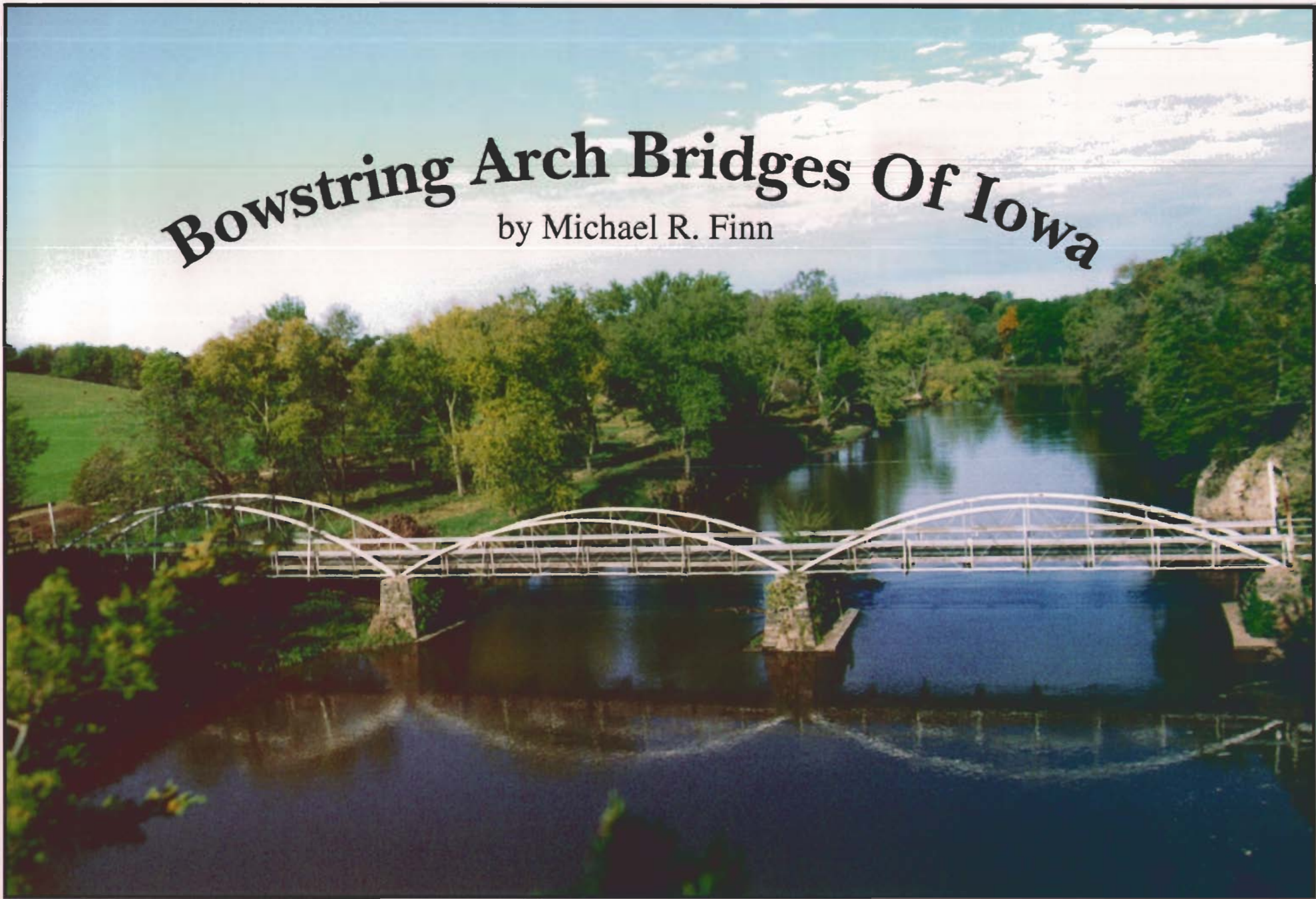


Bowstring Arch Bridges Of Iowa

by Michael R. Finn



Bowstring Arch Bridges Of Iowa

1. Allamakee County

Monsrud Bridge pg. 20

2. Bremer County

Green Mill Ford Bridge pg. 21

3. Crawford County

Beaver Creek Bridge pg. 22

Buck Grove Bridge pg. 23

East Soldier River Bridge pg. 24

Nishnabotna River Bridge pg. 25

Nishnabotna River Bridge (#2) pg. 26

Yellow Smoke Park Bridge pg. 27

4. Dubuque County

Washington Mill Bridge pg. 28

5. Jones County

Fremont Bridge pg. 29

Hale Bridge pg. 30

Corbett's Mill Bridge pg. 39

Lower Road Bridge pg. 41

Scotch Grove Coon Hunters' Bridge pg. 42

6. Montgomery County

Nodaway Bridge pg. 32

7. Poweshiek County

McDowell Bridge pg. 33

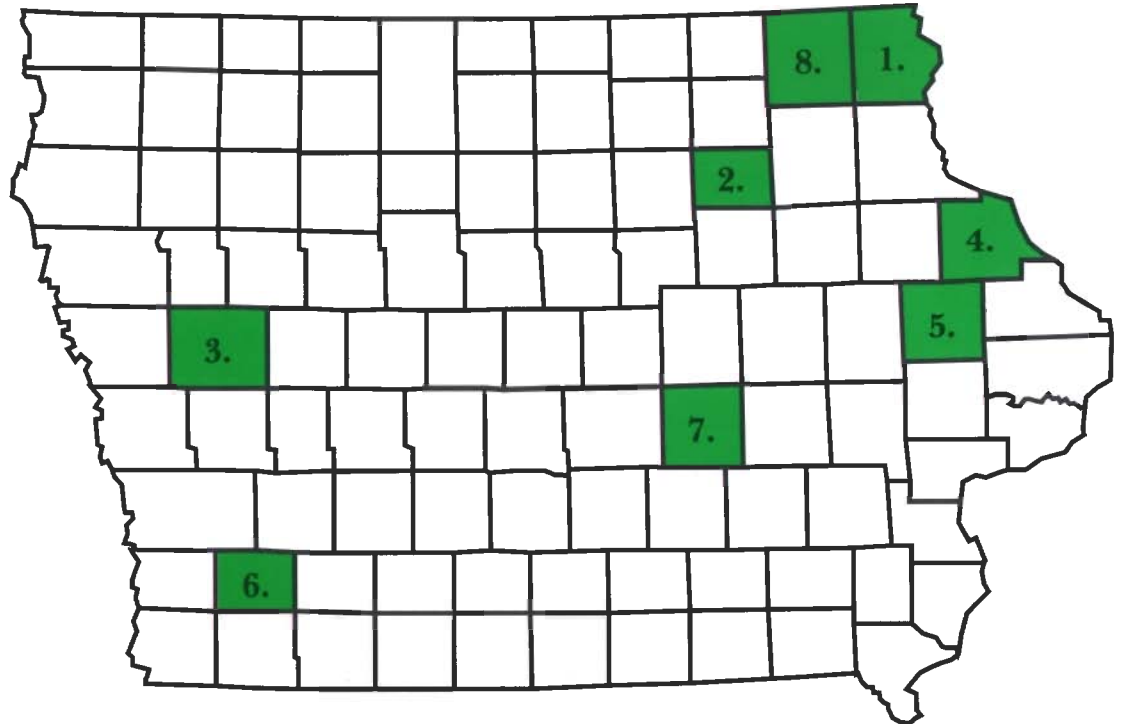
8. Winneshiek County

Eureka Bridge pg. 34

Freeport Bridge pg. 35

Gilliece Bridge pg. 36

Turkey River Bridge pg. 37





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by **Michael R. Finn**

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Introduction

Iowa's bowstring arch bridges represent a legacy of the early history of the state. These bridges today are considered historically significant resources because of the role that they played in early transportation systems of Iowa. Their graceful forms provide a reminder of the economy and elegance of bridge technology in the late 19th century.

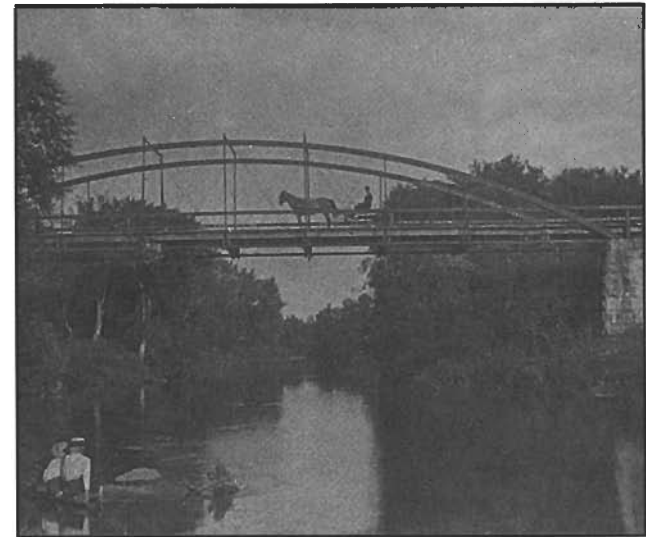
Some counties in Iowa have taken steps to preserve the last remaining structures for future generations to study and appreciate. While at one time there were hundreds of these bridges in Iowa, only 20 now remain, extending across the state from the Mississippi to the Missouri Rivers. These bridges are located in eight counties: Allamakee, Bremer, Crawford, Dubuque, Jones, Montgomery, Poweshiek, and Winneshiek.

To preserve the history of these bridges, the Iowa Department of Transportation, in conjunction with the Federal Highway Administration, the State Historic Preservation Office of Iowa, and the eight counties with remaining bridges authorized publication of this booklet. This publication was written to record the history of the bridges and relate the stories of those who built them. All of the bridges will undoubtedly be replaced in future years. Even if the bridges were completely refurbished, the inherent weight limits of their original design means that they could carry only a fraction of modern-day traffic.

Many state and county officials, in cooperation with local preservationists and county historical societies, are working toward preserving these last few historic bridges. This booklet is intended to document the final vestiges of these once common forms.



Horse drawn carriage over unknown Jones County bowstring arch bridge (possibly the Buffalo River Bridge), circa 1900. Photographer and date unknown. Photograph from the personal archives of Bertha Finn.



A view over the Buffalo River in Anamosa. Photographer and date unknown. Photograph from the personal archives of Bertha Finn.

Iowa in the 1870s

When John H. Gear was established in office as Iowa's 11th governor on January 17, 1879, he faced several major problems. On the one hand, a huge influx of immigrants into the state had caused the population to swell by almost a million people in only 20 years.¹ On the other hand, much of the country was still feeling the effects of the "Panic of 1873," as it came to be called. This economic slowdown left a legacy of high unemployment and low wages. For an agricultural state like Iowa, it caused prices that farmers received for livestock, grain, and produce to fall to record lows.²

There was little Governor Gear could do directly to alleviate the plight of the farmers, but he realized he could improve the transportation network within the state to ease problems with getting goods to market. Perhaps the greatest challenge was Iowa's road system. In a letter to the state legislature, Gear strongly criticized the deplorable state of Iowa's roads and the laws that inadequately delegated responsibility for maintaining them:

The condition of the roads is such at times as almost to forbid travel, and thus bring nearly to a standstill the large amount of business transacted upon the highways. This subject needs your attention. The present system of working the roads by a heedless and almost aimless army of over ten thousand supervisors is radically unsound. The infinitesimal

*road districts, with their attendant dissipation of responsibility and utter want of system, along with the practice of paying taxes with what is called labor on the roads, ought to be remorselessly annihilated.*³

Given that many roads were little more than simple, rutted, dirt trails, there was little Gear or anyone else could do. As William H. Thompson described the situation, "A wagonload of 3,000 pounds was a heavy load. A trip of 10 miles was a long journey, and to travel 20 miles was a full and hard day's work."⁴ The overall problem with the roads would prove to be almost intractable until decades later when new paving technologies and new state organizations were created to deal with the predicament. Local officials were well aware of the problem and were dealing with the difficulty as best they could.

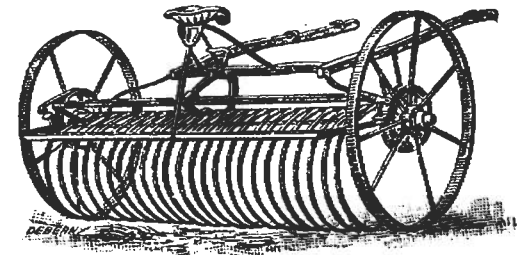
For officials at the county level, the situation was not much better. In Jones County, for example, the road system was under the stewardship of township trustees, 16 in total. County officials found that they had little control over these trustees, and little say in road maintenance projects.

One area, however, where progress could be made was with Iowa's bridges. The counties were responsible for providing funding for major bridge projects. In Jones County, the Board of Supervisors, composed of three elected officials (changed to five in 1872), faced the perennial problem of having too many streams that required too many bridge projects and not enough funding to build them. The situation had

become so severe by 1879 that the Board actually passed a resolution that stated that, even though the county had assisted with the construction of bridges less than 30 feet in length, these were not to be considered county bridges and must be maintained by the road districts in which they were located.⁵

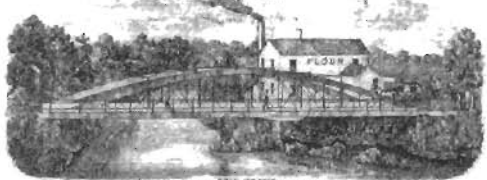
For the Jones County Supervisors, who met only quarterly plus in the month following elections, it was a question of priorities. The total expenditure of county funds for 1878 was listed as \$45,903, of which \$14,473 (that is over 30 percent of the total county budget), was allocated just to pay for the repair and replacement of bridges.

The county's economy, like that of the entire state, was based on agriculture, and the movement of goods to market was paramount for its fiscal well-being. The presence of bridges to facilitate the passage of what amounted to massive quantities of grain, livestock, and produce was threatened by the frequency with which the structures were washed away by floodwaters and destructive ice floes. Prior to the 1870s, all of these bridges were built of wood and required nearly continuous maintenance and repair due to flood damage.



A revolutionary resolution to these problems was presented with the introduction of a new iron bridge type called the bowstring arch bridge design. These bridges featured a characteristic wrought iron arched or curved truss. There was public acclaim favoring these bridges, which were both sturdy and cost effective, and many of which outlasted the lives of those who built them:

CONSTRUCTED BY THE
KING BRIDGE CO.
CLEVELAND, OHIO




EAST BRANCH OF CLEVELAND RIVER

ELVIRA, Lorain County, Ohio.

We have several of the "KING PATENT WROUGHT IRON BRIDGES" in use in this County, in spans ranging from 30 to 190 feet, all of which give good satisfaction.

(Signed): B. S. COILING, } Commissioners
LUCIUS HERRICK, } of Lorain Co.
C. S. MILLS, }



Bridge at Westfield, N. Y. 1 span 200 ft. 1 span 100 ft.

Our Bridge gives entire satisfaction to all, and I recommend all who contemplate building Bridges, to contract with the King Bridge Company of Cleveland.

WESTFIELD, N. Y., Aug. 10, 1873. A. ABBOTT, Commissioner.

KING IRON BRIDGE AND MANUFACTURING CO., CLEVELAND, OHIO

Page from King Iron Bridge and Manufacturing Company catalog. Courtesy of Allan King Sloan.

The Liberal [The Monticello Liberal, G. W. Hunt, editor] or someone writing to that paper says the county bridge fund is being wasted. We doubt it. We suppose not a bridge has been constructed during the past two years that was not necessary—in the majority of cases those built having been petitioned for repeatedly before the Board of Supervisors. Scores of bridges are still needed—some very badly.


Iron was never cheaper and is much more likely to rise than depreciate in value. So the board has used its best discretion in ordering bridges. There are probably two or three thousand dollars of bridge warrants outstanding. This is no doubt an inconvenience to bridge contractors, but the indebtedness will be met by next winter's taxes.

If it had not been for the terrible storm of July 4, 1876 by which an outlay of seven thousand dollars was made necessary to replace and repair bridge structures there would be in the treasury a substantial surplus and no outstanding obligation. But we would like to have the Liberal point out to us where and how the bridge fund is being wasted.⁶

It is clear that the editorial writer, in this case the Anamosa Eureka's pioneering editor, Edmund Booth, knew the value of keeping the lines of commerce open. His newspaper carried daily quotations from the Chicago exchanges on the current prices paid for animals and grain. Of course, his paper was also full of items for sale by merchants in the town's businesses and by mail-order from around the country, everything from J. A. Scott's numerous listings of kinds of Heavy Hardware, to Sandford's Liver Invigorator, to G. H. Higby's Drugs, Medicines and Chemicals (including

Pure Wines and Liquors for medicinal purposes), to the latest model of Steam Powered Threshers, available from Nichols, Shepard & Co. of Battle Creek, Michigan.

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STEAM Power Threshers a Specialty. Special quality of American made improved and reliable. **SOLE** Manufactured by Nichols, Shepard & Co., Battle Creek, Mich., U.S.A.

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Admire the Beautiful Many Ladies

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THE WORLD PAUSES TO
Admire the Beautiful Many Ladies

ADVERTISEMENTS
FOR SALE: ...
FOR RENT: ...
FOR LEASE: ...
FOR SALE: ...
FOR RENT: ...
FOR LEASE: ...

THE WORLD PAUSES TO
Admire the Beautiful Many Ladies

ADVERTISEMENTS
FOR SALE: ...
FOR RENT: ...
FOR LEASE: ...
FOR SALE: ...
FOR RENT: ...
FOR LEASE: ...

Page from June 12, 1879, Anamosa Eureka with advertisements.

The ability of farmers to buy these goods and services was contingent upon their ability to sell their cattle, hogs, sheep, wheat, corn, oats, milk, butter, and eggs on the regional and national markets. Hence, there was great interest and in the construction of a network of functional, long-lasting, and economically produced bridges in particular.

The Bowstring Arch Bridges Are Built

New Bridges Help Mill Commerce

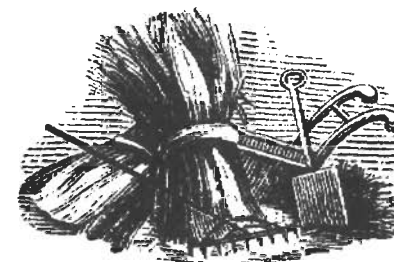
The year 1871 was an auspicious time from the perspective of bridge construction. The first iron bridge built in Jones County in 1871 was constructed by the King Iron Bridge and Manufacturing Company of Cleveland, Ohio. The bridge was located at Walters Mill, Clay Township. Thereafter all large county bridges were constructed of iron. Similar to the Walters Mill site, many early bridges were placed near mill sites, which represented small, thriving centers of rural commerce.

The oldest remaining bowstring arch bridge in Jones County is Corbett's Mill Bridge (also known as Eby's Mill Bridge).⁷ The bridge originally was located on the Maquoketa River, which flows to the southwest in a series of sharp bends through Scotch Grove Township, south and east of the city of Monticello. James S. Applegate established a gristmill at this location in 1858. John Corbett later became owner of the mill and expanded it to include a sawmill with a larger, sideways waterwheel and a blacksmith shop as well.

