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Bridging The Lower Falls

by Joseph W. Barnes

The year was 1817. A dense forest of pine and mixed hardwoods covered the lower Genesee Valley, interrupted here and there by miasmic swamps, isolated homesteads, and a few small villages. Among the villages was a new settlement located near the main falls of the Genesee River. Its residents, who numbered something fewer than 1,000 souls, had secured incorporation for the village of Rochesterville from the state legislature in March. Lot-jobbers, millers, merchants, and mechanics -- almost to a man (for indeed, the populace was weighted with young men) the citizenry of Rochester celebrated this fact of legal recognition confident that it marked another step in the progress of their town towards future importance. ¹

"Townsite" was the magic word with which promoters fired the imaginations of ambitious men throughout the epic extension of settlement in the United States. Men with a stake in Rochester were certain that their townsite had real advantages. They were confident because of the site's abundant water power and central location in a rich agricultural region, rapidly filling with migrants. Already the

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merchants and millers at Rochester participated in a brisk commerce, processing frontier products carried downstream on the Genesee and sending the finished commodities -- flour, leather, shingles, and staves -- aboard schooners and sloops to eager buyers in Montreal. Not only did Rochester have its finger on the pulse of the north-south trade artery, it had a favorable prospect over east-west trade and travel as well. One of the crucial elements assuring the town's growth was the frail wooden bridge thrown across the Genesee between 1810 and 1812. The location of this bridge (at the present site of Main Street Bridge) had been determined largely by physical factors. The bridge was easily placed on piers in the shallow rapids, and posed no obstacle to navigation. Its existence warmed the hearts of land holders in the new townsite, notably the three partners from Maryland, William Fitzhugh, Charles Carroll, and Nathaniel Rochester. James Wadsworth, a sort of Yankee *patroon* at Geneseo twenty-five miles to the south, enviously said, "I wish that tract of 100 acres could be purchased of the Maryland gentlemen. The Bridge and Mill seat render it very valuable indeed." ²

Sometimes nature alone dictated the location of cities, as was the case with the colonial seaports and inland cities at the intersections of major rivers, such as Pittsburgh and St. Louis. In other places, engineers and master builders assumed an active role in fixing city locations or assigned the relative size of several cities in a region with the construction of roads, bridges, canals, and railroads. More often than not the urban history of a region reflects a mixture of nature and artifice, as in the story of Rochester and its potential rivals early in the nineteenth century. For, although there was a general supposition among the inhabitants of the Genesee country that its natural prosperity would support the growth of one or more major commercial centers, there was as yet little agreement on the matter of where those cities would be.

Carthage Bridge

In the same year that Rochesterville was incorporated. Elisha Johnson was busily surveying and platting the streets for a new village in a one thousand acre tract about two and a half miles away. Johnson was not one of the principals in the new venture, but had earned a reputation for practical engineering due to his activities at Rochester. On the east side of the river, directly across the wooden bridge from Rochesterville proper, Johnson had purchased eighty acres with the help of a partner, Orson Seymour. To encourage purchasers of lots in the subdivision, the partners constructed a dam above the present (1973) site of Court Street Dam and blasted out a mill race with large amounts of black powder -- providing suitable entertainment for the 1817 Fourth of July celebration. Now Johnson was engaged in another survey, not for himself but for a business associate in Canandaigua who was backing a large scale challenge to Rochester -- the village of Carthage at the lower falls. ³

The Canandaiguan businessman chiefly responsible for launching the Carthage project was Elisha B. Strong, an emigrant from Windsor, Connecticut who had graduated from Yale in the class of 1809. An ambitious young man, he had traveled through the West, and, seeing the opportunities of the frontier, opened a law office at Canandaigua in 1813. In 1816 he persuaded a few men in that village to join with him in the purchase of land at the lower falls. The land, bought in two successive parcels from Caleb Lyon, formed an elongated section bounded on the west by the Genesee River gorge. With reference to present streets, the tract lay between Clifford Avenue and Ridge Road. ⁴ There was little about the physical appearance of the place at the time to suggest the likelihood of a metropolis befitting the grand name of "Carthage."* (see page 4) Numerous accounts say that the woods in the vicinity of Rochester harbored wolves, bears, and wildcats. The area was particularly well endowed with rattle-

snakes, which were fond of nesting in the rocks and scrub in the river gorge. A plentiful wilderness diet no doubt accounts for the fact that the snakes were sometimes six feet long and as thick as a man's arm.⁵

