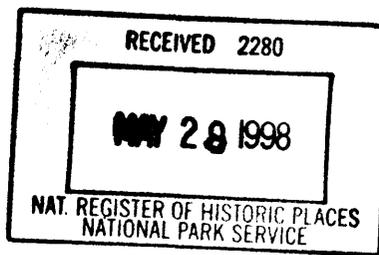


**United States Department of the Interior
National Park Service**

**National Register of Historic Places
Registration Form**



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This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in *How to Complete the National Register of Historic Places Registration Form* (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name Beaver Creek Bridge

other names/site number _____

2. Location

street & number 120 210th Street over Beaver Creek not for publication

city or town 5.9 miles northwest of Ogden vicinity

state Iowa code IA county Boone code 015 zip code 50212

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, 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. I recommend that this property be considered significant nationally statewide locally. (See continuation sheet for additional comments.)
Patticia Oberking DSITD 5-6-98
Signature of certifying official/Title Date

State or Federal agency and bureau

In my opinion, the property meets does not meet the National Register criteria. (See continuation sheet for additional comments.)

Signature of certifying official/Title Date

State or Federal agency and bureau

4. National Park Service Certification

I hereby certify that the property is:

- entered in the National Register
 See continuation sheet
- determined eligible for the National Register
 See continuation sheet
- determined not eligible for the National Register
- removed from the National Register
- other, (explain):

Edson H. Beall 6-25-98

5. Classification

Ownership of Property

(Check as many boxes as apply)

- private, public-local, public-State, public-Federal

Category of Property

(Check only one box)

- building(s), district, site, structure, object

Number of Resources within Property

(Do not include previously listed resources in the count)

Table with 2 columns: Contributing, Noncontributing. Rows for buildings, sites, structures, objects, Total.

Name of related multiple property listing

(Enter "N/A" if property is not part of a multiple property listing)

Highway Bridges of Iowa

Number of contributing resources previously listed in the National Register

0

6. Function or Use

Historic Functions

(Enter categories from instructions)

TRANSPORTATION/road-related

Current Functions

(Enter categories from instructions)

TRANSPORTATION/road-related

7. Description

Architectural Classification

(Enter categories from instructions)

other: concrete Marsh arch

Materials

(Enter categories from instructions)

foundation Concrete, walls, roof, other Concrete

Narrative Description

(Describe the historic and current condition of the property on one or more continuation sheets)

Located 5.9 miles northwest of Ogden, the Beaver Creek Bridge spans Beaver Creek in a rural Boone County setting that has changed little since the structure's period of significance. A description of the structure follows:

span number: 1, span length: 50.0', total length: 52.0', roadway wdt.: 18.0', construction date: 1919, construction cost: unknown, current condition: good, alterations: none

superstructure: concrete, 6-panel, fixed Marsh arch; substructure: concrete abutments and wingwalls; floor/decking: concrete deck; other features: tapered concrete arch ribs; concrete hangers, cast integrally with concrete floor beams; slotted concrete guardrails with paneled concrete bulkheads

Other than maintenance-related repairs, the bridge remains essentially unaltered as it continues to carry vehicular traffic. The Beaver Creek Bridge today retains a high degree of integrity of location, design, setting, materials, workmanship, feeling and association.

8. Statement of Significance

Applicable National Register Criteria

(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing)

- A** Property is associated with events that have made a significant contribution to the broad patterns of our history.
- B** Property is associated with the lives of persons significant in our past.
- C** Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- D** Property has yielded, or is likely to yield, information important in prehistory or history.

Areas of Significance

(Enter categories from instructions)

ENGINEERING

Period of Significance

1919

(The period of significance is derived from the original construction date.)

Significant Dates

1919 (construction date)

Significant Person

(Complete if Criterion B is marked above)

N/A

Cultural Affiliation

N/A

Architect/Builder

designer:
James B. Marsh, Des Moines IA

fabricator:
none

builder:
N.E. Marsh & Son Construction Company

Criteria Considerations

(Mark "x" in all the boxes that apply)

Property is:

- A** owned by a religious institution or used for religious purposes.
- B** removed from its original location.
- C** a birthplace or grave.
- D** a cemetery.
- E** a reconstructed building, object, or structure.
- F** a commemorative property.
- G** less than 50 years of age or achieved significance within the past 50 years.

Narrative Statement of Significance

(Explain the significance of the property on continuation sheets.)

9. Major Bibliographical References

Bibliography

(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

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

Primary location of additional data:

- State Historic Preservation Office
 - other State agency
 - Federal agency
 - Local government
 - University
 - other
- name of repository:
-

10. Geographical DataAcreage of Property less than one acre**UTM References**

(Place additional UTM references on a continuation sheet)

1	<u>15</u>	<u>405260</u>	<u>4654950</u>	2	<u> </u>	<u> </u>	<u> </u>
	zone	easting	northing		zone	easting	northing

Verbal Boundary Description

(Describe the boundaries of the property)

The nominated property is a rectangular-shaped parcel measuring 20 feet by 52 feet, which is centered on the UTM point(s) listed above. Included within this rectangular parcel are the bridge's superstructure, substructure, approach spans and floor system.

