



# Towpath Topics

Middlesex Canal Association P.O. Box 333 Billerica, MA 01821

[www.middlesexcanal.org](http://www.middlesexcanal.org)

---

Volume 54 No. 3

April 2016

**Please mark your calendars**  
**MCA Sponsored Events in Bold**

**Spring Walk**, 1:30pm, Sunday, April 24, 2016  
Woburn Cinemas

Saturday, May 14, 2016  
SNEC-SIA tour of Connecticut Iron Industry Sites  
Information on SNEC-SIA Website

**Spring Meeting**, 1:00pm, Sunday, May 15, 2016  
Bill Gerber "Canal Side Landings"

Saturday, June 11, 2016  
SNEC-SIA Bicycle Tour  
Waban Arches & Sudbury Aqueduct, Wellesley, MA  
Information on SNEC-SIA Website

**Remembrance Gathering for Nolan Jones**  
Saturday July, 9, 2016 at 10:30am

**14th Bicycle Tour North**, 9:00am, Saturday, October 1, 2016

**Fall Walk**, 1:30pm, Sunday, October 16, 2016  
Winchester-Medford

**Fall Meeting**, 1:00pm, Sunday, October 30, 2016  
Speaker to be Determined

## TABLE OF CONTENTS

Topic	Page
Editors' Note	2
Spring Walk	3
Spring Meeting	3
Remembrance Gathering for Nolan Jones	4
President's Message	5
Unraveling the Mystery of the Barton Watercolors by Alec Ingraham	8
A Single Letter Can Make a Difference by Betty Bigwood and Len Harmon	11
N. Billerica Mill Village: Part III by Alec Ingraham	13
Vose Lecture: Part II Compiled by Deb Fox	16
MCA & MCC Response to the <i>Concord River Fish Restoration Study</i> by Bill Gerber	27
Miscellany	35

### **Editors' Note**

Hopefully, spring will have arrived by the time you read this, and we will have trudged safely through another winter. A fairly decent one actually, after February, 2015.

This issue of Towpath Topics marks the end of our first year as editors. It is hard to believe that it has been that long, since we agreed with great trepidation, to take on the task of editing this esteemed newsletter. We have enjoyed it, and hope you have enjoyed reading it.

This edition continues the two articles that we started in January; the story of Loammi Baldwin, Jr. and Part II of the North Billerica Mill Village. Also included is a report on Tom Dahill's lecture, and information about a gathering in July for Nolan Jones.

In our first issue we asked if any readers knew who had won the contest to rename this newsletter. The answer was not published in the next issue because no one amongst our readers knew the answer. We asked because we did not know it either. So keep trying, the answer has to be out there somewhere....

As always, your contributions are welcome and please check the calendar for up-coming events. — Deb, Alec, and Robert

## **Events**

### **Spring Walk**

The spring walk will take place on April 24, 2016. Participants are encouraged to meet at 1:30pm at the southeast corner of the parking lot behind the Woburn Cinemas. The three mile walk, along a two level sections of the historic Middlesex Canal, will be conducted in cooperation with the Appalachian Mountain Club. Robert Winters will lead the walk accompanied by co-leader, Roger Hagopian.

Directions: From Rte. 128/95, take Exit 35, Rte. 38S. Proceed about 0.1 miles and take a left turn off Rte. 38 onto Middlesex Canal Drive past the Crowne Plaza to the meeting place. Additional information can be obtained at [www.middlesexcanal.org](http://www.middlesexcanal.org).

### **MCA Spring Meeting**

At 1:30pm the Middlesex Canal Association will hold a public meeting at the Middlesex Canal Museum and Visitors' Center, 71 Faulkner Street, North Billerica, MA. The featured speaker will be Bill Gerber. The Title of Bill's talk is *Canal Side Landings*.

In the first half of the 19th century a 120-mile system of canals and navigable waterways provided "heavy lifting" transportation services throughout the Merrimack Valley and the area north of Boston. Interspersed throughout much of the system were more than three dozen "landings" which provided shipping and receiving services for those who had goods to transport.

Bill notes that this is something of a status report on a continuing, very long term effort, not a final report.

**The Middlesex Canal Museum and Visitors' Center** – The Middlesex Canal Museum and Visitors' Center is open every Saturday and Sunday from noon until to 4:00pm, except holidays.

**MCA Board of Directors' Meeting** – The Board meets at the Canal Museum from 3:30pm to 5:30pm on the first Wednesday of each month with the exception of July and August. Members are welcome and encouraged to attend.

### **Directions to Middlesex Canal Museum and Visitors' Center**

By Car: From Rte. 128/95

Take Route 3 toward Nashua, to Exit 28 "Treble Cove Road, North Billerica, Carlisle". At the end of the ramp, turn left onto Treble Cove Road toward North Billerica. At about ¾ mile, bear left at the fork. After another ¾ mile, at the traffic light, cross straight over Route 3A (Boston Road). Go about ¼

mile to a 3 way-fork; take the middle road (Talbot Avenue) which will put St Andrew's Church on your left. Go ¼ mile and bear right onto Old Elm Street. Go about ¼ mile to the falls, where Old Elm Street becomes Faulkner Street; the Museum is on your left and you can park across the street on your right, just beyond the falls.

#### From I-495

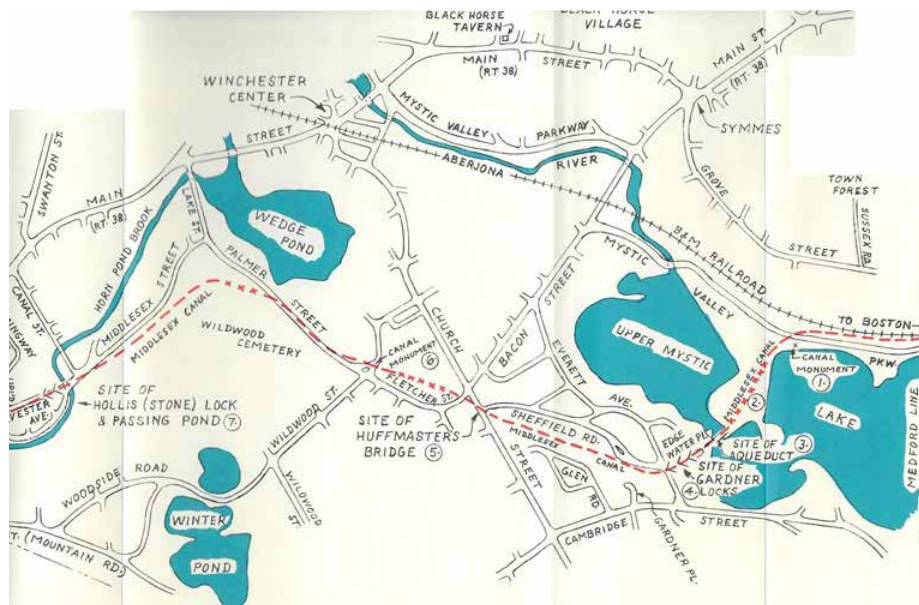
Take Exit 37, North Billerica, south roughly 2 plus miles to the stop sign at Mt. Pleasant Street, turn right, then bear right at the Y, go 700' and turn left into the parking lot. The Museum is across the street (Faulkner Street).

#### By Train:

The Lowell Commuter line runs between Lowell and Boston's North Station. From the station side of the tracks at North Billerica, the Museum is a 3-minute walk down Station Street and Faulkner Street on the right side.

### **Remembrance Gathering for Nolan Jones**

We invite all who knew Nolan Jones to join his family on Saturday, July 9, at 10:30am for a remembrance gathering and scattering of some of his ashes. I remember going on a canal walk near Upper Mystic Lake with Joan, Dad and MCA members, off of Mystic Valley Parkway, just downstream from Bacon Street, in Winchester. There's a big parking lot for the park (see map canal monument 1), and the route of the canal has a walkway in it, between the beach and the lake. There are remnants of where the canal crossed the narrow



neck of the lake, and I'd like to meet somewhere along the path or at the terminus (reference the link <https://goo.gl/maps/NJPWvhCJC2E2>, but I didn't save my 'pin' for the proper path). For those who receive the newsletter electronically there is a nice picture of The Middlesex Canal that comes up on Google Maps at this location (link <https://goo.gl/maps/KXrZW7yH85K2>).

We plan to meet for lunch afterwards at about noon at Lucia's, 13 Mount Vernon Street in downtown Winchester. We invite you to share your memories of Nolan with the group. Please RSVP for lunch to Susan Jones (eldest daughter) at 916-549-3758 or [SusanJones533@gmail.com](mailto:SusanJones533@gmail.com).