Undaunted by the wildness of the land they had purchased, Strong and his friends based their optimism on what they felt was the favorable location of the projected town near existing trade routes. In 1804 the merchants of Canandaigua had commissioned the opening of a road which ran irregularly northwest from Canandaigua to the foot of Irondequoit Bay; later, this route was extended to connect with the lower Genesee and the mouth of the river.⁶ More importantly, the "Great Ridge Road," a natural highway which had proved its utility during the War of 1812, was on the northern side of Carthage. The Ridge Road was regarded by contemporary observers as an unparalleled natural wonder and providential stimulus to the settlement of western New York. The smooth broad crest of the Ridge carried an east-west traffic of migrant families and heavy freight wagons which increased year by year.⁷ Strong hoped that Carthage would intercept the Ridge Road traffic that now turned south to cross the river at the Rochester bridge. One "small" obstacle intervened -- the gorge cut by the falls which at Carthage was some two hundred feet deep. An indication of the proprietors' plan to overcome this obstacle appears on Elisha Johnson's Map of the Village of Carthage, drawn in 1817. A little less than midway up the western side of the village map, Johnson drew a short street leading to the precipice and labeled it, in a small and timid hand, "Bridge Street."⁸

By the following year Strong and his associates had begun selling lots and persuading others to join in the improvement of the place. In March, 1818, there were already some forty

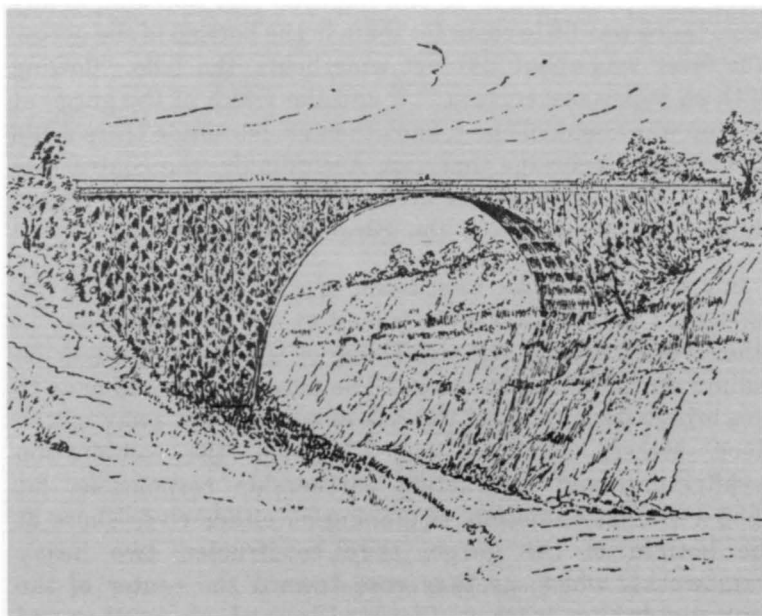
*Admiral Franklin Hanford, in "Origin of the Names of Places in Monroe County," Rochester Historical Society **Publications**, Volume V (1926), p. 66, asserts that the name "Carthage" may have been the inspiration of a pioneer with a scholarly turn of mind. In Phoenician, the language of the builders of the ancient city in North Africa, the name meant "new town."

dwellings, mills, and warehouses on the high bank and on the river flats in the bottom of the gorge. An ingenious inclined railway, counter-weighted and powered by a horse treadmill, provided communication between the upper and lower parts of the settlement; it was also useful for the transference of goods carried on sailing vessels tied up at the landing below. Now the proprietors were prepared to take the boldest step of all. Organizing themselves as the Brighton Bridge Company, they had petitioned the state legislature the previous winter for a loan of ten thousand dollars and permission to erect a toll bridge. The bridge builders eventually spent six thousand dollars of their own in addition to the state loan -- which was secured by liens on their property. ⁹

Work began in May, 1818. Since the intention of the Bridge Company was to build a *high bridge*, that is, one that would carry traffic at the grade of the Ridge Road and the upper part of Carthage, it was not practical to construct it on piers; the piers would have had to be two hundred feet tall, and, in any case, there was little room for them in the bottom of the gorge. The river was about 120 feet wide below the falls, "flowing with an impetuous current," ¹⁰ and the width of the gorge at the top was about 700 feet, bank to bank. No single truss could be expected to bridge that gap. Accordingly, the contractors decided on a great round arch to be constructed of braced timbers, reaching across the gorge in a single span.