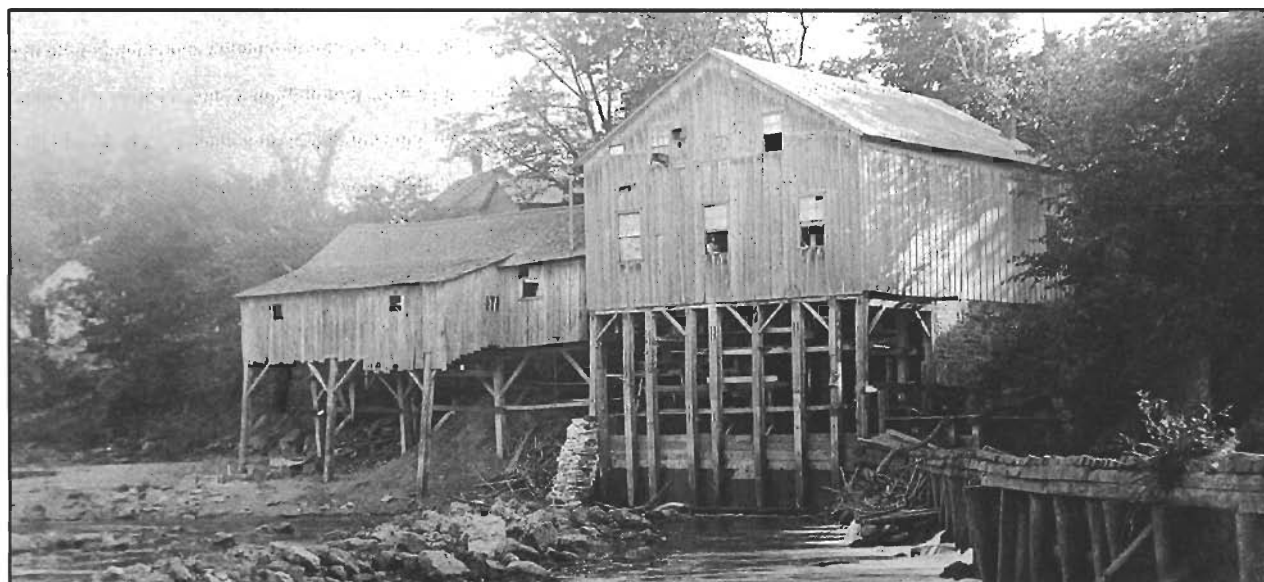
Corbett wanted a new bridge to provide access between his mill site and his customers. He petitioned the County

Supervisors in 1866 for a wooden structure, for which \$1,000 was appropriated.

The 1866 structure was damaged by flooding, and a petition for a second bridge was presented in June of 1869. The District Bridge Committee, however, reported "finding no evidence of subscription by the petitioners to aid in the construction of said bridge, we would recommend it be laid over until such evidence comes to the knowledge of the board."⁸



One year later, another committee was appointed to inspect the site at Corbett's Mill. It held the power to draw from the bridge fund under the usual restrictions: one-third of the cost by the people and two-thirds by the county. The committee reported that a single span, 136 feet in length, was required. It also said that the old abutments needed to be raised by seven feet, at an estimated cost of approximately \$3,200.



Corbett's Mill, later known as Eby's Mill, on the South Fork of the Maquoketa River, Jones County, Iowa. Date unknown. Courtesy of Bill Hasek.

Counties Require Citizen Contributions for Bridges

Bridges in the late 1800s were funded differently than today. Bridge funding evolved over time relative to needs versus expenditures. Prior to the mid 1860s, private citizens requesting a bridge in their locality paid 50 percent of the cost of building or replacing that bridge in Jones County. During that time, funds were obtained by subscription, directly from the pockets of merchants, landowners, and other users who had a vested interest in construction of the bridge. One writer who later described the practice stated:

It has been the custom of the Board of Supervisors usually to make appropriations in part for building bridges, expecting the remainder to be raised by subscription. Thus an appropriation would be made with the understanding that the citizens most interested in the bridge would subscribe and pay \$1 to every \$2 expended by the county, or \$1 to every \$3 of the public funds.⁹

The county required proof that matching funds were available prior to approving any bridge construction. Following the Civil War, the ratio of private dollars was reduced to one-third.¹⁰ A further reduction to one-fourth was adopted by the Board of Supervisors in October 1870. All past subscription laws were rescinded in April 1872, with the advent of the more

costly iron superstructure that needed more substantial piers and abutments.¹¹ The county then financed the bridges by way of county levies on all taxpayers.

With no money available for Corbett's Mill Bridge, due to a lack of subscriptions from private sources, the county accepted an offer from Corbett and Son in the spring of 1871 to build the stone abutments and provide bonds for the same, without charge to the county.

The county received two sealed proposals for the erection of two iron bridges, one at Corbett's Mill Bridge and another near Monticello.¹² The contract was awarded to the Miller Iron Bridge Company, "having all the requisite requirements of strength and durability; and [being] several hundred dollars less in price."¹³ Both bridges were completed by November 1871, at a total cost of \$8,891.¹⁴

The new bowstring arch bridge was built across the Maquoketa River and continued to serve the area and the adjacent mill into the next century. In 1875, the mill was purchased by Samuel Eby of Jackson County, and it continued to run for many years, turning out beams and boards as well as buckwheat flour, which was sold in local stores. The mill later came to be known as Eby's Mill.¹⁵



Mistakes and Lawsuits Plague Bridges

Cost was not the only bridge problem the supervisors had to contend with in these years. In September of 1878, the *Anamosa Eureka* reported a claim for damages by Mr. B. F. Bedford, who asked that the sum of \$10,250 be paid by the county for injuries he sustained in the collapse of a wooden bridge over the Buffalo River.¹⁶ The irony was that the Jones County Supervisors had just recently finished constructing a new, two-span iron bridge over the Buffalo. Unfortunately, although the rickety, old bridge had been officially condemned, the supervisors had not physically closed it to traffic. The derelict bridge collapsed beneath Mr. Bedford and his team of horses as they were transporting a wagon load of young shade trees.



The new bridge was a two-span design: one large 105-foot bowstring arch truss, and one small 50-foot bowstring pony arch.¹⁷ It spanned the Buffalo River 0.6 miles northwest of Anamosa. This bridge was known historically as the Fisher's Mill Bridge. Construction of the bridge was completed in April 1878, near the small community known as Fisherville. This

town was named for Joseph Fisher and his son Israel, who purchased a primitive mill on the Buffalo in 1846. They erected a three-story stone flour mill in 1853 and also owned an extensive, flourishing merchandise business. Israel continued operations after Joseph retired from the partnership in 1866. The mills were sold in 1878 to Mathews and Son of Maquoketa (these fixtures were dismantled in 1939).¹⁸

In 1876, W. M. Skinner and other supporters circulated a petition for a new bridge near Fisher's Mill.¹⁹ They desired a new bridge to replace a 216-foot wooden structure completed just after the Civil War in 1866 that was determined to be "in dangerous condition" as early as 1870.²⁰ The petition was laid over at the quarterly sessions of June and September, but was finally approved by the supervisors in January 1877.²¹ The King Iron Bridge and Manufacturing Company of Cleveland, Ohio, was awarded the contract for the iron superstructure under a comprehensive agreement with the county that included all iron bridges ordered in the years 1877 and 1878.²² Samuel Tucker and William Lamerton, both local contractors, were awarded the bids for the stone substructure. The contracts were finally let late January 1877.

Anamosa Eureka editor, Edmund Booth, kept readers up to date on the bridge project. In August 1877, he reported, "The contractors will soon commence work on the bridge this side of Fisherville

for which the iron superstructure has already arrived. The old wooden bridge is a flimsy affair and there is a great need that it be replaced by the new one as soon as possible." He added, "We are informed that the King Iron Bridge Company's men are on the ground at Olin (in Rome Township) and the iron superstructure will immediately be put in place."²³

The *Eureka* noted in the November 15th, 1877, edition that Samuel Tucker had completed the south pier on the Buffalo bridge and had driven about 145 piles. Lamerton and Tucker, working during the winter months, finished the stone bridge abutments. In February 1878, however, the *Eureka* learned that the stone piers had been constructed too far apart to support the 105-foot iron superstructure. Booth undoubtedly had obtained these facts from Tucker. He editorialized: "The measurements were made by the county surveyor, O. Burlingame, and the mistake probably grew out of the fact that no allowance was made for the batter, or slope, of the abutments. This is a serious error which we regret."²⁴

Burlingame, serving in his first two-year term as County Surveyor, countered this allegation of fault in a letter to the editor the following week, stating, "The mistake occurred I think, from taking stakes for the base of the pier instead of the top. All would have been right had the plan I made for the Olin bridge been referred to, as it applies to all bridges of that kind."²⁵

The mists of history have obscured who was really at fault and where the mistake originated. There is no written record of the bridge's construction problems cited in the County Supervisors' proceedings for April and June 1878. The only reference is in October when Supervisor M. C. Thompson, on the District Bridge Committee, announced that: "it is the opinion of the Board that the extra cost of three hundred and eighty nine dollars and twenty eight cents (\$389.28) for constructing the bridge across the Buffalo near Fisher's Mill, was occasioned by an error in the survey of O. Burlingame, county surveyor, and he should be required to pay the same to the county."²⁶ In any event, the abutments had been positioned incorrectly and the problem needed to be fixed.

The January 1879 county records show



1936 postcard showing the bridge over the Buffalo River. Photographer unknown. From the personal archives of Bertha Finn.

that Thompson's resolution to censor Burlingame and require him to pay the costs of the error was forwarded. The resolution was ultimately overturned; nonetheless, Burlingame resigned his office and returned to Ohio.

The bridge, in the meanwhile, was completed by May of 1878, with a small pony arch added, probably to compensate for the original measurement error. The two iron spans rest on stone abutments and a middle pier. Its total length is 160 feet. The cost of the Fisher's Mill bridge was \$9,590. The King Iron and Bridge Company received \$2,130.50 of that amount.²⁷

But what of the B. F. Bedford lawsuit? It appears that the old timber bridge, which really had been in perilous condition, was left open to traffic although it had been condemned. Two weeks before the new bridge opened, in April 1878, Bedford, according to the May 2 edition of the *Eureka*, was crossing the bridge when it collapsed entirely.

*[He] is said to be suffering greatly and fears are entertained that fatal results will follow. The bridge was condemned by the county but no notices were put up. The inference is to what the county will be called upon to do in the premises, is easily drawn.*²⁸

Through a series of motions and a trial, Bedford was eventually awarded \$3,750, over a third of the cost of the new bridge itself. The *Eureka* concluded, "It is our opinion that Jones County will be pretty



Postcard showing flooding of the Upper Iowa River valley, covering approaches to the Freeport Bridge in its original location in Winneshiek County, Iowa. The photograph possibly depicts the 1911 flood. Courtesy of James Ronan.

careful in the future about leaving tumble down bridges open to the traveling public."²⁹ In 1927, a new road and bridge were built one-half mile downstream on Buffalo Creek. This road bypassed the steep "Fisher Hill," an abrupt and precipitous road leading from the 1878 structure, and connected the Buffalo roadway to the "Ridge Road" (currently Jones County Road E28) to Stone City. The county maintained the old bridge in passable condition even though critics believed it to be a waste of money.

In 1931, an Anamosa newspaper remonstrated, "we understand the old Fisher bridge spanning the Buffalo is to undergo some extensive repairs. This bridge is seldom used since the completion of the new Stone City Road. The Board of Supervisors might wisely have spent the money used in repairing this unused bridge in repairing the Wapsi river bridge near the state park."³⁰ Nevertheless the repairs helped preserve the bridge into the present.



Winter Ice Both Wreaks Havoc and Helps Build Bridges

Ice and high water presented a major threat to the old wooden bridges. The average life span was on the order of 10 years. Citizens of the town of Waverly in Bremer County watched as their bridge, known as the Waverly Free Bridge, collapsed in January of 1858. It spanned the Cedar River and, as it ran through the center of town, it subsequently received much attention and publicity when it fell. The first time it went down, several citizens were still on the bridge, but they escaped just as it broke apart and floated down river. The second timber bridge, 375 feet long, was completed in 1860. It lasted until 1871, when a massive ice jam above the bridge broke in March.

*[A]s a great ice mass above the bridge was expected to break, anxious citizens assembled on a Sunday morning to watch... At 4 p.m. the ice broke and came crashing against the bridge. The crowd, knowing it was inevitable, cheered the majesty of its power. Every bit of the bridge disintegrated.*³¹

Even as it was so often damaging, ice was also a very helpful medium when it came to erecting iron bridges. With respect to the Fremont Mill Bridge, a Supervisor's committee report from 1871 states, "It is my opinion an abutment will be needed on the south side.... We recommend the same be deferred until winter when the ice can be used to rest the bridge upon

while said work is being performed.”³² In another example, the *Anamosa Eureka* details the construction of one iron bridge across the Wapsipinicon in March of 1873.

*The materials for the iron bridge arrived last Tuesday, and are now being transferred from the RR cars to the Wapsie. The foreman of the job sent on by the Ohio Bridge Company is pushing the job with might and main having some twenty men and two or three teams steadily at work. The trestle work [trestles were scaffolds used to work from to build the iron superstructure] is ‘bottomed’ on the bed of the stream, and two of the long stringers are already in place. The foreman has given assurance that the bridge will be alright if the ice does not go out before Monday. It’s a pretty close shave the best we can make of it.*³³

A week later, the *Anamosa Eureka* announced,

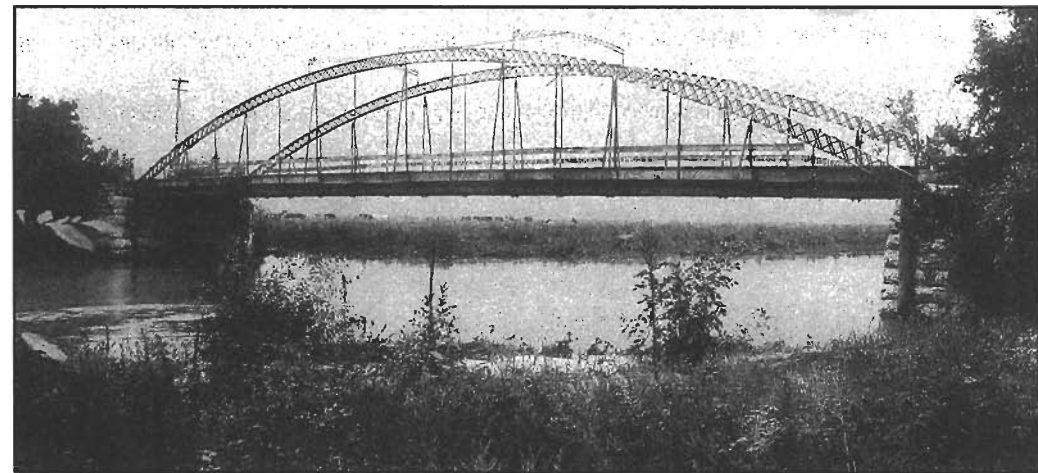
*Last Thursday the trestle work for the iron bridge had been put in place, resting on the bottom of the Wapsie through holes cut in the ice four feet thick. The warmth of the weather on that day had sent considerable water running and the ice below the work, and just above the dam, began to break and pass off. Fears arose of a general breakup, and decisive measures seemed necessary. So from nine o’clock that night till three the next morning, the men were engaged in taking off the iron laid and pulling up and taking ashore the trestle work.*³⁴

Mother Nature could be both a help and a hindrance when it came to bridge work.



Monticello Bridge Is Recycled

Although known locally as the Fremont Mill Bridge, this bowstring arch truss structure was originally built in 1873 to span the Maquoketa River at Monticello, in Richland Township, on the Military Road (Iowa’s first permanent thoroughfare, which began as a trail in 1839). The bowstring arch bridge served for 57 years (from 1873 to 1930) in this location. The wooden bridge it replaced went out with the ice March 8, 1873.³⁵



1913 postcard depicting the Maquoketa River Bridge, Monticello. This postcard shows the original placement of the bridge in Monticello. The bridge was later moved and was known as the Fremont Bridge and Central Park Bridge. Published by O.H. Soetje. Postcard in possession of the author.

After the wooden Fremont Mill Bridge was ruined in 1873, the Board of Supervisors quickly sought to replace it as it was on a major road through the county. They solicited bids from five bridge companies at the April session. The contract for the iron

superstructure was awarded to the Massillon Iron Bridge Company of Massillon, Ohio, for \$23 per lineal foot. The bid for the substructure was let to James Milne of Scotch Grove, Iowa. When completed in June its total cost was \$5,428.³⁶ The Massillon Company received \$2,944 for the 128-foot iron structure. The county paid the total amount as approved in April 1872, whereby all former resolutions regarding subscription payments were rescinded.

In June 1928, bridge bids were let to replace the historic 1873 structure over the

Maquoketa River as part of the State Highway Commission’s Plan for the Highway 161 improvement project. (In September 1930, the Military Road through Jones County was added to the primary road system whereby Highway 161 became US Highway 151.) The

historic bridge was preserved, not initially with historic intent, but because the county needed a crossing near the small village of Fremont to span the Buffalo River in Cass Township. In January 1930 the bridge was moved and reassembled near the former Fremont Mills site, a small community one mile north of Stone City, to begin its second half century of service (1930-1985).



Bridges Provide Vital Link Between Farms and Markets

While many of the early bridge crossings were built near mill sites, the Hale bridge was not. Instead, the bridge was constructed to afford access between the north and south populations of Hale Township, separated by the Wapsipinicon River, and to allow access to the railroad depot at Hale Village.

As was often the case with bridge replacements, the bowstring arch bridge at Hale was built on the foundations of an earlier wooden structure, 340 feet in length, constructed in 1870 at a cost of \$7,995. Also, as frequently happened, the timber bridge was not sturdy enough to withstand the ravages of nature and was in constant need of costly repairs. It was during this period that the Jones County Board of Supervisors agreed with a petition by Hale Township residents granting a request to reduce the amount of their subscription from one-third

to one-fourth of the total wooden bridge cost.

Seven years later, work began on a more sturdy iron bridge. According to a Hale writer in the *Anamosa Eureka*,³⁷ the middle of the wooden bridge was torn up and a strong central pier was constructed to support an iron bridge when deemed necessary.³⁸

Jones County had contracted with the King Iron Bridge and Manufacturing Company in April 1877 to build three bridges during a specified time range. As of 1872, private citizens no longer were required to foot part of the bill for bridge construction. The county thereafter paid 100 percent of the costs.

Financing issues notwithstanding, building

a bridge was not always a quick or easy process. For one thing, county supervisors only met quarterly. Because they met so infrequently, they used independent bridge committees to get some of the work done. However, these committees were required to report at the regular meetings and gain board approval for expenses.

The bridge manufacturers usually were not responsible for substructure construction, that is the stone piers, abutments, or wood pilings. On many projects, local contractors were hired separately by the county to undertake this work. For the iron bridge proper, the supervisors put out notices to secure bids for a span of a given length. Agents or salesmen for different companies would then submit their



1909 postcard showing wagons and postal workers, Walker post office. Postcard in possession of the author.

bids to the county, priced by lineal foot.

In the case of the Hale Bridge, project work began in the spring of 1877, and each span was approved and erected at different times. Once again Jones County officials selected the King Iron Bridge and Manufacturing Company of Cleveland, Ohio. This company also was erecting bridge spans at Olin on the Wapsipinicon River. At the Hale location, what was to be a three-span iron arch would replace a 349-foot wooden span built in 1870. This timber structure consisted of a main span of 170 feet supported by two stone piers with 85 feet of trestle work on each end. This project was reported in the *Anamosa Eureka* on October 13, 1870. Cost of the structure was reported as \$7,995.