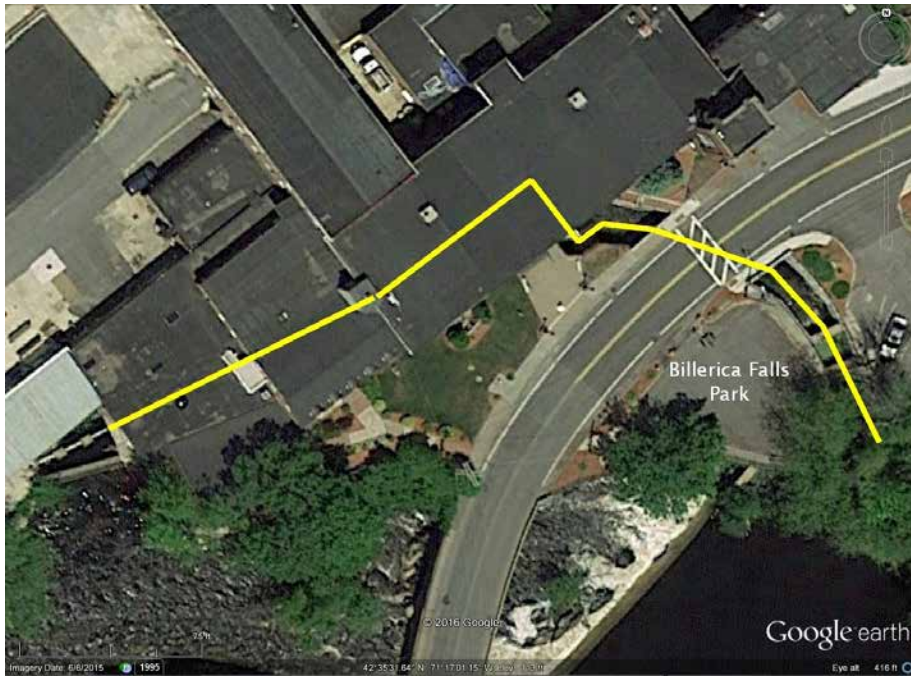
### **President's Message, "Faulkner Canal"**

J. Jeremiah Breen, President  
[jj@middlesexcanal.org](mailto:jj@middlesexcanal.org)

On February 23, 2016, the final presentation to the public of the engineer's draft report on the restoration of diadromous fish to the Concord River was made in the Reardon Room of the canal visitor center. The sponsor of the report, the state Division of Marine Fisheries, is likely to favor removal of the granite dam built in 1828 by the Middlesex Canal Company. On March 2, the directors of the association voted to oppose removal of the dam. Director Bill Gerber has volunteered to write the opposition to removal, emailing it before the end of public comment, April 6th.

The summit pond behind the dam is the center of the Middlesex Canal Heritage Park, for which the Middlesex Canal Commission has already spent several hundred thousand dollars to bring to the 25% design level. Though the park has been stopped at the 25% level for several years, the Northern Middlesex Council of Governments still budgets \$3.4 million for its future construction. To keep the dam and summit pond, a fishway from down river of the dam to the level of the summit pond could be built using the existing Faulkner Canal.

The mill canal is 380' long on the yellow line in the Google Earth view (next page). Photos of it are on pages B-20 through B-24 of the Feb 2016 report prepared for the MA Division of Marine Fisheries. It is 12'± wide, measured in Google Earth. The fishway in the report, Appendix D, drawing 4, is a 4'x4' waterway 100' long with a difference in water elevation of 10.3', all ±. As concrete construction built on the bed of the river to withstand the force of floods, it is massive. Report, E-3. The same fishway built using the canal need only be strong enough to withstand the weight of the water in it. Ideally, the fishway would be in the basement of the Faulkner Mill with an opening in the wall at the high level and one in the floor for downstream. The basement is 156' x 53' x 10'. A 4' x 4' x 100' trough fits easily. If made of glass, a 360° video record



of the interaction of the migrating herring with the structural features of the fishway could be made under varying conditions. The basement could be an experimental workshop for fishway design.

Use of the Faulkner Canal for a fishway is not in the report. Instead, a fish bypass alternative using the canal was discussed on page 99 of the report. “This alternative was not fully developed for this feasibility analysis in part because drawings or dimensions of the channel under the building could not be obtained. An internal survey would require permission from and coordination with the mill owner.” After more than \$200,000 and two years, the practical alternative of using the existing canal was not fully developed because it “would require permission from and coordination with the mill owner.” A fishway fits easily and a bypass with difficulty in the 380’ canal plus 156’ x 53’ x 10’ basement but neither would be a likely choice of the Division of Marine Fisheries.

The mill canal at Billerica Falls has a long history. A predecessor is mentioned in March 1794 when the Middlesex Canal Company purchased land up to Timothy Sprague’s ditch. Sprague was the successor to Joseph Ruggles who operated a fulling mill at the dam by 1748. The adaptive reuse of parts of what was the oldest woolen mill when production ended in 1987 would be another attraction for the Billerica Mills Historic District.

Visitors attracted to the Billerica Falls Park by the dam, beaver and eel in the canal, would now also have shad, alewives, and blueback herring within easy view from either side of the canal and from either side of the fishway in the basement during the migration period, April 15 to July 15.

### Notes

1. Billerica Falls Dam, not Talbot. While the dam was built in 1828 by the Middlesex Canal Company not the Talbots, Henry Thoreau wrote in *A Week on the Concord and Merrimack Rivers*, 1839, “But now at length we heard this staid and primitive river rushing to her fall, like any rill. We here left its channel, just above the Billerica Falls, and entered the canal, which runs, or rather is conducted, six miles through the woods to the Merrimack at Middlesex, and as we did not care to loiter in this part of our voyage, while one ran along the tow-path drawing the boat by a cord, the other kept it off the shore with a pole, so that we accomplished the whole distance in little more than an hour. This canal, which is the oldest in the country, and has even an antique look beside the more modern railroads, is fed by the Concord, so that we were still floating on its familiar waters.” Thus Billerica Falls is name by which the location was known by a person who knew history and the Concord.
2. The identification Faulkner Canal is preferred to sluice or mill race as the latter two are technical and as sluice is likely unpronounceable by those who don’t know the word. The 1861 engineers’ report identifies it as Faulkner’s Canal.
3. Where the visible canal ends at the main entrance to the Faulkner Mill is likely the former turbine pit for the 1862/1886 main mill. The report, p. 24, identifies it as a stilling basin.

### References

1. *Concord River Diadromous Fish Restoration Feasibility Study* prepared by Gomez and Sullivan, engineers, for MA Division of Marine Fisheries, draft report presented to the public at the Middlesex Canal Visitor Center/Museum, Billerica MA, February 23, 2016. In particular, “Technical Fishway”, Section 4.3.2, pp. 75-88; *Fishway Plan*, Appendix D, drawing 4; photos of Faulkner Canal, Appendix B, pp. 20-24; Aerial Image (Bing, 2015) of Dam Area with Labels, Fig. 2.2.3-1, Appendix A, p. 26; “Bypass through . . . Faulkner Mills complex”, p. 99. <http://tinyurl.com/ConcordRiverFishStudy>
2. *A Short History of the Milldam at North Billerica 1653-1995* by Alec Ingraham. Billerica Historical Society: Billerica, 1995. <https://archive.org/details/TheMilldamAtNorthBillerica>

3. Estimated cost of feasibility study in 2012, page 60 of Nyanza restoration plan, <http://www.mass.gov/eea/docs/dep/cleanup/sites/nyrp.pdf>
4. Oldest woolen mill in continuous operation ended in 1987, page 11, <https://www.nps.gov/lowe/learn/historyculture/upload/LOWE-ARCHIV-FindingAid-08-Faulkner.pdf>

J. J. Breen, MCA President

## Unraveling the Mystery of the Barton Watercolors

by Alec Ingraham

It was 14.6° below zero the night prior to Professor Dahill's lecture on the Barton watercolors. By noon the temperature had climbed to a balmy 10° and the sun shone brightly. Twenty-two hearty souls were in attendance at the MCA Winter Meeting held in the Middlesex Canal Museum's Reardon Meeting Room. Although the talk would have been fitting for any day, holding it on Valentine's Day, 2016 made the presentation extra special. It is believed that Jabez Ward Barton painted the two watercolors to impress William Rogers, the father of his fiancé, Rebecca Rogers. Both paintings, completed in 1822, contain historically invaluable images of the floating towpath which spanned the Concord River and the structures on the eastern and western shores of the summit pond in North Billerica.

Interestingly these are the only two painting attributed to Jabez Ward Barton. He did enjoy, however, a successful career in the hotel industry. Herein lies the mystery. Why didn't Jabez continue to hone his artistic talent? Those in attendance were treated to an examination of the painting by Professor Tom Dahill, a noted author, artist, and educator.

The Professor believed Jabez had received some professional training. Using digital copies of the paintings, he pointed out elements in each that supported this conclusion. These included: the use of a pencil sketch prior to applying the water color, the way triangles, rectangles and cubes were employed in accurately representing the houses and buildings which dotted the shore of the mill pond, the practice of shading to draw attention to the finer details in the painting, the placement of the raft near the eastern shoreline to provide a sense of balance with the floating towpath on the western bank, the use of perspective that was not linear perspective, and finally the positioning of the tree in the foreground to draw attention to the detail beyond.

He did note, however, that Jabez's watercolors revealed some obvious flaws. Some of these included the lack of hands and feet on the horse rider in the center of one of the watercolors, the use of "borrowed" figures (common tech-

nique using stock shapes) employed by inexperienced artists to portray the people which were included in the watercolors, and the relative size of the horse on the towpath when compared with the canal boat being towed across the river, the shape of the canal boat, and the manner in which it floated on the water. These and other facets of the watercolors he described showed a lack of accurate perspective, all evidence that the artist required further training.

Following the lecture, during the question and answer session, a person in the audience suggested that noted itinerant painter, Rufus Porter, (maintained a residence in Billerica from 1823-1844) may have been Jabez's teacher. This proposition was followed by a lengthy discussion of that possibility, which prompted an impetus for further research. In summary, the audience was left with the impression that Jabez Ward Barton had received some professional training but was still an amateur painter and abandoned his art for other pursuits. Through the watercolors, he had accomplished his goal: Rebecca's hand in marriage.