But how were the two sides of the great arch to be supported before they were joined at the middle? How, in other words, could a tall scaffolding of sufficient strength be built in the middle of the gorge? The false-work would have to be a bridge itself to avoid the risk of being swept away by the river. Messrs. Brainard and Chapman, the combination architectural and contracting partnership responsible, hit upon a dramatic solution. Beginning on either river shore at the bottom of the gorge, they constructed two heavy frameworks, which, as they rose toward the center of the projected bridge, were cantilevered toward one another and finally joined in a pointed, or Gothic, arch. After the rounded, or Roman, arch of the bridge itself had been built upon this false bridge, the Gothic arch was disconnected. ¹¹

All of the work on the bridge occupied the short space of nine months and the labor (on the average) of twenty-two workmen. It required 69,513 feet of pine timber, besides 20,806 feet for the false bridge, and weighed 200 tons. The arch was formed of nine ribs, each two feet four inches thick, connected by braced levelers above and below and secured by 800 iron bolts. The feet of the arch, which boasted a chord of almost 352 feet and rise of 54 feet, rested on rock about 60 feet below the edge of the cliffs. The roadway was 718 feet long by 30 feet wide, and was not quite 200 feet above the water's surface, by actual measurement. The *Rochester Telegraph*, which announced its opening on February 16, 1819, said that "the whole structure is braced and bound together in a manner so compact as to disarm even cavil of its doubts." Loaded teams of up to 13 tons passed over it and produced "very little" perceptible tremor. ¹²



Carthage Bridge, 1819

The wooden arch bridge at Carthage was an impressive accomplishment, both because of its size relative to similar structures elsewhere and because of the difficult circumstances of its construction. Contemporary accounts invariably compared the Carthage Bridge to what was believed to be its closest rival, a famous wooden bridge over the Rhine at Schaffhausen, Switzerland.¹³ The Schaffhausen Bridge was in fact an ugly, ponderous structure built in two spans of 171 and 193 feet with a nonfunctional central stone pier. It was built in 1755 and destroyed during the wars of the French Revolution in 1799. Actually, the commentators needn't have looked as far away as Switzerland for a point of comparison with the Carthage Bridge. In 1812 the brilliant German immigrant, Lewis Wernwag, built an arched truss bridge called the "Colossus" over the Schuylkill River at Fairmount, Pennsylvania. The Colossus boasted a clear span of 340 feet beneath its graceful, roofed-in arch. It was still standing when the Carthage Bridge was built, but was destroyed by fire in 1838. *¹⁴

The fact that the Carthage Bridge compared favorably in size with other examples of the bridge builder's art is but one aspect of its remarkable story. Equally astonishing is the fact that it was built at all, given the frontier conditions and resources of the lower Genesee Valley in 1817-1819. To be sure, wood was plentiful in the pine forest of Northwest Irondequoit, and it could be sawn at a new lumber mill adjacent to the lower falls. The assembly of the bridge, however, was probably done without the aid of power equipment; one must imagine the efforts of the handful of workmen who hoisted 200 tons of timber into place with block and tackle.

Another handicap that the builders of the Carthage Bridge endured, and one that was even more serious, was their own lack of mechanical science. We know tantalizingly little about the designers of the bridge, but we can be certain they possessed nothing of the formal training or knowledge

*The Colossus was not as large as the Carthage Bridge, either in main span or in overall size, nor was it built in a deep gorge.

associated with the modern practice of civil engineering. Rensselaer Polytechnic Institute, the first school of its kind in the United States, did not begin granting engineering degrees until 1835. The renowned early American bridge builders like Wernwag, Timothy Palmer, and Theodore Burr possessed the skills of master builders and inventive talent (Palmer and Burr rediscovered the truss), but not the theoretical knowledge which would have permitted them to compute weights and forces with precision.¹⁵ Bridge building during this period was more closely allied with the craft of the carpenter than with any science. The state of affairs is illustrated by the anecdote about the contractor who asked one of his best men how he determined the size of timbers. "I have an infallible rule by which to determine and decide such details," replied the man. "I first take the average judgement then guess and allow."¹⁶

One of the earliest reports we have that something was wrong with the Carthage Bridge is contained in an account by the young Englishwoman Fanny Wright, who, like many tourists through the American frontier in the summer of 1819, made a special point of seeing the bridge that natives were calling "the eighth wonder of the world." She was duly impressed by the falls of the Genesee and thought they were "well worth going fifty miles out of your way to look at." On reaching the lower falls, she reported she found them the most picturesque of all and that the dramatic effect was increased by the "stupendous bridge, thrown across the chasm." Displaying that independence of spirit which later helped her to become a pioneer feminist, Miss Wright climbed partway down the framework of the bridge to a narrow shelf on the rocky wall of the gorge. From this precarious vantage point she looked up at the massive timbers and saw, to her horror, that the center of the arch was badly sprung, with some of the beams seeming "to rest on a hair's breadth." Momentarily panicked at the thought of being crushed, as she later recalled, she froze on the spot and made a very gradual retreat. After regaining high ground, Miss Wright crossed the bridge and discovered several heavy logs placed on the weak spot to prevent further damage.¹⁷

