1. SITE I.D. NO

HAER INVENTORY

Historic American Engineering Record
Department of the Interior, Washington, D.C. 20240

2. INDUSTRIAL CLASSIFICATION: Bridges, Trestles, and Aqueducts
ARCH: concrete

3. PRIORITY: 1

5. DATE: 1915 (7595)

4. DANGER OF DEMOLITION? (SPECIFY THREAT) ☒ YES ☐ NO ☐ UNKNOWN — to be sold to salvage company.

6. GOVT SOURCE OF THREAT: OWNER ADMIN

7. OWNER/ADMIN: Chicago, Milwaukee, St. Paul, and Pacific Railroad Co.

8. NAME(S) OF STRUCTURE: Rosalia Railroad Bridge

9. OWNER'S ADDRESS: 516 West Jackson Boulevard
Chicago, Illinois 60606

10. STATE WA / COUNTY 075 — COUNTY NAME: Whitman — CITY/VICINITY: Rosalia — CONG. DIST.: 05

STATE / COUNTY — COUNTY NAME — CITY/VICINITY — CONG. DIST.

11. SITE ADDRESS (STREET & NO.)
MP 1871 to 1872

#EE-90A; EE-90B

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 / EASTING / NORTHING / SIGN

E. 11 / 473000 / 5229560 / SCALE ☒ 1:24 ☐ 1:62.5 ☐ OTHER ____ / QUAD NAME: Rosalia, Washington

W. 11 / 472640 / 5229720 / 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: Lisa Soderberg — AFFILIATION: HAER/Washington State Bridge Inventory — DATE: October 1979

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

In 1915, the Chicago, Milwaukee, and St. Paul Railroad completed a reinforced concrete arch viaduct 2.5 miles east of Rosalia. The viaduct replaced a temporary 2,177 foot frame trestle that was expeditiously erected in 1907 by the railroad, in an effort to complete its transcontinental line across the State of Washington rapidly. A contemporary article in the Railway Age Gazette observed that a concrete design was selected for the permanent structure because "the site was one where considerations of appearance had to be taken somewhat into account, as the structure would be seen from the two other railways and a county highway." Whatever the reasons for the design, the results of the engineers emphasis on the "considerations of appearance" was indeed impressive. The monumental proportions of the structure seem to be magnified by the rolling, expansive Palouse Valley which is framed by the concrete arch forms.

When the Rosalia Tunnel east of the original trestle was "daylighted" in 1911, there was considerable surplus fillin material available which was deposited on the east bank of Pine Creek long before the final designs were (CONT OVER)

18. ORIGINAL USE: bridge/railroad — PRESENT USE: bridge/railroad — ADAPTIVE USE:

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

Chicago, Milwaukee, St. Paul, and Pacific Railroad Bridge List
"Two Large Concrete Viaducts on the St. Paul," Railway Age Gazette, Vol. 60, No. 5, 11 February 1916, pp. 241-243.
J.A.L. Waddell, Bridge Engineering, 2 Vols., (New York: 1916) 1:pp. 940-944.

(CONT OVER)

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

21. NPS REGION: NW

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

Description (continued)
drawn for a permanent structure. Consequently, the rhythmic pattern of the arch viaduct is broken by a 334 foot embankment. East of the embankment a single 114 foot reinforced concrete arch spans the Northern Pacific tracks. The arch, which has a rise of 50 feet, is flanked by a four span 100 foot concrete abutment on the east side, and a two span 78 foot concrete abutment on the west side. These trestle abutments which consisted of concrete girder spans on high piers were a type that were developed by Milwaukee Road engineers, and were used extensively on the Milwaukee Road lines. West of the embankment is a 502 foot structure which crosses Pine Creek, the Inland Empire Railroad tracks, a county highway, and a "farm crossing." It consists of a 40 foot concrete abutment, a 60 foot standard deck plate girder, three concrete arches with a clear span of 68 feet 6 inches, and a rise of 62 feet, an unsymmetrical skew arch span, a skew through girder span and a combination trestle and U-abutment.