Following the meeting those in attendance were treated to delicious ham biscuits prepared by Betty Bigwood along with other culinary treats.



### Summit Pond

This diminutive watercolor (8" x 10") providing a view from the east bank of the summit pond brings to life what we could only imagine from today's

documented evidence, which includes two visible iron rings fastened in a boulder on the west bank and a photograph of two wooden cribs filled with rubble at the spicule on the east bank. With the use of chains, these anchor points prevented the 400' Floating Towpath from being swept down river with the current.

With funding provided by the author, this watercolor was recently professionally cleaned and digitized under the auspices of Maria Seminatore, President of the Billerica Historical Society. This endeavor revealed detail that had not previously been evident and prompted MCA President, J Breen, to ask Professor Dahill to discuss the rejuvenated painting.



**TITLE** William Rogers House, Billerica, Massachusetts 20 Rogers St  
**DATE** c. 1822 Rebecca Farmer Rogers, b. May 18, 1800; m. July 14, 1822.

**RELATED PEOPLE**

**ARTIST/MAKER:** Jabez Barton  
 New-York Historical Society, [www.nyhistory.org](http://www.nyhistory.org)

**MEDIUM** Watercolor and black ink on paper  
**DIMENSIONS** Overall: 8 3/4 x 11 3/4 in. ( 22.2 x 29.8 cm ) mat: 14 x 18 in.  
**DESCRIPTION** Architecture  
**OBJECT NUMBER** 1894.8  
**MARKS** inscriptions: none

This watercolor, similar in size to its companion, provides a view from the west bank of the summit pond and of the 1807 brick-ender built by William Rogers. Situated to the north of the main house is a one and a half story gambrel ell which is believed to be Roger Toothaker's original home which was built as early as 1660. The ell was removed when the Faulkner Mills purchased the house. This painting provides a view of the Toothaker House which otherwise could only be imagined.



**Tom Dahill J. Breen Maria Seminatore**

Note: The Summit Pond watercolor is the property of the Billerica Historical Society and the William Roger's House painting is the property of the New York Historical Society.

**A Single Letter Can Make All the Difference**

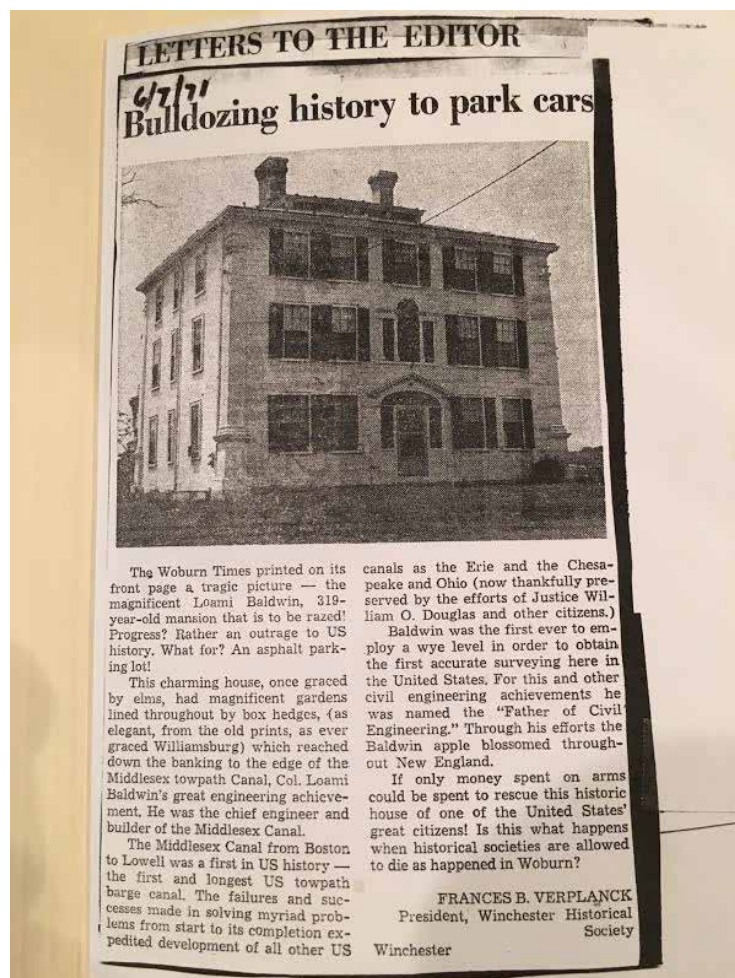
Betty M. Bigwood and Leonard H. Harmon

The year was 1971. A builder was making plans for the property across from the Loammi Baldwin Statue at the Rte. 38 and Rte. 128 junction in North Woburn. He wanted to build a mall. Unfortunately the Baldwin Mansion stood in the way. The mansion had met bad times and was currently being used as a rooming house. The mall builder (Daniel Rothenburg) planned to demolish it.

He was not prepared for Frances B. VerPlanck, at the time President of the Winchester Historical Society. Fran, a strong supporter of the Middlesex Canal, was very upset. She wrote a letter in June to the Woburn Times. It caused an uproar!

The timing was very auspicious. There was an election underway in Woburn for Mayor and it was ripe for emotional topics. "SAVE THE BALDWIN MANSION" was used on election posters. People became involved. When the current Mayor- Edward Gill- lost the election (to Edward Gilgun who had

sold the Baldwin mansion to builder Daniel Rothenburg) he hastily called a meeting of the Council and formed a new seven member Woburn Historical Commission. Len Harmon was made vice chairman. Mayor Gill then walked into the recently convened group and said "Save the Mansion – good bye". He did not want the demolition to occur on his watch. They were on their own.



To move the mansion they had to go out for bids and were obligated to accept the lowest bid - \$17,000. This was paid for by the City of Woburn. But another problem immediately rose: they did not have a clear title to the property where the mansion was to be placed. Yet time was running out. They had 30 days or the mansion was to be demolished.

The City had bought the old railroad property for the Town but not the small parcel on Alfred Street. In spite of this, in October 1971 they poured a concrete

foundation upon which to rest the house, jacked up the house, carted it across Rte. 38 and lowered it. When they discovered that the mansion was initially placed 6 inches off the foundation they fired the contractor and hired someone to place it correctly. Of course they still did not have a clear title but this was soon settled by paying the owner \$500. The Woburn Historical Commission had saved the Baldwin Mansion.

*The following is Part III of an article researched by Alec Ingraham.*

**The North Billerica Mill Village in 1850  
as Told Through Selected Town Valuation Records**  
by Alec Ingraham

**Part III: The Manufacturers**

**A. James R. Faulkner and William E. Faulkner**

James R. Faulkner was the son of Francis and Anne Robbins Faulkner. Francis had come to the Mill Village in 1811 from Acton and was engaged in the manufacture of textiles. His mill was situated on the east bank of the river and its operation was subject to the Middlesex Canal Company's demand for water. In 1850 James and his wife Catherine (Rogers) resided in the house that is now the headquarters of the Faulkner Kindergarten, a house he built in 1825, the same year that he entered the textile business with his father. The enterprise was renamed J. R. Faulkner & Co. James was a respected citizen and was among the first trustees of the Howe Academy in Billerica. One of his daughters rendered a design for one of the classrooms in the Academy.

His brother, William E., was also involved in the operation of the mill. In 1850, he lived with two of his sisters and aged mother across Faulkner Street from the Kindergarten. This house, now gone, would have been situated in the parking lot which currently occupies the site.

The brothers jointly owned a boarding house in the Mill Village. Although further research is needed on the location it is presumed to have been located near the mill.

Real Estate (James R. Faulkner)

Description	Acres	Value	Total	Tax on Same
Homestead	1/2	\$2150	\$2150	\$8.39

Personal Property (James R. Faulkner)

Description	Value	Tax on Same
1 Horse, 1 Cow, 1 Carriage, 10 Shares of L & L RR: \$1000	\$1195	\$4.66

James R. Faulkner's total tax including the poll tax was \$14.55.

Real Estate (The J. R. and W. E. Faulkner Boarding House)

Description	Acres	Value	Total	Tax on Same
Boarding House Est.		\$2300	\$2300	\$8.97

The total tax on the Boarding House was \$8.97.

Real Estate (William E. Faulkner)

Description	Acres	Value	Total	Tax on Same
Richardson Land	14	\$550	\$550	\$2.15

Notes: The location of the Richardson Land requires further research. It is probably located outside the Mill Village.

Personal Property (William E. Faulkner)

Description	Value	Tax on Same
10 Shares of L&LRR: \$1000	\$3000	\$11.70
10 Shares of Appleton Bk: \$1000		
1 Share of the B&LRR: \$500		
Money at Interest: \$500		

Notes: The Boston and Lowell Railroad was chartered in 1830. The Appleton Bank was in 1847.

William E. Faulkner's total tax including poll tax was \$15.35

Real Estate (Francis Faulkner Heirs)

Description	Acres	Value	Total	Tax on Same
Homestead	3	\$2500		
Broadmeadow	5	\$100		
Plain Land	18	\$550	\$3150	\$12.29

Personal Property (Francis Faulkner Heirs)

Description	Value	Tax on Same
1 Horse, 1 Cow, 1 Carriage	\$195	\$0.76

Francis Faulkner's Heirs' total tax \$13.05.

**B. Thomas Talbot and Charles P. Talbot**

In 1839 Thomas Talbot joined his brother Charles P. in the Mill Village. That year the pair began a dyewood business in a mill rented from the Canal Company. Five years later they would move their enterprise to the east bank of the

river, converting a saw mill that they had purchased from Nathaniel Stearns. In 1849 the brothers would open a chemical company near the North Billerica Railroad Depot. The operation was eventually moved to a site between Rogers Street and High Street near the canal.