The flaw in the design of the bridge was that the crown of the arch was too lightly constructed to withstand the inward pressure of its two sides. The timbers at the center were gradually pushed up, although the bridge owners placed twenty or thirty tons of stones alongside the logs Fanny Wright observed. Fifteen months after completion of the bridge, on May 22, 1820, the strained timbers caught in this contest of equilibrium gave way. The counterweights on the bridge were thrown sixty feet in the air and half the arch collapsed into the river. ¹⁸

The fearful crash of the great bridge produced one casualty -- the optimism of the Carthage promoters. Their financial resources depleted by the loss, and hounded by state authorities who wanted the ten thousand dollar loan made good, ¹⁹ Strong and his associates were in no position to replace the high bridge. Instead, they commissioned a far more modest structure on piers at the bottom of the gorge above the lower falls. Area residents were contemptuous of the replacement. The second bridge seemed like a feeble gesture compared with its grandiose predecessor; moreover, the necessity of descending into the gorge to cross the river was inconvenient to say the least. Few mourned the low bridge when it was washed away in the spring flood of 1827. ²⁰

Meanwhile, the Erie Canal had been completed to Rochester in 1823. The location of the Canal's intersection with the Genesee River was influenced by some of the same considerations that affected the Main Street Bridge -- namely, the relative ease of placing piers for an aqueduct in the shallows above the main falls. The coming of the Canal insured the continued boom town growth of Rochester and mooted all the plans of the Carthaginians. Carthage, or Clyde as it was now sometimes called (owing to the official designation of its post office) was soon clearly reduced to the status of Rochester's satellite. In 1834, an act of the state legislature

granting Rochester its first city charter redefined the municipal boundaries and the Carthage tract was annexed to the city. "Carthage" survived for a generation or two as a designation for the area it once occupied, but gradually the name passed from currency. There is today a Carthage Street and a Carthage Drive in the old tract, and a monument honoring the village pioneers at the intersection of Ridge Road and St. Paul Street. Nearby, Strong Street commemorates the name of the chief proprietor of Carthage. Norton, Beach, and Hooker Streets are named after his associates in the venture.

Genesee Suspension Bridge

Events moved swiftly during the thirty years following the fall of the great wooden bridge. Rochester grew with astonishing rapidity, reaching a population of over 36,000 in 1850. Although the city's boom town growth had been interrupted by the national depression of the late 1830s, prosperous times had returned by the end of the period. In the state census of 1855, Rochester's population was reported to be nearly 44,000, representing a 20% increase in five years.²¹ Rochester had become the Flour City, a principal center for the milling and transshipping of cereals grown throughout western New York and in some parts of the midwest. Moreover, the city had become an attractive location for factories engaged in a variety of manufacturing operations. Among the products they turned out were stoves, agricultural machines, steam engines, cotton cloth, and tools of all kinds.²²

The diverse manufacturing concerns which now appeared in Rochester reflected large-scale technological and economic changes affecting the very fabric of western civilization. In the early 1850s the world as a whole was nearing the middle of that rather hazily defined era, the industrial revolution. At the midpoint of the century the chief symbols of industrialization were the railroads -- connecting most of the principal cities in the United States but not yet integrated into regional

networks, the steam engine -- often found in factories, as in Rochester, supplementing rather than replacing the still-dominant water power, and iron -- now beginning to replace wood for a variety of structural purposes.

In the 1850 s Rochester's leaders were beginning to accept greater responsibility for numerous community shortcomings which could be alleviated by physical improvements -- and by the larger tax levies necessary to pay for them. In the preceding decades the city's large taxpayers, whose wishes carried substantial weight in the common council, had held public outlays to a minimum. Within wide variations the city's annual tax levy represented about two or three dollars *per capita*, although in several years it was less than one dollar. ²³ As a result, the city's physical condition and level of public services were, by modern standards, astonishingly poor. The city's unimproved streets became quagmires in wet weather. Its poorly equipped volunteer firemen, with no water mains to tap, were helpless against major conflagrations which routinely leveled whole blocks. Worst of all was the state of public sanitation. Only a few streets were served by sewers, and these were poorly constructed; one result was a high mortality rate from epidemic diseases. (As bad as Rochester's conditions were, however, they were by no means atypical of American cities before the Civil War.)

