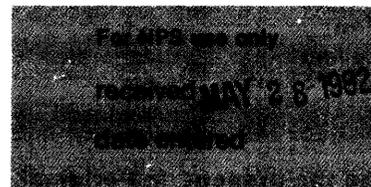


United States Department of the Interior
National Park Service

National Register of Historic Places Inventory—Nomination Form

See instructions in *How to Complete National Register Forms*
Type all entries—complete applicable sections



1. Name

historic Marsh Rainbow Arch Bridge

and/or common Spring Street Bridge

2. Location

street & number Spring Street

___ not for publication

city, town Chippewa Falls

___ vicinity of

congressional district

state Wisconsin

code 55

county Chippewa

code 017

3. Classification

Category	Ownership	Status N/A	Present Use
___ district	<input checked="" type="checkbox"/> public	___ occupied	___ agriculture
___ building(s)	___ private	___ unoccupied	___ commercial
<input checked="" type="checkbox"/> structure	___ both	___ work in progress	___ educational
___ site	Public Acquisition N/A	Accessible	___ entertainment
___ object	___ in process	___ yes: restricted	___ government
	___ being considered	<input checked="" type="checkbox"/> yes: unrestricted	___ industrial
		___ no	___ military
			___ museum
			___ park
			___ private residence
			___ religious
			___ scientific
			<input checked="" type="checkbox"/> transportation
			___ other:

4. Owner of Property

name City of Chippewa Falls, Leo Richard Hamilton, Mayor

street & number 30 W. Central Street

city, town Chippewa Falls

___ vicinity of

state Wisconsin

5. Location of Legal Description

courthouse, registry of deeds, etc. Chippewa County Courthouse

street & number Rushman Drive

city, town Chippewa Falls

state Wisconsin 54729

6. Representation in Existing Surveys (Continued)

title Wis. Inventory of Historic Places has this property been determined eligible? ___ yes no

date 1978 ___ federal state ___ county ___ local

depository for survey records State Historical Society of Wisconsin, 816 State Street

city, town Madison

state Wisconsin 53706

7. Description

Condition excellent good fair deteriorated ruins unexposed**Check one** unaltered altered**Check one** original site moved

date _____

Describe the present and original (if known) physical appearance

MARSH RAINBOW ARCH BRIDGE, Chippewa Falls

Located about one block to the northeast of Highway 124 - Rushmore Drive, the major commercial axis in Chippewa Falls, the Marsh Rainbow Arch Bridge on Spring Street over Duncan Creek is a ninety-three-foot single span reinforced concrete arch. Each arch spans eight concrete vertical intermediate posts, which are joined by concrete floor beams under the asphalt-covered deck. The concrete balustrade is carried across the arches and over the massive concrete abutments at each end; both ends are terminated with the original lamp posts with glass globes intact.

Of the "fixed" type of the patented design, the ends of the arch are anchored in the concrete abutments below the deck. With abutments, the overall length of the span is one hundred eleven feet,¹ and overall width is twenty-nine feet. The condition of the bridge appears to be excellent, with no visible major repairs or retrofits.

1. Wisconsin Department of Transportation bridge file.

**United States Department of the Interior
Heritage Conservation and Recreation Service
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Continuation sheet MARSH RAINBOW ARCH BRIDGE Item number 6

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Representation In Existing Surveys (Continued)

Wisconsin Department of Transportation Bridge Files

1970s

State

Wisconsin Department of Transportation, Hill Farms State Office Building

Madison

Wisconsin

8. Significance

Period	Areas of Significance—Check and justify below			
<input type="checkbox"/> prehistoric	<input type="checkbox"/> archeology-prehistoric	<input type="checkbox"/> community planning	<input type="checkbox"/> landscape architecture	<input type="checkbox"/> religion
<input type="checkbox"/> 1400–1499	<input type="checkbox"/> archeology-historic	<input type="checkbox"/> conservation	<input type="checkbox"/> law	<input type="checkbox"/> science
<input type="checkbox"/> 1500–1599	<input type="checkbox"/> agriculture	<input type="checkbox"/> economics	<input type="checkbox"/> literature	<input type="checkbox"/> sculpture
<input type="checkbox"/> 1600–1699	<input type="checkbox"/> architecture	<input type="checkbox"/> education	<input type="checkbox"/> military	<input type="checkbox"/> social/ humanitarian
<input type="checkbox"/> 1700–1799	<input type="checkbox"/> art	<input checked="" type="checkbox"/> engineering	<input type="checkbox"/> music	<input type="checkbox"/> theater
<input type="checkbox"/> 1800–1899	<input type="checkbox"/> commerce	<input type="checkbox"/> exploration/settlement	<input type="checkbox"/> philosophy	<input type="checkbox"/> transportation
<input checked="" type="checkbox"/> 1900–	<input type="checkbox"/> communications	<input type="checkbox"/> industry	<input type="checkbox"/> politics/government	<input type="checkbox"/> other (specify)
<input type="checkbox"/> invention				