In 1851 Thomas and Charles would purchase the water rights and eleven parcels in the Mill Village from the Middlesex Canal Company. They would successfully defend the water rights against claims from land owners upstream, who claimed the dam (with flash boards attached) at its present height flooded their riparian land and diminished its value. By 1857 the Talbot brothers had completed construction of their woolen mill. Benjamin Judkins, the Town Principal Assessor at the time, noted that the land the brothers purchased from the canal was assessed (in 1850) at \$17,000, then years later their property was assessed at \$82,000.

Charles chose to live in Lowell but Thomas remained in Billerica. It is said that he boarded with the Faulkners shortly after his arrival. It was also noted that he resided in his mill at times. In 1849 he would marry Mary Howe Rogers. She passed away in 1851 after which Thomas would marry Isabella Hayden in 1855. In 1850, however, he was residing in a small home (no longer extant) on Rogers Street just south of the Canal Bridge.

Thomas would eventually build a mansion house on Mount Pleasant Street near the intersection with Doris Avenue. He would serve as State Representative, Lieutenant Governor, and Governor of the Commonwealth of Massachusetts, Trustee of the Howe Academy, Director and President of the Boston and Lowell Railroad, and benefactor to the citizens of the Mill Village.

Real Estate (Thomas Talbot)

Description	Acres	Value	Total	Tax on Same
Rogers Land	2	\$200		
Wilson Place	1/2	\$400	\$600	\$2.34

Notes: The Rogers land is the acreage on which the Chemical Works was situated. The Wilson Place requires more research. There were several Wilsons in the area.

Thomas Talbot's total tax including the poll tax was \$2.34.



*The first part of this speech was published in the January, 2016 issue of "Towpath Topics"*

### **Life of Loammi Baldwin**

#### **"A sketch in the Life & Works of Loammi Baldwin, Civil Engineer"**

##### **Part II**

compiled by Deb Fox

document supplied by Susan Williams

Having completed his legal (and hydraulic) studies, Mr. Baldwin opened an office in Cambridge in 1804. In this business he remained but a short time (about three years). He was fond of telling an anecdote of his experience at this period. He had a good many callers at his office, he said, but they always came to inquire where Fay's office was; and he would kindly direct them to his classmate, in the story above. The late Judge Ashur Ware, who for nearly half a century presided over the United States District Court at Portland, Me., and who died in 1873, studied law in the office of Loammi Baldwin, at Cambridge, in 1805 and 1806. It is not a little peculiar that, while Judge Ware commenced the study of divinity, but, finding it not to his taste, enter the office of Mr. Baldwin and there laid the foundation for his future success as a profound jurist, his master, not finding the law to his taste, left it for the profession of engineering, which he so signally adorned. A somewhat similar case was that of the brothers Benjamin and J.H.B. Latrobe. The former was intended for the law, having studied and been admitted to the Baltimore bar, and afterward having opened an office and commenced practice in New Jersey. Finding, however, that this profession was not to his taste, he left it, and entered the service of the Baltimore and Ohio Railroad Company, and became one of the most distinguished of American engineers. His brother, on the other hand, was educated as an engineer, but, discovered later a taste for the law, entered that profession, and became equally noted as the legal counsellor for the same company.

In 1807, Mr. Baldwin closed his office in Cambridge, and went to England for the purpose of examining the various public works of that country. He had intended to visit the continent for the same purpose, but was prevented by the difficulty of reaching France from England at that time. On his return, he opened an office in Charlestown, and commenced the life for which by all his tastes he was so admirably fitted.

One of the earliest works upon which we find Mr. Baldwin engaged was the construction of Fort Strong upon what, at that time, was called Noddle's Island, the following description of which is from Sumner's History of East Boston: --

"In 1814, the British policy of coast descents was extended to New England. Scattered attacks were made, accompanied by burning and pillage; and the sails of English cruisers could daily be descried from Boston. The town was in a defenseless condition: the forts were almost useless; and, owing to the bitter quarrels with the administration, no help had been given or was to be looked for from the National Government. The people of Boston and of Massachusetts had no mind to endure the fate of Washington, and took prompt measures to protect themselves. The old forts were to be put in order, and a new one to be thrown up on Noddle's Island. Loammi Baldwin was appointed engineer, and, entering at once upon his duties, issued his first official notice on the 10th of September (1814), requesting all volunteers to meet him at the Exchange Coffee House: and so ready was the response that from five hundred to six hundred men were at once put to work, the various trades and crafts taking special days for their part of the labor; and, on the 21st of September, Mr. Baldwin reported that the works were so far done that a guard was needed. On the 26th of October, the flag was raised; and the work was formally occupied, and named Fort Strong in compliment to the energetic governor of the Commonwealth. This fort was located on what was known as Camp Hill. The old barracks were removed in 1833, and the breastworks were gradually obliterated. The site of this fort was in the neighborhood of what is now Belmont Square."

In 1814, the Massachusetts Legislature chartered the Boston and Roxbury Mill Corporation; and, in 1818, work was begun on the Milldam, or Western Avenue, now the extension of Beacon Street beyond the Common. For the construction of this road, one and a half miles long, Irish laborers were for the first time expressly imported into the country. The stone used was from the Parker Hill Quarry. It was opened July 2, 1821. As a means of obtaining water power, the project was a failure; but, as a step in the future extension of the city of Boston, it was an important movement. Mr. Uriah Cotting, the projector of the work, having died in 1819, Mr. Baldwin was appointed engineer to complete the undertaking, which he did in a manner most satisfactory to the company. That this work did not meet with universal approval may be seen by the following, from the *Daily Advertiser* of June 10, 1814: "Citizens of Boston! Have you ever visited the Mall? Have you ever inhaled the western breeze, fragrant with perfume, refreshing every sense and invigorating every nerve? What think you of converting this beautiful sheet of water which skirts the Common into an empty mud basin, reeking with filth, abhorrent to the smell, and disgusting to the eye? By every god of sea, lake, or fountain, it is incredible!" It would seem that the citizens of Boston did not relish the idea of bad smells in the early part of the century much more than they do at the

present time.

From 1817 to 1820, Mr. Baldwin was engaged in the State of Virginia upon various works of internal improvement, which were intended to develop the resources of that great Commonwealth. In 1821, he was appointed engineer of the Union Canal in Pennsylvania. This work extended from the Schuylkill, two miles below Reading, to Middletown on the Susquehanna, nine miles below Harrisburg. Its length was 79 miles, exclusive of a navigable feeder on the Swatara. The summit level passed through a tunnel 18 feet wide, 14 feet high, and 739 feet long. There were two reservoirs for the summit supply, containing 12,000,000 cubic of water, one of them covering 8 and the other 27 acres. There were two steam-engines of 100 horsepower each, and three water wheels, for supplying the summit with water, capable of raising in all 1,250,000 gallons every twenty-four hours. There were three dams for supplying the main canal with water, one across the Schuylkill and two across the Swatara. The great dam, located in a narrow gorge, through which the Swatara passes, and near the northern slope of the Blue Mountain, held an artificial lake of about 800 acres. The crib-work measured 200 feet across the stream, and 40 feet in perpendicular height, and was compassed of timbers 10 by 12 inches, those at the base being of white oak, and the remainder of white pine, laid at right angles, forming squares of from 6 to 8 feet from centre to centre, firmly tree-nailed, and filled with stone, the whole being strongly fitted against the mountain at the west end. On the east side there was an abutment of stone laid in hydraulic cement, 48 feet high, and 8 feet above the top of the dam. The dam had a base in the direction of the stream of 110 feet. An embankment of stone and earth reached to the east side of the gap, a distance of 230 feet, and was 260 feet wide on the base, and 60 feet on top, being 50 feet in height, and 10 feet above the dam. There were twelve sluice-gates, about 6 feet above the bottom of the dam, each having an opening 2 feet square. The gates were of cast iron, and were raised by screws.

In the process of construction of this work, Mr. Baldwin had a long controversy with the president, Mr. Mifflin, in regard to the proper width of the canal and of the locks, the result of which was the resignation of Mr. Baldwin and the appointment, in his place of Canvass White, who coincided with Mr. Mifflin in his views as to the proper width for the locks. It turned out afterward that Mr. Baldwin's opinion was the correct one, and the canal was enlarged at a great expense. An elaborate description of the above work was prepared in 1830 by the late W. Milnor Roberts, who commenced his long and useful life as an engineer upon the Union Canal.

In 1824, Mr. Baldwin went to Europe, and spent a year, mostly in France,

devoted to a careful examination of the most important public works in that country. He went also to Antwerp, to inspect the docks at that place. At this time, too, he laid the foundation of the largest and best professional library of engineering works that was to be found in America, -- a collection in which he took great pride, and to which he added, until, at his death, it had cost nearly \$8,000. This library is still preserved in the old house at North Woburn. Mr. Baldwin was also very fond of pictures, and owned some of the best works of his classmate, Allston.

