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NPS Form 10-900
(Rev. 8-86)

OMB No. 1024-0018

United States Department of the Interior
National Park Service

OCT 1988

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations of eligibility for individual properties or districts. See instructions in *Guidelines for Completing National Register Forms* (National Register Bulletin 16). Complete each item by marking "x" in the appropriate box or by entering the requested information. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, styles, materials, and areas of significance, enter only the categories and subcategories listed in the instructions. For additional space use continuation sheets (Form 10-900a). Type all entries.

1. Name of Property

historic name Marsh Rainbow Arch Bridge
other names/site number Coon River Bridge, Rainbow Bend Access

2. Location

street & number Hwy N37 [NA] not for publication
city, town Lake City [X] vicinity
state Iowa code IA county Calhoun code 025 zip code 51449

3. Classification

Ownership of Property	Category of Property	Number of Resources within Property	
		Contributing	Noncontributing
[ ] private	[ ] building(s)		buildings
[X] public-local	[ ] district		sites
[ ] public-State	[ ] site	1	structures
[ ] public-Federal	[X] structure		objects
	[ ] object	1	Total

Name of related multiple property listing: N/A

Number of contributing resources previously listed in the National Register 0

4. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this [✓] nomination [ ] request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property [✓] meets [ ] does not meet the National Register criteria. [ ] See continuation sheet.

James S. Marsh SHPO — 9-30-88
Signature of certifying official — Date

Chief Bureau of Historic Preservation
State or Federal agency and bureau

In my opinion, the property [ ] meets [ ] does not meet the National Register criteria. [ ] See continuation sheet.

Signature of commenting or other official — Date

State or Federal agency and bureau

5. National Park Service Certification

I, hereby, certify that this property is:

[✓] entered in the National Register. [ ] See continuation sheet. — Beth DiCord — 3/30/89
[ ] determined eligible for the National Register. [ ] See continuation sheet.
[ ] determined not eligible for the National Register.
[ ] removed from the National Register.
[ ] other, (explain:) _____

Signature of the Keeper — Date of Action

6. Function or Use

Historic Functions (enter categories from instructions)	Current Functions (enter categories from instructions)
TRANSPORTATION/road-related(vehicular)	TRANSPORTATION/pedestrian-related

7. Description

Architectural Classification (enter categories from instructions)

NO STYLE

Materials (enter categories from instructions)

foundation CONCRETE
walls N/A
roof N/A
other CONCRETE

Describe present and historic physical appearance.

See Continuation Sheet, Section number 7, Page 2

The Lake City Rainbow Arch Bridge, built in 1914, is a three span, open spandrel arch with steel structure encased in concrete hangers and reinforced concrete. Designed by James Barney Marsh of the Marsh Engineering Company, the bridge is 271 feet long and has a curb-to-curb width of 18 feet. The bridge's longest span is 81 feet, with arches rising 11 feet, 3 1/2 inches above the roadbed. The structure spans the North Raccoon River two miles south of Lake City (Section 25, Jackson Township).

Built largely to be a "durable and permanent structure" with the added advantage of saving maintenance expenses "in the matter of painting," it was considered unique at the time of its construction (Lake City Graphic, Apr. 30, 1914). When completed, it stood as one of four bridges of the Marsh Rainbow Arch type, and the largest of the four.

The Iowa Bridge Company, a Des Moines firm owned by J. S. Carpenter, served as contractor on the project. As called for in Marshes' design, the bridge builder fashioned a structure or armature composed largely of riveted steel angle and flat stock for the spandrels and arches. This "method of construction," as described in a 1918 issue of Engineering and Contracting, was to shape "the structural steel reinforcing of the ribs first and connect them rigidly in place with struts, floor beams and hangers. The false work is then built around the steel reinforcing. The reinforcing for the arched ribs is composed of four angles laced on four sides and with the back of the angles placed outward, which gives the maximum value for the metal. The angles can be made heavy enough to carry the forms and the false work of the bridge, including the weight of the concrete." Encasing the resulting steel structure in concrete was more for protection of the steel structure than for loadbearing reasons. The contractor for the Lake City bridge erected the three arches on two piers and two abutments, the piers containing twenty-seven piles and the abutments twenty-four. According to contemporary newspaper accounts, construction of the bridge required five cars of cement, three cars of steel and 1,000 yards of gravel, the gravel being obtained from the river bank one-quarter of a mile east of the bridge. The Rainbow Bridge replaced a steel structure, known locally as the Zane Bridge, which was built by the King Bridge Co. of Cleveland, Ohio in 1892 (this bridge, of Howe truss configuration, was moved several miles upriver and put into service until being removed and destroyed in 1983).