Specific dates 1916¹ **Builder/Architect** Iowa Bridge Co.¹

Statement of Significance (in one paragraph)

The Marsh Rainbow Arch Bridge on Spring Street over Duncan Creek in Chippewa Falls is of state-level significance in the history of engineering in Wisconsin as the state's only example of a patented reinforced concrete bridge design of the early twentieth century.

Developed and patented by engineer James Barney Marsh, a native of North Lake, Wisconsin, the Marsh Rainbow Arch Bridge represented an attempt to prove the superiority of reinforced concrete construction in bridge design in America. In the late nineteenth century, the use of a concrete casing to preserve a steel skeleton was advocated and successfully tested in Austria,² and after initial reluctance, was widely accepted by engineers in the design of now ubiquitous slab and girder bridges. Marsh's design, following experimentation (as president and chief engineer of the Marsh Bridge Company) with the use of concrete and steel, has been cited for its resemblance to the earlier metal bowstring arch, patented by the King Bridge Company of Cleveland for which Marsh had worked earlier in his career. Like metal truss bridges the rainbow arch's steel lattice core was assembled on the ground, installed on the abutments, then cast in place with concrete. The Chippewa Falls example is of the originally patented type,³ whose arch "flowed below the bridge deck and was 'fixed' directly into the abutment;"³ the arch of a later variation was "tied" to steel rocker or expansion rocker bearings on top of the abutment.

James Marsh was graduated from Iowa State College of Agriculture and Mechanical Arts in 1882 with a B.M.E., and the following year went to work in the Des Moines office of the King Bridge Company. While serving as general western agent for King, Marsh also became head of the Northern Agency for the Kansas City Bridge and Iron Company. In 1896 he formed the Marsh Bridge Company, which was incorporated in 1904, and became the Marsh Engineering Company in 1909.⁴ The patent for the Marsh Rainbow Arch Bridge was granted on August 6, 1912.

J. B. Marsh himself, "expert engineer,"⁵ visited Chippewa Falls on June 3, 1916 to inspect the previous concrete bridge on Spring Street, which had been "wrecked beyond repair" by a flood on April 1, 1916. (Thomas Wooly's 1915 concrete bridge "looked good to everybody," and was supposed to have been designed to withstand the periodic flooding of Duncan Creek, but "the mistake of the work" was attributed to improper footing of the center pier and hasty completion before the cold weather; Marsh was quoted as asking about it, "'Why did you have so much reinforcing steel in your concrete bridge?'"⁶) Marsh pronounced the plans of city engineer J. T. Hurd for a 95-100 foot single span replacement bridge "first class," but recommended additional

(continued)

9. Major Bibliographical References

Kansas Preservation, Vol. II., No. 6, September - October, 1980

UTM NOT VERIFIED

(Chippewa Falls) Weekly Herald, April - October, 1916.

10. Geographical Data

Acreeage of nominated property less than one

Quadrangle name Chippewa Falls

Quadrangle scale 1:24,000

UMT References

A

1	5	6	2	7	0	0	0	4	9	7	6	9	2	0
Zone			Easting					Northing						

B

Zone			Easting					Northing						

C

Zone			Easting					Northing						

D

Zone			Easting					Northing						

E

Zone			Easting					Northing						

F

Zone			Easting					Northing						

G

Zone			Easting					Northing						

H

Zone			Easting					Northing						

Verbal boundary description and justification

The nominated property shall consist of a rectangle conforming to the 30-foot width and 125-foot length (including approaches) of the span over Duncan Creek on Spring Street between Rushman Drive and High Street in the city of Chippewa Falls, Chippewa Co., Wisc.

