

Souhegan Falls Power

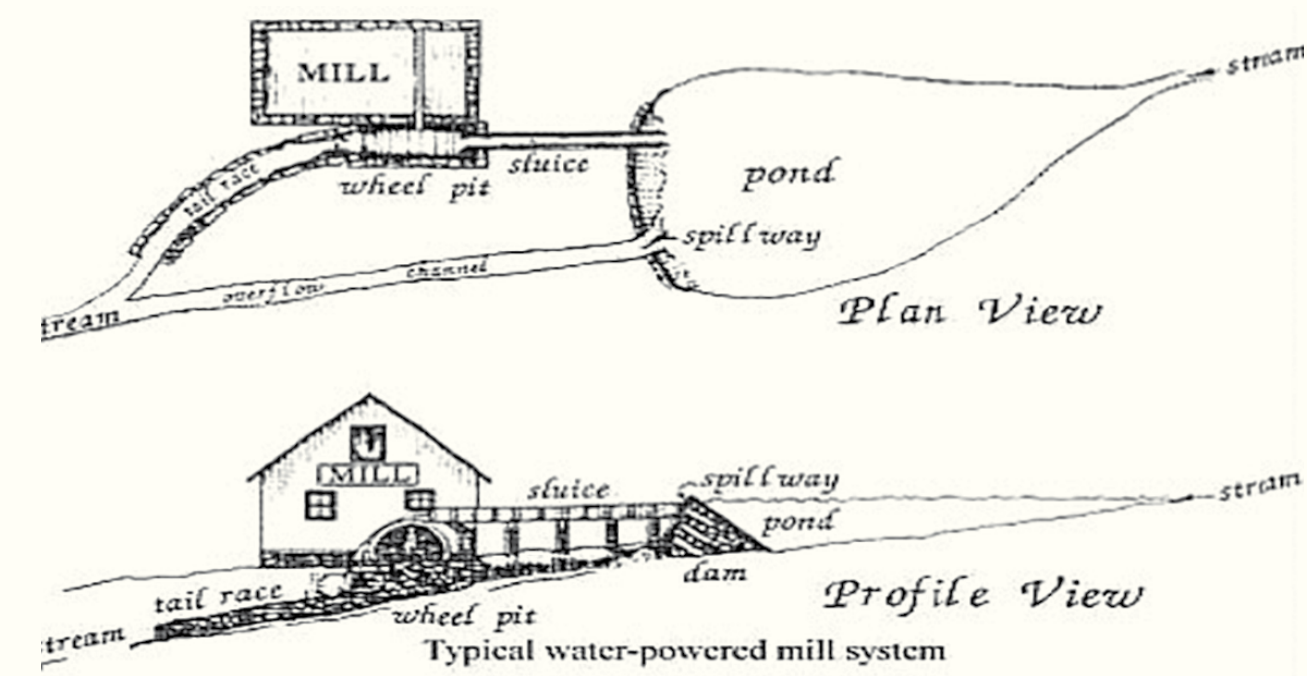
HARNESSING THE MIGHT OF THE SOUHEGAN RIVER

Dam for the Ages

The Merrimack Village Dam, a granite gravity arch dam, was demolished in August 2008. Since its construction in 1895 the substantial dam had straddled Souhegan Falls, a natural falls on the Souhegan River. At the time of its demolition, it was one of only four known gravity arch dams in the state. Removal of the dam returned the river to its natural flow at the Falls for the first time since before the 1730s, when the first of a series of dams was built at this location. Into the early twentieth century, the dam impoundment provided waterpower to nearby mills and factories (See Industry Sign). Then, into the mid-twentieth century, it supplied water for processing leather, chemicals, and poultry.



Merrimack Village Dam, ca. 1900, as first built. This shows the dam and Falls before later early 20th-century alterations and the original stone power canal configuration.
Merrimack Historical Society



This general illustration shows a wood crib dam and how water from a dam pond is directed to a water wheel powering the operations in a mill.

