Form No. 10-300 (Rev. 10-74)

DATA SHEET

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

# NATIONAL REGISTER OF HISTORIC PLACES INVENTORY -- NOMINATION FORM

FOR NPS USE ONLY
RECEIVED JUN 13 1975
DATE ENTERED JUL 30 1975

SEE INSTRUCTIONS IN *HOW TO COMPLETE NATIONAL REGISTER FORMS*
TYPE ALL ENTRIES -- COMPLETE APPLICABLE SECTIONS

## 1 NAME

HISTORIC
Rock Island Railroad Bridge

AND/OR COMMON

## 2 LOCATION SW of Rock Island over the Columbia River

STREET & NUMBER Spanning the Columbia River, 4 mi. upstream from the Rock Island Dam
__NOT FOR PUBLICATION

CITY, TOWN Rock Island vicinity __ VICINITY OF

CONGRESSIONAL DISTRICT #4 - Honorable Mike McCormack

STATE Washington CODE 53 COUNTY Chelan - Douglas CODE 007 - 017

## 3 CLASSIFICATION

| CATEGORY | OWNERSHIP | STATUS | PRESENT USE | |
|---|---|---|---|---|
| __DISTRICT | __PUBLIC | X OCCUPIED | __AGRICULTURE | __MUSEUM |
| __BUILDING(S) | X PRIVATE | __UNOCCUPIED | __COMMERCIAL | __PARK |
| X STRUCTURE | __BOTH | __WORK IN PROGRESS | __EDUCATIONAL | __PRIVATE RESIDENCE |
| __SITE | **PUBLIC ACQUISITION** | **ACCESSIBLE** | __ENTERTAINMENT | __RELIGIOUS |
| __OBJECT | __IN PROCESS | __YES: RESTRICTED | __GOVERNMENT | __SCIENTIFIC |
| | __BEING CONSIDERED | X YES: UNRESTRICTED | __INDUSTRIAL | __TRANSPORTATION |
| | | __NO | __MILITARY | __OTHER: |

## 4 OWNER OF PROPERTY

NAME
Burlington Northern, Inc.

STREET & NUMBER
820 Central Building

CITY, TOWN Seattle __ VICINITY OF STATE Washington

## 5 LOCATION OF LEGAL DESCRIPTION

COURTHOUSE, REGISTRY OF DEEDS, ETC. Chelan County Courthouse

STREET & NUMBER Orondo and Washington Street

CITY, TOWN Wenatchee STATE Washington

## 6 REPRESENTATION IN EXISTING SURVEYS

TITLE
Washington State Inventory of Historic Places

DATE
1974 __FEDERAL X STATE __COUNTY __LOCAL

DEPOSITORY FOR SURVEY RECORDS Washington State Parks and Recreation Commission

CITY, TOWN Olympia STATE Washington

# 7 DESCRIPTION

| CONDITION | | CHECK ONE | CHECK ONE |
|---|---|---|---|
| X EXCELLENT | __DETERIORATED | __UNALTERED | X ORIGINAL SITE |
| __GOOD | __RUINS | X ALTERED | __MOVED DATE______ |
| __FAIR | __UNEXPOSED | | |

DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

The Rock Island Railroad Bridge is a fixed span through truss of riveted steel construction erected in 1893. It reaches across a narrow chute in the Columbia River near the town of Rock Island southeast of Wenatchee on the Burlington Northern main line from Spokane to Seattle. The Columbia runs unusually swift and deep at this location -- 125 feet deep to the riverbed in the main channel at low water, which precluded the use of falsework during the erection process. Ordinary cantilever construction was impractical because a spur of the Wenatchee Mountains rose abruptly from the river's west bank, requiring an immediate curve in the tracks beyond the bridge and preventing the use of a conventional shore arm. Such a shore arm and continuous span would have extended the structure too far toward the mountains forcing an impossibly tight bend before the tracks could continue northward along the river bank.