The present condition of the bridge is very good. There is little spalling of the concrete, and what significant damage exists is largely the result of collisions with over-wide farm equipment. This compares favorably with another of Marsh Rainbow Arch design built in 1915 just east of Rockwell City on old Highway 20 (now closed to traffic). The Rockwell City bridge, a single arch of 55 foot span, is in poor condition; large cracks are visible and the concrete is badly spalled, owing in large part to its having been subjected to loads and stress that it was never designed to handle. By contrast, the longer Lake City bridge is in much better condition due, in part, to the difference in loads it was asked to carry during its lifetime.

The Lake City Rainbow Bridge is adjacent to Rainbow Bend Access, a property owned by the State of Iowa and maintained by Calhoun County. This park has a boat ramp and other features that make it attractive to fishermen and outdoor enthusiasts, which, with the bridge itself, draw people to the area. The park is wooded, as is the surrounding river valley, which soon gives way to farmland. The approach to the bridge from the south has been removed and rip-rap substituted, while the north approach adjacent to the park entrance has remained; several steel poles have been set into the ground at the north entrance of the bridge to prevent vehicular traffic.

John A. Panning, the research/writer of the nomination, appreciated the invaluable assistance given by Jerry Weber, Calhoun County Engineer, and Donald Van Ahn and his fellow members of the Calhoun County Conservation Board.

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8. Statement of Significance

Certifying official has considered the significance of this property in relation to other properties:

[X] nationally [ ] statewide [ ] locally

Applicable National Register Criteria [ ] A [ ] B [X] C [ ] D

Criteria Considerations (Exceptions) [ ] A [ ] B [ ] C [ ] D [ ] E [ ] F [ ] G

Areas of Significance (enter categories from instructions)	Period of Significance	Significant Dates
Engineering	1914-1935	1914

Cultural Affiliation: N/A

Significant Person:

Architect/Builder: Marsh, James Barney

State significance of property, and justify criteria, criteria considerations, and areas and periods of significance noted above.

See Continuation Sheet, Section number 8, Page 2

[X] See continuation sheet

Section 8, Page 2

9. Major Bibliographical References

See Continuation Sheet, Section number 9, Page 2

Previous documentation on file (NPS):
- ☐ preliminary determination of individual listing (36 CFR 67) has been requested
- ☐ previously listed in the National Register
- ☐ previously determined eligible by the National Register
- ☐ designated a National Historic Landmark
- ☐ recorded by Historic American Buildings Survey # _____
- ☐ recorded by Historic American Engineering Record # _____

☒ See continuation sheet
Section 9, Page 2

Primary location of additional data:
- ☒ State historic preservation office
- ☐ Other State agency
- ☐ Federal agency
- ☐ Local government
- ☐ University
- ☐ Other

Specify repository: _____

10. Geographical Data

Acreage of property Less than one acre

UTM References

	Zone	Easting	Northing
A	15	354140	4676540
B			
C			
D			

☐ See continuation sheet

Verbal Boundary Description

As shown on the accompanying map entitled "MAP: Marsh Rainbow Arch Bridge," the nominated property is situated 525 feet south of the center of Section 25, that is, in the NW 1/4, SE 1/4 of Section 25, T86N - R34W.

☐ See continuation sheet

Boundary Justification

The boundary includes the entire bridge and its approach that has historically been associated with the previous highway alignment.