Among the city's deficiencies which caught the public attention was the need for new bridges. The wooden Main Street Bridge of 1812 had been rebuilt twice, but now in the early 1850s was again dangerously rickety and in need of replacement. The same was true of two other bridges, at Court Street and Andrews Street, which had been built in 1826 and 1839. These, too, had been constructed of wood and proved a false economy. Since the low bridge at the lower falls had not been replaced, and since only one other bridge, a wooden truss at Clarissa Street, had been built in the 1840s, a

great deal depended on the intermittent service provided by the three unsafe bridges downtown. ²⁴

To meet this and other challenges, aldermen reluctantly began raising taxes to pay for a range of public works. The new program was not implemented suddenly. It was more akin to a gradual transformation in public policy; but it resulted in a doubling and tripling of the tax levies which had prevailed in the 1830s and 1840s. Important streets which had been rivers of mud in the spring were now paved with limestone. Drainage, though hardly perfected, was greatly improved. New fire equipment was purchased and fire "reservoirs" (cisterns) were installed, although the common council was still reluctant to commission an adequate water system. In addition, the city now turned its attention to the problem of bridges. Between 1850 and 1860 four new bridges were built: iron bridges at Court Street and Andrews Street, since replaced, a stone bridge at Main Street still in service, and the Genesee Suspension Bridge.

The idea of a new high bridge at the site of the old Carthage Bridge was first raised in a letter to the *Daily Advertiser* in April, 1851. The letterwriter, who identified himself only as "Ontario," asked that in view of "bridges being thrown across the Niagara . . . without stint or question" why was it not feasible to bridge the Genesee gorge? He recalled the old Carthage Bridge, misleadingly called it a "*Wooden Suspension Bridge*," and lamented its fall. "From that day to this," Ontario said, "the people living East and West of the River, and North of the city, have been obliged to come to the city, to get across the river." The editor of the *Advertiser* agreed with the proposal, suggesting it deserved some scrutiny. ²⁵

Ontario's reference to bridges across the Niagara was occasioned by work on a suspension bridge being built across

the Niagara gorge below the famous falls. The original engineer for the Niagara span was Charles Ellet, who had completed the first important cable supported bridge at Wheeling, West Virginia, in 1849. Following a dispute with the directors of the bridge company, Ellet resigned and was replaced by John A. Roebling, who was then at the midpoint of his career. Roebling completed the Niagara bridge in 1855. Later, he reconstructed Ellet's Wheeling Bridge and built suspension bridges at Pittsburgh and Cincinnati. His greatest achievement was the design he submitted in the late 1860s for a bridge across the East River between Brooklyn and New York City. Construction of the Brooklyn Bridge, which was supervised by his son Washington A. Roebling, was not completed until 1883. ²⁶

In 1855 the city's common council and the county's board of supervisors reached an agreement on a bridge building program, with the city assuming a major share of the cost. The plan included replacement of Main Street Bridge with the present stone structure and construction of a suspension bridge at Carthage. The initial estimate of the cost of the suspension bridge was \$17,000, with \$5,000 to be paid by the county, \$5,000 by the city's general tax, and \$7,000 by a special assessment on the property owners at either end of the bridge. ²⁷ While it might seem extraordinary to define a bridge as a "local improvement" -- particularly one that was being funded in part by the general tax of the city and county -- there were several instances of this procedure during the nineteenth century.*

*Including, for example, assessments for the Clarissa Street Bridge in 1844 and the Vincent Place Bridge in 1870. The tax rolls for these bridges are among those that were recently uncovered by the City Historian's Office during a program of cleaning and cataloguing the city's special assessment rolls; there are tens of thousands of such rolls bound in over one thousand volumes. One difficulty in levying a special assessment for a bridge was the problem of assigning the

The engineers chosen to execute the work on both the suspension bridge and the new Main Street Bridge were the local partnership of William Kauffman and Josiah W. Bissell. Tradition assigns Bissell the principal role in designing the suspension bridge. Bissell, age 37, the son of a pioneer miller and ardent reformer, was said to possess unusual vitality along with unbounded optimism. Whatever the truth of this characterization, factual details of Bissell's career seem to bear it out. Entering business as a clerk in a Geneva bank with little or no formal education, he rose successively in rank to become cashier in a Rochester bank and finally a banking partner. During the 1840s his interests shifted toward architecture and practical engineering. Again, although there is no evidence of formal training in these fields, Bissell made a good accounting of himself. He erected several houses in the vicinity of East Avenue, assisted in the construction of the second Erie Canal aqueduct, and launched the first propeller-driven steam boat built at Rochester. Leaving Rochester in 1857, Bissell traveled to St. Louis where he submitted a design for a suspension bridge over the Mississippi. At the outbreak of the Civil War Bissell organized an Engineering Regiment at St. Louis and henceforth was known as Colonel Bissell, a man who had given valuable service at the siege of Vicksburg. After the war he pursued two more careers, as a merchant in Mississippi for twelve years, and finally an organizer of a title-search business in half a dozen northern cities. ²⁸

