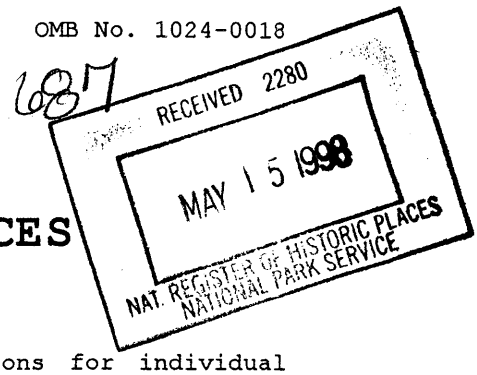
NPS Form 10-900
(Rev. 10-90)

OMB No. 1024-0018



United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES REGISTRATION FORM

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 any 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 Kettle River Bridge
other names/site number Bridge No. 5718

2. Location

street & number Mn. Hwy. 123 over Kettle River
not for publication N/A
city or town Sandstone vicinity N/A
state Minnesota code MN county Pine code 115
zip code 55072

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1986, as amended, I hereby certify that this X 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 X meets ___ does not meet the National Register Criteria. I recommend that this property be considered significant ___ nationally ___ statewide X locally. (___ See continuation sheet for additional comments.)

Signature of certifying official Date 4/27/98
Ian R. Stewart, Deputy State Historic Preservation Officer
State or Federal agency and bureau Minnesota Historical Society

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

Signature of commenting or other official Date

State or Federal agency and bureau

4. National Park Service Certification

I, hereby certify that this property is:

✓	entered in the National Register ___ See continuation sheet.	Beth Boland	6/29/98
____	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 Keeper	Date of Action

5. Classification

Ownership of Property (Check as many boxes as apply)

___ private
___ public-local
_X_ public-State
___ public-Federal

Category of Property (Check only one box)

___ building(s)
___ district
___ site
_X_ structure
___ object

Number of Resources within Property

Contributing	Noncontributing	
0	0	buildings
0	0	sites
1	0	structures
0	0	objects
1	0	Total

Number of contributing resources previously listed in the National Register N/A

Name of related multiple property listing (Enter "N/A" if property is not part of a multiple property listing.)
Historic Iron and Steel Bridges in Minnesota

6. Function or Use

Historic Functions (Enter categories from instructions)
Cat: TRANSPORTATION Sub: road-related (vehicular)

Current Functions (Enter categories from instructions)
Cat: TRANSPORTATION Sub: road-related (vehicular)

7. Description

Architectural Classification (Enter categories from instructions)
OTHER: Deck Pratt truss

Materials (Enter categories from instructions)
foundation (Substructure) CONCRETE
roof
walls
other (Superstructure) METAL: Steel

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

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.

_X_ 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.

Criteria Considerations (Mark "X" in all the boxes that apply.)

____ A owned by a religious institution or used for religious purposes.

____ B removed from its original location.

____ C a birthplace or a 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.

Areas of Significance (Enter categories from instructions)
ENGINEERING

Period of Significance 1948

Significant Dates 1948

Significant Person (Complete if Criterion B is marked above)

_____

Cultural Affiliation _____

_____

Architect/Builder Contractor/Builder: A. Guthrie and Company
Designer: Minnesota Highway Department

Narrative Statement of Significance (Explain the significance of the property on one or more continuation sheets.)

9. Major Bibliographical References

(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
_X_ Other State agency
___ Federal agency
___ Local government
___ University
___ Other
Name of repository: Minnesota Department of Transportation

10. Geographical Data

Acreage of Property less than one acre

UTM References (Place additional UTM references on a continuation sheet)

	Zone	Easting	Northing		Zone	Easting	Northing
1	15	511100	5108170	3	__	_____	_____
2	__	_____	_____	4	__	_____	_____

___ See continuation sheet.
Sandstone North, Minn., 1981

Verbal Boundary Description (Describe the boundaries of the property on a continuation sheet.)

Boundary Justification (Explain why the boundaries were selected on a continuation sheet.)

11. Form Prepared By

name/title Jeffrey A. Hess, Historian
organization Hess, Roise and Company
street & number The Foster House, 100 North First Street
city or town Minneapolis state MN zip code 55401
telephone (612) 338-1987
date September 1997

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets

Maps

A USGS map (7.5 or 15 minute series) indicating the property's location.

A 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 the SHPO or FPO.)

name _____
street & number _____
telephone _____
city or town _____ state ____ zip code ____

Description

Located on the eastern edge of Sandstone, Bridge No. 5718 carries Minnesota Trunk Highway 123 (formerly Trunk Highway 23) over the Kettle River on an east-west alignment. The crossing is a three-span, rigid-connected, cantilevered, deck, Pratt truss with a concrete substructure and an arched bottom chord in the main center span. The span profile is 100-200-100 feet. The end spans consist of a 50-foot cantilever arm connected by means of a pinned hinge to a 50-foot suspended section; this arrangement was designed to accommodate anticipated settling of the abutments. The superstructure utilizes two truss webs, identically detailed. Top chords and bottom chords consist of two channel sections with X-lacing. Vertical and diagonal members are single rolled I-beams. The bridge's concrete deck rests on I-beam stringers and I-beam floor beams riveted to the superstructure. A metal plaque on the bridge's northeast approach bears the following inscription: "Minnesota Bridge 5718 1948-1984." The first date lists the year of the structure's completion; the second, the year of its remodeling. In 1984, the state highway department rebuilt the concrete abutments, replaced the original concrete deck with a five-foot wider slab in order to accommodate a 32-foot roadway with a sidewalk on the south side, and replaced the original open-balustrade metal railings with concrete solid-parapet railings (topped, on the south side, along the sidewalk, with a metal-balustrade section). Additional remodeling occurred in 1985, when the state reinforced the upper and lower chords of the truss with batten plates in order to counter section loss from rust. None of these alterations significantly affected the crossing's overall design. Bridge No. 5718 retains its historical integrity.