☐ See continuation sheet

11. Form Prepared By

name/title Lowell Soike, Historian (research/writing by John A. Panning)
organization State Historical Society of Iowa date March 29, 1988
street & number Capitol Complex telephone (515) 281-3306
city or town Des Moines state Iowa zip code 50319

This bridge meets Criterion "C" as a significant example of James B. Marsh's skill as a bridge engineer in which he created and patented a multi-arch reinforced bridge design embodying a new type and method of bridge construction that served as the earliest prototype for a series of "Marsh Arch" multi-span bridges built across the country between the years 1914 and 1935--hence the period of significance indicated above. During This same period, his earlier designed single span "rainbow" arch bridge was achieving a popularity of its own around the country, especially in the midwestern states.

This remarkable "rainbow" three-arch bridge near Lake City became the prototype for numerous other multiple-span versions built outside Iowa. Its designer, James B. Marsh--the head of Marsh Engineering in Des Moines--had patented a small single span bridge of rainbow arch design in 1912. Within the next two years two bridges of this type had been built in Iowa and a third was about to get underway in Yellowstone National Park. With these successful beginnings, Marsh commenced developing a design to meet multiple span needs and then sought patent rights for it. Meanwhile, when the Lake City project offered an opportunity to carry out his new design, he submitted plans for the Lake City three-span bridge for approval to the Iowa State Highway Commission in March 1914. A little over four months later, on August 12, 1914, Marsh was awarded a U. S. Patent on his triple rainbow arch. "This bridge is being made as a sample," reported the editor of the Lake City Graphic and later, upon its completion, he announced with pride that their new rainbow arch bridge was "the largest bridge of its type in the United States" (Aug. 27, Oct. 14, 1914).

Its graceful and substantial appearance combined with characteristics of strength and durability to bring Marsh Arch bridges into rapid popularity. Single span "rainbow" arch bridges came into common use between 1912 and the early 1930s, especially in the Midwest. Multiple-span type also proliferated, with examples known to have been built over the Little Wabash River at Carmi, Illinois (1917), the Cannonball River at Mott, North Dakota (1921), the river at Fort Morgan, Colorado (1922), the Neosho River west of Iola, Kansas (1928),the Neosho River east of Parsons, Kansas, the Elk River north of Independence, Kansas, and one over the Verdigris River east of Neodesha, Kansas (1931). The longest known Marsh Arch bridge was the Kansas River bridge at Wamego, consisting of seven tied spans. In Iowa, at least fourteen single-span Marsh Arch bridges were erected in addition to the three span prototype built near Lake City.

The designer, James Barney Marsh, was born in 1856 at North Lake, Wisconsin and moved to Iowa at age eighteen to attend preparatory school at Fredericksburg. By 1882 he graduated with a Bachelor of Mechanical Engineering degree from Iowa State College of Agriculture and Mechanic Arts in Ames. He moved to Des Moines and became contracting engineer for the King Bridge Company of Cleveland, Ohio from 1883 until 1887, doing the design and marketing of metal bridges as well as acting as supervisor for their erection. After a brief stint with the Kansas City Bridge and Iron Company, he returned in 1889 to the King Bridge Company as their General Western Agent and Contracting Engineer. There he remained until 1896 when he established a private practice building and designing bridges. He continued in private practice until the early 1930s, having incorporated as Marsh Bridge Company in 1904 and later reorganizing in 1909 to become Marsh Engineering Company.

About 1900 James Marsh evidently began to specialize in designing reinforced concrete bridge structures. The cities of Kankakee and Peoria, Illinois, and Kenosha, Wisconsin commissioned Marsh to design concrete bridges during the years 1902 and 1903, followed later by consultant commissions for reinforced concrete bridges from three Iowa cities--Des Moines, Cedar Rapids, and Waterloo. Additionally, Marsh Engineering undertook numerous contracts for the Iowa State Highway Commission.