List all states and counties for properties overlapping state or county boundaries

state	code	county	code
-------	------	--------	------

state	code	county	code
-------	------	--------	------

11. Form Prepared By

name/title Diane H. Filipowicz/Architectural Historian

organization State Historical Society of Wisconsin

date January, 1982

street & number 816 State Street

telephone (608) 262-2970

city or town Madison

state Wisconsin 53706

12. State Historic Preservation Officer Certification

The evaluated significance of this property within the state is:

national state local

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

State Historic Preservation Officer signature

Richard M. Mancy

title Director, State Historical Society of Wisconsin

date 5/19/82

For NPS use only

I hereby certify that this property is included in the National Register

Delores Byer

Kept in the National Register

date 6/25/82

Keeper of the National Register

Attest:

date

Chief of Registration

**United States Department of the Interior
Heritage Conservation and Recreation Service**

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Continuation sheet MARSH RAINBOW ARCH BRIDGE Item number 8

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Significance (Continued)

features of his own design. After heated argument several weeks later, the Chippewa Falls city council voted unanimously to construct a Marsh Rainbow Arch Bridge on Spring Street at the cost of \$13,950 (a price judged to be equivalent to an all-steel structure), to be constructed by the Iowa Bridge Company.⁷ The Chippewa Falls Weekly Herald of Friday, July 21, 1916 reported that "the Marsh Rainbow type of bridge is frequently used in Germany and Hungary where there is low clearance and great strength required of bridges." Iowa Bridge Company agent G. Montgomery affirmed that the bridge would prove "extraordinarily strong" and "...will stand the test of time;" further, the company would guarantee the structure for five years. The press and citizenry followed construction of the span from August through October of 1916, and recommended the spectacle to bridge buffs traveling to the N. Wisconsin State Fair that season as a "...new type of bridge for this section of the country..."⁸

Indeed, now more than sixty-five years old and unique in the state and distinctive in the region, the Spring Street Marsh Rainbow Arch Bridge has stood the test of time as a functional span and an important engineering artifact. Well-preserved in its handsome and graceful form, the structure is no less an urban amenity to the city of Chippewa Falls.

Footnotes

1. Bridge plate.
2. Kansas Preservation, Vol., II, No. 6, p. 1.
3. Ibid., p. 2.
4. Ibid., p. 3
5. (Chippewa Falls) Weekly Herald, Friday, June 9, 1916.
6. Ibid.
7. Weekly Herald, Friday, July 21, 1916.
8. Weekly Herald, Friday, September 22, 1916.

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

**National Register of Historic Places
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Marsh Rainbow Arch Bridge, Chippewa Falls, Chippewa Co., WI

Continuation sheet

Item number 7.

Page 1.

Addendum, 7/82 - DESCRIPTION

Located about one block to the northeast of Highway 124 - Rushmore Drive, the major commercial axis of Chippewa Falls, the Marsh Rainbow Arch Bridge on Spring Street spanning Duncan Creek, is a reinforced concrete "fixed" arch of a patented design.

The bridge spans 90 feet clear between abutments. The walls of the reinforced concrete abutments extend 20 feet either side and rest on reinforced concrete footings. The arch has a rise of 22 feet 6 inches and the top of the arch at bridge midspan is 26 feet above the spring line. The spring line is 13 feet below the bridge deck. The cross section of the concrete arch decreases from 26 by 48 inches to 26 inches wide by 36 inches deep at midspan, adding a feeling of grace to its design. The arch reinforcement system is composed of four rolled steel angles that were held in position by a series of lattice arranged small sized rolled steel angles while the concrete was poured in place.

The bridge bed, originally consisting of a 20 foot roadbed and an 8 foot walk was supported on reinforced concrete beams, with a depth of four feet and a width of 16 inches at the bridge ends, and 3 feet 8 inches deep by 12 inches wide at 8 foot 8 inch intervals throughout the span. The intermediate beams were reinforced with a combination of rolled steel angles and reinforcing bars, while the end beams used only reinforcing bars. The beams were suspended from the arch by eight equally spaced hangers containing four steel angles, encased in concrete, providing the appearance of an all concrete structure.

The rails on either side of the bridge are of reinforced concrete with rebar reinforcing. The design simulates a rail with balustrades. The bridge deck is a reinforced concrete slab, 8 inches deep.

The overall dimensions of the bridge are 32 feet 10 inches to the outside of the concrete arches, and one hundred thirty feet to the extremes of the abutment walls. Originally paved with blocks, the wearing surface is now bituminous. The condition of the bridge is excellent and has only insignificant repairs and modifications.

Gordon D. Orr, Jr., FAIA
23 June 1982