While no solid evidence exists to confirm the supposition, it is easy to believe that Bissell spent some time visiting John A. Roebling at the site of the Niagara Suspension Bridge. The proximity in time and place of the Genesee and Niagara Bridges suggests more than coincidence. Certainly a young engineer with the mercurial personality of Bissell would not

geographic area in which benefitting property owners were supposed to reside. The boundaries of the assessed area were always more or less arbitrary and generated endless arguments.

permit 70 miles to keep him from witnessing one of the great mechanical feats of his time. For that is what the Niagara Bridge was -- a symbol for its time, as, on a larger scale, the Brooklyn Bridge would be thirty years later.

In his design for the Genesee Suspension Bridge Bissell displayed the same concern for vertical stability which characterized Roebling's designs. The bridge at Wheeling, West Virginia, which Roebling rebuilt, had destroyed itself in a high wind by undulating from end to end. To lessen this type of instability Roebling stiffened the roadbeds of his suspension bridges and added a network of diagonal stays between the main cables and the floors. The diagonal stays account for the weblike appearance of the Brooklyn Bridge. The same device was used by Bissell, who went even further by attaching stays from the bottom of the Genesee Bridge to the rocks in the gorge below. To some critics, the stays underneath seemed to reinforce an impression of fragility -- the bridge was said to have a "spider-web appearance." According to Bissell, however, these guy wires were a decided advantage. As he told *Moore's Rural New Yorker*, "*More than a mile (6,000 feet) of wire cable has been used for this purpose, and the effect is such that the highest winds do not move the floor of the bridge half an inch.*" ²⁹

Another of Bissell's innovations was the substitution of cast iron for masonry in the construction of the support towers. There were four towers, two for each side, built on natural terraces a little below the edge of the gorge. Each tower was formed of four cylindrical columns made of cast iron, bound and braced together with wrought iron bars. The cast iron "pipes" used to form the cylindrical columns were a foot in diameter and thirteen feet long in section -- castings of unusual size for the time. ³⁰

Work on the Genesee Suspension Bridge was begun late in 1855. It was first opened to the public in July, 1856, closed soon after for safety reasons, reopened after additional work had been done, and again officially closed early the next year. Throughout its rapid construction and brief life-span the bridge was an object of controversy. In an age when political passions were volatile, any municipal project was liable to become inmeshed in partisan politics and suffer sharp criticism from individuals on the alert for waste of tax monies. The engineering difficulties that beset the bridge were equalled if not exceeded by its political travail.

A letter to-the-editor signed "Carthaginians" and published in the *Daily Union* when construction was in its first stages said that "it will be a bridge of *suspense*, emphatically so to all who will have the temerity to cross it." Charging that the bridge suffered *general debility* and *nervous tremor* in its infancy and that it had been restored to "apparent good health by the use of *nostrums, braces, bandages, etc.*" the letter writer predicted that it would not stand for twelve months.³¹ The misapprehensions of critics were not relieved when, on November 16, the common council ordered a change in plan to move the western terminus of the bridge a few dozen yards south of its intended location. The change was made so that the bridge would line up with McCracken Street (Driving Park Avenue), but it necessitated increasing the length of the bridge by 50 feet and its cost by \$4,800. A spokesman for the Fifth Ward, the northeastern quarter of the city which contained many working class residences, charged that if the recent modification had moved the bridge a mile south, it would then have been a *public* improvement. The merchants and mechanics of the Fifth Ward were daily risking their lives crossing a railroad bridge to their places of work, said the critic, while "a large portion of this section of the city is taxed to build a bridge across the Genesee, at a point where it is of no more practical utility to them than a suspension bridge