By 1825, Mr. Baldwin's studies and his work had already made him recognized, not only as an engineer, but also as a man of taste and sound judgment in matters relating to public buildings; and we find him at this period associated with the projectors of the Bunker Hill Monument. The first committee of the association on the design for this work consisted of Daniel Webster, Gilbert Stuart, Washington Allston, Loammi Baldwin, and George Ticknor. After various discussions as to the best general plan, and the obelisk having been selected, a committee was appointed to fix the dimensions and proportions in detail, consisting of Loammi Baldwin, George Ticknor, Jacob Bigelow, Washington Allston, and Samuel Swett. The final report of Col. Baldwin recommended "an obelisk, or frustum of a quadrangular pyramid, the base of which shall be a square of 30 feet on either side, to rise 220 feet from the platform or ground on which it is to be erected, to be surmounted with an apex having its upper angle 90 degrees, and to be 15 feet square at the top, the four faces being respectively opposite the four cardinal points of the compass." The foundation was to be 12 feet deep and 50 feet square, with offsets, and built of stone of large dimensions, all being in accordance with the designs of Solomon Willard.

The committee spent much time in determining the proportions for the monument; and, to fix this point satisfactorily, Mr. Baldwin took them to the Boston and Roxbury Milldam, whence, across the vacant space, the surface of Bunker Hill could be seen, and fastened against the railing of the sidewalk in turn small models he had prepared of different proportions, and then, going to a sufficient distance in the opposite direction, so that the model would appear to the eye to be transferred to the hill, as if standing thereon in full size, he would study with them its effect as seen at a distance. Thus, by comparison, they were enabled to decide upon the proper size of base and the proper rate of diminish which would seem to be most striking. In this way, they fixed upon the size and proportions which they reported. The outward form being agreed upon, the arrangement of the details and the interior construction was mainly intrusted to Mr. Baldwin. The whole report was drawn up in his own neat, uniform, and compact handwriting, the original being still preserved among the

papers of the Monument Association. "It is fortunate," says Mr. Warren, in his history, "that the Association was able to have in the beginning the valuable services of Mr. Baldwin as chairman of the important committee to whom was referred the general subject of a plan for the monument."

Among the early projects in the neighborhood of Boston was that contemplated by the Salem Milldam Corporation. This company proposed to dam up the water way at Beverly Bridge for the purpose of obtaining water power. Mr. Baldwin was appointed engineer to the company; and, in an elaborate report to the Hon. John Pickering, of Salem, made in 1826, it is stated that two lines were surveyed for dams. That for the west dam was from Orne's Point to the rock east of Beverly Bridge, and was 2,180 feet long. The east dam ran from the same rock to Salem Neck, and was 3,031 feet long, passing along the south side of the Beverly channel and crossing the Collins Cove channel. The total estimated cost of the two dams was \$200,000. The power thus obtained was reckoned sufficient to run forty mills, which, at \$500 each per annum, would pay \$20,000, exceeding by \$8,000 the interest on the cost. This work, for various reasons, was never carried out.

The project of connecting Boston with the Hudson River was considered at a very early period in the present century; and, in 1825, the Legislature appointed a committee to ascertain the practicability of making a canal from Boston Harbor to the Connecticut River, and thence to the Hudson, with a view to a connection with the Erie Canal. Mr. Baldwin was appointed engineer, and made a very thorough examination of various routes, and presented a very complete report on the project, in which, among other features, it was proposed to tunnel the Hoosac Mountain at almost exactly the place of the present Hoosac Tunnel. This report was one of the most complete engineering documents of the time; and, at the end of it, the commissioners say: "It is with great satisfaction that the commissioners express their decided approbation of the efficient manner in which the engineer, Col. Loammi Baldwin, has discharged his very responsible and laborious duties. To great scientific attainments and a vast fund of intelligence acquired by the minute inspection of canals and other public works within the department of the civil engineer, in Europe and in this country, he has added the advantages of great practical experience, derived from many years' constant employment in the successful exercise of his professional skill. Indefatigable, energetic, and persevering, he has achieved all that can be accomplished during the period he has been employed, in a manner highly satisfactory to the committee and honorable to himself."

The day for canals, however, was rapidly passing away; and, in 1827, Mr. Baldwin was appointed by the governor of Massachusetts to procure surveys

and estimates for a rail-road from Boston to the Hudson River. This work was put into the hands of his brother James, as the subject of our sketch had at just that time accepted an appointment which led to the two great works of his life,-- the naval dry docks at Charlestown and at Norfolk. These two structures were in process of building from 1827 to 1834, both being carried on at the same time and both being made from the same plan. This work was commenced under the administration of John Quincy Adams and finished under that of Gen. Jackson, Samuel Southard being Secretary of the Navy and Commodore John Rodgers president of the Naval Board.

Directly after his appointment, March 28, 1827, Mr. Baldwin proceeded to locate the two docks, and to make the necessary plans for the construction; and, on the 12th of the following June, work was commenced at Charlestown by building the coffer dam, which was completed so far as to shut out the tides the next spring, when the excavation of the pit was begun. The bearing piles were driven during the year 1828, and the foundations were sufficiently advanced to lay the corner-stone of the masonry on the 21st of May, 1829. The dock was so far completed as to be delivered into the charge of the commandant of the yard on the 9th of September, 1833. The interior of the chamber, at the top, was 86 feet wide, and 253 feet long, to the face of the arch above the mitre-sill, being the portion that could be used for docking vessels inside of the turning gates. In addition to this, the space between the turning and floating gates, 53 feet, could be used by blocking up to the level of the mitre-sill, making in all 306 feet length of dock. The width of the chamber floor was 30 feet, and the length 228 feet. The depth from the coping to the mitre-sill was 30 feet. The depth of water at ordinary high tide over the mitre-sill was 25 feet, and the rise and fall of the tide 11 feet. The surface of the site on which this dock was built was about 9 feet below ordinary high tides. The height of the coping was fixed by Mr. Baldwin, after an examination of the record of tides in Boston Harbor for the previous sixty years, at several inches above the highest that had occurred within that period. In the great gale of 1851, however, the tide rose to such a height as to overflow the dock, falling in cascades along its whole length. The entire work is of granite, of the most substantial character, all of the exposed surface being finely hammered. The cost of this dock was \$677,090.

Early in the summer of 1833, the work was so nearly finished as to be ready for use; and to give additional interest to the opening of the dock, which had been six years in building, it was decided that the old frigate "Constitution" should be the first vessel admitted. The event was fixed for the 24th of June, 1833. In the midst of a vast concourse of spectators, and in the presence of the Vice-President, Mr. Van Buren, the Secretary of War, Mr. Cass, the Secretary of the Navy, Mr. Southard, and other distinguished guests, Commodore Hull

once more appeared on the deck of his old ship, and superintended its entrance into the dock.

The Norfolk Navy yard is located on the southern branch of the Elizabeth River, adjoining that part of the town of Portsmouth called Gosport, about one and a half miles from the city of Norfolk. The plan and dimensions of the Norfolk dock were the same as for that at Charlestown; but the Boston dock has since been lengthened 65 feet, as shown by the deeper courses of masonry near the head. The Norfolk dock was commenced in November, 1827; and on the 17th of June, 1833, the ship of the line "Delaware" was taken into it, being the first national ship put into a dry dock in the United States. The work was not entirely completed, however, until March, 1834. The cost of the Norfolk dock was \$943,676, the excess over that at Charlestown being due to the extra price of both stone and labor, the stone having been sent from the North, as well as most of the skilled labor.

It is strange to look back now and note the lack of engineering machinery, even so late as 1830. The pile-drivers at the Charlestown dock were worked by a treadmill, although some objection was made to putting the free-born American into a machine which had so unsavory a reputation. The derricks, too, were quite different from those of the present day; and many of the modern appliances for carrying on such work were entirely unknown. The work upon these two structures was throughout designed and executed by Loammi Baldwin, his principal assistant being Capt. Alexander Parris, well known in Boston as a prominent architect during the early part of the century.

Mr. Baldwin was particular to have his position on the government work very plainly defined. In his letter to Mr. Southard, accepting the position, he writes: "It will be a very important inquiry how extensive will be my authority. Power and responsibility ought to go together; and it is always my wish, in employments like the one proposed, to have a general control and authority over the establishment under my immediate direction. I should not like to hold a divided power and responsibility with any one, not even with my own brother." Mr. Baldwin's salary, as government engineer was fixed by himself at \$4,000 a year, with \$80 a month for the expense of living when away from home, and fifteen cents a mile for travelling expenses, that being the allowance for government officers. His time was spent between the two docks, the summers being passed in Charlestown and the winter in Norfolk, his assistant, Capt. Parris, alternating with him at those two places.

Mr. Baldwin's valuable journals during his connection with the government works were unfortunately lost on one of his passages from Norfolk to Boston, by the burning of the steamer "William Penn," near Philadelphia, on the 4th

of March, 1834. The boat caught fire and was run aground, the passengers making their way ashore over half a mile of mud flats,-- an operation not only tedious, but dangerous for a man of Mr. Baldwin's weight. By the aid of a fellow-passenger, Mr. Basil Hall, the noted English traveler, he was enabled to reach the shore in safety.

In addition to the work upon the dry docks, Mr. Baldwin was made in 1827 consulting engineer to a board of commissioners, consisting of Commodores Bainbridge, Morris, and Chauncy, to examine the various navy yards, and to form plans for their future improvement. He was also engaged at various times, between 1826 and 1835, in making surveys of New York Harbor, and in determining the best location for a dry dock at that place. This work, however, was not carried out until after Mr. Baldwin's death.