The entire structure, excluding the floor, is divided along its longitudinal axis into two separate units connected at intervals by horizontal transverse ties. The arches consist of two separate ribs which are connected by six ties. This ribbed arch construction represented the mainline of development in concrete bridge design in 1915, and reflected a move away from the earlier massive solid barrel arch design which had been commonly used in the construction of concrete railroad bridges at the turn-of-the-century.

The ribs of the east arch are 4 feet wide and are spaced 15 feet 3 inches center to center. They are 3 feet 6 inch deep at the crown, gradually increasing to 9 feet 8 inches near the springing line. The spandrel wall of the east arch is pierced by six 8 foot arches which are separated by columns that are 1 foot 6 inches by 2 feet 8 inches. Above the crown, the spandrel wall is unbroken for a length of almost 30 feet. Though they are proportionately smaller, the dimensions of the three main arches of the west structure closely correspond to those of the east arch.

In order to insure independent action on the arch ring and to provide for temperature fluctuations, the spandrel wall was designed with five vertical expansion joints. One joint cut through the solid wall at the crown of the arch, and the others cut through the first and third spandrel arches on either side of the arch rib. As a result, four of the spandrel arches are structurally reinforced concrete girders. The solid portion of the spandrel wall of which the reinforced concrete girders are a part, is supported by the arch ring at six points. The girders carry the track floor which rests on concrete floor beams and a reinforced unit concrete slab.

Because of the ground slope, and the necessity to provide clearance for a skew highway crossing, the western most arch is unsymmetrical. Its west springing line is 14 feet higher than the east one, causing the south arch rib to be 50 feet 7 inches, while the north rib is 61 feet 3 inches.

Due to the elevation of the Inland Empire tracks in relation to the Milwaukee Road tracks, and the necessity to provide an adequate opening for the Inland Empire locomotives, it was necessary to use a through plate girder span with a floor of minimum thickness. The steel girder was completely encased in concrete in an effort to maintain the structure's "unity of appearance."

It was necessary to construct substantial piers between the arch ribs. These 3 foot 6 inch concrete columns, which were connected longitudinally by continuous reinforced concrete girders, carried the horizontal thrust of the arch

Waddell advised in his book Bridge Engineering that in concrete arch construction, "special care must be taken to secure unyielding foundations." It was noted in the article in Railway Age Gazette that the foundations at the Rosalia Bridge were favorable for arch construction. Solid cemented gravel lay 12 to 19 feet below the ground surface of the east structure, and rock lay at a depth of 5 to 20 feet below most of the west structure.

Description (continued)

The falsework used in erecting the arches was unusally complicated because it was necessary to keep the arch centering independent of the falsework carrying the track. The situation was particularly difficult where the two railroads passed underneath the structure on skews.

A single plant located at the west structure supplied the concrete for the construction of the viaduct. A narrow guage track was built to transport the concrete to the single arch east of the embankment. The concrete was mixed by a mixer located on top of an 80 foot tower which was mounted on a traveler or platform that ran on a 24 foot gauge track parallel to the bridge for a distance of about 210 feet. The concrete was poured from a spout at the top of the traveler. Because the traveler had a reach of almost 40 feet, it was possible to place almost all of the concrete without additional handling. The stone, sand, and cement were transported from the storage area to the mixer in small cars by a tower hoisting engine.

The two bridges were designed and constructed by the Milwaukee Road engineering department under the direction of the chief engineer, C.F. Loweth. All plans were drawn up in the office of the engineer of design, H.C. Lothholz. The construction was supervised by J.F. Pinson, assistant engineer of bridges and buildings in Seattle, Washington.

The commanding monumental form of the Rosalia Bridge rivals that of two concrete arch highway bridges built contemporaneously in the city of Spokane. The Rosalia Bridge is the only multiple span concrete arch railroad bridge within the State. Because of the high impact of railroad loads, concrete arches were never widely used in the construction of railroad bridges, particularly in long span structures.

25. Photos and Sketch Map of Location