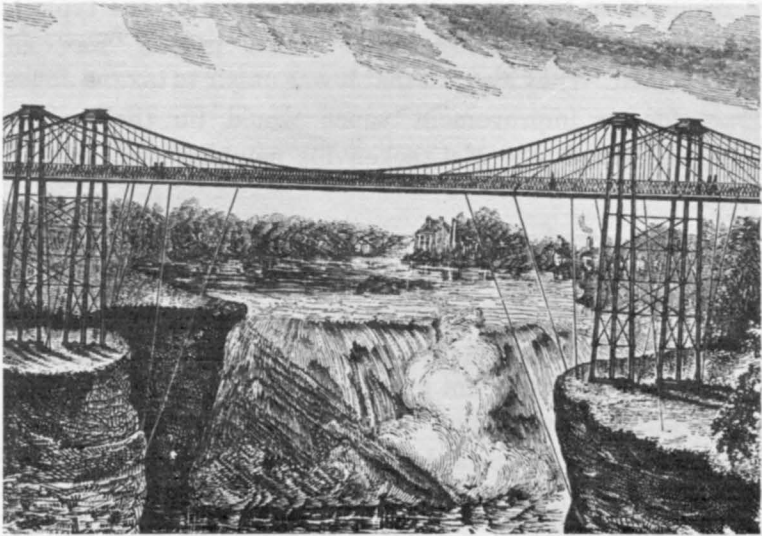
across the Rhine or Danube would be." Taxpayers groaned shortly after this protest was published when it was reported that two of the bridge's iron columns under construction on the east bank had fallen, with a loss of \$2,000. ³²

Disbelief in the ultimate value of the bridge was reinforced by this and other construction setbacks. While Bissell worried all through the winter over uncertainties in its novel design -- so much so that friends began calling it the "Bridge of Sighs" -- property owners on both sides of the river began protesting the tax assessment for its construction. ³³ A protest meeting of residents of the Jones Tract on February 19 was typical. Speakers emphasized that the whole project was an "experiment." They also felt that it was unfair to tax the Jones Tract for an improvement which would (in their view) primarily benefit the McCrackenville neighborhood. ³⁴

As the assessed property owners began to actually withhold payments, the common council, which had already borrowed money to pay the bridge contractor as work progressed, found itself in an embarrassing position. The Suspension Bridge was not the only improvement giving trouble; revisions in design and delays in construction were forcing the cost of the new Main Street Bridge upward as well. The twenty-man common council which convened in April 1856 appointed three of its members as a special committee to supervise work on the bridges. Henceforth the special Bridge Committee assumed a very active role, engaging Professor Quimby of the University of Rochester as their adviser and making repeated inspections and written reports. ³⁵

Having worked with remarkable speed, Bissell declared the Suspension Bridge ready for first crossing in July, 1856. "A sure footed and well trained horse favored the experiment," said the *Democrat* on July 31st, "which those who tried it successfully do not recommend to others." The wooden

roadway, only 19 feet wide and 755 feet long, must have seemed like a narrow ribbon stretched 208 feet above the floor of the chasm. In a fresh wind the bridge swayed a good deal. Although Bissell calculated the supporting power of the iron bridge cables and overhead stays as 1,000 tons, and the dead weight of the floor at only 150 tons, ³⁶ he agreed with the Bridge Committee that additional stays were needed to lessen the sideways motion. During the month of August workmen connected extra wire ropes between the bridge and the rocky gorge.



Genesee Suspension Bridge, 1856

In September the Genesee Suspension Bridge was opened a second time. Much of its undesired flexibility was apparently eliminated, since traffic on the bridge gradually increased. In October, Mayor Samuel G. Andrews and a party of officials crossed the bridge and judged it safe. Still, however, the city was not willing to accept the bridge as fulfillment of the contract requirements. ³⁷ The Bridge Committee declared that it had not been built according to specifications, and

prepared a list of nine specific short-comings. According to the Committee, the cables were not properly anchored at the east end; certain stone walls and wooden detail work were omitted; several stays were anchored in the river bed below the level of high water. The trucks (saddles) at the top of the towers designed to carry the cables and move with their expansion and contraction were inoperative, causing the towers to vibrate whenever the cables were strained by a weight on the bridge. The roadway was undulating and irregular, spoiling the symmetry of the bridge and giving it an "unworkmanlike" appearance. ³⁸

The common council's refusal to accept the bridge eased the special assessment problem; the tax roll was quietly laid aside and the assessment never collected. Since Bissell's contractor had been paid in installments as work progressed, little protest was heard from that quarter. As for the general public, opinion remained divided over whether the bridge was safe. Early in November the *Daily Union* observed that the bridge had withstood a week of gale-like winds without damage -- but the same newspaper urged that steps be taken to prevent fast driving over it. ³⁹ Accordingly, on November 25 the council published an ordinance limiting the speed of persons, animals, and vehicles on the bridge to a walk. Even fire engines were so restricted. Bridge speeders faced a stiff penalty of twenty-five dollars, while the fine for marching in groups larger than five or playing martial music on the bridge was fifty dollars. ⁴⁰