The bridge originally consisted of two simple spans and a heavy timber approach trestle. The main channel span of 416 feet 6 inches is a modified Petit or Camelback truss 63 feet deep at the center with subties and substruts provided to avoid a heavy floor system and minimize dead weight. Originally this was supported between a steel rocker abutment at the end of the western approach trestle, and a fixed triangular steel tower resting on a rock island that diverts part of the river into a shallow side channel. The secondary span is an inverted Parker deck truss reaching from the island tower to a natural rock abutment on the east bank. This rock rises above the level of the valley floor on the opposite side, so an opening was blasted out to provide a perfectly flat approach.

The bridge deck is wide enough for two sets of standard guage tracks with sufficient clearance for trains passing in opposite directions.

In 1925, both spans and the underpinnings were heavily reinforced and the wooden approach trestle was replaced. The triangular tower was apparently encased in a monolithic concrete pedestal, the rocker abutment was strengthened with additional steel columns and bracing, and the trestle was rebuilt in steel. The main and secondary spans were doubled by essentially duplicate trusses placed alongside the original structure but offset downward to clear its bottom ~~cord~~ chord with the deck reinforcing framework. During this work the old spans were left in place and the entire structure became one bridge upon completion without any interruption of traffic.

# 8 SIGNIFICANCE

| PERIOD | AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW | | | |
|---|---|---|---|---|
| __PREHISTORIC | __ARCHEOLOGY-PREHISTORIC | __COMMUNITY PLANNING | __LANDSCAPE ARCHITECTURE | __RELIGION |
| __1400-1499 | __ARCHEOLOGY-HISTORIC | __CONSERVATION | __LAW | __SCIENCE |
| __1500-1599 | __AGRICULTURE | __ECONOMICS | __LITERATURE | __SCULPTURE |
| __1600-1699 | __ARCHITECTURE | __EDUCATION | __MILITARY | __SOCIAL/HUMANITARIAN |
| __1700-1799 | __ART | X ENGINEERING | __MUSIC | __THEATER |
| X 1800-1899 | __COMMERCE | __EXPLORATION/SETTLEMENT | __PHILOSOPHY | X TRANSPORTATION |
| __1900- | __COMMUNICATIONS | __INDUSTRY | __POLITICS/GOVERNMENT | __OTHER (SPECIFY) |
| | | __INVENTION | | |

SPECIFIC DATES 1892-93 BUILDER/ARCHITECT

STATEMENT OF SIGNIFICANCE

In 1893, under the auspices of the Great Northern Railroad, the St. Paul, Minneapolis and Manitoba Railway Company completed a transcontinental line from Minneapolis and the Mississippi River to Seattle and Puget Sound. This was the first direct rail connection from Seattle to Spokane and the first transcontinental route through the central interior of Washington State. The last section of track was built across the Cascade Mountains at Stevens Pass with crews working east from Everett and west from Wenatchee. The rails were brought together at Scenic, a few miles west of the Stevens Pass summit on January 6, 1893. However, the line eastward beyond Wenatchee was interrupted by the Columbia River. As a temporary expedient, the railroad cars were shuttled across the river on the ferry Thomas L. Nixon. Finished on May 2, 1893, the Rock Island Bridge spanning the Columbia joined the trackage and completed a continuous line from Seattle to Minneapolis.

Because the Columbia River has such a swift current at the Rock Island narrows, it was impossible to use falsework to support the span during the construction process. Other constraints (explained in the preceding description) prevented ordinary cantilever construction, so an interesting varient was designed to solve these engineering difficulties. In effect the bridge was a cantilever during construction and a simple span upon completion. The erection process is described at some length in January 6, 1894 issue of the Engineering Record:

> The erection of the bridge carrying the recently completed Great Northern Railway line over the Columbia River near Rock Island, Washington, is notable on account of the manner in which an ordinary fixed span was erected as a cantilever in a way that is, so far as we are aware, novel and original.