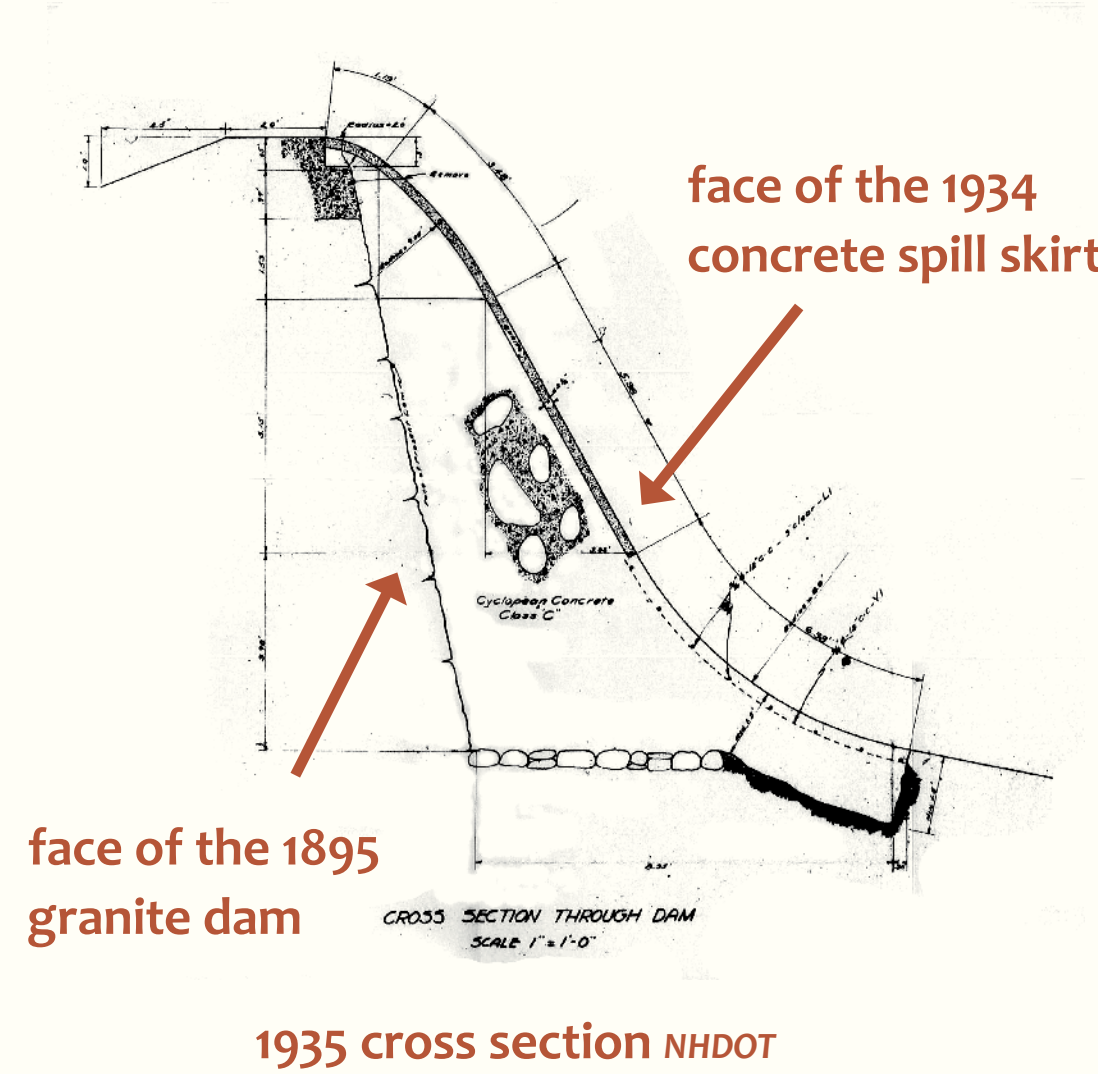
Earlier Wood Dams

Little is known about the earlier dams at this location. In the 1730s, John Chamberlain, an early Merrimack settler, built the first dam at the Falls to power a grist mill and a sawmill. This was the first of a series of dams at this location. The dam would have been of wood construction, as were all the later ones until 1895. By 1880, the approximately 10'-high wooden dam at Souhegan Falls had a fall of approximately a 25' or 30' drop over a ledge of rock. It provided waterpower to three woolen mills and a cabinet shop. In 2008, the demolition of the 1895 dam uncovered evidence of one of the earlier

dams, just upstream. The lowered water level revealed a single log on the river bottom, with a small section of planks laid vertically across it. Wood dams of varying designs often had planks covering the upriver section of the dam.

Energizing Local Industry

The financier Gordon Woodbury (1863-1924) funded construction of the granite gravity arch dam and adjoining granite power canal in 1895. These provided waterpower to his new Shoe Factory and Morocco Shop, located on the downstream side of the bridge (see Industry and Canal Signs). The substantial new dam consisted of granite blocks, 10' thick at the base, 6' at the top, with 200 barrels of cement filling. The dam combined the massiveness of a gravity dam with the form of a masonry arch dam. Each type provides a different means of managing the water pressure put on a dam. A gravity dam resists the water force primarily due



to its massive weight. An arch dam disperses the water pressure towards flanking stone walls or stone banks and thus can be thinner. An arch design also lengthens the spillway thereby increasing the amount of water passing over the dam, providing a more controlled means of overflow. The new dam also created a larger back pond.

Modifications

In 1916, the W. H. McElwain Company increased the height of the dam 1.5 feet, presumably to create an even larger back pond. In 1934, the International Shoe Company significantly altered the dam with the addition of a cyclopaean (large stone) concrete spill skirt over its granite face. This changed the profile of the dam to an ogee (curved) shape. The new spill skirt continued as a concrete apron over the natural ledges on the downstream side, providing a smoother surface for the water to flow over and minimizing spray.



2008 photo of dam during demolition showing the rows of rectilinear, dressed, granite stones of the 1895 dam and thick layer of cyclopaean cement of the 1934 added ogee spillway.
Mark Wamser

A River Restored

In 1964, Pennichuck Water Works purchased the dam for a hydroelectric project, which never came to fruition. In subsequent years, the dam was not actively maintained. By 2004, it was declared deficient and so Pennichuck Water Works, in concert with the NH Department of Environmental Services, decided to remove the dam. Demolition began in August 2008 followed by work on restoring the area to its natural state. Removal of the dam opened up fourteen miles of the river to native fish for repopulation and spawning. Upstream, the areas of wetland created by the dam have drained, and the river has returned to its general historic course.



August 2008, Removal of Dam. The machinery removed the upper portions of the north end of the dam first, to release the impounded water. This shows the ogee spillway and one of the outflows. Mark Wamser

This interpretive panel was produced in cooperation with the New Hampshire Department of Transportation, Federal Highway Administration, the New Hampshire Division of Historical Resources, and the Town of Merrimack under Section 106 of the National Historic Preservation Act. Preservation Company and BaileyDonovan 2021