*King Iron Bridge and Manufacturing Company patent mark on the Hale Bridge, Jones County.
Photograph by the author 2002.*

In the spring of 1877, the supervisors ordered a strong central pier be built on the site of the wooden structure “to support one iron structure.”³⁹ Bids were requested from local contractors for the stone work. This pier was completed by September and the first 81 foot span was put in place.⁴⁰ The County Supervisors then ordered a second 82 foot iron span, which was erected

in the spring of 1878. By the end of the year, however, the county Bridge Fund was depleted and the supervisors were forced to order all bridge work stopped and petitions for new bridges “laid over until January 1879.”⁴¹ In January, all petitions were again put off until April 1879.⁴² At that time, the King Iron Bridge and Manufacturing Company was given a contract for the third span of 100 feet at a cost of \$14 a lineal foot. The bridge finally was completed in June 1879.⁴³ The records do not show a total amount paid for the three-span bridge, but Hale Bridge construction warrants from June 1877 to June 1879 total approximately \$8,000, of which the King Iron Bridge and Manufacturing Company received \$3,640. Along with the three iron spans, totaling 281 feet, the wooden approaches rendered the Hale Bridge 296 feet in length.



Sales Agents for National Bridge Companies Make Inroads in Iowa

The King Iron Bridge and Manufacturing Company began bridge building in Iowa at a very early date. In 1869, the Bremer County Board of Supervisors noted that many of the county’s bridges were in “deplorable condition.”⁴⁴ They especially took notice of a petition by the city council of the town of Waverly, the county seat, for the

replacement of the wooden bridge over the Cedar River. As noted earlier, this 375 foot wooden bridge required replacement after being spectacularly destroyed several times. The supervisors quickly provided approval of the Waverly petition.

A special election passed a measure that requested an increase in the mill levy on property taxes to finance the new iron bridge project. By the spring of 1871, the supervisors began work on the bridge abutments, contracting with John Price and Brothers, who imported stone from the Anamosa quarries in Jones County, for which he was paid \$5,000. By June the board reached an agreement with William Crickett, who was employed as an agent for the King Iron Bridge and Manufacturing Company of Cleveland, Ohio. The contract called for “three spans of 125 feet each in length, width of bridge 18 feet in the clear, 2 sidewalks 6 feet each in the clear”⁴⁵ at a cost of \$11,000. The bridge was completed by the end of 1871. The 375 foot spans made the Waverly bridge one of the longest multi-span bowstring structures in the state.

This designation, however, was somewhat short lived. Eighteen years later (in 1889) the Waverly Bridge was replaced with a new girder bridge. The King bowstring bridge was then disassembled; one span was moved to a crossing in Franklin Township and two spans were moved to a location on the Cedar River in Jefferson Township, where together they became known as

the Green Mill Ford Bridge. Even with the two separate 125 foot spans, the two wooden stringer bridges on either end still made the 377 foot long bridge over the Cedar River an impressive structure.

Agent William Crickett also figured in another Iowa bridge deal, but this time he appeared to be serving more than one company. In 1883 the Poweshiek County Supervisors were forced to close the dilapidated wooden McDowell Mill Bridge over the North Skunk River. James McDowell, owner of the mill, was an influential figure in the area. He was one of the original settlers in Sugar Creek Township, establishing a home site in 1845, which grew into a sawmill and later a gristmill.⁴⁶ As could be said about almost every mill, it was a center of rural commerce and provided a focal point around which other farmsteads grew. Hence the bridge was given some priority from the supervisors.

In August of 1883, the county then contracted with William Crickett, whom they thought was serving as an agent for the Pennsylvania Iron Bridge Works, to provide a new bowstring arch bridge for the North Skunk River crossing.⁴⁷ Crickett, apparently, was less than forthcoming in his negotiations with the county and his company. By the time he procured the contract with the county he was no longer employed by the Pennsylvania firm, a detail of which he neglected to inform county officials. When the supervisors finally



Postcard of car on bowstring arch bridge, location and date unknown. Photograph attributed to J. F. Koos of Lawler, Iowa. Postcard courtesy of James Roman.

became aware of Crickett's deception, they were forced to contact officials of the Pennsylvania Iron Bridge Works directly. The bridge company said they would be able to manufacture a 120-foot span for delivery within 60 days. The board wanted the bridge installed sooner, however, so Pennsylvania Iron Bridge Works agreed to transfer the bridge contract to the King Iron Bridge and Manufacturing Company of Cleveland, which was able to begin within their time frame. The latter company accepted the contract and by the end of 1883 had installed a bowstring arch bridge that today is still known as the McDowell Bridge.⁴⁸

By the end of the 1880s, bowstring arch bridges were falling out of favor. Newer and more efficient designs were put into service that were structurally more sound and less expensive to manufacture. Where previously there had been thousands of bridges built

every year across the nation, there was a dramatic decline in the numbers of bowstring arch bridges completed in the 1880s.

There was still a slight demand, however, for relatively small bridges that were not prone to some of the deficiencies of the larger bridges. As late as 1887, the Allamakee County Supervisors contracted with the King Iron Bridge and Manufacturing Company for a 43-foot span bridge.⁴⁹ Known locally as the Monsrud Bridge, it was erected at the base of a steep hill on a county road over Paint Creek, near the town of Waterville, about 10 miles west of Harpers Ferry and the Mississippi River. It was one of the last bowstring arch bridges to be built by the King Iron Bridge and Manufacturing Company in the state, and is among the last still standing.

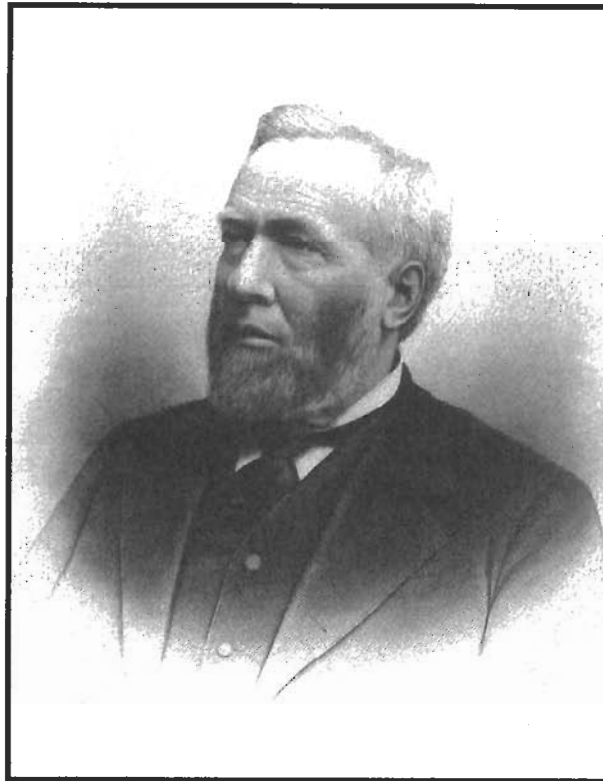


Zenas King Giant Among Bridge Builders

Bowstring arch iron bridges were among the first and most popular bridge types built in the late 19th century. The reason for the popularity of the design was because it combined a strong, durable form with a relatively low cost, using the minimum amount of wrought iron material. The stylish and graceful shape of the arching spans added to the allure of the design.

In fact, the bowstring arch-truss bridge became the most popular type of span used in much of the Midwest in general and in Iowa in particular. From 1860 through the 1880s, bowstring bridges were manufactured in the thousands by large commercial firms, many headquartered in Ohio, such as the King Iron Bridge and Manufacturing Company of Cleveland; Massillon Bridge Company of Massillon; and the Wrought Iron Bridge Company of Canton.⁵⁰

Design of the first bridge has been attributed to Thomas Moseley who patented his ideas on how to construct a wrought iron tubular bowstring bridge form in 1857.⁵¹ Mosley originated the idea to use wrought iron boiler plate to form a triangular-shaped tube that could then be pieced together into the distinctive curved shape. He then worked on a way to economically



Portrait of Zenas King, founder of the King Iron Bridge and Manufacturing Company. Courtesy of Allan King Sloan.

fabricate the iron arcs so they could be assembled at the bridge site.⁵² Ultimately, a variety of different shapes and forms were created and patented that enabled a number of companies to manufacture their own distinctive versions of this bridge type.

It was a Moseley assistant, Zenas King, however, who was instrumental to bringing the bowstring bridge type to its greatest popularity with his emphasis on a nation-wide distribution force and marketing system. King began his own company in Cleveland

in 1860, called the King Iron Bridge and Manufacturing Company.⁵³ Although not a trained engineer, King, at around the age of 40, had learned about the salesmanship and manufacture of boiler plating in the sale of farm machinery. In Cleveland, King teamed up with a metalworker named Frees and, together in 1861, they submitted a patent for an improvement to the bowstring arch form.

At first the new innovation was not deemed groundbreaking enough to warrant a new patent, but by appealing directly to the commissioner of patents and making some design adjustments, King was able to claim a “patented” bowstring bridge as his own. King bridge types were quickly adopted throughout the state of Ohio. Noting his success, numerous other bridge building enterprises entered the market. These included Massillon Bridge Company of Massillon, Ohio, founded by Joseph Davenport, and the Wrought Iron Bridge Company of Canton, Ohio, headed by David Hammond. After the Civil War the number of bridges erected by these and other companies around the country increased dramatically.⁵⁴

King was the innovator when he decided to build the facilities to manufacture custom sized bridge pieces that could be shipped quickly and assembled at distant river crossings. He built his factory in Cleveland adjacent to the main rail line. His greatest accomplishment, however,

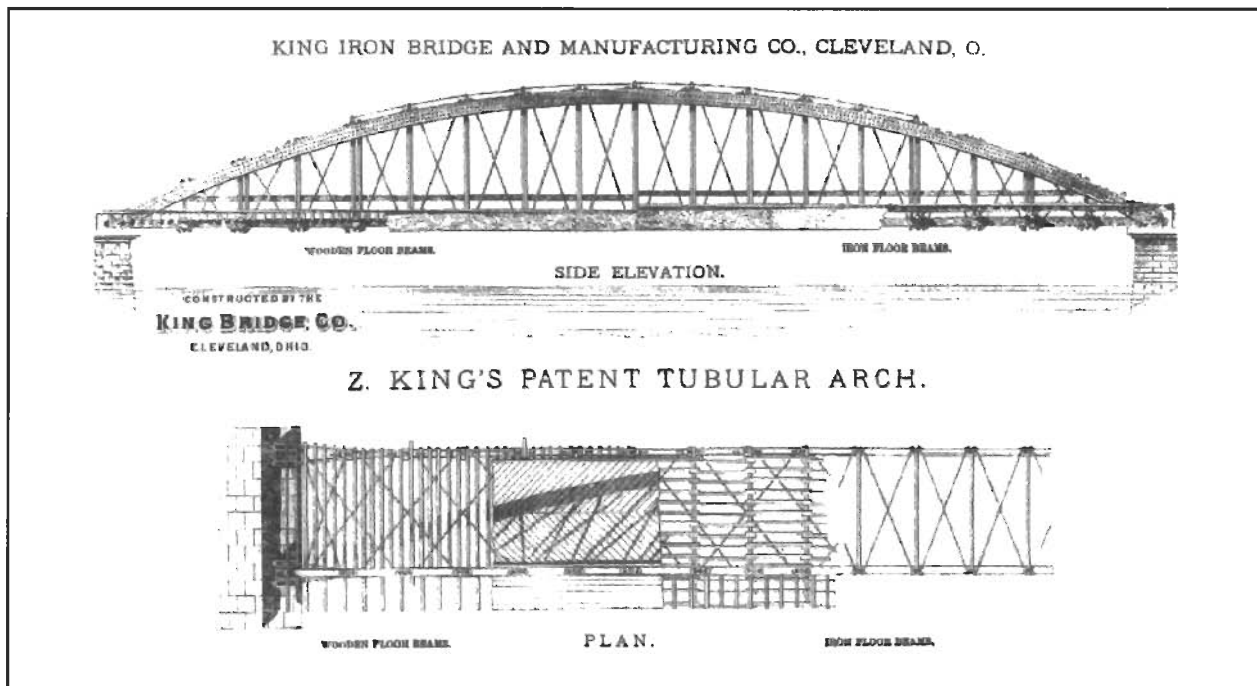


Illustration of one of King's bowstring bridge patents from 1882 sales catalog, King Iron Bridge and Manufacturing Company. Courtesy of Allan King Sloan.

may have been the establishment of a network of agents across the country who sold the bridges to city and county officials.

King established business agents in many areas of the west. The company armed these agents with a catalog containing illustrations of the various types of bridges they already had built, along with some schematics and plans. By 1872, King had sold nearly 100 bridges in the states of Kansas, Minnesota, Arkansas, Nebraska, and Iowa. Eventually, the King Bridge and Manufacturing Company set up a Midwest headquarters in Des Moines. Zenas's nephew, George King, was hired

as an agent for the company and assigned to the Topeka center. He eventually became the general western agent and contract engineer for the King Bridge Company in Des Moines, to coordinate the activities of the network of agents working throughout the western states.

By 1882, the company had constructed a total of over 5,000 bridges. In the company catalog of that year, 195 bridges were listed as having been built west of the Mississippi River alone, and Iowa and Kansas accounted for over half of the total.⁵⁵

King died in 1892. After his death, the State of Ohio and the U.S.

Government filed and won a suit against the King Iron Bridge and Manufacturing Company and 13 other Ohio bridge companies because of pooling arrangements in which the companies had engaged starting in 1883. Sixteen national companies agreed to form a pool to control and share profits from highway bridge projects. The antitrust suit sought to prohibit the companies from doing further business in Ohio because they had illegally entered into an agreement in restraint of trade, in violation of the antitrust laws of the state.

The company eventually lost the suit and moved to New Jersey in 1906, doing business as the King Bridge Company. It was officially terminated as an enterprise in 1922.



Other Companies Compete Against King

The King Iron Bridge and Manufacturing Company was not the only firm to construct early iron bowstring bridges in Iowa. The movement of millions of immigrants, especially into the western part of the country, opened the doors for other entrepreneurs to try their hand at the bridge manufacturing business.

The Missouri Valley Bridge and Iron Works of Leavenworth, Kansas is among some of the lesser known regional firms from the late 1880s that still have bridges in existence in Iowa. The founder was Edwin

Farnsworth, who served as the City Engineer of Leavenworth until he left in 1871 to seek employment with the Wrought Iron Bridge Company of Canton, Ohio. The following year, Farnsworth was employed by the King Iron Bridge and Manufacturing Company where he became their chief engineer at the Topeka, Kansas manufacturing facility. He later co-founded a bridge manufacturing company in 1874 called the Missouri Valley Bridge and Iron Works.⁵⁶

A Missouri Valley Bridge and Iron Works bridge was placed in Montgomery County, Iowa, after the supervisors were petitioned by S. M. Smith in 1876 for a new bridge.⁵⁷ The supervisors awarded Farnsworth's company the contract for \$1,000 to erect a 70 foot span over the West Nodaway River south of Grant. However, the Missouri company appears to have made few other inroads in the state. The Montgomery County bridge was later moved and remains the only example of a Missouri Valley Bridge and Iron Works structure in the state.

Keeping talented and resourceful engineers was a particular problem for the large national companies. Not only was there an almost revolving door of skilled people leaving these firms, but many of them were leaving to start their own companies in direct competition with their former employers.⁵⁸ Besides Farnsworth, other King employees who founded their own companies included James Marsh, who established a firm in Des Moines and



*Drawing of a King bridge at Centennial Grounds, Fairmount Park, Philadelphia.
Courtesy of Allan King Sloan.*

who produced a modern, concrete version of the bowstring that became known as the Marsh Rainbow Arch Bridge.⁵⁹

Another major contributor was David Hammond, who began the Wrought Iron Bridge Company of Canton, Ohio. It was said of Hammond that no other bridge designer in the 19th century did as much to popularize the bowstring bridge design.⁶⁰ The Wrought Iron Bridge Company, under Hammond's direction, produced

16 patents covering the bowstring design, and manufactured hundreds of structures that were located across the nation.

Among the more famous of the Wrought Iron Bridge Company structures found in Iowa was the bridge built across the Upper Iowa River, near Freeport, in Winneshiek County.⁶¹ The bridge was put into service in 1878. Spanning 160 feet across the river, the Freeport bridge was the second longest bridge built in

the nation by Hammond's company.⁶²

The bridge at Freeport was one of many bridges purchased by the Winneshiek County Board of Supervisors which, unusually, had an almost exclusive business relationship with the Wrought Iron Bridge Company. Bowstring arch bridges appeared in Winneshiek County as early as 1872 when the county began building the more sturdy wrought iron edifices. The first two bridges were built in 1872 and 1873. In 1873, petitioners asked that bridges be built in two other places: one in Bluffton Township over the Upper Iowa River, and the second in Washington Township over the Turkey River.⁶³ The Turkey River Bridge, with a span of 160 feet, and a total bridge length of 177 feet, was completed in the same year.

As was almost always the case, the board contracted with a local stone mason to build the bridge abutments. For the Upper Iowa River Bridge, the County Supervisors hired Thomas Dwyer to assemble the two massive stone piers, which according to a local commissioner, was "by far the best job of masonry in the county and so noted by all who have seen it."⁶⁴ The bridge, known locally as the Gilliece Bridge, with a span of 130 feet, was finished in 1874, at a total cost of \$6,969.



Local Bridge Company Makes Unique Contribution

There is another type of bowstring arch bridge found in Winneshiek County that was not manufactured by the Wrought Iron Bridge Company. This exception proves the rule about the exclusive relationship between the county and the Wrought Iron Bridge Company: the structure in question, known as the Eureka Bridge, was requested and apparently funded entirely by township officials.⁶⁵

It appears that officials of the small village of Ridgeway were rebuffed in their attempt to convince County Supervisors to build a bridge in their area. So they turned to a small local manufacturer to custom build what was then termed a "Eureka" type of bowstring arch bridge. It seems that sometime around 1872, they contracted with the Allen, McEvoy & Company of Beloit, Wisconsin to manufacture a relatively modest-sized, single span structure for their use. The name "Eureka" is a type name used by the manufacturer to designate their specific patented bowstring design.



*Two women posing on an unknown bowstring arch bridge. Photographer and date unknown.
Photograph from the personal archives of Bertha Finn.*

Rather than using wrought iron plates, the Eureka Bridge relied on four iron rods bent into a curve to form the arch.

The Ridgeway Eureka Bridge is believed to have been moved to another site in Bloomfield Township in Winneshiek County. The bridge was later placed over the Yellow River in Moneek Valley where it remained until 1989.



Massillon Bridge Company Competes

The third of the great national bridge companies was the Massillon Bridge Company of Canton, Ohio. Its founder was Joseph Davenport. (Besides bridges, Davenport also is renowned for designing the first steam locomotive cow catcher—that plow-like device that is attached to the front of the engine to help remove debris and stray livestock from the tracks.)

Davenport's design for the bowstring arch bridge incorporated a different kind of upper chord, the part that forms the top of the arch. The bridge design used for the Fremont bridge in Jones County employed webbing consisting of hollow crossed rods.⁶⁶ These rods were cut and manufactured from extra heavy gas pipes and then placed between two pieces of

flat boiler plates to hold them apart. The resulting shape was a distinctive cross or X-shaped lattice pattern in the top of the arch.

The same design was present in a Massillon Bridge Company structure erected in Dubuque County. The need for a long lasting iron bridge over Lytle Creek, next to Washington Mills, was evident to the Dubuque County Supervisors at an early date. In fact, the first iron bridge in the county was placed over this creek in 1873.⁶⁷

Washington Mills was run by Oliver Bussard and John Kifer.⁶⁸ The men evidently believed in the power of advertisement, as a writer for the *Dubuque Express and Herald* expressed his thanks to the mill upon receiving a “sack of very excellent flour of their own manufacture ... located sixteen miles from here on Lytle creek ... and [the mill] can manufacture just as good flour as can be made anywhere in the Union.”⁶⁹ The bridge was placed on Creek Branch Lane, which crossed back and forth between Washington and Prairie Creek Townships and served Township School No. 6 up the hill from the creek.⁷⁰ A narrow gauge railroad line was added to the area in the 1880s. A wooden bridge was erected at that location in 1865, but needed repairs in 1873 and 1876. By the fall of 1877, the board had decided to replace the trouble prone wooden bridge with a new iron structure.