As the Bridge Committee had feared, several stays at the base of the gorge were swept away by ice during high water in the spring of 1857. Once again the bridge was (officially) closed. Some brave souls continued to cross it, however, including teamsters with loaded wagons. Horace Hooker, a prominent resident of the Carthage tract, was moved to declare publicly that the Suspension Bridge was the "safest in the area." ⁴¹

On Sunday morning, April 19, it began to snow. At first the snow tended to melt in the relatively mild spring temperatures, but by Monday evening the temperature had dropped and up to a foot of slush and heavy wet snow lay on the ground. The freakish storm stopped at 10:00 A.M. on Tuesday the 21st. Sometime in the dark early hours of that morning the Genesee Suspension Bridge fell, unseen, and unheard save by one watchman who thought there was a crash in the night. ⁴²

In the light of day some five thousand citizens made their way to the lower falls to view the spectacular ruins. All were relieved to hear that no one was hurt in the disaster, and several individuals put in conflicting claims to be the *last* person who crossed the bridge. Men fashioned canes from the suspension wire and pulled other souvenirs from the wreckage. Among the crowd were newspapermen who retrieved parts of the bridge for clues to an explanation for its destruction. It was noted that the main cables had been completely pulled from the anchorages at the east end and from the south abutment at the west end. ⁴³

The *Democrat* pointed this out and emphasized the severity of the snowstorm to account for it. Estimating the snow load on the roadway at twelve pounds to the square foot, the *Democrat* calculated the total load to have been fifty tons. The *Union*, now merged with an older daily as the *Union and Advertiser*, took a sharper tone. Although it conceded that the snow load was severe, and set the estimate as high as 150 tons, the *Union and Advertiser* felt that poor construction was to blame for the bridge's failure. The reason the cables had pulled out of the anchorage, said the paper, was that one or more of the iron towers had snapped:

The towers were made in an inferior manner and were not as strong as they appeared to be. We noticed that one of the columns broke at a point where it had been patched by a piece of boiler iron

Three years later news of the collapse of the Pemberton Mills at Lawrence, Massachusetts reached Rochester. The frightful disaster took the lives of nearly two hundred laborers. The multi-story Pemberton textile plant was a fairly new structure, built with cast iron columns in place of wood to support vertical loads. The *Union and Advertiser* supposed that the fall of the Suspension Bridge would "be recollected by many of our citizens (especially by those who pay taxes)." The probable cause for both structural failures, said the paper, was defective iron castings. It then printed a lengthy discussion of the difficulties of casting large hollow pieces of iron; when making an iron column, the central core of the mold was liable to drift, causing one side of the finished product to be thick and the other side thin. In the case of the bridge columns -- pieces of which were still in the newspaper office -- the castings in some places were no more than "a mere shell." ⁴⁵

Interest in such technical matters was characteristic of the time. Before civil engineering became an abstruse science, it was possible for anyone, even a committee of aldermen or a newspaper editor, to make serious pronouncements about the merits of a bridge design or the reasons for a structural failure. The era passed quickly, even as mass-produced steel began to replace treacherously brittle cast iron as the chief material to support large structures.

By 1890 the erection of great bridges seemed almost routine, so much so that the opening of the present Driving Park Avenue Bridge caused little comment. The bridge rests on a single arch with a span of 428 feet. The single arch is somewhat reminiscent of the old Carthage Bridge, but there the similarity ends. The Driving Park Bridge, designed by L.

put on the inside and riveted to the casting. This piece of patch work was made in consequence of a crack around the column and to save recasting. How many of these columns were thus patched we cannot say. ⁴⁴

L. Buck and erected by the Rochester Bridge and Iron Works, contains 900 tons of wrought iron and steel. Its arch is hinged at either end and in the middle to allow motion from temperature change and live loads. ⁴⁶ The bridge has provided 83 years of service. Although alarms for its safety during the 1960s brought temporary closures and permanent traffic restrictions -- neglect had caused some deterioration -- the bridge stands today as a monument to nineteenth century progress in civil engineering.

Notes

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32. **Daily Union**, November 22, 28, 1855.
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35. **P.C.C. 1856-57**, p. 31 (May 20, 1856) and **passim**.
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37. **Daily Union**, September 15, 20, 1856; **Daily Democrat**, October 22, 1856.
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