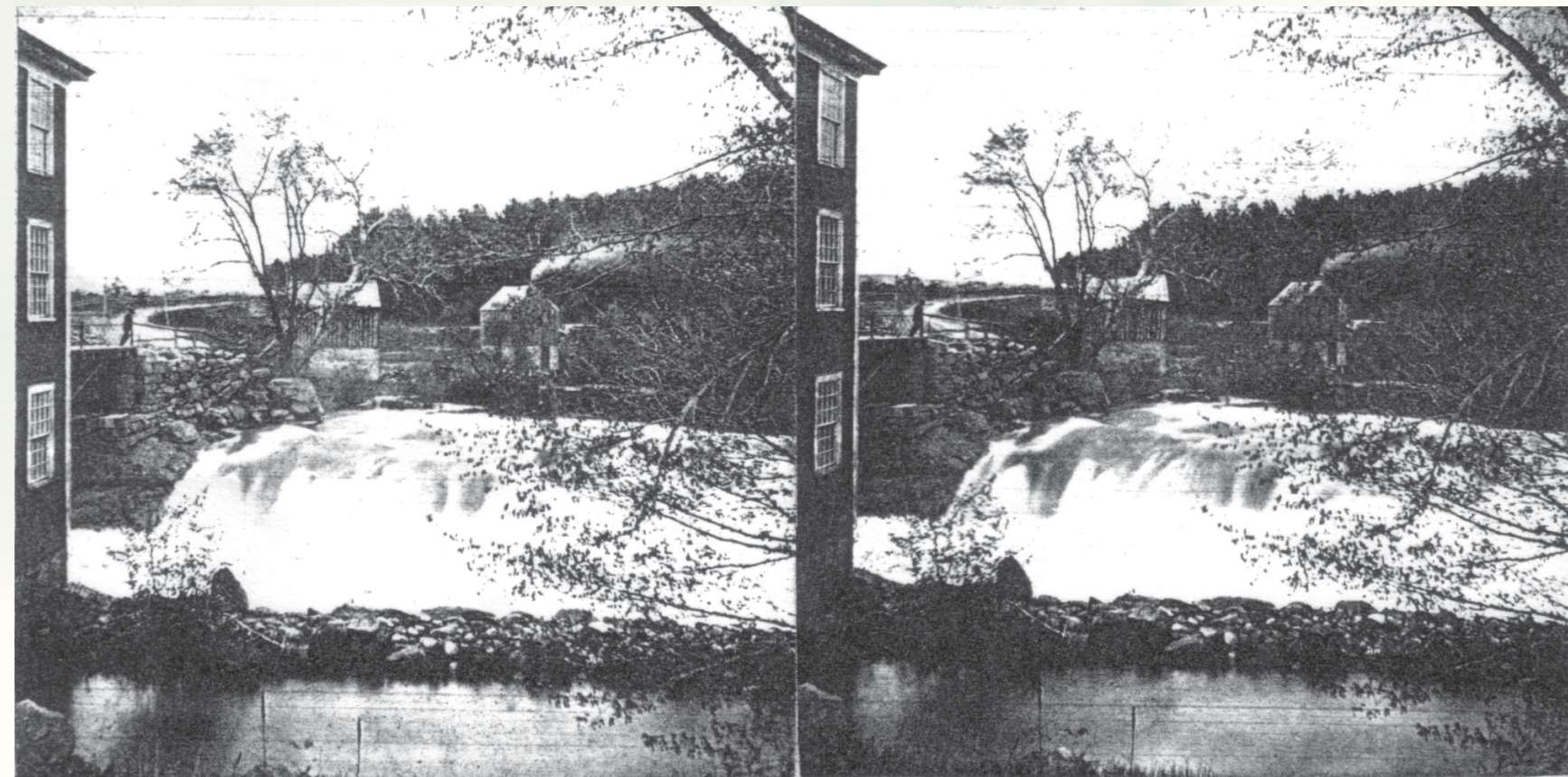
1989 photo of bridge, dam, and power canal head gate. The ogee design and continuation over the ledge eliminated water spray on the Chamberlain Bridge and passing cars. NH Dam Bureau

Canal In Control

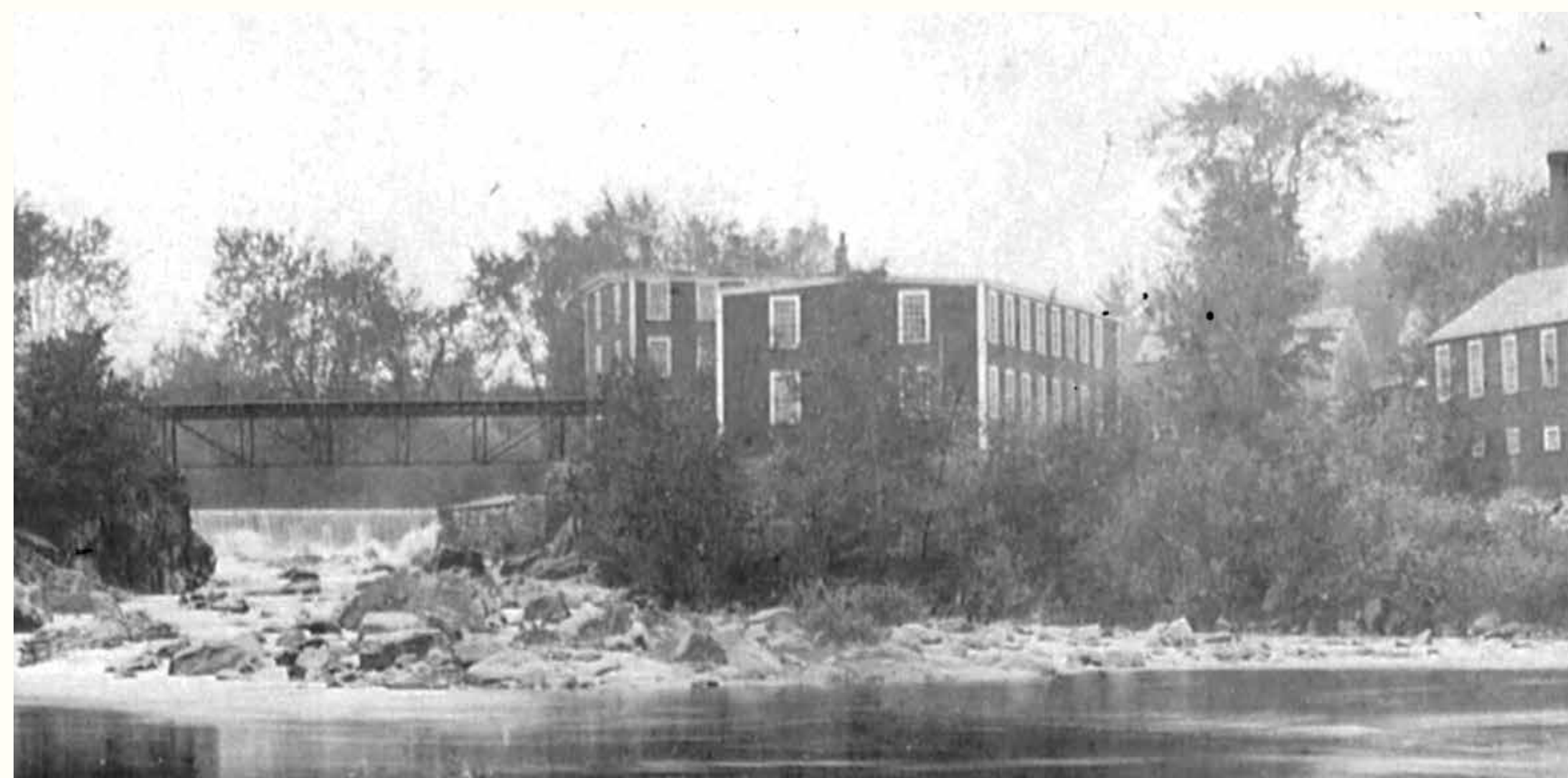
DIRECTING LOCAL POWER & TRAFFIC

Hydraulic Energy

A masonry power canal was built in 1895, at the same time as the Merrimack Village Dam. The 20'-wide canal directed water from the impoundment pond to power the Excelsior Mill before the bridge and Gordon Woodbury's new large shoe factory and Morocco Shop on the other side of the bridge. The Canal also supplied water to process leather in the tanning pits in the basement of the Morocco Shop.