In the spring of 1828, the Secretary of the Navy directed a survey and estimate to be made for building a canal, or laying a pipe, from the Norfolk Navy Yard to Lake Drummond in the centre of the Great Dismal Swamp, for the purpose of introducing that water into the yard. This water was of a peculiar quality, being strongly impregnated with juniper, which grew very abundantly in that place and had a very agreeable flavor, and was well adapted for the supply of vessels. The survey was a very difficult one, a large part of it being made through an almost impenetrable swamp. The project was never carried out, Congress being unwilling to make the necessary appropriation. A water boat was, however, made of suitable dimensions to enter the lock at Deep Creek at the end of the Dismal Swamp Canal, and so provided with valves that, when in the lock, it could readily be filled with the pure juniper water. The boat was then taken to the Navy Yard, where the water was forced on board the ships by a pump. This water was often carried to sea, and during long voyages retained its purity and sweetness in a remarkable degree. The source from which the canal received its supply was Lake Drummond, a sheet of water about seven miles long and five miles wide, the only outlet of which was the Dismal Swamp Canal. The surface of the water in the lake was twenty-five feet above tide at Norfolk, and the quantity of water supplied was much more than that needed for the canal.

In 1834, Mr. Baldwin made an elaborate report upon introducing pure water into the city of Boston, a second edition of which was published in 1835. In this report of seventy pages, and an appendix of as many more, Mr. Baldwin discussed rain water and cisterns, common and artesian wells, aqueducts, conduits and pumps, and refers to the water supply of ancient and of modern Rome, Constantinople, Lyons, London, Liverpool, Manchester, Edinburg, Greenock, Glasgow, Paris, Beziers, Philadelphia, Cincinnati, and Richmond.

A list of the various ponds west of Boston is given, and a plan and profile of surveys from Farm and Long Ponds; and also a plan of surveys for several feeders to Jamaica Pond, by which it was proposed to increase its capacity.

In 1835, several prominent gentlemen in Maine became interested in the development of the water power of the Androscoggin River at Brunswick; and Mr. Baldwin was employed to make the necessary measurements and computations. The survey extended from a point about three-fourths of a mile above the village to an island one and a half miles below (from the Free Bridge to Cow Island). Two measurements of the river were made, one about half a mile, and the other about a mile and a half, above the upper falls. From the several gaugings, 4,000 cubic feet per second were reckoned safe as the discharge which might be relied upon as constant through the year for mill power; and, with the forty feet fall in the river at this place, Mr. Baldwin concluded that the Androscoggin at Brunswick offered a power unsurpassed by any river in New England at that time occupied. Recent measurements have confirmed the accuracy of his work.

In 1836, Mr. Baldwin made very complete surveys and an elaborate report for a canal to connect the Altamaha River, at Darien, with the port of Brunswick, in Georgia. The Altamaha is navigable for 200 miles from Darien, to the forks of the Ocmulgee and Oconee. The Ocmulgee is navigable for 300 miles, to Macon; and the Oconee, 200 miles, to Milledgeville, the capital of the State. The Altamaha is thus the medium of communication for an immense tract of the interior of Georgia with Darien; but this place, which is on the left bank of the river, about twelve miles from the sea, has no harbor for foreign shipping. All the produce of the country had to be sent to Savannah or to Charleston, and return goods received from the same places by steamboats and small coasters. No foreign trade could be carried on. Georgia was a great State, with an enormous production, but without a port. It was to connect the immense traffic of the Altamaha with a good harbor, for the most extensive foreign shipping, that the Brunswick Canal in Georgia was contemplated. The length of the work was to be about 13 miles. The canal was to be 6 feet deep and 35 feet wide on the bottom, with slopes of one and a half to one, making 53 feet of width at the water level. At each end there was to be a lock, 23 feet wide and 100 feet long, with counter guard gates to prevent the river at one end and the tide at the other from entering the canal, when either should rise above its level. The canal was to be supplied by a sluice about four miles from the southern end, as it was reckoned that such feeding would distribute itself in either direction much better than if admitted at the end.

For the locks, a mode of construction was proposed such as had been often

employed in England, and in Holland, where stone is difficult to get; namely, to make them of good hard-burned brick, building up in the side walls of the chamber, every 10 or 12 feet, a pier of stone, projecting a little in front of the brickwork, and rounded off, so not to damage the boats. In the wing walls also, horizontal courses, 2 or 3 feet apart, were to be laid, to protect the brick. The gate quoins and coping were to be of stone. The whole cost of the canal and locks was estimated to be \$448,474. The work was commenced, but never completed. The cutting still exists, as far as it was made.

Samuel M. Felton, well and widely known, from his connection with many important public works in this country during the past fifty years, writes as follows, in regard to Mr. Baldwin: --

“In the year 1834, immediately after my graduation at Harvard, I went to Charlestown to take charge of a select school for boys, which had been established a year before by Prof. Lovering. Col. Baldwin was then about finishing the dry dock, on which he had been employed for several years. I soon became acquainted with him socially, and found him a most entertaining man, full of information upon all public works, at the head of his profession, and thoroughly animated by a laudable pride in its progress and success, often remarking that it was a high and honorable calling, and deserving recognition as such, equally with those of medicine, divinity, or law. His works, and his views upon this subject, often expressed, did more than those of any other man to bring our profession prominently before the public at that time.”

“About the year 1835, Mr. Baldwin asked me to undertake the instruction of some of the students then in his office, in physics, mathematics, surveying and kindred subjects. This I did, as I had leisure, and soon became so much interested myself in the matters relating to engineering that, at the end of the year, I gave up my school, and entered the office as a regular student. I was soon put in charge of the office business; and I remained in this position until Mr. Baldwin’s death, in 1838, when I took the office, completed such work as remained unfinished, and took other work as it came to the office for several years.”

“The principal business which was done in the office of Mr. Baldwin at this time, and which was not finished until after his death, was the investigation and computation of the water power at the milldam used by the Boston Iron Company. The decision of this question had been referred to Leverett Saltonstall, Loammi Baldwin, and James Hayward. It was a very complicated case, as the conditions of head and fall and back water on the wheels were changing constantly. Mr. Baldwin took great interest in this

case, giving it a good deal of personal supervision, until his final sickness and death. The report was afterward completed and signed by the two surviving members of the commission, and confirmed by the Supreme Court, after an attempt by the Boston Iron Company to set it aside.”

“Mr. Baldwin was independent and positive in his professional opinions, and did not hesitate to enforce them anywhere and at any proper time. An instance illustrating this trait occurs to me at this moment, told to me in his library nearly half a century ago. Gen. Jackson had, during his administration, conceived a scheme of bridging the Potomac at Washington, and had taken a great fancy to an old friend as the contractor to carry out the work. This person, however, was far from competent for such an undertaking; and, when the bridge came up in Congress for an appropriation, Mr. Saltonstall, the senator from Massachusetts, offered a resolution to refer this plan to Mr. Baldwin for investigation as to its feasibility of construction and its stability when done. Mr. Baldwin was accordingly requested, by a vote of the Senate, to come to Washington and to report upon the plan. He did so, and after a thorough investigation reported that the bridge could not be made for anything like the estimated price, and that it would not stand, if built. This report did not please Gen. Jackson, at all; and Mr. Saltonstall told Mr. Baldwin that, if he had not already packed his trunk, he had better do so at once, and leave, as the President would make it too warm for him to remain in Washington. Mr. Baldwin replied that he was then on his way to pay his respects to Gen. Jackson before leaving, as he felt in duty bound to do. He called, and told the President that, having finished the business for which he was summoned to Washington, he had come to pay his respects to the President, and say good-by. The general at first received him with great politeness; but, having got through with the preliminaries, the bridge, as was natural, came up as the great thing in the mind of the President, and he said: ‘By the bye, Mr. Baldwin, I have read your report on the bridge; and, by the Eternal, you are all wrong. I have built and have seen built a good many bridges; and I know that the plan is a good one, and that the bridge will stand.’ ‘Gen. Jackson’, quietly replied Mr. Baldwin, ‘in all pontoon or temporary bridge-work for military purposes, I should always yield to your good judgment, and should not venture to call it in question; but you must remember that this bridge should be built as a permanent structure, and should stand for all coming time. And I yield in such matters to no one, when I have applied scientific principles to my investigations and am sure of my conclusions. Good morning, Gen. Jackson.’ It is hardly necessary to say that the appropriation was not made, and that the pet bridge was never built, much to the chagrin of the President, but to the quiet satisfaction of Mr. Baldwin.”

“Mr. Baldwin’s position as government engineer upon the dry docks at Charlestown and Norfolk was not always a bed of roses. He was appointed under the administration of John Quincy Adams; but when Gen. Jackson came in there were many aspirants for the position, who set the wheels in motion to depose him by circulating all sorts of falsehoods, charging him with great extravagance in spending the government money, and other offences very heinous in the eyes of politicians. Mr. Baldwin, however, triumphed over all his enemies, and finished his great works; and they stand to-day as monuments to his fame and skill as an engineer.”

In addition to the numerous works above referred to, Mr. Baldwin was consulted in regard to the dam across the Kennebec River at Augusta, Me.; he furnished very complete plans for a marine railway at Pensacola; he designed and superintended the construction of the old chapel and of Holworthy Hall, at Cambridge; he was consulted in regard to the Louisville and Portland Canal around the Falls of the Ohio; and he furnished a very elaborate plan for a stone bridge for the directors of the Warren Bridge. He was consulted in regard to the Harrisburg Canal in Pennsylvania, and was one of the corporators of Craigie’s Bridge. In 1809, he published an exceedingly plain and well-written pamphlet of seventy pages, entitled “Thoughts on the Study of Political Economy as connected with the Population, Industry, and Paper Currency of the United States.” His remarks in this paper upon the value of improved modes of transport are very clear, and show a thorough appreciation of this matter. He is also stated to have written a very complete account of the Middlesex Canal, constructed by his father, and also a memoir of Count Rumford; but neither of the last named papers can be found. His reports were prepared with the greatest care, and were models for style and remarkable for the exact and proper use of words. His constant professional activity left him little time for other engagements; but he was, in the widest sense of the term, a public-spirited man. In 1835, he was a member of the Executive Council, John Davis being governor; and, in 1836, he was a Presidential elector from what was then the Fourth Massachusetts District, and threw his vote, with the other Massachusetts electors, for Daniel Webster.