The supervisors hired a local stone mason, T. J. Donahue, to build new



Photograph of the standard double-plated lattice design on the Fremont Mill Bridge, Jones County. Photograph by Evan Vulich 2003.

abutments for the bridge at a cost of \$765.⁷¹ They then contracted with the Massillon Bridge Company for a 113 foot single span bowstring arch bridge for the Lytle Creek crossing. The bridge encompassed the standard double-plated lattice design. It was finished in April 1878 at a cost of \$1,824. The new bridge was not without its own problems, needing numerous repairs in its first 32 years; nonetheless, it has been in use continuously for the past 125 years.



New Design Replaces Bowstring

The era of the bowstring arch bridges was fading by the end of the 1880s. Another structural design, the Pratt Truss form, would soon challenge and overtake the older bridge plan in popularity. The Pratt patent incorporated straight upper and lower chords. Bridge span lengths could be expanded simply by varying panel or beam lengths, which was difficult to achieve with the arched forms, since each and every curve length had a unique shape which had to be manufactured separately.

Perhaps even more of a problem was the view that the sparse use of material which produced the characteristic elegant design of the bowstrings was in fact unstable or even dangerous: "The bridges are light and flimsy. Everything about them is conducive to extreme and excessive vibration. Every man who has crossed one has noticed the trembling of the structure and the rattle of the rods and members of the bridge," complained one highway engineer.⁷²

The 1880s would have seen the end of the bowstring period if not for a fortuitous series of events that brought the graceful design back into production.

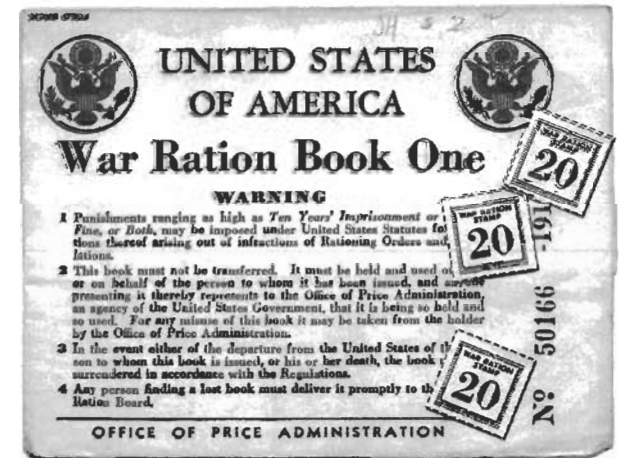


World War II Revives the Bowstrings

It is difficult for someone who did not directly experience the World War II era to appreciate the difficulty of life in the United States during that time. With literally millions of men and women enlisted in the various branches of the armed forces fighting a global war, almost the entire economy of the United States was geared toward production for the war effort. What that meant for the civilian population was continual shortages and a nationwide imposed rationing system. One Iowa writer provided a succinct summary:

By 1945 people were accustomed to orders originating from Washington in regard to carrying on the war. Ration schedules appeared each week in the local press informing citizens which rationing stamps could be used for meats and fats, processed foods, sugar, gasoline, fuel oil and shoes. The only stamps good indefinitely were for shoes. The purpose of the "brownouts" was to conserve electricity. Limits were placed on outdoor display lighting, outdoor electric advertising and show window lighting. The homes of the citizens who had sons or daughters in the service had service flags in their windows...⁷³

Newspapers across the country, besides carrying local news on the contributions—or deaths—of service members from the community, were full of ads asking for the public to purchase War Bonds, participate in clothing and scrap drives, and to provide any types of materials in short supply. Steel was in especially short supply as



World War II ration book. Issued to Mable E. Pringle on the 23rd of September, 1942. In possession of the author.

it was used in all of the major weapons and transportation systems. Of course all of the large bridges required massive amounts of steel. Therefore construction was prohibited or delayed due to the critical shortage of materials. To circumvent this problem, some bridge designers reverted back to the older bowstring arch form, which required less iron.



Crisis In Crawford County

The year 1945 was an exceptionally wet one in the state, but especially in western Iowa. The heavy rains started in April and hit again in May and July, and each deluge was seemingly worse than the previous one. Flood damage occurred in many areas, and Crawford County was particularly hard hit that summer. According to a story in the *Denison Review*, the April rain total was the highest since records began in 1896.⁷⁴ The Boyer River crested at a 50-year high, taking with it 28 county bridges, which were swept away or had their approaches washed out.⁷⁵ Bridges also were lost on US Highway 30 and State Highway 4.

To compound the problem, Crawford County, as also reported in the *Denison Review*, had in the previous two years been forced to issue bonds amounting to a quarter of a million dollars to cover expenses for emergency bridge repairs because of shortages in the amount of money received from property taxes. The county was again experiencing a shortage in 1945.

In May, the Crawford County Supervisors confronted the problem by declaring an emergency with the Secondary Roads Fund, and again ordered the issuance of a quarter of a million dollars in bonds to effect new bridge repairs.⁷⁶ The most cost effective measure was to replace washed out timber bridges with new

steel structures, but even with victory having been declared in Europe in May of 1945, the supply of iron and steel—important as they were to the manufacture of critical war supplies such as ships, planes, and tanks—was still in a period of shortage.

Because of the nationwide need to conserve steel and keep its use to a minimum, several innovative designers took a page from the past and resurrected the idea of once again designing bowstring arch bridges that do not require as much metal.⁷⁷ Crawford County ordered six bridges using what had previously been considered an outmoded form. The new design incorporated a hybrid bowstring arch-truss plan; angle outriders provided lateral support.⁷⁸ The county purchased the bridges from the Pittsburgh-Des Moines Steel Company, an Iowa company that was started near the turn of the century by two Iowa State engineering graduates, William Jackson and B. N. Moss.⁷⁹ Still in business today, the firm last gained renown by furnishing the steel for the Gateway Arch in St. Louis.

The steel manufacturers fabricated the bridges into sections, which were then assembled at the bridge site by county crews. The six bridges were placed at sites around Crawford County:

The Buck Grove Bridge is a 70-foot long span located on a county road that crosses Buck Creek in Washington Township, Crawford County, Iowa.⁸⁰

The Nishnabotna River Bridge is a 77-foot long single span structure located on a county road over the West Branch of the West Nishnabotna River, 3.4 miles northeast of Manilla, in Crawford County, Iowa.⁸¹

The second Nishnabotna River Bridge is a single span structure that crosses the West Branch of the West Nishnabotna River, 2.3 miles southwest of Manilla, in Crawford County, Iowa.⁸²

The East Soldier River Bridge is a single span structure that crosses the East Soldier River, 2.5 miles southeast of Charter Oak, in Crawford County, Iowa.⁸³

The Beaver Creek Bridge is a 77-foot span structure located on 180th Street over Beaver Creek, 4.5 miles northwest of Schleswig, in Crawford County, Iowa.⁸⁴

The sixth of the World War II vintage bowstring arch bridges was placed over Paradise Creek in Paradise Township, 7.0 miles west of Denison.⁸⁵



Where They Are Now

Of the hundreds that were built in the state of Iowa, there are only 20 bowstring arch bridges still standing today. Seventeen of these are publicly owned, while three are on private property. Only three of the bowstring arch bridges are still in use in their original locations. The remainder have been closed or moved. Many counties have gone to great lengths and expense to preserve these historic structures, all of which are eligible for the National Register of Historic Places. Their graceful form is an historical asset and a testament to past ingenuity that can be appreciated even today.



Bowstring Bridge
National Register of Historic Places

Manufactured by Massillon Iron Bridge Co., Massillon, Ohio
- 1873

Spanned the Maquoketa River, Military Road, Monticello, Iowa
Cost was \$2914.00

January 1930, moved to Freemont, Northwest of Anamosa,
Iowa, spanned the Buffalo Creek. Contractor was Elmer
W. Coon.

July of 1985 moved to Central Park, Center Junction, Iowa.
Contractor was Grimshaw Construction Co.

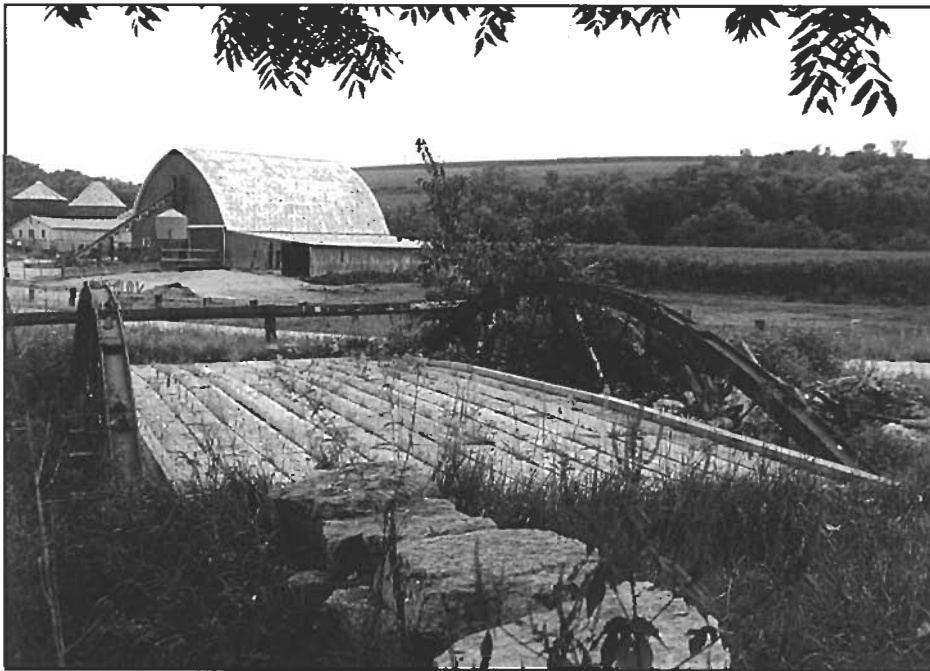
This bridge is of bowstring construction, and is possibly the
only one of this type in Iowa.

This historic bridge is the last tangible artifact of the Military
Road.

Public Bridges

Monsrud Bridge

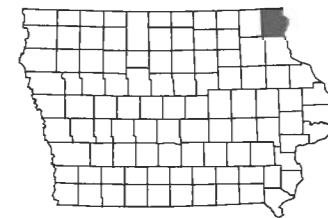
The Monsrud Bridge is located on Swebakken Road over Paint Creek, 1.1 miles northwest of Waterville, in Allamakee County, Iowa. It is situated in Section 16 of Paint Creek Township, T97N, R4W. The 1887 bridge was constructed by the King Iron and Bridge Manufacturing Company. The small, 43-foot long structure was left in place when a new bridge, replete with two large culverts, was built beside it. The bridge lies at the base of a steep hill within the picturesque Paint Creek Valley. This bridge appears to have been one of the last bowstring arch bridges built in Iowa. Although no longer open to traffic, the bridge remains in its original location.



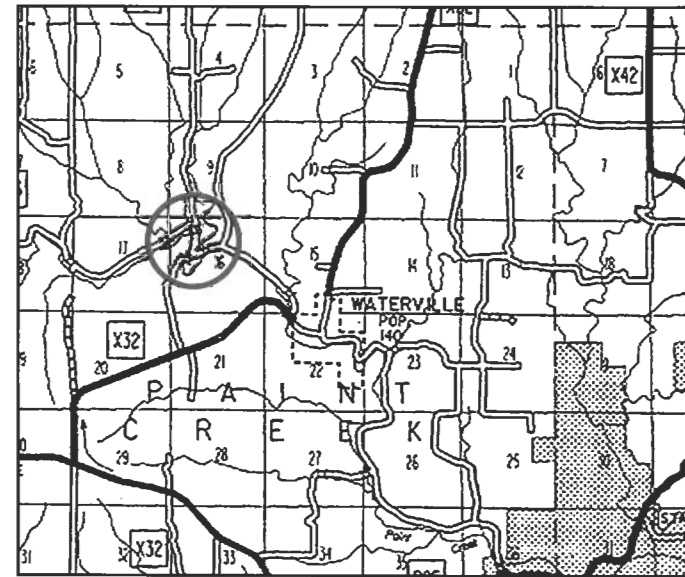
Approach to the Monsrud Bridge (Paint Creek Bridge), Allamakee County, built in 1887. Photograph by the author 2002. (FWHA #: 061840)



Profile view of the Monsrud Bridge. Photograph by the author 2002.



Allamakee County



Location maps in this book are derived from Highway and Transportation Maps published by the Iowa Department of Transportation.

The Green Mill Ford Bridge

The Green Mill Ford Bridge spans the Cedar River, and is located off a county road, 260th Street, 2.8 miles northeast of Janesville, in Bremer County, Iowa. It is located in Section 19 of Jefferson Township, T19N, R13W. The original Green Mill Ford Bridge crossed the Cedar River in the city of Waverly. It was produced by the King Iron Bridge and Manufacturing Company in 1872. It served in that location until 1889 when a new girder bridge was put in its place. The King bowstring bridge was then disassembled; one span was moved to a crossing in Franklin Township, but was later torn down. The remaining two spans, each 122 feet in length, were moved to a site on the Cedar River known locally as Green Mill Ford.

The county road that the Green Mill Ford Bridge served was vacated sometime in the 1980s. Because the bridge no longer played a useful function as a crossing, the approaches were removed by the Bremer County Engineer's office. Although still in place at the time of this writing, it probably will be removed at some point in the future.

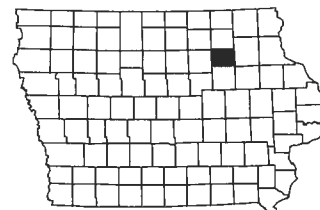


Profile view of the Green Mill Ford Bridge. Photograph by the author 2002.

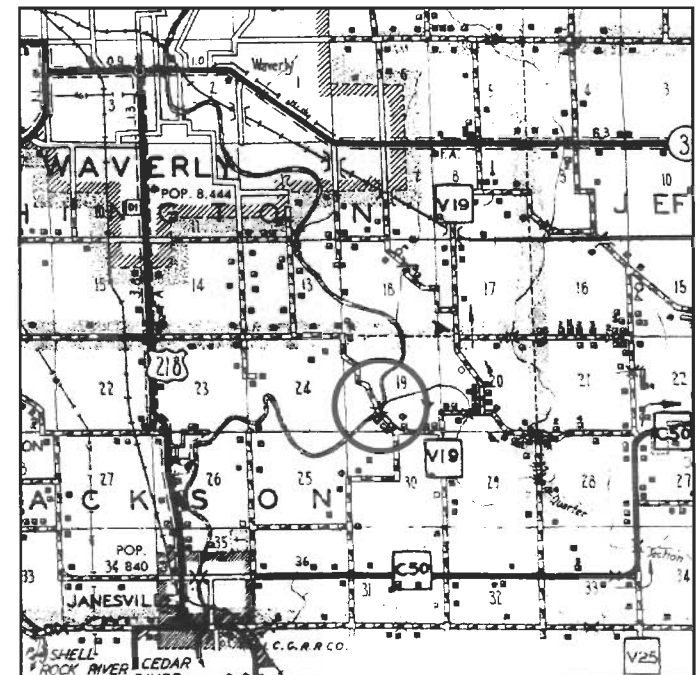


Approach to the Green Mill Ford Bridge (Waverly Bridge, Cedar River Bridge), Bremer County, built circa 1872.

The bridge has been condemned and the approach spans have been pulled. Photograph by the author 2002. (FHWA#: 078890)

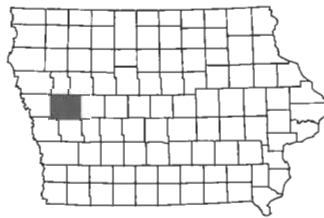


Bremer County



The Beaver Creek Bridge

The Beaver Creek Bridge has a 77-foot iron span and 57 feet of wooden approaches, making the total bridge 134 feet long. The structure is located on 180th Street over Beaver Creek, 4.5 miles northwest of Schleswig in Crawford County, Iowa. It is located in Section 9 of Morgan Township, T85N, R40W. This bridge is distinguished by two wooden stringer bridges on both approaches that help it span this wide and deep portion of Beaver Creek. This bridge was built in 1945.



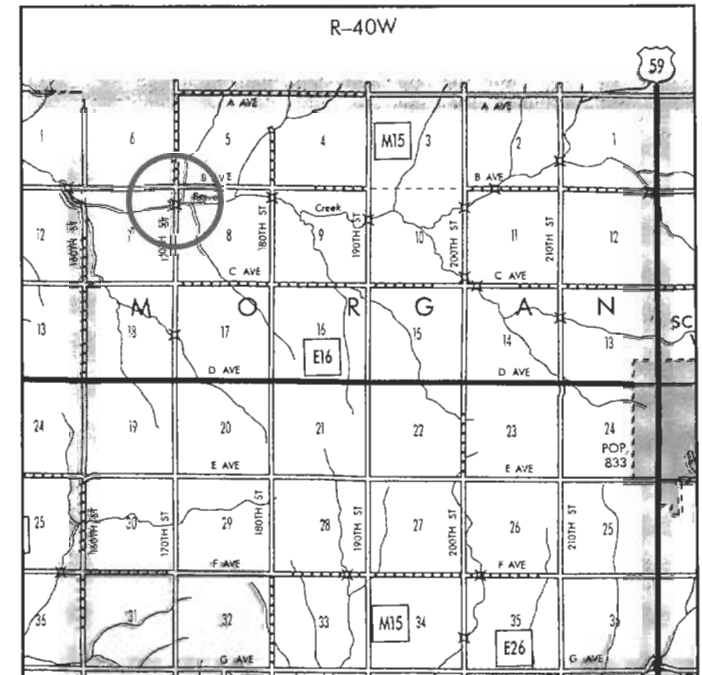
Crawford County



Approach to Beaver Creek Bridge. Photograph by the author 2002.
(FHWA#: 130550)

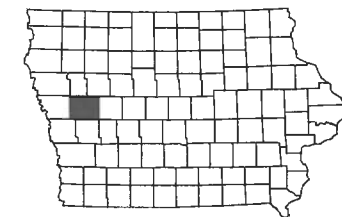
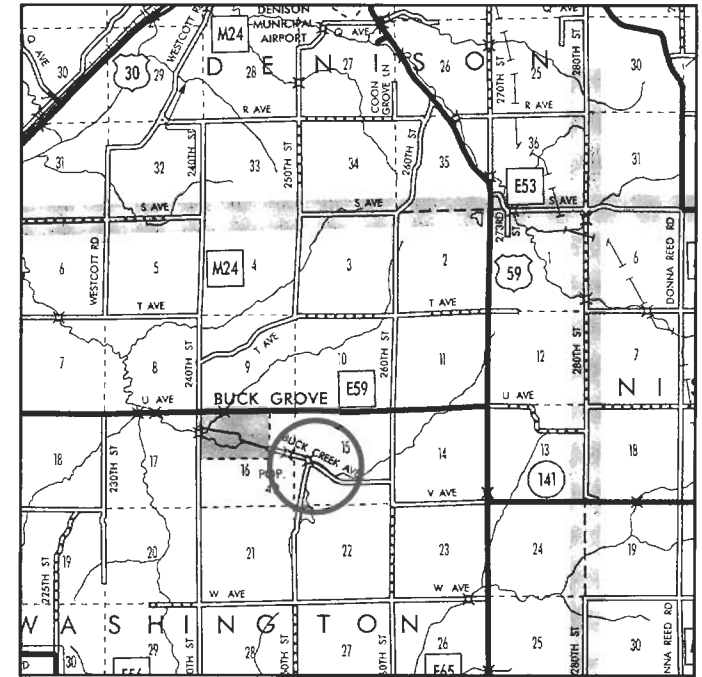


Profile view of the Beaver Creek Bridge, Crawford County, built in 1945. Photograph by the author 2002.