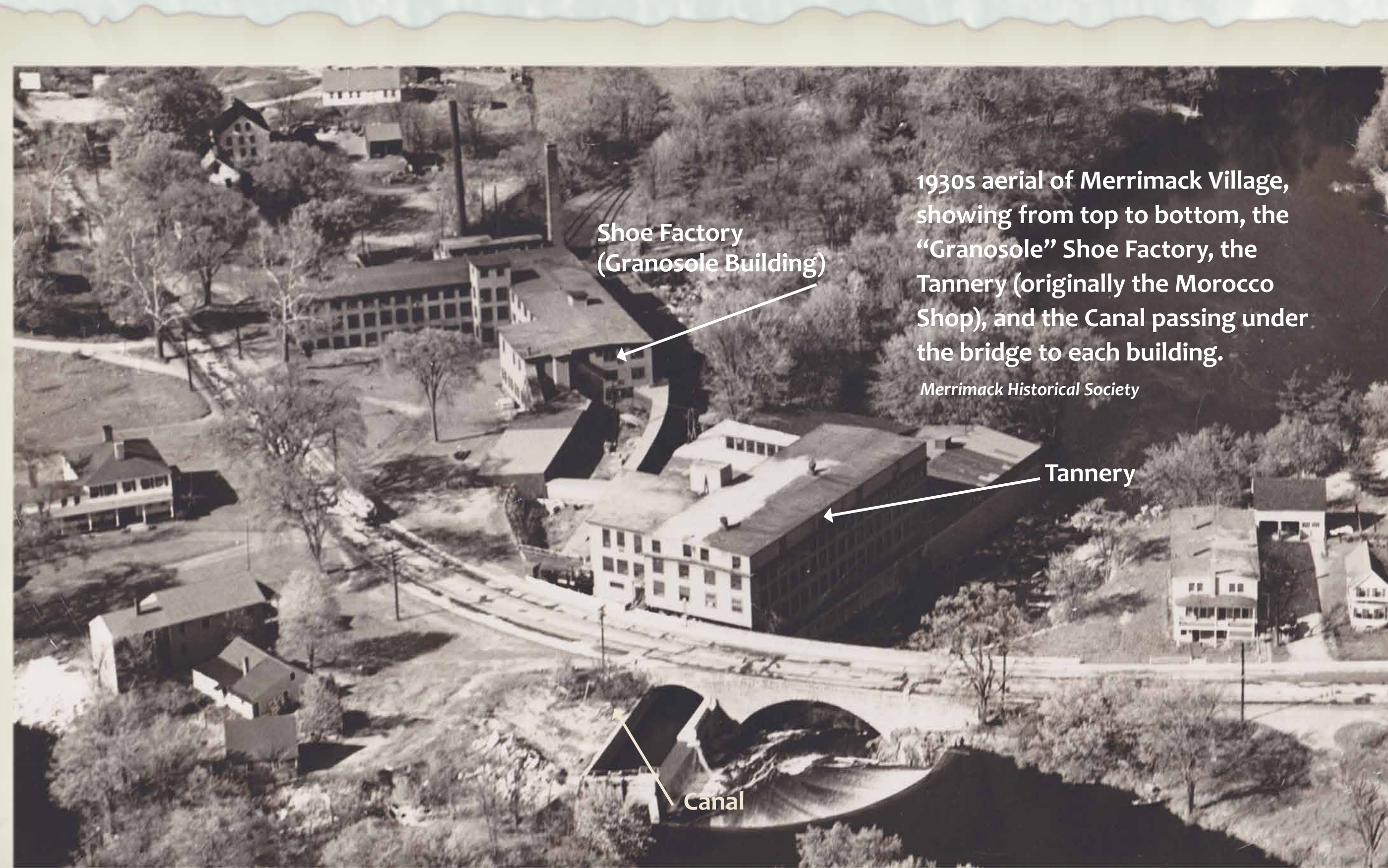
Undated stereographic image of the 1895 stone power canal as built, near its passage under the Excelsior Mill (building at left). The impounded water simply flowed from the pond into the canal. Merrimack Historical Society



Circa 1900 photo, looking upstream towards the old iron truss bridge over the Souhegan River and industrial buildings on the north bank. The old Excelsior Mill is partially visible on the upstream side of the bridge and the Morocco Shop and Table Shop are visible on the downstream side. Merrimack Historical Society

Early Bridge

A bridge has spanned the Souhegan River in Merrimack Village since the 18th century. The early ones would have been of wood construction, but by the end of the 19th century, a sturdier iron bridge crossed the river. In February 1900 a freshet carried away the south end of that bridge, by then part of a primary travel route between Nashua and Concord, so the town quickly erected a new iron-truss bridge.



1930s aerial of Merrimack Village, showing from top to bottom, the "Granosole" Shoe Factory, the Tannery (originally the Morocco Shop), and the Canal passing under the bridge to each building. Merrimack Historical Society