The side channel of the river was shallow enough for the construction of falsework, and falsework was also possible in place of the trestle on the opposite bank. The side span was erected in two separate sections; each half inverted on top of the falsework at opposite ends of the channel span. These served as temporary shore arms provided with an adjustable counterbalance to offset the weight of the main truss as its triangular panels were assembled across the void by the cantilever method. Adjustable members were placed between the shore arm and the channel span to raise or lower the two parts or adjust laterally as necessary to connect them at the center. The counterweight consisted of a block of rails whose number increased as erection progressed and the weight and lever arm of the balanced steel work also increased. Eventually the counterweight totaled 3,400 tons. Construction of the deck and permanent track kept pace with the span so that it could serve to transport

# 9 MAJOR BIBLIOGRAPHICAL REFERENCES


"Erection of the Columbia River Bridge", The Engineering Record, January 6, 1894, P. 86.

Great Northern Railway Company, Fourth Annual Report for the Year Ending June 30, 1893.


# 10 GEOGRAPHICAL DATA

UTM OK HL

ACREAGE OF NOMINATED PROPERTY One

UTM REFERENCES

| | ZONE | EASTING | NORTHING | | ZONE | EASTING | NORTHING |
|---|---|---|---|---|---|---|---|
| A | 1 0 | 7 1 4 9 9 0 | 5 2 4 9 7 0 0 | B | | | |
| C | | | | D | | | |

VERBAL BOUNDARY DESCRIPTION

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

| STATE | CODE | COUNTY | CODE |
|---|---|---|---|
| Washington | 53 | Chelan | 007 |
| Washington | 53 | Douglas | 017 |

# 11 FORM PREPARED BY


NAME / TITLE
Jacob E. Thomas, Historic Preservation Specialist

ORGANIZATION
Washington State Parks & Recreation Commission

DATE
May 14, 1975

STREET & NUMBER
P.O. Box 1128

TELEPHONE
(206) 753-4116

CITY OR TOWN
Olympia

STATE
Washington


# 12 STATE HISTORIC PRESERVATION OFFICER CERTIFICATION

THE EVALUATED SIGNIFICANCE OF THIS PROPERTY WITHIN THE STATE IS:

NATIONAL X 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.

FEDERAL REPRESENTATIVE SIGNATURE Charles H. Odegaard

TITLE Executive Director - Charles H. Odegaard

DATE June 9, 1975

FOR NPS USE ONLY

I HEREBY CERTIFY THAT THIS PROPERTY IS INCLUDED IN THE NATIONAL REGISTER

DATE 7/30/75

DIRECTOR, OFFICE OF ARCHEOLOGY AND HISTORIC PRESERVATION

ATTEST:

DATE JUL 30 1975

KEEPER OF THE NATIONAL REGISTER

additional materials to crane-like travelers on tracks running along the top cords.

During erection, cables and heavy bracing were required to prevent damage or movement induced by strong, gusting winds.

When the channel span was complete, the shore arms were removed and reassembled upright as the required 250 foot deck truss across the side channel.

In his two volume, 2,000 page text Bridge Engineering published in 1916, J. A. L. Waddell describes in explicit detail most of the construction principles used in the Rock Island Railroad Bridge.

> At each side of the river there is erected on falsework a simple span having its chords and certain of its web members (for short spans all of them) stiffened for erection stresses. Then over each pier is built a toggle consisting of horizontal upper-chord eye-bars and adjustable verticals, by means of which one-half of the central span is cantilevered over the stream to meet the other half, after which the toggles are removed.

He continues with a description of the site conditions that necessitated the development of this method. These conditions are almost precisely the same as are found in the Columbia River crossing at Rock Island, including the rock outcropping and side channel situation. Waddel then explains that this was a method that he originated "two decades ago" (1886) for use on a branch line of the Nippon Railway. Because of financial difficulties, construction was delayed for "many years after the author's plans were finished."