The Buck Grove Bridge

The Buck Grove Bridge is located on 250th Street, a half mile east of the town of Buck Grove. It crosses Buck Creek in Section 16 of Washington Township, T82N, R39W, in Crawford County, Iowa. The bridge spans 70 feet and was constructed in 1945, borrowing elements from the early bowstring arch design that originated in 1861. The bridge currently has a load limit of 10 tons. The bridge was manufactured by the Des Moines Steel Company and stands today as a fine example of its work and of bridge construction in Iowa during World War II.



Crawford County

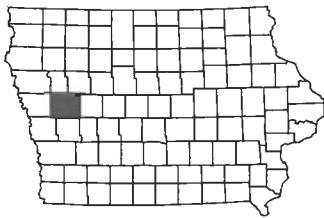
*Profile of the Buck Grove Bridge, Crawford County, built in 1945.
Photograph by the author 2002. (FHWA#: 126675)*

The East Soldier River Bridge

The East Soldier River Bridge is a single span structure that crosses the East Soldier River on 120th Street, 2.5 miles west of Charter Oak in Crawford County, Iowa. It is located in Charter Oak Township on the Section line between Sections 28/29, T84N, R14W. The bridge, which currently has an 11-ton weight limit, was built in 1945.



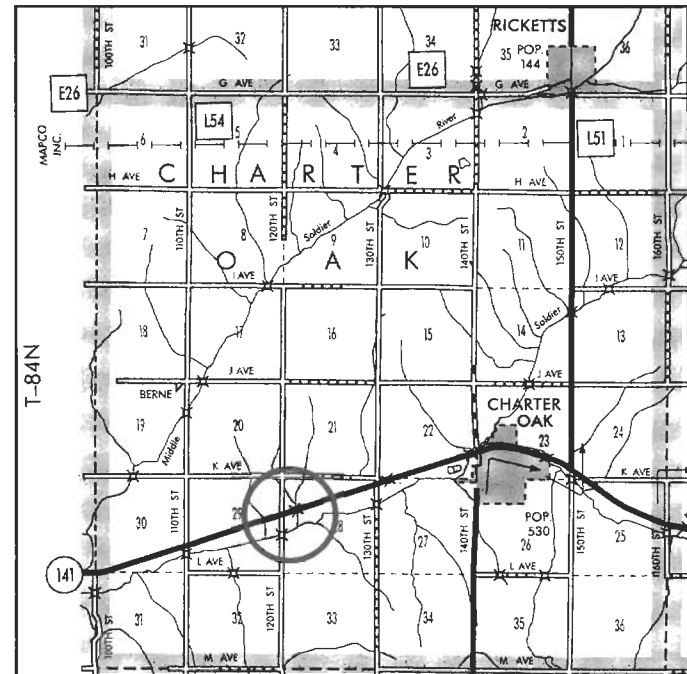
*Profile of the East Soldier River Bridge, Crawford County, built in 1945.
Photograph by the author 2002. (FHWA#: 129750)*



Crawford County

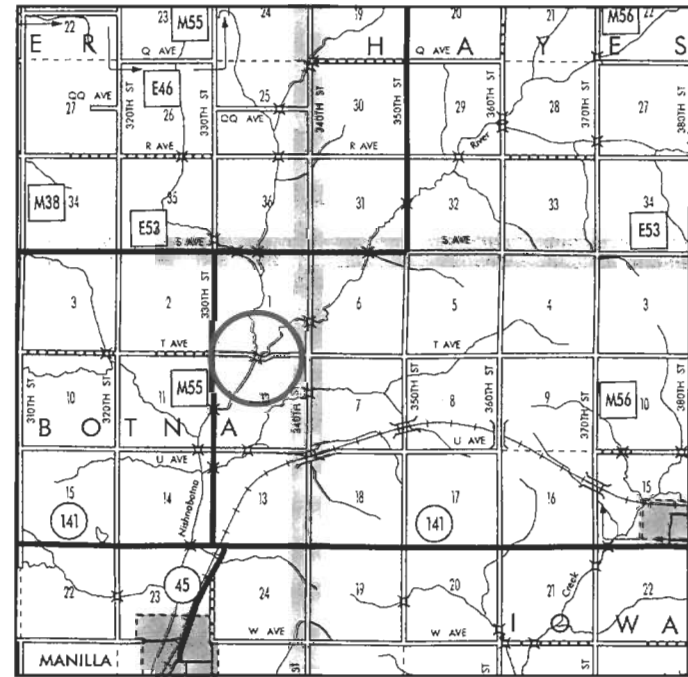


*Close up of the span of the East Soldier River Bridge.
Photograph by the author 2002.*

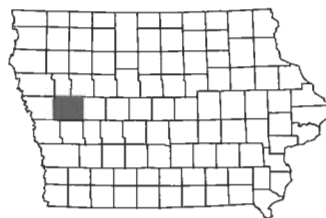


The Nishnabotna River Bridge

The Nishnabotna River Bridge is a 77-foot long iron span with another 20 feet of wooden approaches, making the bridge 97 feet long. The structure is located on T Avenue, and crosses over the West Branch of the West Nishnabotna River, 3.4 miles northeast of Manilla in Crawford County, Iowa. It is located in Section 12 of Nishnabotna Township, T82N, R38W. This structure is another fine example of World War II era bridge work.



Approach to the Nishnabotna River Bridge, Crawford County, built in 1945. (FHWA#: 126410)



Crawford County



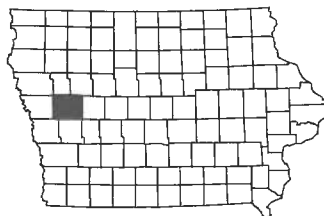
Profile of the Nishnabotna River Bridge. Photograph by the author 2002.

The Nishnabotna River Bridge (#2)

The second Nishnabotna River Bridge is a single span structure that crosses the West Branch of the West Nishnabotna River, 2.3 miles southwest of Manilla on 300th Street in Crawford County, Iowa. It is located in Section 33 of Nishnabotna Township, T82N, R38W. This bridge also represents the era of World War II bridge building. Nearly identical to the other four bowstring arch bridges that still carry vehicular traffic, this bridge is also subject to a weight restriction of 10 tons.



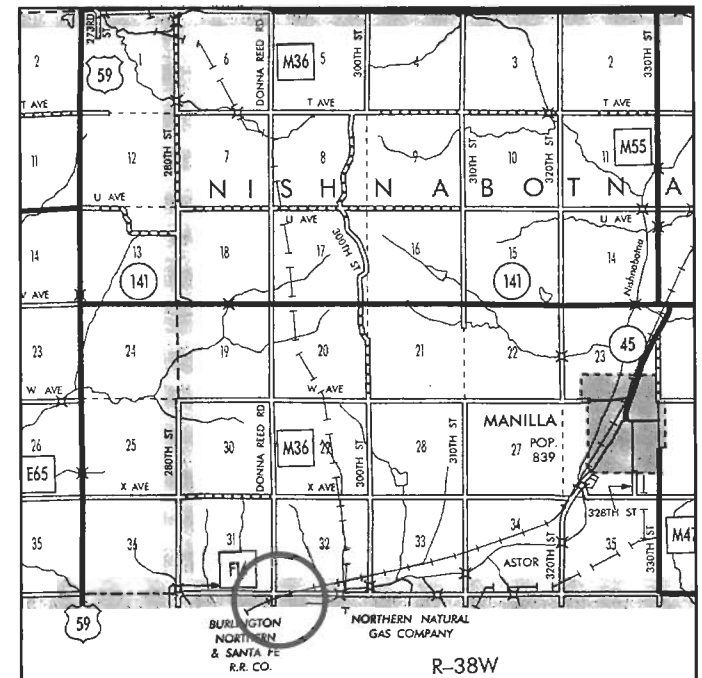
Approach to the second Nishnabotna River Bridge, Crawford County, built in 1945. Photograph by the author 2002. (FHWA#: 126550)



Crawford County



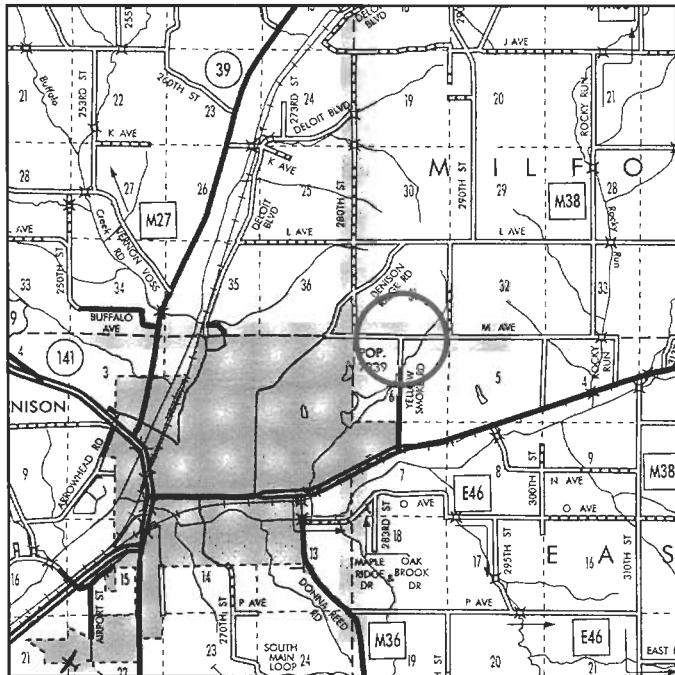
Profile of the second Nishnabotna River Bridge.
Photograph by the author 2002.



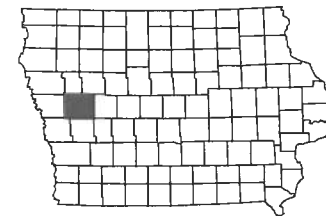
The Yellow Smoke Park Bridge

The Yellow Smoke Park Bridge is located in T83N, R38W, in a county park of the same name. Yellow Smoke Park lies one mile east of the city of Denison off Highway 30 in Crawford County, Iowa. The park is a majestic, 321-acre recreation area that contains a 40-acre lake and has been developed for picnicking, hiking, camping, swimming, boating, and fishing. There is a large campground that offers modern facilities for campers.

Until 1986, this bridge is believed to have been located over Paradise Creek in Paradise Township. When the bridge was relocated to Yellow Smoke Park in 1986, it was replanked and the center of its floor beams were cut to make it more narrow. The bridge is now located adjacent to the lake along a pedestrian path that crosses an intermittent stream.



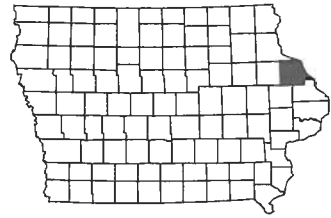
Approach to the Yellow Smoke Park Pedestrian Bridge, Crawford County, built in 1945. Photograph by the author 2002. (FHWA#: none)



Crawford County

The Washington Mill Bridge

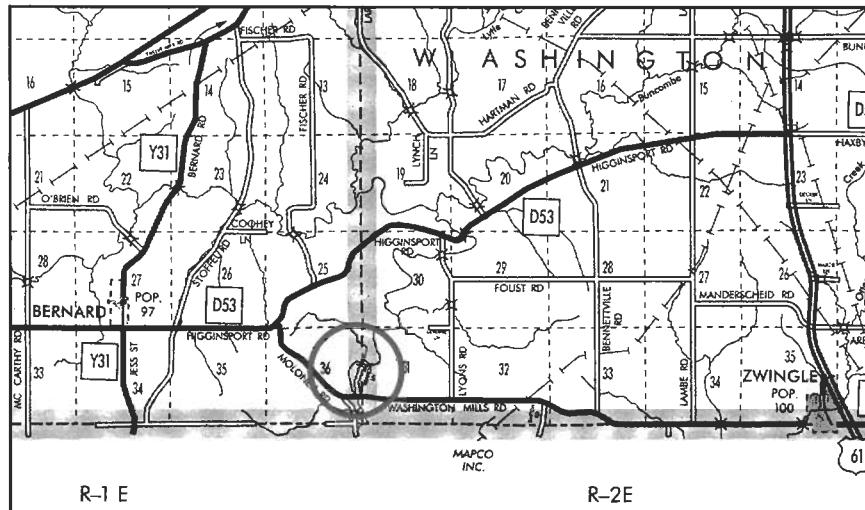
The Washington Mill Bridge is located on a county road that crosses Lytle Creek, 2.5 miles southeast of Bernard in Dubuque County, Iowa. It is located in Section 31 of Washington Township, T87N, R2E. Built in 1878 by the Massillon Bridge Company of Massillon, Ohio, the 113-foot long Washington



Dubuque County

Mill Bridge was once situated on a north-south running road, Creek Branch Lane, in Dubuque County. In the 1960s, the one room school served by the bridge was closed due to consolidation and most of the road fell into disuse by the county. The road presently dead-ends at the bridge. It is one of only three

bowstring structures in the state of Iowa that is standing at its original site and still functions as an on-line bridge, albeit with a greatly reduced weight limit of 5 tons. At present, it serves only a single farmstead on the other side of Lytle Creek. Like the other two standing bowstring bridges that remain at their original locations, the future status of the Washington Mill Bridge is unknown.



Approach to the Washington Mill Bridge, Dubuque County, built in 1878.

This bridge is still in use in its original location.

Photograph by the author 2002. (FHWA#: 145870)

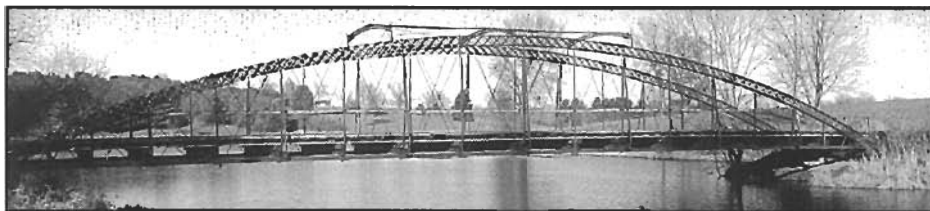


Profile of the Washington Mill Bridge. Photograph by the author 2002.

The Fremont Mill Bridge

Known locally as the Fremont Mill Bridge, this bowstring arch truss structure was built in 1873 to span the south fork of the Maquoketa River at Monticello, in Richland Township, on the Military Road that passed through Jones County. The bowstring arch bridge stood in this location for 57 years. In 1930, the bridge was moved and reassembled near the former Fremont Mills site, a small community one mile north of Stone City, to begin its second half century of service. The structure was slated for demolition in 1983, but was saved through efforts undertaken by local preservationists, the Jones County Conservation Board, and the cooperation of the County Engineer. The new relocation site was the 217-acre recreation area at Central Park, two miles west of Center Junction and seven miles east of Anamosa. The park is located in Section 1 of Jackson Township, T84N, R3W in Jones County, Iowa.

Central Park lies in a valley among the rolling prairie uplands of east central Iowa. The bridge now serves as a pedestrian crossing in the southwest section of the 25 acre lake within the park. From the bridge, one can look across the lake and view the natural basin in which the entire park is contained. This scenic park offers a variety of activities to the public, including fishing, swimming, boating, camp sites with either fully modern facilities or a more primitive setting, hiking trails, shelters, a playground area, volleyball court, and a Nature Center.



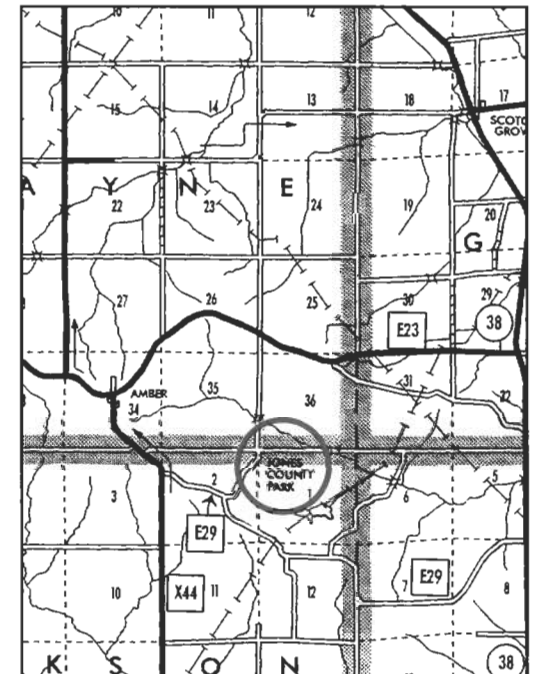
Profile of the Fremont Mill Bridge (Monticello Bridge, Central Park Bridge), Jones County, built in 1873. The bridge is now located in Central Park. Photograph by the author 2002.



Approach to the Fremont Mill Bridge. Photograph by the author 2002. (FHWA#: none)

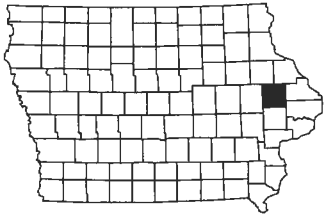


Jones County



The Hale Bridge

The Hale Bridge was located over the Wapsipinicon River, one mile due south of the village of Hale, T83N, R2W, in Jones County, Iowa. The elegant structure, of which three iron spans combine for 263 feet, also had two additional wooden approaches, making the total span of the bridge 296 feet long. It was manufactured by the King Iron Bridge and Manufacturing Company. Constructed between 1877 and 1879, this bridge was the longest standing bowstring arch bridge in the state of Iowa.



Jones County

In recent years, the bridge was weakened due to flood damage and general old age. In 1972, the county authorized \$15,860 of repairs after completing a study that had revealed structural deficiencies. Upon careful consideration, Jones County eventually decided to close the bridge in 1997 because it was determined that

even if the bridge was repaired at prohibitive costs, its carrying load still would be greatly limited when compared to a modern structure. In late winter of 2003, through the planning of the Jones County Historic Preservation Commission with the support of the Jones County Supervisors, the three spans were removed from their piers and transported to sites on either side of the river to be refurbished and restored. It is the intention of Jones County that the spans be relocated for future use. However, the final destinations of each of the three separate spans have not yet been determined as of the writing of this text.



*Approach to the Hale Bridge, Jones County, built circa 1879.
Photograph by the author 2002. (FHWA#: 206270)*



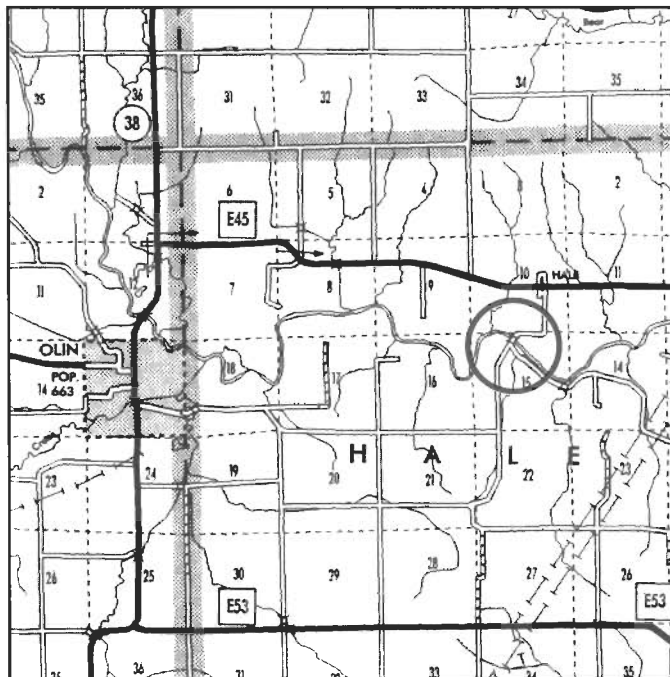
Profile of the Hale Bridge. Photograph by the author 2002.