Boundary Justification

(Explain why the boundaries were selected)

The nominated structure includes the bridge's superstructure, substructure, floor system, any approach spans and the property on which they rest. These boundaries encompass, but do not exceed, all of the property that has been historically associated with the bridge.

11. Form Prepared By

name/title	<u>Clayton B. Fraser</u>		
organization	<u>Fraserdesign</u>	date	<u>31 August 1994</u>
street & number	<u>1269 Cleveland Avenue</u>	telephone	<u>303-669-7969</u>
city or town	<u>Loveland</u>	state	<u>Colorado</u> zip code <u>80537</u>

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets**Maps**A **USGS map** (7½ or 15 minute series) indicating the property's locationA **Sketch map** for historic districts and properties having large acreage or numerous resources**Photographs**Representative **black and white photographs** of the property**Additional Items**

(Check with the SHPO or FPO for any additional items)

Property Owner

(Complete this item at the request of SHPO or FPO)

name/title	<u>Boone County</u>		
street & number	<u>201 State Street</u>	telephone	<u>515-433-0530</u>
city or town	<u>Boone</u>	state	<u>Iowa</u> zip code <u>50036</u>

Paperwork Reduction Act Statement: This information is being collected for applications to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C. 470 et seq.).

Estimated Burden Statement: Public reporting burden for this form is estimated to average 18.1 hours per response including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding this burden estimate or any aspect of this form to the Chief, Administrative Services Division, National Park Service, P.O. Box 37127, Washington, DC 20013-7127; and the Office of Management and Budget, Paperwork Reductions Projects (1024-0018), Washington, DC 20503.

**United States Department of the Interior
National Park Service**

**National Register of Historic Places
Continuation Sheet**

Section Number 8 Page 1 Beaver Creek Bridge Boone County; Iowa

This concrete fixed arch spans Beaver Creek in the northwestern corner of Boone County. Consisting of one 50-foot span, the structure features slotted guardrails with paneled concrete bulkheads and is supported by a concrete substructure. Dating from 1919, the bridge was erected by the Des Moines-based N.E. Marsh & Son Construction Company, who used a design by James Marsh, engineer and patent holder for the rainbow arch configuration. The Beaver Creek Bridge has functioned in place some six miles northwest of Ogden, in Amaqua Township, since its completion in 1919.

This medium-scale arch marks a noteworthy innovation in bridge design, an achievement engineered by James Marsh, the bridge's designer and patent holder. Marsh's design represented the hybridization of continuous concrete and segmental steel-arch designs. This marked a radical departure from standard engineering practice. Concrete can withstand a nominal amount of tension. For this reason, most previous concrete arches - both reinforced and mass arches in filled and open spandrel configurations - had been built with the arch below the deck, where the downward force of the deck could be carried in compression by the arch ribs and spandrel wall or columns. Marsh's suspended arch reversed this.

His arches, of course, acted in compression. But the hangers and floor beams carried the deck in tension. Furthermore, the novel treatment of the deck over sliding steel plates on the floor beams and the use of pin-connected, articulated steel hangers for the end panel points were devices more suited to steel construction than concrete. To make the concrete thus act against its nature, Marsh inserted large amounts of structural steel. His bridges may have looked like concrete spans, but the arch ribs and hangers carried such heavy and complicated reinforcing that they were, in reality, steel structures encased in concrete. Marsh designed his bridges with either tied (with the arches attached to the abutments at the floor beam level) or fixed (arches extending below the floor beams to the abutments) configurations. Aside from this, all of his rainbow arches were similar, varying only in span length, arch rise and number of hangers.

Marsh's invention did not foretell a new direction in reinforced concrete design. The industry would later turn to other, simpler slab and beam configurations as it developed more sophisticated reinforcing techniques in the 1930s and 1940s. The rainbow arch did, however, denote one of the more interesting early experiments in concrete engineering and represented the proliferation of concrete for road and bridge construction. It is not known how many Marsh arches were built in Iowa in the 1910s and 1920s: judging from county records, perhaps not more than one hundred. The large amount of reinforcing steel sheathed within a relatively thin skin of concrete has made them particularly vulnerable to rusting and spalling. As a result, only eleven are known to remain. One of seven Marsh arches in Boone County, the Beaver Creek Bridge is distinguished as a well-preserved example of an indigenous structural type.

**United States Department of the Interior
National Park Service**

**National Register of Historic Places
Continuation Sheet**

Section Number 9 Page 2 Beaver Creek Bridge Boone County; Iowa

Iowa Department of Transportation, Structure Inventory and Appraisal: Structure No. 078080.

Boone County Supervisors' Record, Book 6: page 544 (11 August 1916).

Iowa State Highway Commission: page 140 (1919).

Nomination for the Raccoon River Bridge to the National Register of Historic Places, 29 March 1988, prepared by John A. Panning, Des Moines IA.

Field inspection by Clayton Fraser, 17 July 1988.