It is interesting that Waddell originally designed this method for use with the more elegant Petit truss and its graceful polygonal top cord, while the Japanese engineers who eventually executed the concept employed the Camel-back for reasons of economy and ease in fabrication. The top ~~cord~~ chord has fewer changes in inclination. Waddell's comment on the Camel-back configuration is that "in appearance the truss is uncompromisingly ugly." The Camel-back truss was also used at Rock Island about six years after the basic construction concept was first proposed. Waddell himself never used the method until 1912.

The use of the side span, erected in half sections and inverted as temporary shore arms, is not mentioned in Bridge Engineering and as observed in the Engineering Record, it was probably an innovation.

In 1925 the bridge was extensively reinforced to carry the weight of heavier trains and the massive R-2 class 2-8-8-2 engines then being delivered to the Great Northern. For this reason similar reinforcement was added to most existing bridges on the main line. At present the obvious doubling of the Rock Island Bridge is an unusually graphic illustration of this transition in railroad equipment.

The Rock Island Railroad Bridge was designed, fabricated and erected by the Edge Moor Bridge Works, Wilmington, Delaware. It was a difficult engineering achievement at the time of its construction and it was the final link in an important transcontinental rail connection. The bridge has been in continuous, uniterrupted service for more than 80 years.

Waddell, J. A. L. Bridge Engineering, John Wiley & Sons, Inc., New York, 1916.

Wood, Charles R. Lines West, Superior Publishing Company, Seattle, 1967.

# HAER INVENTORY

Historic American Engineering Record
Department of the Interior, Washington, D.C.

1. SITE I.D. NO

2. INDUSTRIAL CLASSIFICATION

| | | | | |
|---|---|---|---|---|
| Bridges, Trestles, and Aqueducts | 7 | 6 | 0 | 2 |
| TRUSS: wrought iron: cant. | 7 | 6 | 4 | 0 |
| TRANS: RR: route | 5 | 4 | 7 | 2 |

3. PRIORITY 1

4. DANGER OF DEMOLITION? (SPECIFY THREAT) ☐ YES ☐ NO ☒ UNKNOWN

5. DATE 1893

6. GOVT SOURCE OF THREAT OWNER ADMIN

7. OWNER/ADMIN
Burlington Northern, Inc.

8. NAME(S) OF STRUCTURE
Rock Island Railroad Bridge

9. OWNER'S ADDRESS
800 Central Building
Seattle, Washington 98104

10. STATE W A COUNTY 0 0 7 COUNTY NAME Chelan CITY/VICINITY Wenatchee CONG. DIST. 0 4

STATE COUNTY COUNTY NAME CITY/VICINITY CONG. DIST.

11. SITE ADDRESS (STREET & NO.)
Crossing: Columbia River at Rock Island, near Wenatchee, 4 miles upstream from the Rock Island Dam.

12. EXISTING SURVEYS ☒ NR ☐ NHL ☐ HABS ☒ HAER—I ☐ HAER ☐ NPS ☐ CL6 ☒ CONF ☐ STATE ☐ COUNTY ☐ LOCAL ☐ OTHER

13. SPECIAL FEATURES (DESCRIBE BELOW) ☐ INTERIOR INTACT ☐ EXTERIOR INTACT ☐ ENVIRONS INTACT

14. UTM ZONE 1 0 EASTING 7 1 4 9 8 0 NORTHING 5 2 4 9 6 9 0 SIGN

SCALE ☐ 1:24 ☐ 1:62.5 ☐ OTHER QUAD NAME Stevens Pass, Washington

UTM ZONE EASTING NORTHING SIGN SCALE ☐ 1:24 ☐ 1:62.5 ☐ OTHER QUAD NAME

15. CONDITION 70 ☐ EXCELLENT 71 ☐ GOOD 72 ☐ FAIR 73 ☐ DETERIORATED 74 ☐ RUINS 75 ☐ UNEXPOSED 76 ☐ ALTERED 82 ☐ DESTROYED 85 ☐ DEMOLISHED

16. INVENTORIED BY
P.H. Scott/Lisa Soderberg

AFFILIATION
HAER

DATE
Apr. 29, 1975/Aug. 1980

17. DESCRIPTION AND BACKGROUND HISTORY, INCLUDING CONSTRUCTION DATE(S), HISTORICAL DATE(S), PHYSICAL DIMENSIONS, MATERIALS, EXTANT EQUIPMENT, AND IMPORTANT BUILDERS, ENGINEERS, ETC.