Dismantling the Hale Bridge by Peterson Contractors, Inc. and Voss Moving Company, February 2003. Photographs on this page by the author 2003.



Removal of the 100 foot southern span of the Hale Bridge by Peterson Contractors, Inc. and Voss Moving Company, February 2003.



Removal of the 81 foot middle span of the Hale Bridge by Peterson Contractors, Inc. and Voss Moving Company, February 2003.

The Nodaway River Bridge

The Nodaway River Bridge is located in Pilot Grove County Park, three miles west of Grant, on County Road H14 in northern part of Montgomery County, Iowa. It is located in Section 1 of Pilot Grove Township, T73N, R37W. The Nodaway River Bridge was built in 1876 by Missouri Valley Bridge and Iron Works of Leavenworth, Kansas. The 70-foot long bridge was originally placed at a crossing on the Nodaway River south of Grant. The structure stood until 1969 when it was moved to the county park. It now serves as a pedestrian bridge over a small arm of the lake in the park.

Pilot Grove County Park is in a lovely 23-acre area containing a large, clear pond and grove of majestic, mature oaks. It has a campground with electric hookups, a large playground area, and both fishing and swimming are allowed in the lake. The park also includes a mile long hiking trail around the perimeter of the grounds. The relocated Nodaway River Bridge sits at the west end of the pond and caters to foot traffic through the park.



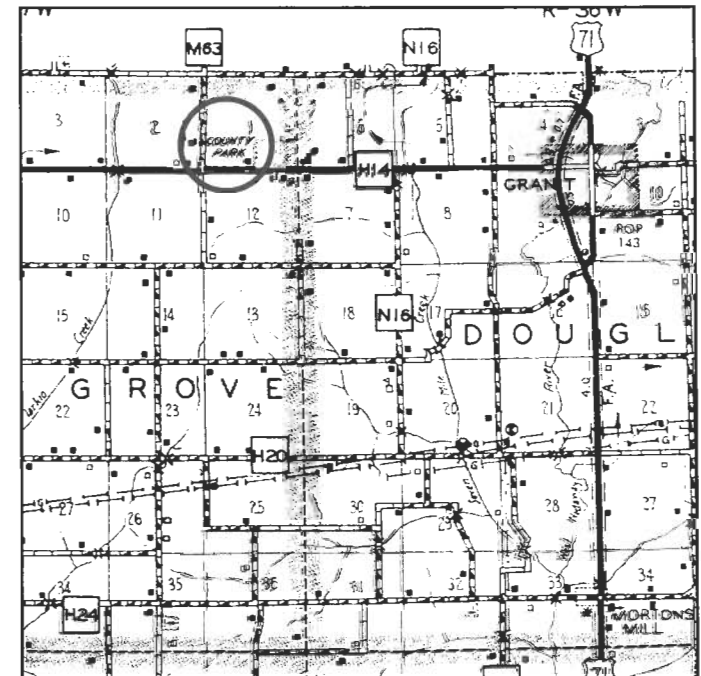
Approach to the Nodaway River Bridge. Photograph by the author 2002.



Profile of the Nodaway River Bridge, Montgomery County, built in 1876. The bridge is located in Pilot Grove County Park. Photograph by the author 2002. (FHWA#: none)



Montgomery County



The McDowell Bridge

The McDowell Bridge is located over the Skunk River in the Millgrove Access Wildlife Area, 8.9 miles southwest of Montezuma, in Poweshiek County, Iowa. It lies on an abandoned roadway that formerly intersected with River Road in Section 35 of Sugar Creek Township, T78N, R16W. The bridge is 167 feet in length, with an iron span of 120 feet long. It was manufactured by the King Iron Bridge and Manufacturing Company in 1883. It was originally built on a county road over the North Skunk River, but the road was closed and vacated by the Poweshiek County Board of Supervisors in 1986.

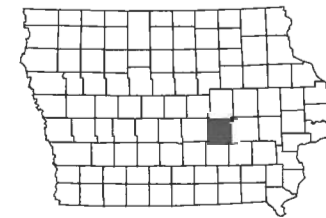
Rather than dismantle and sell the old bridge for scrap, the county chose to leave the structure in place, in what has become the Millgrove Access Wildlife Area. This wildlife area is composed of 430 acres of land and is a designated Natural Resource Area. It is one of the few remaining public wetlands areas in Poweshiek County. It is managed by the Poweshiek County Conservation Board. Hunting and fishing are allowed in season and it is open to hiking. Another 200 acres adjacent to Millgrove access have recently been donated by the Iowa Natural Heritage Foundation.



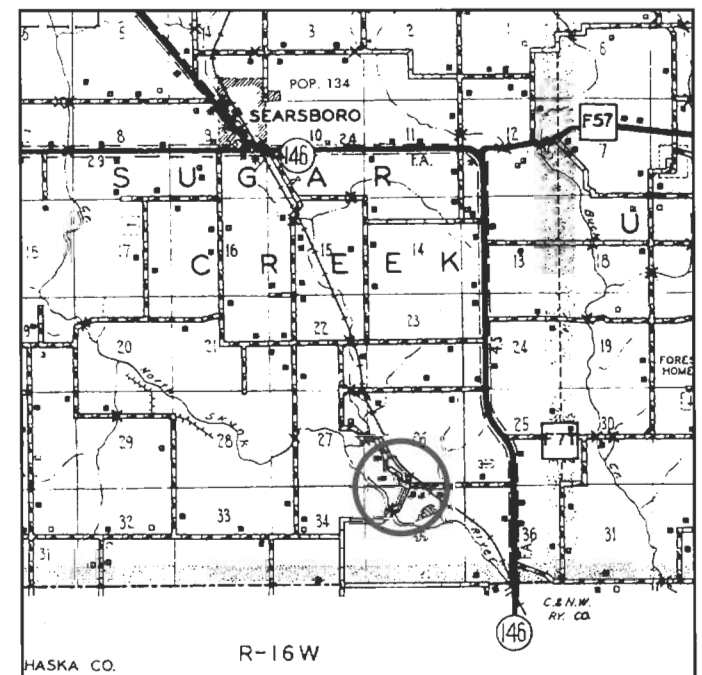
Approach to the McDowell Bridge (Skunk River Bridge) Poweshiek County, built in 1883. The bridge is located in the Mill Grove Access Wildlife area. Photograph by the author 2002. (FHWA#: 292080)



Profile of the McDowell Bridge. Photograph by the author 2002.



Poweshiek County



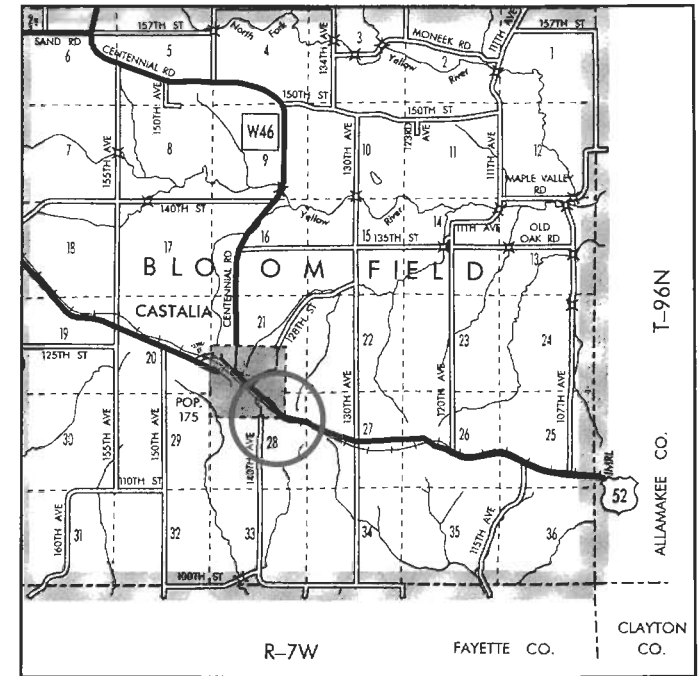
The Eureka Bridge

The Eureka Bridge is located just off Hammer Street in the City Park of Castalia, T96N, R7W, in Winneshiek County, Iowa. The structure was manufactured by Allen, McEvoy & Company of Beloit, Wisconsin. The name “Eureka” is a type name used by the manufacturer to designate a unique kind of patented bowstring design. According to research done by James Hippen, the Eureka bridge probably was originally used at a site in or near the village of Ridgeway in Winneshiek County, but was later moved to another site in Bloomfield Township. It was placed over the Yellow River in the Moneek Valley, where it stayed until 1989. The bridge was relocated to the park by the Bloomfield Historical Society and the community of Castalia in 1993.

The Eureka Bridge remains the only existing example of an early bowstring structure built by the relatively small local firms, which competed against the giant national manufacturers that shipped out hundreds of bridges a year.



Profile of the Eureka Bridge, Winneshiek County, built in 1871. The bridge is located in the City Park of Castalia. Photograph by the author 2002. (FHWA# none)



The Freeport Bridge

The Freeport Bridge is located in Trout Run Park near the city of Decorah, in Winneshiek County, Iowa. Trout Run Park is situated in Section 23, T98N, R8W, along the north side of Highway 9 on the southeast edge of Decorah just east of the intersection with Montgomery Street. Among the more famous of the Wrought Iron Bridge Company structures that was built in Iowa, the 160 foot bridge originally was built across the Upper Iowa River near Freeport, in Winneshiek County. The bridge was put into service in 1878. The Freeport Bridge was the second longest bridge built in the nation by Hammond's company. It was relocated to its current location in the 1990s by Winneshiek County.

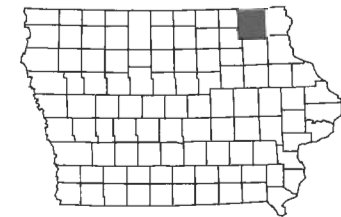
Trout Run Park is maintained by the Winneshiek County Conservation Department. The park features the bridge as its centerpiece and has a small picnic and walking area, but is best known for its boat and canoe access to the Upper Iowa River.



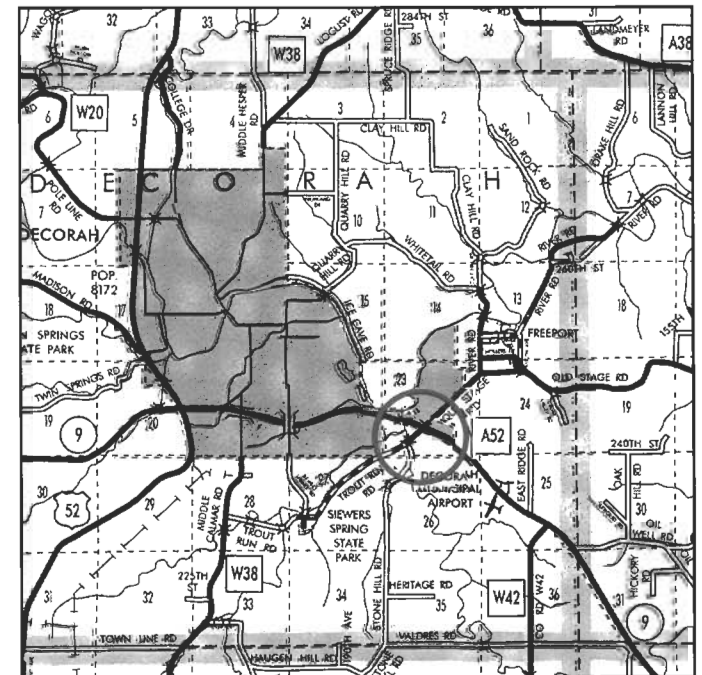
Profile of the Freeport Bridge, Winneshiek County, built in 1878. The bridge is located in Trout Run Park, Decorah. Photograph by the author 2002. (FHWA#: none)



Postcard showing flooding of the Upper Iowa River valley, covering approaches to the Freeport Bridge in its original location in Winneshiek County, Iowa. The photograph possibly depicts the 1911 flood. Courtesy of James Roman.



Winneshiek County



The Gilliece Bridge

The Gilliece Bridge is located on Cattle Creek Road and crosses the Upper Iowa River, 3.2 miles west of Bluffton, in Winneshiek County, Iowa. It is located in Section 6, Bluffton Township, T99N, R9W. Built in 1874 by the Wrought Iron Bridge Company, the iron portion spans 130 feet, and, including its approaches, the bridge totals 151 feet. The Gilliece Bridge is one of only three bowstring arch bridges still standing in its original placement and still functioning as an on-line bridge, albeit with a greatly reduced weight limit of 3 tons imposed upon it. The bridge stands down in the valley, next to the steep bluffs of the Upper Iowa River. From the bridge, there is a pleasant view of the river floodplain and the valley slopes. Like the Turkey River Bridge, it will undoubtedly be removed at some point in the future. As of this date, what the outcome will be remains unknown.



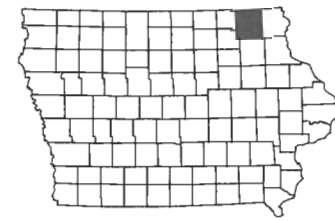
Approach to the Gilliece Bridge, Winneshiek County, built in 1874.

The bridge is still in use in its original location.

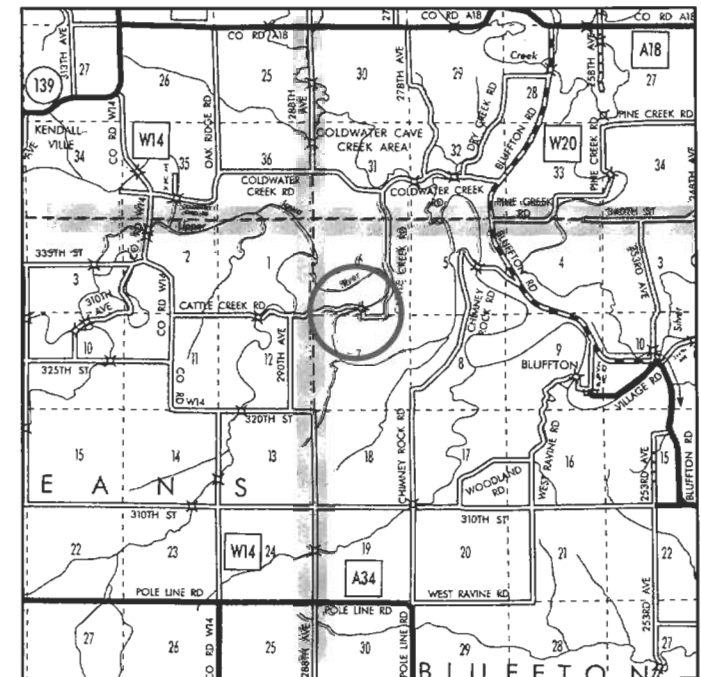
Photograph by the author 2002. (FHWA#: 348800)



Profile of the Gilliece Bridge. Photograph by the author 2002.

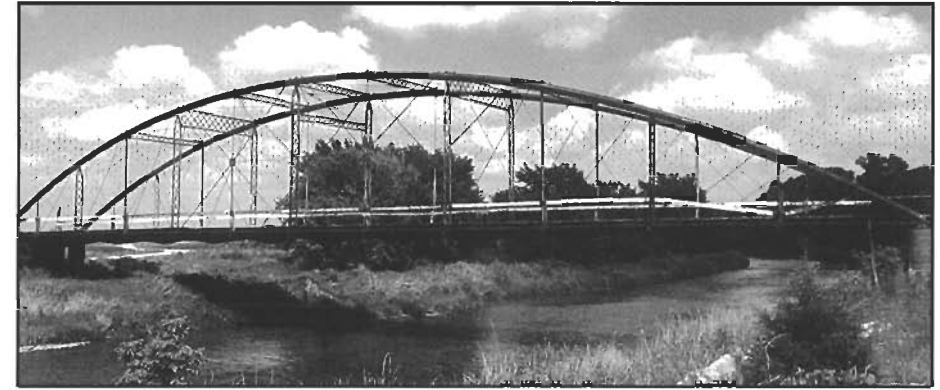


Winneshiek County

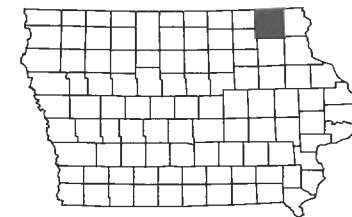


The Turkey River Bridge

The Turkey River Bridge is located on Little Church Road over the Turkey River, 2.5 miles south of Festina, in Winneshiek County, Iowa. It is situated in Section 34 of Washington Township, T96N, R9W. Built in 1873 by the Wrought Iron Bridge Company, the graceful, 160 foot structure includes 17 feet of approaches, giving it a total length of 177 feet. The Turkey River Bridge is one of only three bowstring structures left in Iowa that is still standing in its original placement and still, as of 2003, functioning as an on-line bridge, albeit with a greatly reduced weight limit of 3 tons imposed on it. The bridge spans the Turkey River at a broad, scenic point in the floodplain. It is easy to spot, as it rises on a high point above the river. This bridge will undoubtedly be removed at some point in the future: as of this date, however, its future disposition is unknown.



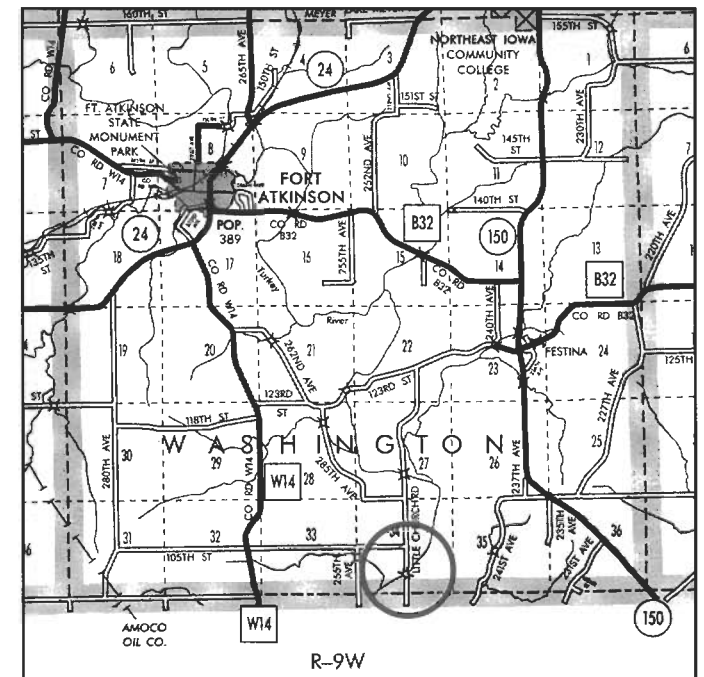
Profile of the Turkey River Bridge. Photograph by the author 2002.



Winneshiek County



Approach to the Turkey River Bridge, Winneshiek County, built in 1873. The bridge is still in use in its original location. Photograph by the author 2002. (FHWA#: 346440)

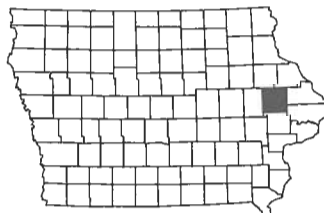


Privately Owned Bridges

Three of the remaining bowstring arch bridges in Iowa belong to private owners. These three are located in Jones County. In two of the cases, the Jones County Supervisors decided to reroute the county roads where the bridges are located, while leaving the old iron spans intact and in place. Both bridges can be viewed from the public right-of-way on the rerouted county roads; however, they are on private property and cannot be accessed without the owners' approval.



