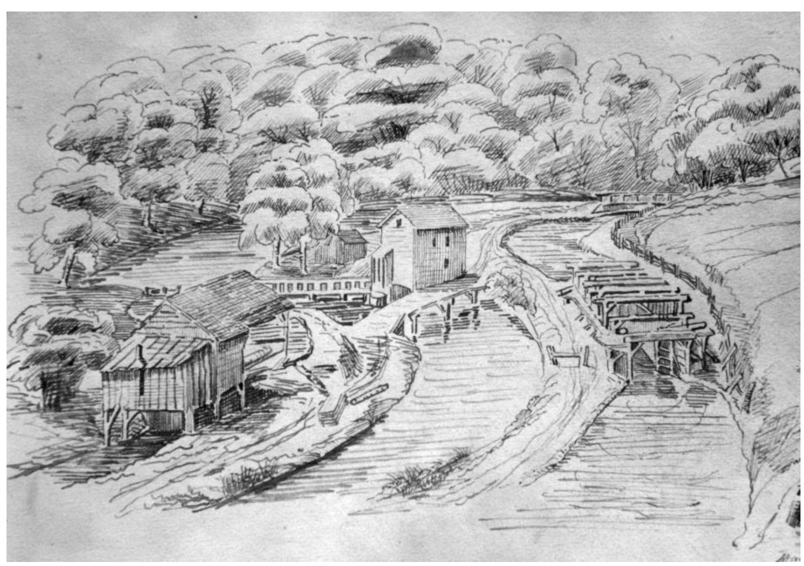


Figure 31 (left). 1964 view of gate recess on entrance lock on the Crooked Lake Canal in Dresden, NY. Figure 32 (right). Mallory's Mill alongside Crooked Lake lock, c1837.

Figure 33. View northwest over Watkins Glen with the northern entrance of the Chemung Canal in the upper right, c1873.