The construction of the Rock Island Railroad Bridge over the Columbia River in 1893 marked the second railroad crossing of the Columbia, and the completion of the Great Northern Railway's transcontinental line from Minneapolis to Seattle. The Great Northern route across Washington was another demonstration of the way in which the railroads diverted the orientation of the whole northern portion of the interior of the state from its historic focus down the Columbia River to Portland towards Puget Sound. The span is significant as the final link in the first direct rail connection between Seattle and Spokane. During a time when a city's well-being was contingent upon its railroad connections, the Great Northern line was essential to the development of Seattle as a primary port on Puget Sound.

The bridge consists of a 416.5 foot modified Petit camelback through truss which spans the main channel, a 125 foot approach trestle on the west, and a 250 foot inverted Parker deck truss on the east. The erection of the riveted steel truss was described in an 1894 issue of Engineering Record, which claimed that the bridge was notable on

(CONT OVER)

18. ORIGINAL USE
Bridge/railroad

PRESENT USE
Bridge/railroad

ADAPTIVE USE

19. REFERENCES—HISTORICAL REFERENCES, PERSONAL CONTACTS, AND/OR OTHER

"Erection of the Columbia River Bridge," Engineering Record, 6 January 1894, p.86.
Great Northern Railway Company, Fourth Annual Report for the Year Ending June 30, 1893.
J.A.L. Waddell, Bridge Engineering, 2 vols., (New York, 1916).
D.W. Meinig, The Great Columbia Plain, (Seattle, 1968), p. 270.

(CONT OVER)

20. URBAN AREA 50,000 POP. OR MORE? ☐ YES ☒ NO

21. HCRS REGION N W

22. PUBLIC ACCESSIBILITY ☐ YES, LIMITED ☒ YES, UNLIMITED ☐ NO ☐ UNKNOWN

23. EDITOR INDEXER

24. LOCATED IN AN HISTORIC DISTRICT? ☐ YES ☒ NO NAME DISTRICT I.D. NO

25. PHOTOS AND SKETCH MAP OF LOCATION

account of the manner in which an ordinary fixed span was erected as a cantilever "in a way that is, so far as we are aware, novel and original." Because of the Columbia River's swift current and its depths of up to 125 feet at Rock Island, it was not possible to use falsework in erecting the channel span. The rugged topography of the Wenatchee Mountains also precluded erection by conventional cantilever methods. The 250 foot deck truss was erected upside down on falsework at each end of the main channel, serving as temporary shore arms during the construction of the channel span. The shore arms were temporarily connected to the channel span by eye-bars at the top, and by struts at the bottom, and were weighted with rails to enable the erection of the channel span as a cantilever. When the channel span was completed, the shore arms were removed and reassembled upright as a deck truss over the west side of the channel.

The bridge was designed, fabricated, and erected by the Edge Moor Bridge Works of Wilmington, Delaware. In 1925, it was extensively reinforced to support the weight of the heavier R-2 class 2-8-8-2 locomotives. At this time, the main and secondary spans were doubled through the construction of duplicate trusses alongside the original structure. The Rock Island Bridge was not only the final link in an important transcontinental rail connection, but its innovative method of erection was a significant engineering accomplishment at the time of its construction.

REFERENCES (CONTINUED)


Charles R. Wood, Lines West, (Seattle, 1967).


ABSTRACT

HAER NO | LC | TECH REPORT | HIST REPORT | CONTEMP PHOTO | HIST PHOTO | CONTEMP DRWG | HIST DRWG | COLOR PLATE | PHOTOGRAM | SW | FILM