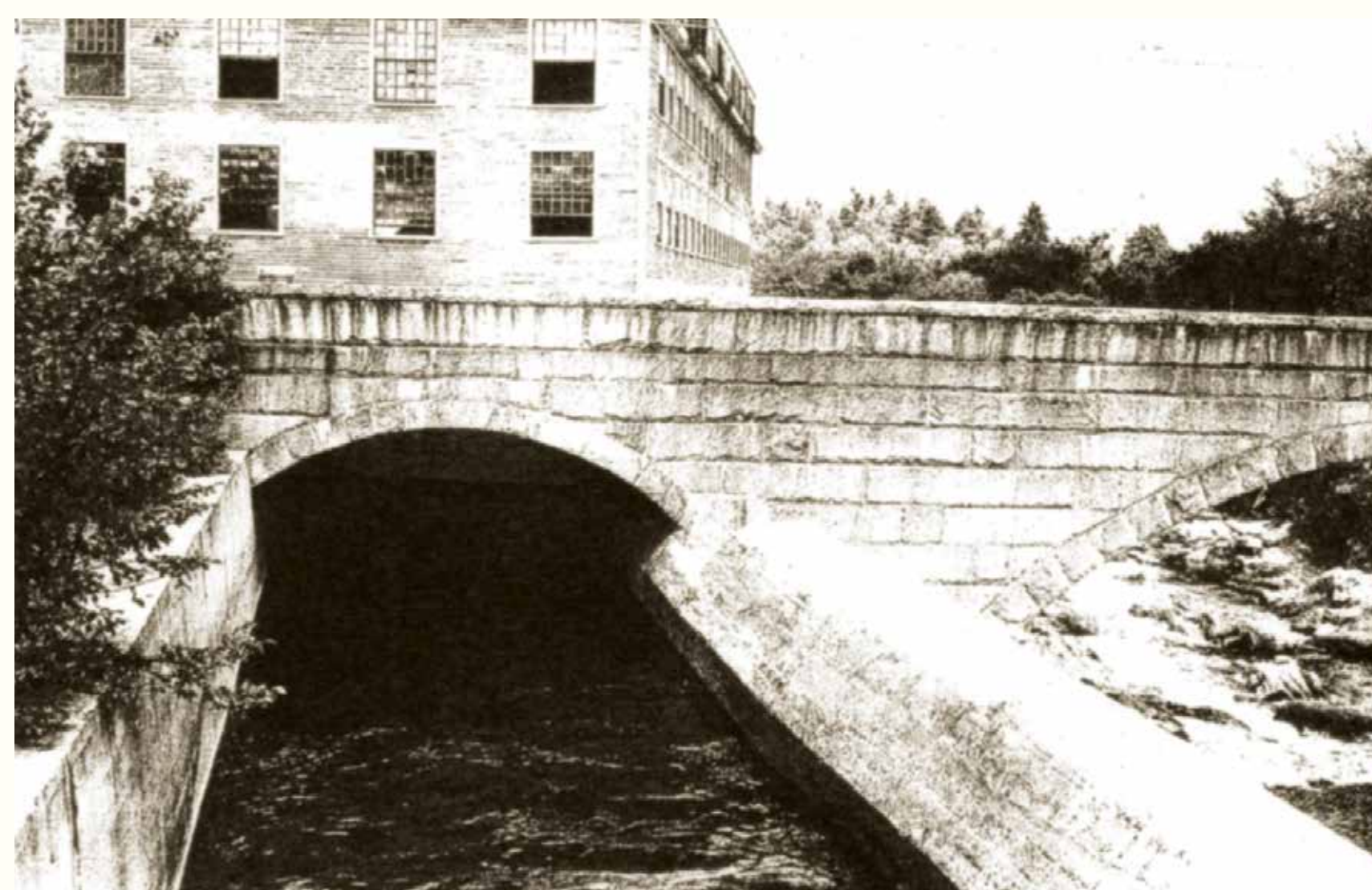
Enhancements

In 1906, the W.H. McElwain Company purchased the Woodbury manufacturing properties and water privilege. The following year, the company modified the existing stone power canal. It erected a concrete wall with a headgate at the west end of canal to better control the water flow. It capped the existing stone canal with concrete, increasing its durability.

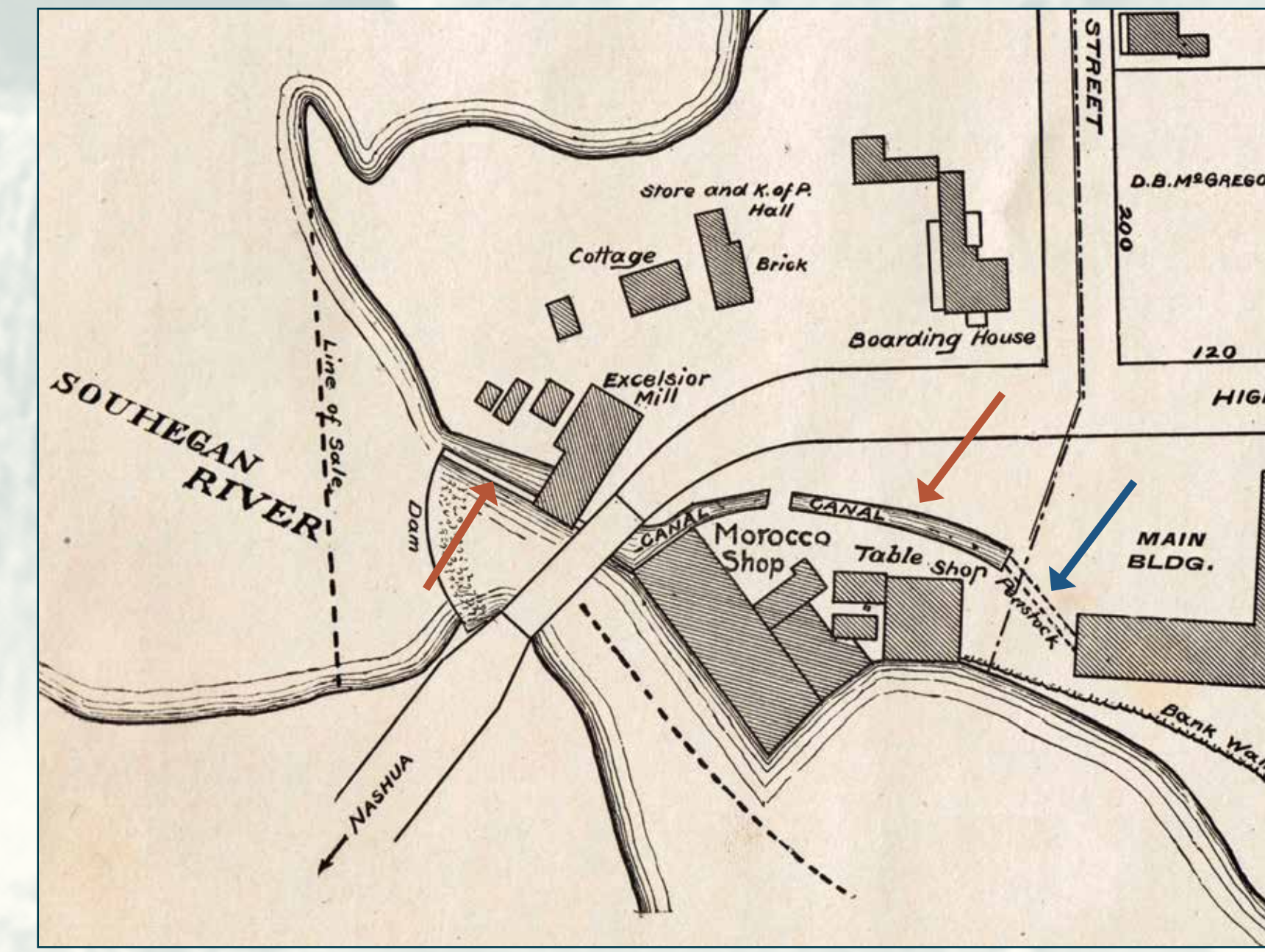
Alterations on the east side of the bridge included the addition of a concrete forebay. It worked with the dam and canal to hold and control the distribution of water to the buildings through intake openings.