Summary of Significance

In 1933, the Minnesota Legislature radically expanded the state trunk highway system by adding 140 new routes covering about 5,000 miles of existing roadway. The Minnesota Highway Department had opposed the expansion, partly because many of the new routes were selected for political rather than for engineering reasons, and partly because the state lacked the funds to reconstruct the new routes according to trunk highway standards. Obsolete bridges were a particular problem, and the Kettle River Bridge on the newly designated Trunk Highway 23 near Sandstone was a case in point. Shortly after the state highway department assumed ownership of the structure, the citizens of Sandstone petitioned the agency to replace the old, rickety, 700-foot, steel-trestle structure with a modern crossing. The highway department declined, explaining that there were neither state nor federal monies available for the purpose. In 1939, however, the federal government opened a prison near Sandstone and found that the bridge impeded the delivery of supplies to the new institution. Federal funds for its replacement soon became available; in 1941, the state department completed plans for the project.

Instead of erecting a new 700-foot span, the highway department decided to cut down the sides of the river gorge at the bridge site and to use the excavated material to build extensive approaches, thereby reducing the length of the required superstructure to about 400 feet. Since the roadway would cross the gorge at a height of about 40 feet, there was sufficient vertical clearance to design the new span as a deck truss, which would economize on substructure costs. The optimum design seemed to be a three-span, continuous, deck truss of the Pratt configuration, displaying a span profile of 100-200-100 feet. The design also included a boldly arched lower chord in the main center span, which was not only more aesthetically pleasing than a flat lower chord, but also more economical in its overall use of structural steel.

In 1942, the state highway department completed the approaches for the new Kettle River crossing as planned, but wartime shortages in construction materials made it impossible to proceed with erection of the span itself. From an engineering perspective, the delay was fortuitous, for it permitted the highway department to monitor the site and to discover that the approaches were settling. With this information in hand, the state engineers returned to their original design and inserted pinned hinges in the end spans of the superstructure to accommodate future substructure movement. This modification changed the proposed superstructure from a continuous truss to a cantilevered truss. As engineering student Stephen R. Brown explained in a case study of the bridge's design:

> The design of the truss itself was modified in such fashion that the expected abutment settlements would cause a minimum of structural distress to the bridge. This was accomplished by placing a pinned-joint hinge in the upper chord of the truss,50 feet out from each abutment. The corresponding lower chord member was pin-connected at both ends, with one pin riding in a 12 inch long slot; due to the pin and slot arrangement this actually became a "false member" incapable of transmitting any axial thrust. The net result of these details is that the bridge, while having the elegant arch-like appearance of a continuous curved-chord truss, is in fact composed of three distinct units. The main center span is supported on the river piers and cantilevers toward the abutments; while the two suspended end spans are free to rotate downward about the pin at the cantilever end, in response to abutment settlements.

Because of continuing shortages of construction materials in the immediate post-war period, the highway department did resume construction on the Kettle River Bridge until 1947, when it awarded contracts for the substructure and superstructure work to A. Guthrie and Company, Inc., St. Paul. The total cost was $225,321. The contractor completed the project in 1948. In the

state highway department's bridge inventory, the new crossing was designated as Bridge No. 5718.

The Kettle River Bridge is eligible for the National Register under Criterion C in the area of engineering, within the historic context of "Iron and Steel Bridges in Minnesota." The Multiple Property Documentation Form (MPDF) associated with this context states that "some truss bridges may be significant because they embody characteristics not typical of standard applications. These may include special . . . elements of engineering design which allowed the bridge to meet unusual site conditions." With its cantilevered and hinged design, the Kettle River Bridge satisfies this criterion. The Kettle River Bridge is also eligible under Criterion C because it is a rare Minnesota example of a deck truss. As the MPDF states in Registration Criterion 9: "[Under Criterion C, a bridge may be eligible if it was or is] a deck truss bridge. Such bridges are very rare and represent a design solution to an unusual problem."

Bibliography

Unpublished Sources

Brown, Stephen R. "Substructure Movement at Bridge 5718: A Case History." Civil Engineering Internship Paper, University of Minnesota, 1983. Bridge No. 5718 File (also plans). Minnesota Department of Transportation, District 1 Office, Duluth.

Quivik, Fredric L. "Iron and Steel Bridges in Minnesota." Multiple Property Documentation Form, 1988. State Historic Preservation Office, St. Paul.

Archival Sources

Bridge Database. Minnesota Department of Transportation, St. Paul.

Bridge No. 5718 File. Minnesota Department of Transportation, Bridge Division, St. Paul.

Bridge No. 5718 Storage File (plans, contract, correspondence). Minnesota Department of Transportation, Record Storage Center, St. Paul.

Verbal Boundary Description

The general area of the nominated property is a rectangle 39.6 feet wide and 402.8 feet long, whose long center axis parallels the centerline of the bridge.

Boundary Justification

Based on measurements provided by the Minnesota Department of Transportation, the boundaries enclose the entire historic resource.