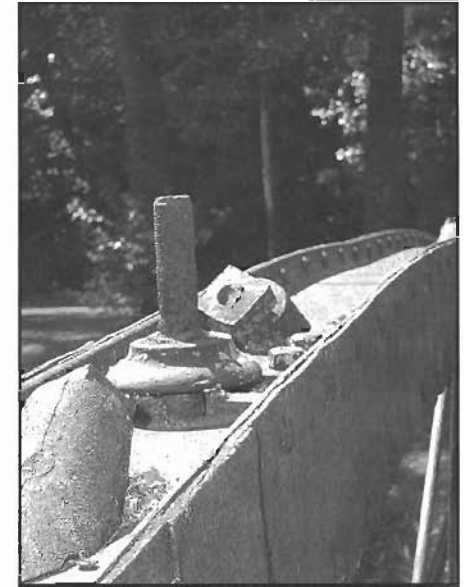
No trespassing signs greet visitors to privately owned bridges. Access to these bridges is by permission only. Photograph by the author 2002.



Jones County



Close up view of side supports on the Coon Hunters' Bridge. Photograph by Evan Vulich 2003.



Old and rusted bolts still hold the Coon Hunters' Bridge together. Photograph by Evan Vulich 2003.



Close up view of the steel plates that anchor the Coon Hunters' Bridge to the ground. Photograph by Evan Vulich 2003.

The Corbett's Mill Bridge

The Corbett's Mill Bridge is located over the Maquoketa River 3.0 miles northeast of Scotch Grove, Jones County, Iowa. It is situated in Section 3 of Scotch Grove Township, T85N, R2W. Corbett's Mill Bridge, also known as Eby's Mill Bridge, is a 128 foot long, single span bridge that was manufactured in 1871 by Miller, Jamison and Co., known as the Miller Iron Bridge Company.

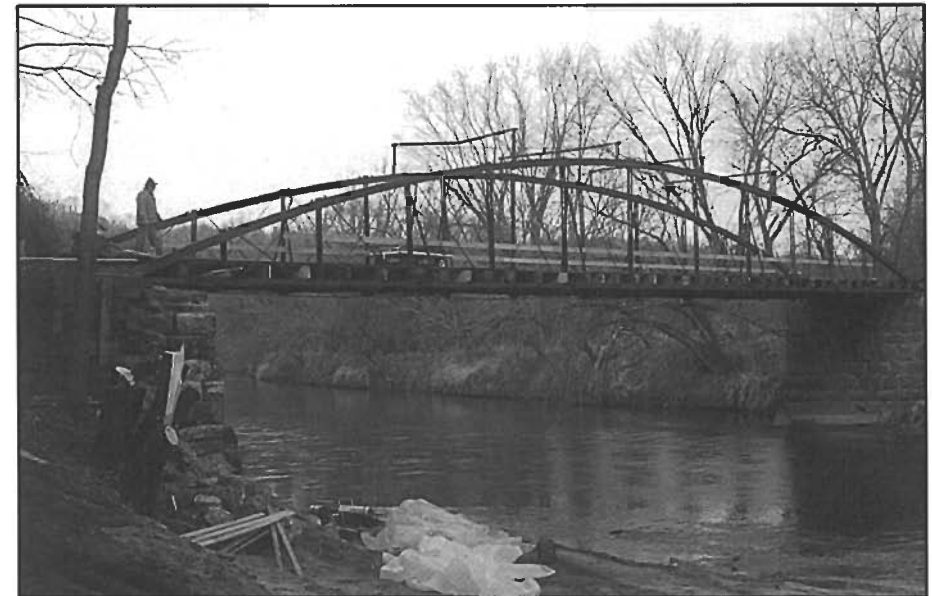
The bridge was still in place at the mill site in 1958 when the Jones County Engineer designed a shorter route on County Road X73. This new road bypassed the previous loop that twisted around the mill pond and passed the mill and farmstead. The old roadway and bridge were vacated by the county. Ownership of the bridge site then passed on to the landowner.

By 2002, however, age and wear had caught up with the structure. The Corbett's Mill Bridge had deteriorated to a point where the wooden floor planks had rotted away, making it almost impossible to walk across the bridge. Huge limestone blocks on one end of the abutments had torn lose after many severe floods and threatened to topple the entire structure into the Maquoketa River. The property owner then hired a construction company, Taylor Construction of New Vienna, Iowa, to refurbish the deck and stone pilings. The workers refitted the stone blocks back into place and put new timbers across the entire floor, restoring the bridge to usability again.

The old Corbett's Mill Bridge is, today, visible several hundred meters upstream from the newer 1958 bridge. It cannot be accessed or visited without the landowner's permission.



Approach to the Corbett's Mill Bridge (Eby's Mill Bridge), Jones County, built in 1871. The entire bridge deck has just been replaced by Taylor Construction Company. Photograph by the author 2002. (FHWA#: none)



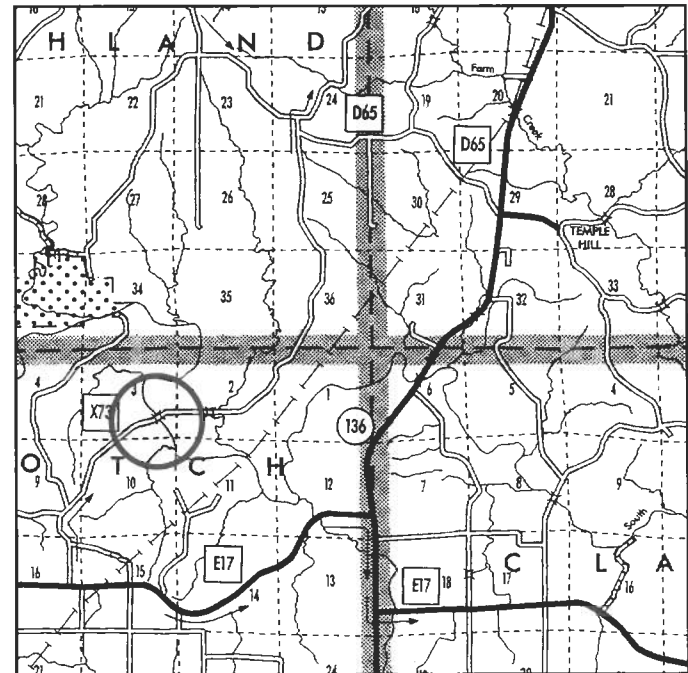
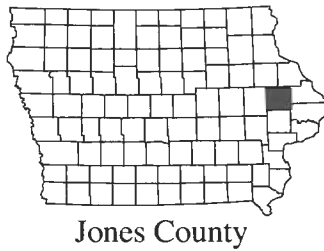
Profile of the Corbett's Mill Bridge. Photograph by the author 2002.



Close up of Corbett's Mill Bridge showing damage to the stone pier on the western end of the bridge prior to renovation. Photograph by the author 2001.



Stone pier repaired at Corbett's Mill Bridge, 2002. Photograph by the author 2002.



The Lower Road Bridge

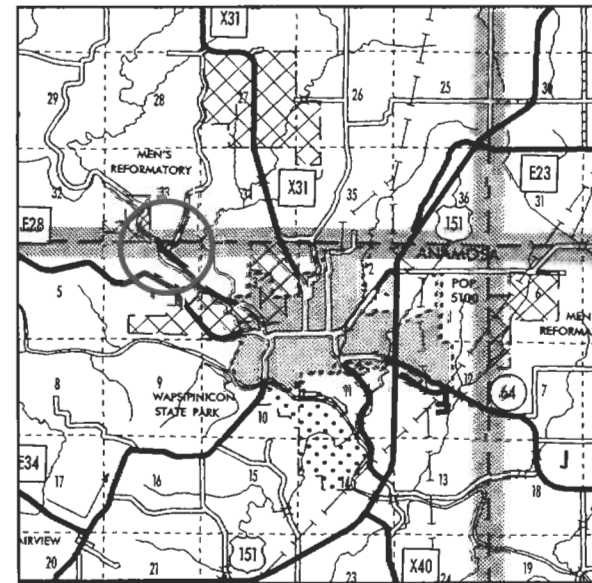
The Lower Road Bridge is situated on private property over Buffalo Creek, adjacent to County Road E-28, also known as the Lower Road, 0.6 miles northeast of Anamosa in Jones County, Iowa. It is located in section 4 of Fairview Township, T84N, R4W. The two spans of the 155-foot bridge—105 feet and 50 feet in length—were built in 1878 by the King Iron Bridge and Manufacturing Company of Cleveland, Ohio. Coupled with the wooden approaches, the bridge is 160 feet long. The bridge originally spanned the Buffalo River along a road that linked Anamosa and Stone City. The road was vacated and abandoned in 1927, and a new road and bridge were built a half mile downstream on Buffalo Creek. This road bypassed the steep Fisher Hill, an abrupt and precipitous route leading from the 1878 structure, which connected the Buffalo roadway (the “Lower Road”) to the “Ridge Road” (current County Road E28) to Stone City.



Approach to the Lower Road Bridge. The smaller span is in the forefront of this photograph. Photograph by the author 2002.



Profile of the Lower Road Bridge. Jones County, built in 1878. Note the smaller span at the southern end of the bridge, which may have been built to correct a survey error. Photograph by the author 2002. (FHWA#: none)



Jones County continued to maintain the old bridge for several decades, until the 1970s. Following a public hearing in 1971, both Fisher Hill Road and the bridge were closed. The bridge reverted back to a private owner who possessed property on both sides of the bridge. The present owner of the bridge has had an extensive amount of work done on this historic structure and it is in an excellent state of preservation. The structure serves as a visual reminder of what was once a common form of bridge construction. Today the bridge can be visited only with permission of the owner.



The Scotch Grove Coon Hunters' Bridge

As this book was going to print, it was brought to my attention that there is a 20th bowstring arch bridge still standing in the state. This bridge is currently located at the Scotch Grove Coon Hunters' facility along Eby's Mill Road, in T85N, R2W, Section 2 of Scotch Grove Township, in Jones County.

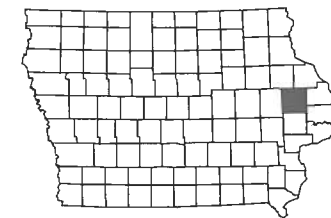
The bridge was built in 1876 by the King Iron Bridge and Manufacturing Company at a cost of \$594. The bridge, which spans 54 feet, originally crossed Kitty Creek just outside of Monticello. In 1929, this bridge was moved to another location across Kitty Creek. Then, in 1987, the bridge was removed and sold to Jerry Walter for \$1400, who donated it to the Scotch Grove Coon Hunters. In 1997, the bridge was erected across a gully in the middle of a golf course, where it stands today.⁸⁶



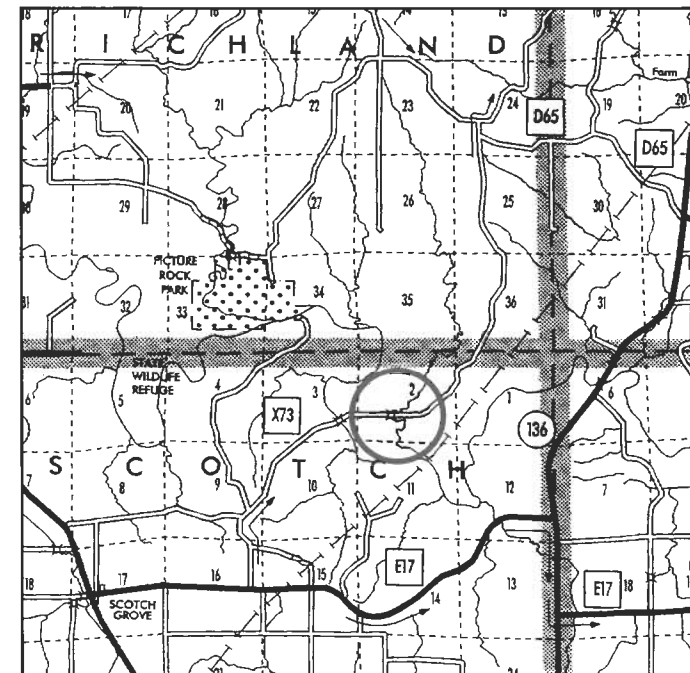
*Approach to Coon Hunters' Bridge, Jones County, built in 1876.
Photograph by Evan Vulich 2003.*



Profile of the the Coon Hunters' Bridge. Photograph by Evan Vulich 2003.



Jones County

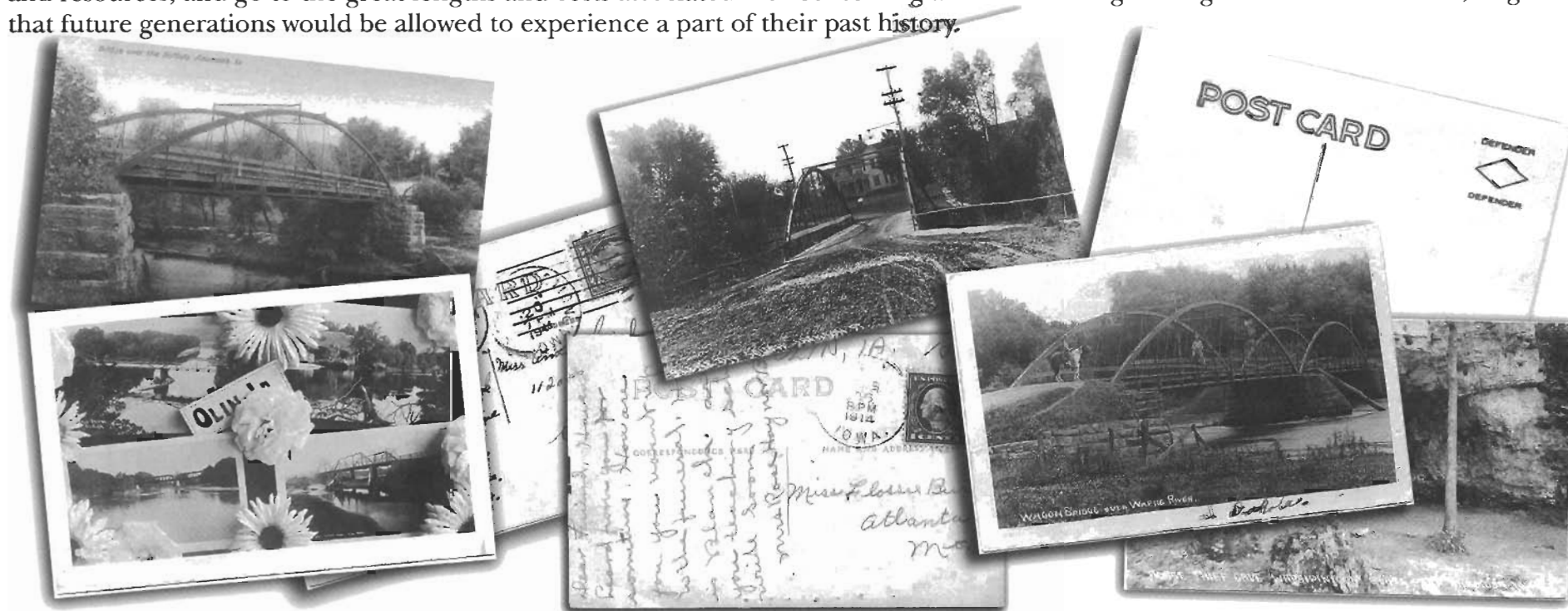


Afterword

Have we seen the last of the bowstring bridges? Not if recent innovations are any indication. At the beginning of the year 2002, the *Cedar Rapids Gazette* carried a picture of a new footbridge being placed across the Yellow River at Effigy Mounds National Monument near Marquette, Iowa. The new bowstring was a 160-foot long span, produced by Bridge America Inc. of Alexandria, Minnesota. Bridge America President, Bruce Leland, said: “The bowstring is an old fashioned design that is enjoying a resurgence of popularity, especially for light loads because it is both efficient and aesthetically pleasing.”⁸⁷ The very same benefit of the design was, of course, noted almost 150 years earlier by Thomas Moseley and Zenas King, among others.

In the 1879 *History of Jones County*, there is a page that carries a small heading simply titled: “Bridges.”⁸⁸ It provides a listing of the location of the many major river crossings. What the writer was trying to convey, however, goes beyond the mere enumeration of the places where a stream was forded. It also expresses the fact that the bridges helped to unite all of the areas and residents within their bounds, not just those who resided in a few convenient locations.

When the future history of the county is written, those same crossings may again be mentioned, although it will be the carrying capacity and strength of the concrete bridges that is emphasized, and most certainly not their elegance or attractive design. But by setting aside and preserving a few of the last remaining old bridges, it also will convey the fact that the people of the county were willing to invest the time and resources, and go to the great lengths and costs associated with conserving and maintaining these graceful old structures, to guaranty that future generations would be allowed to experience a part of their past history.



Collection of postcards from various bridge sites in Jones County, Iowa. Courtesy of Doug Jones.

Endnotes

- ¹ Leland L. Sage, *A History of Iowa* (Ames, Iowa: Iowa State University Press 1974) pp. 200-201.
- ² William H. Thompson, *Transportation in Iowa: A Historical Summary* (Ames, Iowa: Iowa Department of Transportation 1989) p. 43.
- ³ John H. Gear cited in Edgar R. Harlan, *A Narrative History of the People of Iowa with Special Treatment of Their Chief Enterprises in Education, Religion, Valor, Industry, Business, Etc.* (Chicago and New York: The American Historical Society, Inc. 1931) p. 119.
- ⁴ Op. cit., Thompson, *Transportation in Iowa: A Historical Summary*, p. 69.
- ⁵ Jones County Supervisors Record, Book C, p. 437 (June 4, 1879), Jones County Courthouse, Anamosa, Iowa.
- ⁶ *Anamosa Eureka*, September 27, 1877.
- ⁷ Clayton B. Fraser, Iowa Historic Bridge Inventory: JONE15, Corbett's Mill Bridge. (Eby's Mill Bridge). Loveland, CO: FRASERdesign, produced for the Iowa Department of Transportation, 1993.
- ⁸ Jones County Supervisors Record, Book B, p. 156 (June 11, 1869) Jones County Courthouse, Anamosa, Iowa.
- ⁹ *History of Jones County, Iowa* (Chicago: Western Historical Company, 1879) p. 349.
- ¹⁰ Jones County Supervisors Record, Book B, p. 275 (Oct. 18, 1870).
- ¹¹ Jones County Supervisors Record, Book B, p. 392 (April 2, 1872).
- ¹² Jones County Supervisors Record, Book B, p. 319 (April 5, 1871).
- ¹³ Op. cit., Fraser, Iowa Historic Bridge Inventory: JONE15, Corbett's Mill Bridge (Eby's Mill Bridge). The Fraser document, also known as the HAER Inventory for the Historic American Engineering Record, has it listed as the Miller Company [the Buckeye Bridge Company] of Cleveland, Ohio.
- ¹⁴ Jones County Supervisors Record, Book B, p. 384 (Jan. 5, 1872).
- ¹⁵ "Bridge may be Historic", *Anamosa (Iowa) Journal-Eureka*, Wednesday, April 3, 1985.
- ¹⁶ *Anamosa Eureka*, October 17, 1878.
- ¹⁷ Clayton B. Fraser, Iowa Historic Bridge Inventory: JONE14, Lower Road. Loveland, CO: FRASERdesign, produced for the Iowa Department of Transportation, 1993. The Fraser HAER document does not use the Fisher's Mill Bridge name.
- ¹⁸ Bertha Finn, *Anamosa, 1838-1988: A Reminiscence* (Monticello 1988), pp. 30-37.
- ¹⁹ Jones County Supervisors Record, Book C, p. 124 (April 7, 1876).
- ²⁰ Jones County Supervisors Record, Book B, p. 267 (Sept. 9, 1870).
- ²¹ Jones County Supervisors Record, Book C, p. 220 (Jan. 6, 1877).
- ²² Jones County Supervisors Record, Book C, p. 238 (April 5, 1877).
- ²³ *Anamosa Eureka*, August 23 1877.
- ²⁴ *Anamosa Eureka*, February 14, 1878.
- ²⁵ *Anamosa Eureka*, February 21, 1878.
- ²⁶ Jones County Supervisors Record, Book C, p. 375 (Oct. 15, 1878). Action on the resolution was postponed until the January session, 1879.
- ²⁷ Jones County Supervisors Record, Book C, p. 348 (June 7, 1878).
- ²⁸ *Anamosa Eureka*, May 2, 1879.
- ²⁹ *Anamosa Eureka*, June 26, 1879.
- ³⁰ *Anamosa Journal*, October 8, 1931.
- ³¹ *Bremer County History: Written by the People of Bremer County, Iowa, and Compiled by the Bremer County History Book Committee* (Dallas: Taylor Publishing Company, 1985), p. 62.
- ³² Jones County Supervisors Record, Book B, p. 337 (June 9, 1871).
- ³³ *Anamosa Eureka*, March 8, 1873.
- ³⁴ *Anamosa Eureka*, March 13, 1873.
- ³⁵ Clayton B. Fraser, *Iowa Historic Bridge Inventory: JONE13, Fremont Mill Bridge (Central Park Bridge)*. Loveland, CO: FRASERdesign, produced for the Iowa Department of Transportation, 1993.