1935 photo of concrete covered power canal and headgate. NH Dam Bureau.



Circa 1940 photo of Canal and Chamberlain Bridge with Tannery Building in background. NHDOT Bridge Design



This 1902 plan by J. E. Conant & Company illustrates how the canal (red arrows) carried water to the three buildings. A penstock (blue arrow) is a conduit that carries water from its source to the turbine it is powering. Merrimack Historical Society

Times Change

As of 1919, the McElwain operations continued to use two water wheels to power its operations in Merrimack Village. A 33" wheel operated continuously, augmented by a 24" wheel operated for three months a year, mostly in the spring when water levels were higher. During times of low water levels in the river, the company used auxiliary power from other locations. By 1929, the factory buildings used water (now delivered by a pipe at the bottom of the canal) to process materials; the water no longer powered the turbines.

Good Roads Movement

By 1907, the road had become part of the Merrimack Valley Highway, one of three primary north-south roads in New Hampshire. The improved road system was associated with the nation-wide Good Roads Movement, intended to increase automobile usage and draw visitors to the state. The successful program eventually necessitated an even more substantial bridge at the crossing in Merrimack Village, to accommodate continued traffic growth.

Granite Replaces Iron

In 1921, the Chamberlain Bridge, a substantial stone arch bridge, replaced the iron truss bridge. The design of the new two-span bridge accommodated two distinctive features of the location. The bridge had to span the existing power canal. Because of the curve in the road, the upstream elevation needed to be longer than the downstream elevation. The design featured a 61'-wide span over the river and a 25'-wide arch span over the canal. Herbert E. Fletcher, an engineer and owner of granite quarries in Westford, MA, designed the bridge for the town. Lovejoy Granite Company of Milford, NH, built the bridge. The bridge was listed in the New Hampshire State Register of Historic Places in 2003.



January 2018 Preservation Company

This interpretive panel was produced in cooperation with the New Hampshire Department of Transportation, Federal Highway Administration, the New Hampshire Division of Historical Resources, and the Town of Merrimack under Section 106 of the National Historic Preservation Act. Preservation Company and BaileyDonovan 2021

Thriving Industrial Village

A FLOURISHING VILLAGE FUELED BY THE FALLS

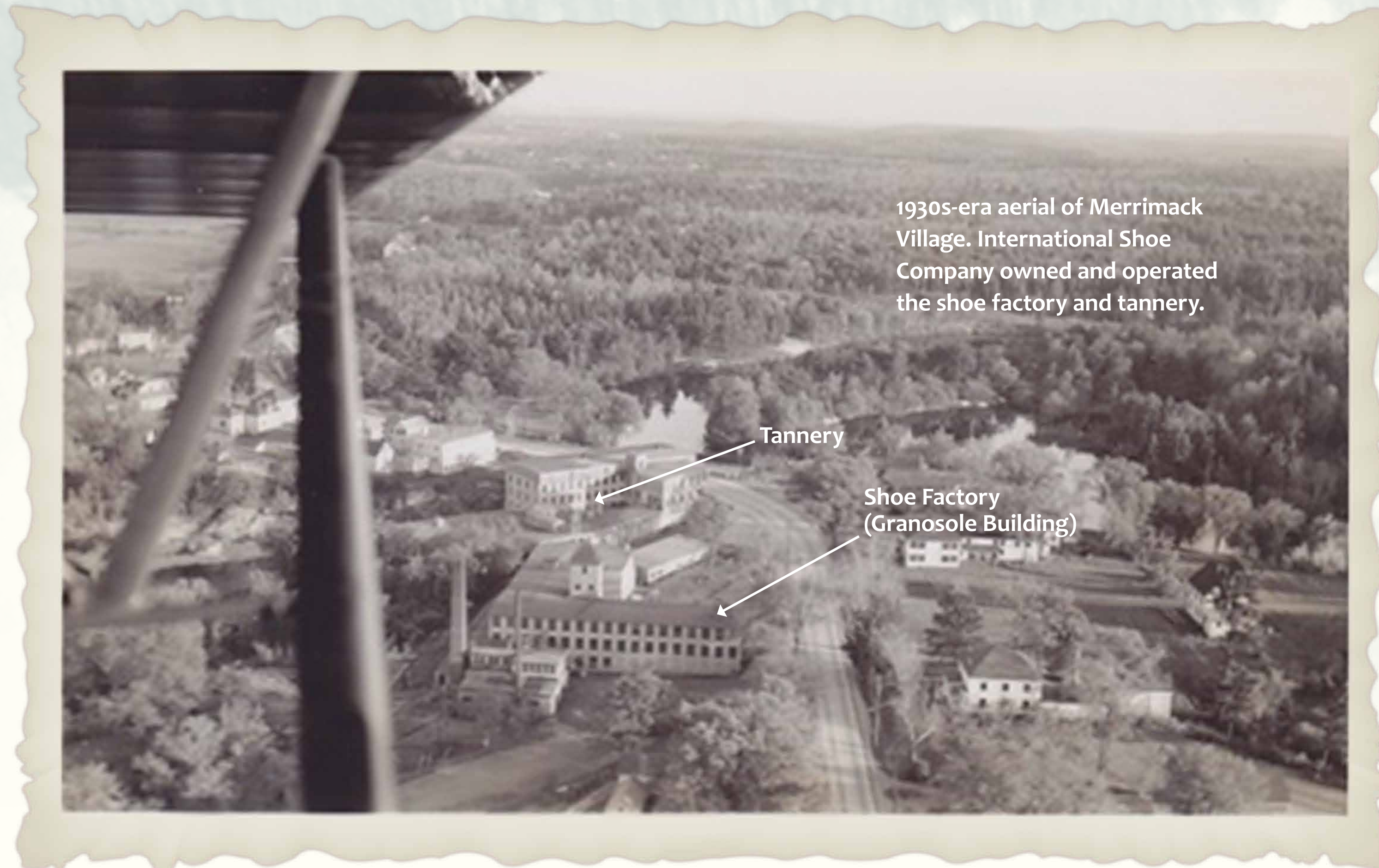
Souhegan Falls first powered industrial activity beginning in the 1730s, when John Chamberlain constructed a grist mill and a sawmill on the north bank of the Souhegan River. By the 1810s, a modest but prospering village, known as Riddle Village (after the then mill owner Isacc Riddle), had developed in connection with the several mills. Between 1807 and 1894, the village had a succession of mills that used waterpower to mostly manufacture textiles. The successful Bedford merchant Isaac Riddle (1762- 1830) established the Souhegan Nail, Cotton, and Woolen Manufacturing Company and also erected a number of other buildings in the village. By 1850, David Henderson (1811-1886) had established a large carpet mill which produced 75,000 yards of carpeting and employed fifty-four workers.