**MCA & MCC Response to the *Concord River Fish Restoration Study***  
by Bill Gerber

April 6, 2016

From: Middlesex Canal Association and Middlesex Canal Commission To:  
Gomez and Sullivan Engineers

Attn: Jill Griffiths, PE PO Box 2179, Henniker, NH 03242

Dear Ms. Griffiths,

The purpose of this letter is to state the position of the Middlesex Canal Association (MCA) on the ‘Concord River Diadromous Fish Restoration Feasibility Study’, dated February 2016, particularly regarding the information and options presented for the Talbot Mill Dam (aka the Summit Pond Dam).

The MCA has no objection to the restoration of the fish and eel species, cited in the report, to the Concord River. Also, we have no objections to two of the three options presented - i.e., to do nothing, or to construct a fish ladder at the Summit Pond Dam. However, we totally reject the third set of options - i.e., dam removal or breaching in any form.

#### Background:

The Middlesex Canal was a key component of a 120+ mile network of canals and navigable waterways that, for more than 50 years, provided heavy lift transportation services north of Boston. Availability of the network began in about 1797, with the opening of the Merrimack River for the transportation of ‘boats, rafts and masts’ from the NH border to tidewater.

Thereafter the network expanded progressively with the opening of the Middlesex Canal in 1804, opening the following year of the Mill Creek Canal across Boston and a Branch Canal from the M’sex Canal to the Mystic River, in Medford; opening of the upper Concord River in about 1810; and opening the Merrimack River to and above Concord NH by 1815. Thereafter, additions were made to the network in 1826, which added access to the Nashua River, and again in 1837, which provided access to the lower Concord River as far as the south end of Centennial Island.

For half a century, the canal and river network made very significant contributions to the growth of the area economy. Countless boatloads of cordwood heated homes and commercial furnaces. Timber and other wood products were used for the construction of homes and businesses, the shipping of goods, etc. Along the Mystic River alone, shipyards that began with the opening of the canal constructed 465 ships, mostly ocean-going sailing vessels, during the years the canal was open. Farm goods were routine cargos, including those that carried hay to the Haymarket.

Prominent buildings, among them the Charlestown Prison, Massachusetts General Hospital’s Bulfinch Building (its first building), University Hall at Harvard University, Faneuil Hall Market Place, the Massachusetts Bank, and countless homes and businesses were all constructed of granite from quarries in both Chelmsford MA and Concord NH. Initially, loads of granite and brick and timber were carried to build the textile mills of Lowell, Nashua and Manchester; and in the decade and more thereafter, cotton bales by the boat-

load were transported to keep the mills operating, and to carry their myriad products to market.

Today, little remains of this once important artery of commerce. Although Pawtucket Canal remains largely intact, it is only with considerable difficulty that a few artifacts can be found at points along the Merrimack River. About 10 of the original 27 miles of the Middlesex Canal can be traced from such resources as Google Earth, but two-thirds of the canal length, including both ends, together with the Mill Creek and Medford Branch Canals have all been filled in and built over. Of related structures along the length, only a few remain recognizable - i.e., one relatively intact lock keepers house in Wilmington, and the 1832 toll house now on Chelmsford Common.

However, several of the most important surviving remnants can be found within and adjacent to the Summit Pond in Billerica. These include the eastern and western canal “cuts”, where the canal met the river; also the peninsula component of the iconic floating towpath that once spanned the Concord River; the abutments for the drawbridge (shown above), one of which also served as the eastern anchor point for the floating towpath, together with the stone that anchored its western end; the up-stream end of the western guard lock/raft lock; and, of course, the two dams (the earlier dam situated immediately behind the observable Summit Pond Dam) that are highlighted in the report. Several buildings within the adjacent village, and the Rogers House on the east side, also date to the era of the canal.



### Rationale for opposing breaching or removing the dam

The dam is listed on the National Register of Historical Places (NR), having been so designated on at least four occasions - once when the extant portions of the Middlesex Canal were placed on the NR in 1972; again in 1983 as part of placing the Billerica Mills Historic District on the NR; once more in 1990 as part of a Local District filing under the local jurisdiction of the Billerica Historic Districts Commission; and most recently in 2009 when the entire length of the canal was registered in the NR. NR listing automatically places it on the State Register of Historic Places as well. As such, the dam should enjoy a very substantial measure of protection from development or destruction. Attempted use of Federal funding, licensing, or permitting for breaching or removal of the dam would trigger compliance with the National Historic Preservation Act. In addition to the MCA and MCC, such alteration of the dam and attendant draining of Summit Pond will likely be strongly opposed by several other organizations and many individuals.

The Summit Pond, behind the dam, was the principal source of water to operate the canal throughout its operational life. It is still the source of water to flood the extant remains of the channel on either side of the river. A drawdown or depletion of the Summit Pond would leave these segments dry, or nearly so, such that they would soon be overgrown and unrecognizable for the important role they once played in the development of Boston and the communities to the north. Constructed, as they are, primarily of timber and rubble stone, the peninsula and the drawbridge abutments of the floating towpath, noted above, would be left exposed and, almost certainly, would soon disintegrate and be lost forever.

Together with MCA advocacy, the MCC has been working for many years to restore the extant parts of the canal to public use. Their plan includes construction of an educational park on the west side of the river, adjacent to where the first shovelful of earth was turned to initiate canal construction in 1794. The plan was further enhanced by the recent acquisition of the Talbot Mills cloth warehouse, to provide a future home for the Middlesex Canal Museum. The Summit Pond is part of the authorized Middlesex Canal Heritage Park (Mass. Acts 1977, ch. 403) with much of the land on both banks of the river controlled by Middlesex Canal Commission. Today, in support of this plan, the MCA, MCC and Billerica own or hold easements on about 80% of the land surrounding the Summit Pond.

Archaeology - At the diadromous fish restoration study presentation in February, 2016, a proposal was made to document the remaining artifacts, apparently in recognition that what little remains submerged will soon deteriorate

and pass into oblivion. This would leave the MCA, MCC and town of Billerica with a report in place of the artifacts themselves.

Obviously, a report gathering dust on a shelf somewhere is an unacceptably poor substitute for the few artifacts we still have.

### Comments related to the Report

Aside from historical references to the types of fish that were found in the Concord River more than three centuries ago, what is the justification for attempting to restore them now? Other than historic precedence, nowhere in the Feasibility Study is any justification presented for the restoration of Diadromous Fish, by the New England Fishing Industries or anyone else. And why should such restoration efforts take priority over the more recent development and current status of the river and its environs?

What if you ripped out the dam, and the fish didn't come? What assurance is there that the desired species can be restored; or that undesirable species won't be introduced additionally or in their stead? E.g., what are the sensitivities of the species of fish and eels that you hope to reintroduce to the effects of climate change? The charts for herring and shad, in the slide entitled "Target Species" don't look all that impressive. What are the prospects for Alewife and the American Eel, which are not even shown?

What other species might be newly introduced, including undesirable species?

River Obstacles and related Considerations - fish and eels need to negotiate the Essex Dam (i.e., the Great Stone Dam at Lawrence), Middlesex Falls and the dam at Centennial Falls (actually named Wamesit Falls) on the Concord (as discussed in the report) before reaching the Summit Pond Dam. Along the way, they pass the confluence of Hale's Brook. Would it not be appropriate to determine if the desired species of fish, and others, have already populated Hale's Brook, before considering any action at the Summit Pond Dam?

Are the hydrological projections for the post dam removal levels of the Concord River correct? In one tabulation that we've seen, it appears that the elevation of the bottom of the Concord River, upstream of the Summit Pond Dam, is less than half-a-foot below the elevation of the river bottom at the confluence of the Sudbury and Assabet Rivers, more than 11 miles away. Also, the elevation of the river bottom at Billerica's water intake appears to be less than a foot below the river bottom at the dam. It would seem therefore, that with dam removal or breaching, there is very little elevation differential to work with along this entire length. During a summer of drought, some years back,



a cynical assessment was that the only water left in the river was provided by the effluent from the prison in West Concord. E.g., at times of low water or drought, Billerica might be left without an acceptable source of water in terms of both quantity and quality.

On page ES-5, and elsewhere, the height of the dam is given as 10.2 feet. But the 2009 dam registration gives the height of the dam as 12.5'. (Copy provided at the end of this letter.) What's the explanation for this discrepancy? Will this discrepancy have any impact on the hydrological projections? E.g., could it mean that the river will be drawn down farther than the study projects?

In the slide entitled "ANALYSIS - Hydraulics" - upstream of the Fordway Bar near Billerica's Pollard Street bridge, the reduction in normal water level due to dam removal is projected to be about 0.8 feet. This appears to be based on the assumption of a constant height for the Fordway Bar.