³⁶ Jones County Supervisors Record, Book B, p. 517 (Oct. 23, 1873).

³⁷ *Anamosa Eureka*, February 12, 1877.

³⁸ Clayton B. Fraser, *Iowa Historic Bridge Inventory*: JONE02, Hale Bridge (Wapsipinicon River Bridge). Loveland, CO: FRASERdesign, produced for the Iowa Department of Transportation, 1993. The Fraser HAER document, speaking about the piers states: "Evidently, the Hale location had already been slated for a permanent crossing..." Apparently, the writer did not know about the existing wooden bridge.

³⁹ Jones County Supervisors Record, Book C, p. 230 (April 3, 1877).

⁴⁰ Jones County Supervisors Record, Book C, p. 267 (Sept. 5, 1878).

⁴¹ Jones County Supervisors Record, Book C, p. 349 (June 7, 1878).

⁴² Jones County Supervisors Record, Book C, p. 403 (Jan. 10 1879).

⁴³ Jones County Supervisors Record, Book C, p. 433 (June 4, 1879).

⁴⁴ Clayton B. Fraser, *Iowa Historic Bridge Inventory*: BREM01, Green Mill Ford Bridge (Cedar River Bridge; Waverly Bridge). Loveland, CO: FRASERdesign, produced for the Iowa Department of Transportation, 1993. The Bremer County BREM01 HAER document cited the Bremer County Supervisors Record, p. 478 (January 6, 1870).

⁴⁵ Bremer County Supervisors Record, p. 570 (January 6, 1870), cited in BREM01 HAER.

⁴⁶ L. F. Parker, *History of Poweshiek County, Iowa: A Record of Settlement, Organization, Progress and Achievement, Vol. 1*, (Chicago: The S. J. Clarke Publishing Co., 1911), pp. 271-272.

⁴⁷ Clayton B. Fraser, *Iowa Historic Bridge Inventory*: POWE05, McDowell Bridge (Skunk River Bridge). Loveland CO: FRASERdesign, produced for the Iowa Department of Transportation, 1993. The POWE05 HAER document provides details of Crickett and the Poweshiek County bridge.

⁴⁸ Geoffrey H. Goldberg, Historic American Engineering Record (HAER), No. IA-72, McDowell Bridge (Skunk River Bridge). Produced for the National Park Service, Department of the Interior, 1995.

⁴⁹ Clayton B. Fraser, *Iowa Historic Bridge Inventory*: ALLA13, Monsrud Bridge (Paint Creek Bridge). Loveland CO: FRASERdesign, produced for the Iowa Department of Transportation, 1993

⁵⁰ Goldberg, Historic American Engineering Record (HAER), No. IA-72, McDowell Bridge (Skunk River Bridge).

⁵¹ David A. Simmons, Bridges and Boilers: Americans Discover the Wrought-Iron Tubular Bowstring Bridge, *Industrial Archaeology*, vol. 19, no. 2 (1993):63-76.

⁵² *Ibid.*, p. 67. Simmons' article goes into great detail about the initial attempts to fabricate bowstring arch bridges.

⁵³ Allan King Sloan, Discovering Zenas King. Paper delivered at Society of Industrial Archaeology meeting, June 5, 1999, Savannah, Georgia. Posted on the Internet at <http://www.kingbridgeco.com>. There is a lot of very useful information and there are pictures on this web site about Zenas King's company and his bowstring arch bridges.

⁵⁴ David A. Simmons, Bridge Building on a National Scale: The King Iron Bridge and Manufacturing Company. *Industrial Archaeology*, vol. 15, no. 2 (1989):23-39. The three articles—two by Simmons and the one by Sloan—provide the authoritative narrative about King's Company and the rise of the American bowstring bridge industry.

⁵⁵ Allan King Sloan, Discovering Zenas King, p. 6. Sloan's article provides a wealth of detail about the operation of the King Bridge Company based on family records discovered by Sloan about King in Cleveland, Ohio.

⁵⁶ Geoffrey H. Goldberg, Historic American Engineering Record (HAER), No. IA-78, Nodaway River Bridge. Produced for the National Park Service, Department of the Interior, 1995. The Goldberg HAER IA-78 document provides the details on Farnsworth's work. It also lists additional sources about Farnsworth's career, both before and after his involvement with the Missouri Valley Bridge Company.

⁵⁷ Clayton B. Fraser, *Iowa Historic Bridge Inventory*: MONT26, Nodaway River Bridge. Loveland, CO: FRASERdesign, produced for the Iowa Department of Transportation, 1993.

⁵⁸ *Op. cit.*, Simmons, Bridge Building on a National Scale: The King Iron Bridge and Manufacturing Company, pp. 32-33.

⁵⁹ James C. Hippen, *Marsh Rainbow Arch Bridges in Iowa*, (published by Boone County, Iowa 1997).

⁶⁰ Eugene Farrelly, Historic American Engineering Record (HAER), No. IA-90, Structural Study of Iron Bowstring Bridges, p. 21. Produced for the Iowa DOT as part of the Iowa Historic Bridges Recording Project II, 1996. The Farrelly document is a highly technical engineering report that compares three bowstring bridges built by three of the national bridge companies discussed in the text. Besides a large number of technical details about the three bridge designs, it also gives some information about the individual companies.

⁶¹ *Ibid.* The Freeport Bridge now located in Decorah, Iowa is one of the three bridges discussed in the Farrelly report. The other two are the Fremont Mill Bridge,

now located in Jones County Central Park, and the third bridge is the three-span, 400-foot long North Platte River Bridge, still preserved at Fort Laramie, Wyoming.

⁶² Eric DeLony, "HAER's Historic Bridge Program." *Industrial Archaeology*, vol. 19, no. 2 (1993):23-39. The Freeport Bridge is highlighted in Figure 2.

⁶³ Clayton B. Fraser, Iowa Historic Bridge Inventory: WINN13, Turkey River Bridge. Loveland CO: FRASERdesign, produced for the Iowa Department of Transportation, 1993. The WINN13 HAER document provides some details of the Wrought Iron Bridge Company and its bridge design.

⁶⁴ Clayton B. Fraser, Iowa Historic Bridge Inventory: WINN39, Gilliece. Loveland CO: FRASERdesign, produced for the Iowa Department of Transportation, 1993. The WINN39 HAER document provides some details of the Wrought Iron Bridge Company and its relationship with Winneshiek County.

⁶⁵ James C. Hippen, Historic American Engineering Record (HAER), Addendum to No. IA-10, Eureka Bridge (Perry and Allen Patent Bowing Truss Bridge). Produced for the Iowa DOT as part of the Iowa Historic Bridges Recording Project II, 1996. Hippen provides a detailed account of his search for the origin of the so called "Eureka Bridge" that now resides in a city park in Castalia, Iowa. All of the details here are taken from his report.

⁶⁶ Op. cit., Farrelly, Historic American Engineering Record (HAER), No. IA-90, Structural Study of Iron Bowstring Bridges, p. 17. The Fremont Mill Bridge now located in Central Park in Jones County, Iowa, is one of the three bridges discussed in the Farrelly report. Although highly technical in nature, some details about the Massillon Bridge Company design are discussed.

⁶⁷ Franklin T. Oldt, editor-in-chief, P. J. Quigley, supervising editor, *History of Dubuque County, Iowa; being a survey of Dubuque County History, including a history of the city of Dubuque and special account of districts throughout the county, from the earliest settlement to the present time* (Chicago Goodspeed Historical Association, 1911), p 490.

⁶⁸ Randolph Lyon, *Faith and Fortunes: An Encyclopedia of Dubuque County* (Dubuque, Iowa: Flynn printing and Graphics 1998), p. 392.

⁶⁹ Op. cit., Oldt, *History of Dubuque County, Iowa; being a survey of Dubuque County History, including a history of the city of Dubuque and special account of districts throughout the county, from the earliest settlement to the present time*, p. 489. The text cites *E and H*, June 21, 1859.

⁷⁰ School No. 6 and the full length of Creek Branch Lane road are clearly shown on the 1892 Dubuque County Plat Map in the *Plat Book of Dubuque County, Iowa* (Northwest Publishing Company 1892).

⁷¹ Clayton B. Fraser, Iowa Historic Bridge Inventory: DUBU08 Washington Mill Bridge (Lytle Creek Bridge). Loveland CO: FRASERdesign, produced for the Iowa Department of Transportation, 1993. Details of the Dubuque County supervisors and the bridge company are discussed in this document.

⁷² Geoffrey H. Goldberg, Historic American Engineering Record (HAER), No. IA-59, Hale Bridge (Wapsipinicon River Bridge). Produced for the National Park Service, Department of the Interior, 1995, p. 5. Goldberg cites "Treacherous Danger in Bowstring Bridge," Iowa Highway Commission Service Bulletin. August, 1914, p.7, as the source of this interesting quotation.

⁷³ Anna Marie Schneller, *A Social and Economic History of Crawford County Iowa, Volume 2* (Dallas: Taylor Publishing Company 1988), p. 95. Schneller Crawford County newspaper accounts compile an excellent perspective on of county life from 1926 to 1960.

⁷⁴ "Rampaging Boyer Drowns Valleys," *Denison Review*, 26 April 1945. Goldberg below was the original source for the *Denison Review* stories.

⁷⁵ "28 Bridges Washed Out by Flood," *Denison Review*, May 10, 1945.

⁷⁶ Geoffrey H. Goldberg, Historic American Engineering Record (HAER), No. IA-48, Nishnabotna River Bridge. Produced for the National Park Service, Department of the Interior, 1995, pp. 2-3.

⁷⁷ Ibid, Goldberg, Historic American Engineering Record (HAER), No. IA-48, Nishnabotna River Bridge, pp. 2-6. Goldberg gives a good account of the national situation regarding the needs and shortages of steel during the war.

⁷⁸ Some sources cite H. Gene McKeown as the designer of these bridges, however, McKeown informed the author that he was not involved in any of the work on the Crawford County bridges.

⁷⁹ Op. cit., Goldberg, Historic American Engineering Record (HAER), No. IA-48, Nishnabotna River Bridge, p. 6. Goldberg cites Orin L. Dahl, Pittsburgh-Des Moines Steel Company," in *Des Moines: Capital City* (Tulsa: Continental Heritage, Inc 1978), p. 227, as the source of information about the history of the company.

⁸⁰ Clayton B. Fraser, Iowa Historic Bridge Inventory: CRAW10, Buck Grove Bridge. Loveland CO: FRASERdesign, produced for the Iowa Department of Transportation, 1993.

⁸¹ Clayton B. Fraser, Iowa Historic Bridge Inventory: CRAW08, Nishnabotna River Bridge. Loveland CO: FRASERdesign, produced for the Iowa Department of Transportation, 1993.

⁸² Clayton B. Fraser, Iowa Historic Bridge Inventory: CRAW09, Nishnabotna River Bridge. Loveland CO: FRASERdesign, produced for the Iowa Department of Transportation, 1993.

⁸³ Clayton B. Fraser, Iowa Historic Bridge Inventory: CRAW11, East Soldier River Bridge. Loveland CO: FRASERdesign, produced for the Iowa Department of

Transportation, 1993.

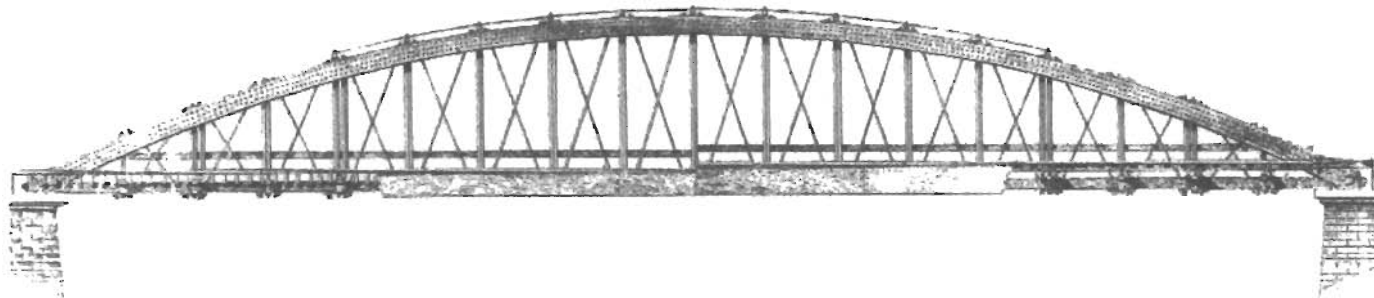
⁸⁴ Clayton B. Fraser, Iowa Historic Bridge Inventory: CRAW12, Beaver Creek Bridge. Loveland CO: FRASERdesign, produced for the Iowa Department of Transportation, 1993.

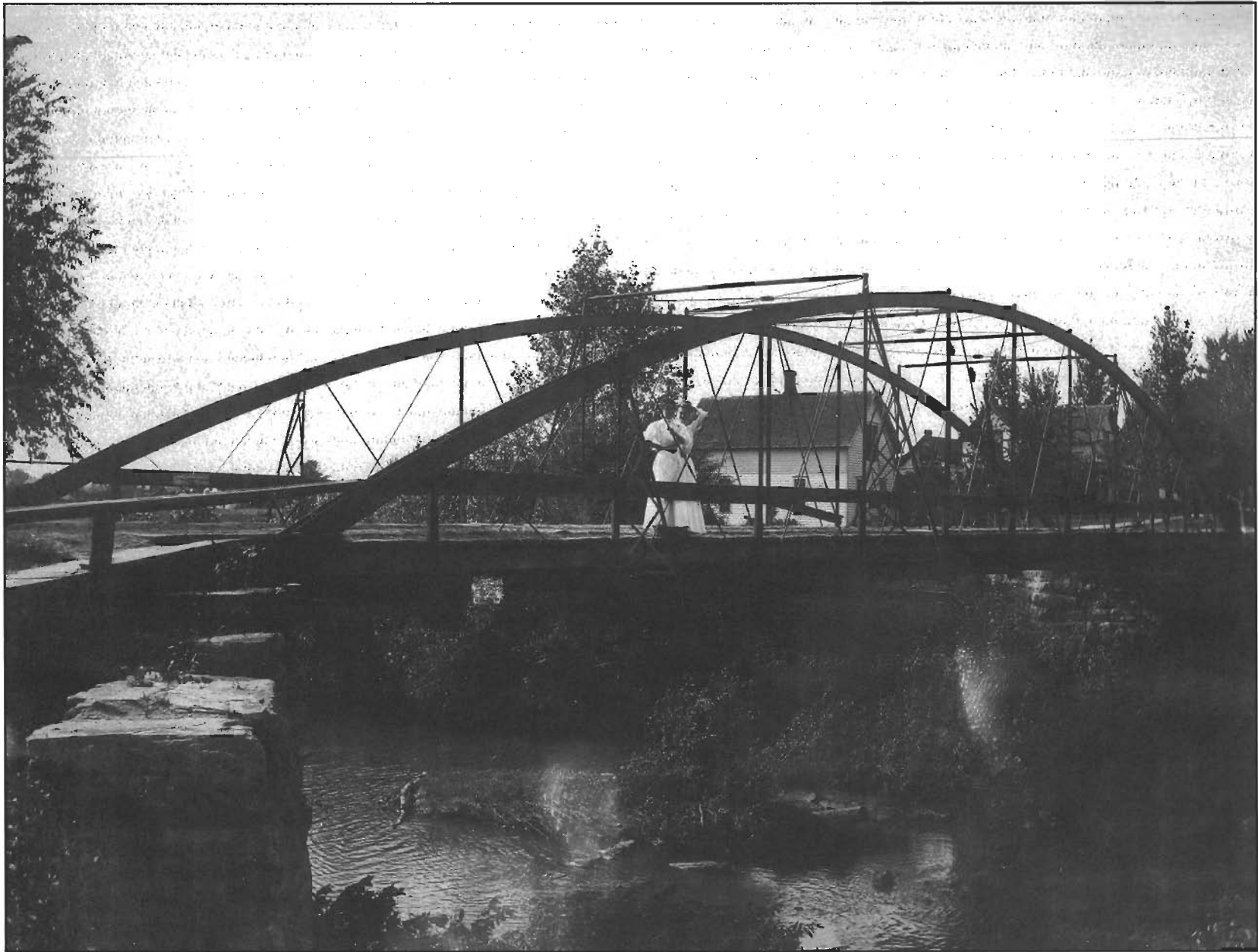
⁸⁵ Clayton B. Fraser, Iowa Historic Bridge Inventory: CRAW14, Yellow Smoke Park Bridge. Loveland CO: FRASERdesign, produced for the Iowa Department of Transportation, 1993.

⁸⁶ This information was supplied courtesy of Paul Rohrbacher of the Jones County Historical Preservation Commission.

⁸⁷ "New footbridge installed," *Cedar Rapids Gazette*, Monday January 7, 2002.

⁸⁸ History of Jones County, Iowa (Chicago: Western Historical Company, 1879).





Notes





Front cover: The Hale Bridge in its original location near Hale over the Wapsipinicon River. The bridge has since been removed. Photograph by Michael R. Finn 2002.

Back cover: Postcard depicting the Jones County Central Park Bridge in its original location at Monticello over the Maquoketa River. Postmarked Cedar Rapids, Iowa, March 23, 1913. Published by O. H. Soetje, printed in France. Postcard in possession of the author.

Opposite: A horse drawn carriage over an unknown Jones County bowstring arch bridge (possibly the Buffalo River Bridge), circa 1900. Photographer and date unknown. Photograph from the personal archives of Bertha Finn.

Page 48: Two women posing on an unknown bowstring arch bridge. Photographer and date unknown. Photograph from the personal archives of Bertha Finn.



Maquoketa River Bridge, MONTICELLO, IOWA.