This 1858 map detail shows the extent of development in the village. J. Chace Jr. Map of Hillsboro County, N.H.

By the 1870s, Henderson also manufactured flannel and had approximately eighty employees. Ten years later a “repellents and suitings” manufacturer with up to thirty employees occupied the main mill. Fire had always been a danger in the mills. In 1883 a fire destroyed most of the Woolen Mill buildings. Only the Shoddy (recycled wool) Mill on the westerly side of the bridge and one other building escaped destruction.

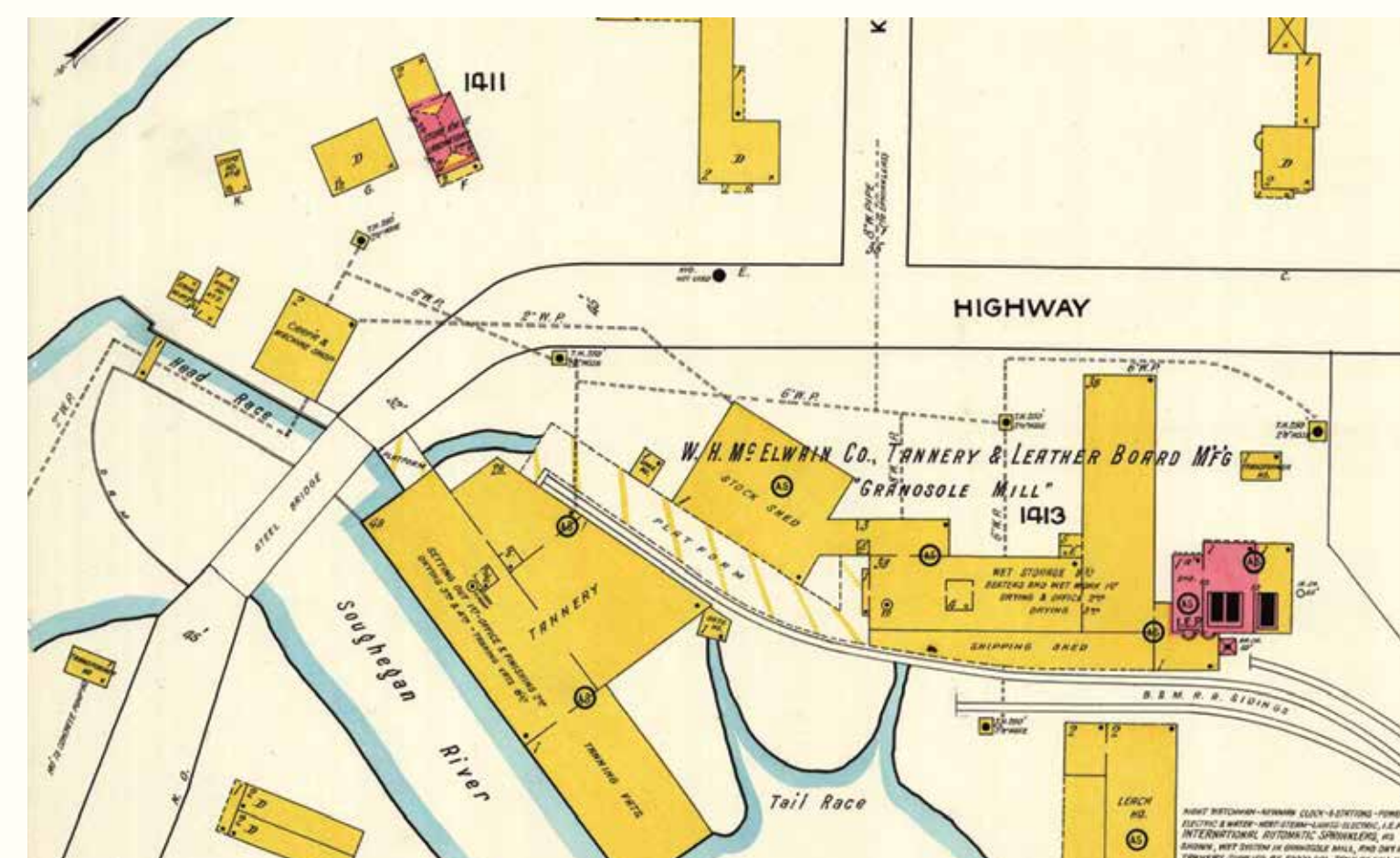
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1930s-era aerial of Merrimack Village. International Shoe Company owned and operated the shoe factory and tannery.