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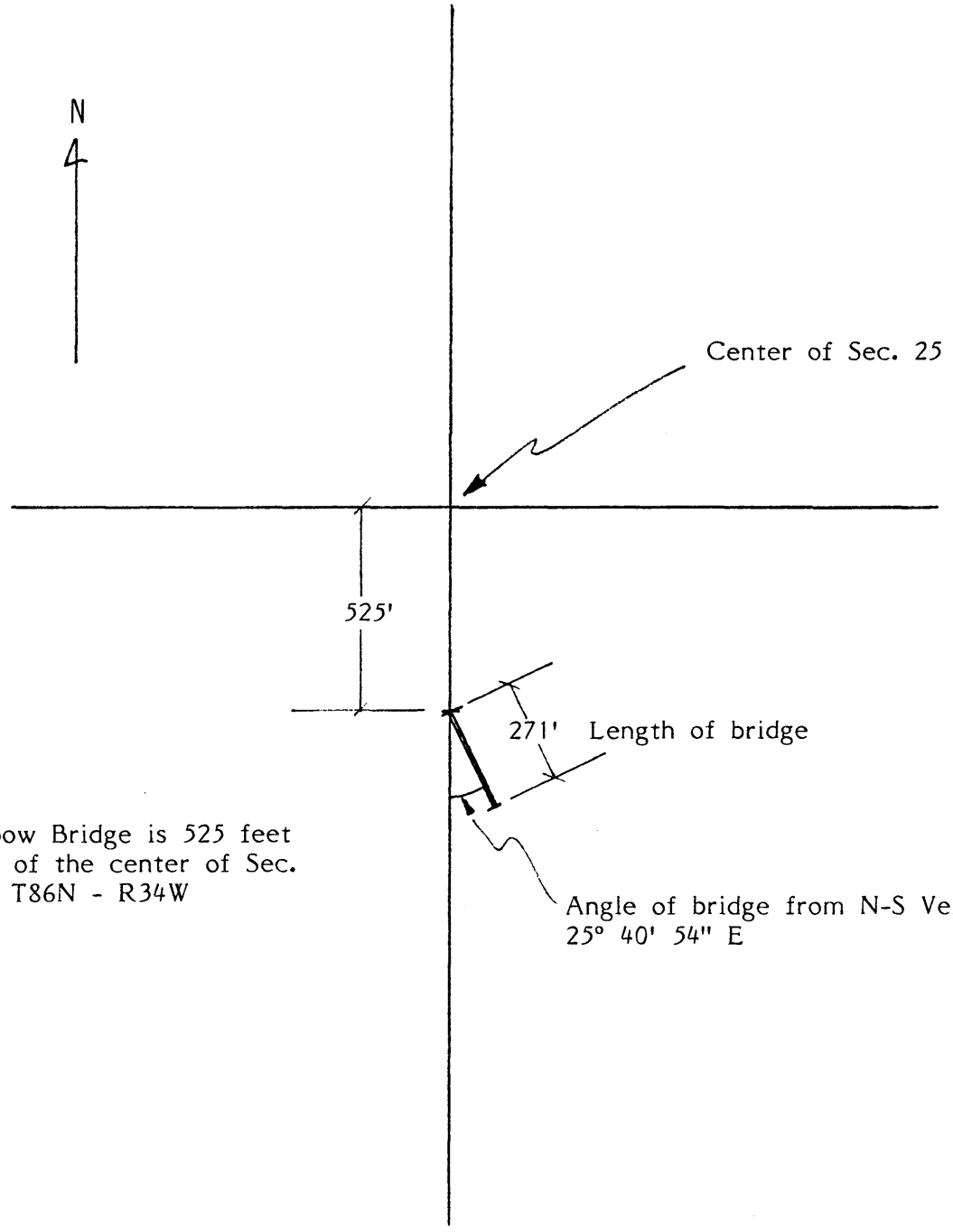
M A P

Marsh Rainbow Arch Bridge
Lake City, Iowa
National Register of Historic Places Nomination



NPS Form 10-900-a
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United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Section number 10 Page 3

CFN-259-1116

PHOTOGRAPHIC KEY

Property:	Marsh Rainbow Arch Bridge
Location:	Lake City, Iowa
Photographer:	John A. Panning
Date:	6/88
Location of Negatives:	Bureau of Historic Preservation State Historical Society of Iowa

1. View of nameplate. Patent date is incorrect; should be August 6 1912 (No. 1,035,026).
2. View from E.N.E.
3. View from S.
4. View from S.
5. Top view.
6. View from E.S.E.
7. View from E.N.E.
8. View from E.S.E.
9. Detail of construction, S.E.
10. Detail of construction.