However, in about 1810, the Middlesex Canal Company cut through a portion of this bar, and two others on the Concord River, to facilitate the passage of boats. (And there is historical evidence that this enabled commercial traffic on the river.) If the bars were again scoured out to the level of the 1810 cuts, what effect would this additional lowering have on the projected level of the river? It seems likely that it would at least have slight influence on the normal level, and tend to draw the river down considerably more during times of low water.

How much effect will a lowered water level have on the width of the Concord River throughout its length? And what effect, in turn, will this have on the currently established recreational appeal of the river? In many places upstream, the bottom of the river exhibits a very gentle slope, thus even a small lowering of the level of the river should result in a considerable reduction in the width of the river. What will the effect of this be at the various public access points - e.g., from Routes -117, -126/Lowell Road (north of Concord), -225, and -4? What effect will it have on businesses such as the South Bridge Boat House in Concord, to the marina and the rowing club in Billerica, and to those who run private boats? Within the Summit Pond itself, no doubt the effect would be dramatic for a proposed access via the Middlesex Canal Park, to the point of making such an access point effectively useless.

Decision Matrix's Evaluation Criteria, page A-86. This chart is seriously disturbing. It appears to have been gratuitously, and not at all subtly, inflated throughout to throw the weight of decision greatly in favor of dam removal. We recommend that this chart be completely eliminated from the report, or thoroughly revised with adoption of objective criteria for each category to be

evaluated, together with criteria for each evaluation, and with adversarial participation in all reassessments.

E.g., for the category "Reduction of invasive species", why does dam removal rate "High", when "Fishway" rates "None"? What's the rationale behind this assessment?

Also why are the same assessments made for "Restoration of natural wetland habitat"? Given that the principal effect of dam removal will be to lower the water level in the Summit Pond for only about the quarter of a mile between the dam and the Fordway Bar, and the river upstream by less than a foot under normal flow conditions, how can such an assessment disparity even conceivably be justified?

Considering that there are, effectively, two dams at this site, with a great amount of fill between them, we question the assessed cost of dam removal.

Estimates of the cost of dam removal or of operating a fish ladder appear not to have considered the cost of the loss of or use of "Water Power Rights". Past MCA/MCC efforts to acquire ownership of the dam have failed partly because these have been retained by the owners of the dam. The value of their loss should be considered in the report as part of the cost of dam breaching or removal, also as part of the operation of a fish ladder.

Fish ladder - the "Conceptual rendering of a fish ladder at Talbot Mills dam" on page E-3 and elsewhere, seems almost grotesque. Photos of fish ladders at other dam sites, as well as the conceptual discussion in pages 76 through 79, suggest that an effective fishway can be constructed that is far less intrusive. Furthermore, if a fishway were to be executed as a bypass, it should be done in a manner consistent with the historical nature of the dam; or could it in some way be integrated into the MCC's plan for a MC park?

#### Bottom line

Today, the Summit Pond Dam site in Billerica serves as the location of the largest concentration of surviving elements of this historically significant transportation corridor and its historical interpretation. A drawdown or depletion of the Summit Pond would greatly reduce the effectiveness of the park as a venue for public education. The same can be said for the current and future Middlesex Canal Museum. As such its preservation is highly warranted.

signed

William E. Gerber

Member, Board of Directors for the Middlesex Canal Association



Commonwealth of Massachusetts  
 Department of Conservation and Recreation  
 Office of Dam Safety  
**DAM REGISTRATION CERTIFICATE**  
 Issued in Accordance with MGL Chapter 253  
 Sections 44-50 and 302 CMR 10.05

CERTIFICATE NUMBER MA00774-R1

As required by MGL Chapter 253, and for the purpose of creating a public record of the subject dam, the Office of Dam Safety hereby issues this Dam Registration Certificate, to be recorded by the dam owner at the Registry of Deeds in the county where the dam lies.

**Section I: Dam Information**

Dam Name TALBOT MILLS DAM AKA FALKNER MILLS DAM  
 Name of Impoundment CONCORD RIVER  
 Location (City/Town) BILLERICA  
 Height 12.5'  
 Hazard Potential Rating HIGH HAZARD  
 National Dam ID No. MA00774  
 Latitude 42.592  
 Longitude -71.284

**Section II: Registry of Deeds Information for the Property of which the Dam Lies**

Property/Dam Owner(s) CRT DEVELOPMENT REALTY, LLC  
 Registry Location (County Name) MIDDLESEX  
 Registry of Deeds Book No. 17958  
 Registry of Deeds Page No. 95

**Section III: Town/City Accessor's Office Information for the Property on which the Dam Lies**

Property/Dam Owner Name CRT DEVELOPMENT REALTY, LLC  
 Mailing Address 6 NICHOLAS CIRCLE  
 Town/Zip ANDOVER, MA 01810-4278  
 Map No 10  
 Lot No

COMMONWEALTH OF MASSACHUSETTS · EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS  
 Department of Conservation and Recreation  
 Office of Dam Safety  
 John Augustus Hall  
 180 Beaman Street  
 West Boylston, MA 01583  
 508-792-7716 508-792-7718 FAX  
 www.mass.gov/dcr



Deval L. Patrick Governor  
 Ian A. Bowles, Secretary Executive Office of Environmental Affairs  
 Timothy P. Murray Lt. Governor  
 Richard K. Sullivan, Jr., Commissioner Department of Conservation & Recreation

*Please return to:*  
**DAVAGIAN & ASSOCIATES**  
**ATTORNEYS AT LAW**  
**365 BOSTON POST ROAD, SUITE 200**  
**SUDBURY, MA 01776-3023**

CERTIFICATE NUMBER MA00774-R1

**Section IV: Transfer of Ownership Notification Requirement**

In accordance with M.G.L. c. 253, the dam owner shall notify the Commissioner by registered or certified mail, of the proposed transfer of legal title of such dam 30 days prior to any such transfer. Upon receipt of such notice, a new Certificate of Registration will be issued. Such Certificate shall contain any outstanding obligations of the registered owner under M.G.L. c. 253, §§ 44 through 50.

The Department of Conservation and Recreation

By: William C. Saloma  
 William C. Saloma, Director  
 Office of Dam Safety

Date Issued: December 9 2008

Suffolk, ss. Commonwealth of Massachusetts

On this 9<sup>th</sup> day of December, 2008, before me, the undersigned notary public, personally appeared William C. Saloma, proved to me through satisfactory evidence of identification, which was personally known to me, to be the person whose name is signed on the preceding document, and acknowledged to me that he signed it voluntarily, in his capacity as Director of the Office of Dam Safety with the Department of Conservation and Recreation, for its stated purpose.

Ariana L. Johnson  
 Ariana L. Johnson  
 Notary Public  
 My Commission Expires  
 August 13, 2015

*Editors' Note: This letter and attachments submitted Bill Gerber, are included here to inform the readers of "Towpath Topics" of the opinion of the MCA Board members to the activities of the Fish and Game Department in regard to their Mill Dam project. Gomez and Sullivan were hired by Fish and Game to do the feasibility study and make a recommendation.*

**MISCELLANY**

**Nameplate** - Excerpt from a watercolor painted by Jabez Ward Barton, ca. 1825, entitled "View from William Rogers House". Shown, looking west, may be the packet boat *George Washington* being towed across the Concord River from the Floating Towpath at North Billerica.

**Back Page** - Excerpt from an August, 1818, drawing (artist unknown) of the Steam Towboat *Merrimack* crossing the original (pre-1829) Medford Aqueduct, probably on its way to service on the Merrimack River.

**Estate Planning** - To those of you who are making your final arrangements, please remember the Middlesex Canal Association. Your help is vital to our future. Thank you for considering us.

**Museum & Reardon Room Rental** - The facility is available at very reasonable rates for private affairs, and for non-profit organizations' meetings. The conference room holds up to 60 people and includes access to a kitchen and restrooms. For details and additional information please contact the museum at 978-670-2740.

**Web Site** - As you may have noted in the nameplate, [www.middlesexcanal.org](http://www.middlesexcanal.org) is the URL for the Middlesex Canal Association's web site. Our webmaster, Robert Winters, keeps the site up to date, thus events and sometimes articles and other information will sometimes appear there before we can get it to you through Towpath Topics. Please do check the site from time to time for new entries. Also, the site now contains a valuable repository of historical information, all the back issues of TT, and an index to all of the articles contained therein, can now be found there at <http://middlesexcanal.org/towpath>.

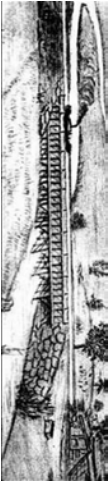
**Back Issues** - Fifty years of back issues of Towpath Topics, together with an index to the content of all issues, are also available from our web site at <http://middlesexcanal.org/towpath>. These are an excellent resource for anyone who wishes to learn more about the canal and should be particularly useful for historic researchers. Instructions for conducting a word search within the back-issues archive can be found in TT 1/2014, see "Searching our Online Archives"

**Museum Shop** - Looking for that perfect gift for a Middlesex Canal aficionado? Don't forget to check out the inventory of canal related books, maps, and other items of general interest available at the museum shop. The store is open weekends from noon to 4:00pm except during holidays.

*Towpath Topics* is edited and published by **Debra Fox, Alec Ingraham,** and **Robert Winters**. Corrections, contributions and ideas for future issues are always welcome.

*Locas: Falkner Street Dam, Billerica, MA*

*ETW*



**Middlesex Canal Association**  
**P.O. Box 333**  
**Billerica, MA 01821**

**FIRST CLASS MAIL**  
**NONPROFIT ORGANIZATION**