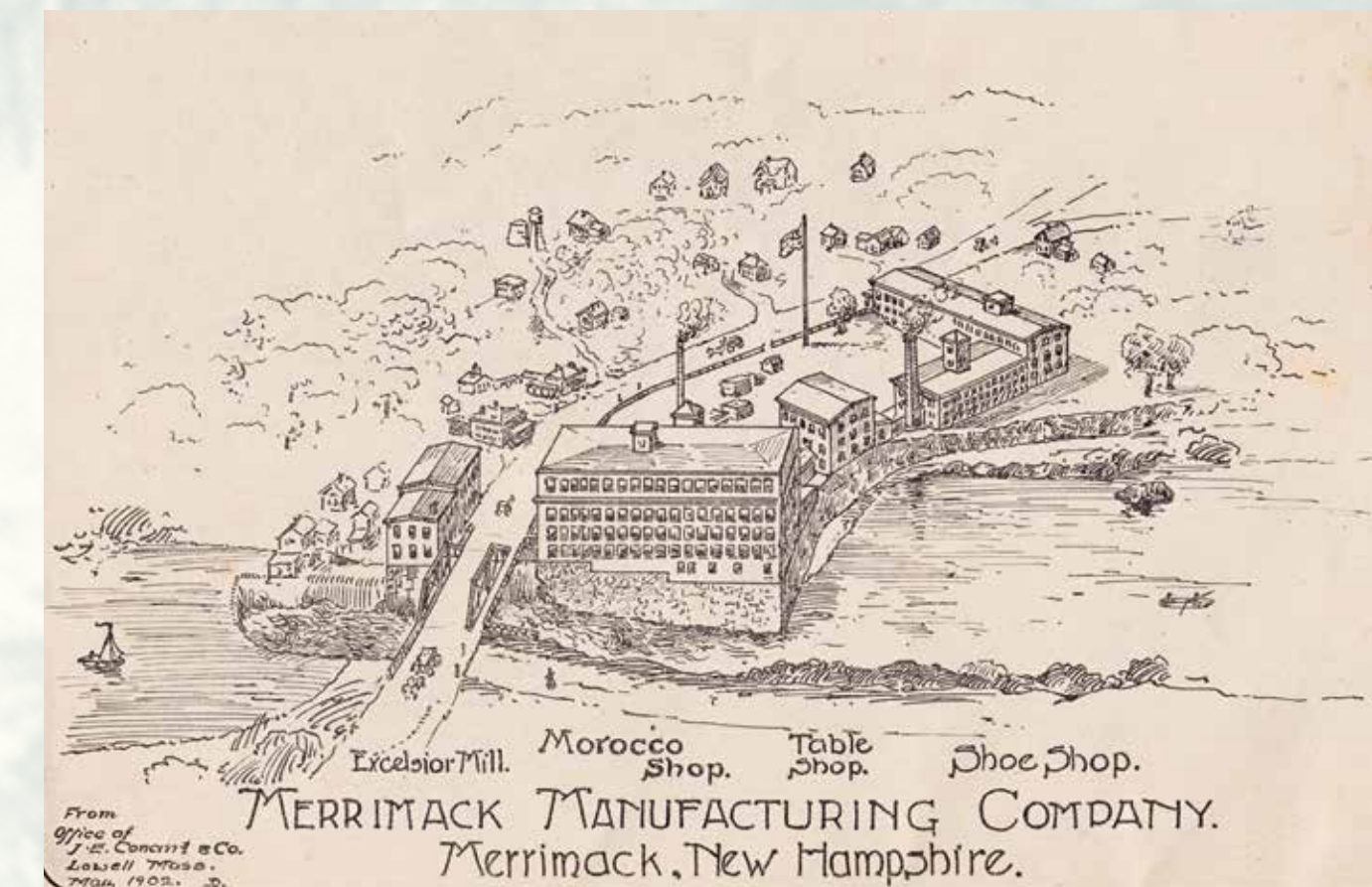
Modern Manufacturing

In the mid-1890s, Gordon Woodbury (1863-1924), a Harvard-educated lawyer, editor, publisher, and politician, purchased a large parcel adjacent to Souhegan Falls. The property included the mills by the river plus some other buildings in the village center. Woodbury not only improved the existing buildings but financed considerable new development in the village. He funded construction of a Morocco (leather) Shop, a Shoe Shop, and new factory workers' housing. The three-story L-shaped Shoe Shop cost \$50,000 to build. A series of shoe manufacturing companies leased the new factory building, primarily under the directorship of Merrimack residents George W. Darrah (1843-1934) and Charles S. Nesmith (1849-1910). The Merrimack Boot and Shoe Company, which manufactured ladies', misses', and children's boots and shoes occupied the building for about a year and had over 50 employees.



1915 Sanborn Fire Insurance Map of the W.H. McElwain Co. Buildings, with general usage information by floor. The tanning vats were in the basement. Library of Congress, Geography and Map Division

Woodbury also financed construction of a four- and five-story building adjacent to the bridge. A. J. Foster Company, headquartered in Boston, leased the building for use as a morocco shop. Morocco is goat hide with a fine pinhead texture. The soft, pliable leather was used for uppers of ladies' shoes and men's low-cut shoes. In 1906, the W. H. McElwain Company, one of the largest shoe manufacturers in the country, purchased the Woodbury land and buildings.



1902 illustration of Woodbury's industrial property in Merrimack Village. Merrimack Historical Society

The company was one of the first in the industry to produce shoe parts, such as heels and uppers, in separate factories. The component parts were then shipped to larger factories, likely in nearby Manchester, for assembly. The Merrimack facility manufactured “granosole,” or non-leather heels for shoes.

Leather Tannery

The McElwain Company converted the former Morocco Shop to a tannery, for shoe sole leather. Tanning is one of the last steps in leather production, to make it pliable. Soaking the hides in a tanning solution converted the raw hides or skin into a stable and more pliable material. This process required considerable quantities of water. That need made the building's location adjacent to the river ideal, with the water supplied through the power canal. In 1919, the company constructed a large addition on the east end of the building. The work included construction of foundations, retaining walls and cement piers (some of which remain visible), a rocker yard with 48 vats, and a new one-story addition. Further alterations occurred in the 1920s and 1930s. A rocker yard contains the first set of tanning vats where the hides are placed on racks in the vats, then rocked back and forth to tan or soften the hides in the tanning liquor.



Undated photograph of Shoe Factory, with later alterations including added tower and new power plant to rear made by the McElwain Company. Merrimack Historical Society

No More Shoes

With business declining after the First World War, McElwain merged with the International Shoe Company, of St. Louis, Missouri. The merger united two of America's largest shoe manufacturers. The buildings' uses remained generally the same, however. International Shoe Company sold the property in 1953. The new owner, Andrew J. Woronka, had various companies which packaged, distributed, and sometimes produced chemicals, in the former shoe factory until 1998. By then the building had undergone considerable change. In 2001, all the buildings were demolished. In 2010, the site was dedicated as Watson Park, in honor of the generous gift of Harold and Barbara Watson.



Photograph of tannery building soon after fire destroyed it on 14 May 1962. Woronka sold the tannery building in 1956 to Gate City Poultry, a chicken processor. At the time of the 1962 fire, the building also housed the Amoskeag Poultry Company. The building remnants were soon demolished, leaving only the vats, retaining walls and concrete piers. Images of America: Merrimack