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 9
TRUSS: Concrete; BEAM: Concrete | 7 5 8 5
State #: 162/6 1620000 68100

3. PRIORITY: 1

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

5. DATE: 1934

6. GOVT SOURCE OF THREAT — OWNER — ADMIN

7. OWNER/ADMIN: State/originally owned by county

8. NAME(S) OF STRUCTURE: McMillin Bridge (I)

9. OWNER'S ADDRESS:
Department of Transportation
Highway Administration Building
Olympia, Washington 98504

10. STATE / COUNTY: 053 | COUNTY NAME: Pierce | CITY/VICINITY: Puyallup/McMillin | CONG. DIST.: 03

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

11. SITE ADDRESS (STREET & NO.)
Crossing: Puyallup River
on Route 162, 5.3 miles south of Puyallup

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	SCALE	QUAD NAME
10	558000	5219700		☐ 1:24 ☒ 1:62.5 ☐ OTHER	Lake Tapps, Washington
				☐ 1:24 ☐ 1:62.5 ☐ OTHER	

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: April 1979

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

When the McMillin Bridge was completed in 1934, its 170 foot main span was the longest reinforced concrete truss or beam span in the United States. The concrete through truss replaced a twenty-one year old, 150 foot steel span which was washed out during a flood in the winter of 1933.

Cost considerations and maintenance advantages led the county engineers to choose the concrete bridge design over that of the steel span; the concrete design was $836.00 less than the lowest bid for construction of a standard light, structural steel highway bridge.

It was the system of hollow box construction that caused the wide concrete truss to be more economical than the more conventional steel span. Although this method of cellular construction was practiced throughout Europe, it was not widely used in the United States. In order to reduce the amount of concrete in the truss, the concrete was poured around hollowed wooden rectangular pier shafts with truncated corners. These octagonal wooden shapes are composed of 1-inch boards internally braced to give ample strength for holding their shape while the concrete was being

(CONT OVER)

18. ORIGINAL USE: Vehicular | PRESENT USE: Vehicular | ADAPTIVE USE:

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 REFERENCES—HISTORICAL REFERENCES, PERSONAL CONTACTS, AND/OR OTHER

W. E. Berry and George Runciman, "Through Concrete Trusses, 170 feet Long Used on Low Cost Highway Bridge, " Engineering News-Record, (January 2, 1936): 1-4.
J.A.L. Waddell, Bridge Engineering, 2 vols. (New York, 1916), 2:1987.
Homer M. Hadley, "Garfield Street Bridge at Seattle," Western Construction News and Highway Builder, (April 10, 1932 :176.

(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

FHR-8-260 1/79

placed around them.

The hollow box construction also decreases the dead weight of the bridge with corresponding decreases in total stresses, reinforcement, and column and footing loads. Because of the unusual length of the span, it was necessary to keep the dead load to a minimum. However, despite the hollow box construction, the dead load constituted 82 percent of the total load for which the truss was designed; originally, it was estimated that for every pound of live load and impact there was 5 pounds of dead load. To help compensate for the higher stresses on the long concrete span, it was necessary to use a richer mix of concrete than the standard Class A mixture.

The concrete truss is divided into ten 17 foot panels. The top chord is a 12 inch slab, and is 7 feet wide with 9 inch flanges at its edges. It is slightly curved with a six inch camber to cover deflection, and to preserve a light upward curvature in the bottom chord. The bottom chord is a 6 inch slab with 8 inch flanges turned upward. Because of the long lengths required, the chord steel was spliced with welded plates. The verticals which are penetrated by the hollowed octagonal forms, are 8 inch wall sections with 8 inch flanges at both sides. Each panel is braced by a pair of diagonals which are framed into the top and bottom chords, and into the verticals through large 45° brackets. Due to the limited tensile strength of concrete, all of the diagonals are composed of steel reinforcing bars. The massiveness of scale is compounded by the enlarged joint at the end of the top chord where the diagonal meets the end post, to provide room for the exceptionally large steel full hooks or hoops ("reinforcing bars, bent into a circular shape, which surround the longitudinal reinforcement of compression members"). The breadth and stiffness of the bridge eliminated the need for lateral bracing of the trusses above the roadway.

The 170 foot truss is flanked by two 20 foot concrete T-beam approach spans creating an overall length of 210 feet. It is 22 feet wide, curb to curb, and rests on concrete abutments.

The bridge was built by Pierce County under the direction of the county engineers, Mr. W.E. Berry and Mr. Forest Easterday. Mr. F.E. Walters was the resident engineer, and Mr. Dolph Jones was the contractor. The detailed plans for the bridge were prepared by the W.H. Witt Company of Seattle. The major design features and layout of the bridge were suggested by Homer M. Hadley, regional structural engineer of the Portland Cement Association.

The McMillin Bridge was one of several unique concrete bridge designs that Mr. Hadley initiated throughout Washington during his lifetime. Mr. Hadley's openness to the use of concrete in a truss form is reflected in an article in Western Construction News where he endorses the novel concrete truss design of the Garfield Street Bridge in Seattle, built in 1929.

"A most important feature of the design (of the McMillin Bridge)," stated a contemporary Engineering News article, "is its simplicity from a construction standpoint." The author admired the way in which the sidewalks were handled, running on both sides of the roadway through the longitudinal center lines of the trusses, exemplifying how this simplicity of construction merged and transformed the structural form into a rhythmic, geometric pattern.

However, the organic strength of concrete that is so frequently revealed through the arch form, is shrouded by the massive breadth and scale of this truss at McMillin. The McMillin Bridge is significant, not only because of its hollow-box construction, but also because it demonstrates the use of concrete for a design that traditionally evolved and conformed to the structural properties of timber and steel.

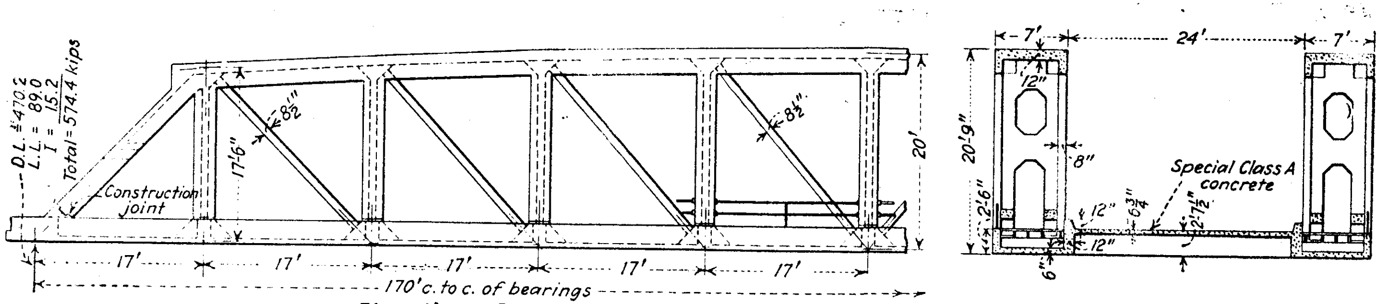
REFERENCES (CONTINUED)

State Highway Department Bridge Files

ABSTRACT

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

25. Photos and Sketch Map of Location



Elevation of Truss **Transverse Section**

from Engineering News-Record, 2 January 1936, p. 2.