Shepperd's Dell Bridge (Young Creek Bridge)
Spanning Young Creek on the Columbia River Highway
Shepperd's Dell State Park
Latourell vicinity
Multnomah County
Oregon

HAER OR-23

PHOTOGRAPHS
WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
U.S. Department of the Interior
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HISTORIC AMERICAN ENGINEERING RECORD

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Jet Lowe, Photographer, Summer 1990

OR-23-1	Perspective view from southeast
OR-23-2	View of trail and bridge from southeast
OR-23-3	General view of bridge from waterfall
OR-23-4	Roadway and bridge from east

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HISTORIC AMERICAN ENGINEERING RECORD

SHEPPERD'S DELL BRIDGE
(YOUNG CREEK BRIDGE)
HAER OR-23

Location:	Spanning Young Creek on the Columbia River Highway in Shepperd's Dell State Park, Latourell vicinity, Multnomah County, Oregon UTM: Bridal Veil, Oregon Quad. 10/562725/504355
Date of Construction:	1914
Structural Type:	Reinforced-concrete deck arch
Engineer:	Samuel C. Lancaster, Consulting Engineer/Assistant Highway Engineer K.P. Billner, Designer
Builder:	Pacific Bridge Company, Portland, Oregon
Owner:	Oregon Department of Transportation
Use:	Vehicular and pedestrian bridge
Significance:	Shepperd's Dell Bridge was designed by bridge designer K.P. Billner under the supervision of Samuel Lancaster in 1914. The bridge is a reinforced concrete deck arch with a 100-foot span. It was the second bridge built on the Historic Columbia River Highway. The solid curtain wall between spandrels and above the crown of the parabolic arch is a unique feature of this bridge. Later bridges of Conde B. McCullough's on the Columbia River Highway imitate this design. K.P. Billner believed this was one of the strongest and best-erected bridges on the highway. The structure harmonizes beautifully with its hilly woodland setting.
Project Information:	Documentation of the Shepperd's Dell Bridge is part of the Oregon Historic Bridge Recording Project, conducted during the summer of 1990 under the co-sponsorship of HABS/HAER and the Oregon Department of Transportation. Researched and written by Kenneth J. Guzowski, HAER Historian, 1990. Edited and transmitted by Lola Bennett, HAER Historian, 1992.
Related Documentation:	See also HAER OR-56, Columbia River Highway Bridges.

HISTORY

The Columbia River has been an important transportation route ever since Captain Gray discovered it in 1792. Early pioneers arriving in the Oregon country transported their families and possessions down the river on barges supplied by the Hudson Bay Company. In 1856 the first wagon road, with 20 percent grades and switchbacks, was completed from Bonneville to the Cascade Locks. This treacherous route allowed for overland travel by the pioneers. The Oregon state legislature appropriated $50,000 for a wagon road from the mouth of the Columbia River to The Dalles in October 1872. This road served its purpose well until completion of the Oregon Railway and Navigation Company line in 1882. Railroad construction destroyed parts of the 1872 wagon road making the railroad the primary means of transportation along the Columbia River until the first decades of the twentieth century.

The Good Roads Movement in Oregon was supported by a constitutional amendment that granted the power to counties to issue bonds for the construction of permanent roads. Additional support followed for a unified highway system thanks to participation by some of Portland's business elite. Henry Wemme and Simon Benson crusaded for construction of a high-class road along the banks of the Columbia River between the years 1910-1912.

With the arrival of Samuel Hill in Oregon in 1907, the tide began to turn for the construction of the Columbia River Highway. Hill was an active proponent of the good roads movement in Washington state. After a great deal of promotion and politicking, and personal financial investment by Sam Hill, the Oregon legislature established the highway department and commission in 1913.

Upon Sam Hill's recommendation, the State Highway Commission hired Major Henry Bowlby as the first State Highway Engineer. Samuel Lancaster was appointed Assistant State Highway Engineer for Multnomah County, and Consulting Engineer for the Columbia River Highway. Both of these men had traveled with Sam Hill to Europe to study highway and bridge development there. Noted bridge engineer Charles H. Purcell was hired as the third member of Hill's handpicked engineering team. K.P. Billner was Assistant Bridge Engineer to Purcell. Lancaster was assigned the task of laying out the highway through Multnomah county to Hood River county. Portland millionaire John B. Yeon volunteered his services as Road master and supervised the construction and work crews.

Samuel Lancaster, with bridge engineers C.H. Purcell, K.P. Billner and L.W. Metzger, worked out the designs for the numerous bridges along the Columbia River Highway. They designed each bridge to conform to the unigque topography that existed at the construction sites. These structures were designed to be light, graceful and durable as well as innovative in their construction techniques for the period. "Lancaster had a great and deep love for the beauty of the Cascades and the Columbia, and had a talent bordering on inspiration for solving difficult engineering problems."[1] Lancaster was inspired by the beauty of the German Rhine, and this influence can be seen in his designs for the Columbia River Highway in Oregon.

Shepperd's Dell is located on the Columbia River Highway just west of the community of Bridal Veil. This charming and picturesque spot was presented to the public in May, 1915, by George Shepperd, as a memorial to his wife.[2] George Shepperd gave these elveven acres as a public park, because he loved it and came here with his family to be refreshed when they were denied the privileges of church and Sunday school, because there was no road.

K.P. Billner paid tribute to George Shepperd when he wrote: "Men of wealth and high position have done big things for the Columbia River Highway which will live in history; but George Shepperd, the man of small means, did his part full well."[3] The bridge complements the enchanting landscape found in this area of the highway.

DESIGN AND DESCRIPTION

This bridge is a graceful reinforced concrete deck arch and was the second bridge constructed by the new highway department on the Columbia River Highway. The main arch spans 100' and consists of two parabolic arch ribs. Four spandrel columns balance each side of the arch and terminate in half circle curtain wall. The spandrel columns have a decorative feature at the junction point of column and arch, which is a simple capital form. Above the parabolic arch there is a solid spandrel wall, which closes the space between the spandrel columns. The spandrels are reinforced to make them act as girders, and are capable of sustaining the bending moment over half the span. The spandrels distribute the loading on the arches. The influence of stiffening of the spandrels was not considered in determining the dimensions of the arch ribs.[4] The girders composing the spandrels are heavily reinforced and designed to distribute the stresses due to moving loads, therefore increasing the rigidity of the structure. Calculations for decking, loading, thickness of floor beams and their spacing are the same as Latourel bridge. The total width, including railings, is 25'. Each walkway is 3'-3" in width, while the roadway between curbs measures 16'-10". Angle iron reinforcement is evident on the edge of the curbs.

This is one of eight deck arches built between 1913-1921 on the Columbia River Highway in Oregon between Troutdale and The Dalles. It is the third largest of the single arches, after Moffett Creek (170') and Mosier Creek (110').

By 1910 bridge construction was moving away from massive construction and towards the flattened parabolic curves with narrow ribs, slender spandrel posts, and minimal piers that scientific reinforcing was to make possible. Such European innovation like the light slabs of Maillart and the thin-walled box girders of Freyssinet were slow to appear in the United States. It was the engineers of the Oregon State Highway Department, who played a leading role in the development of American concrete bridges. Their earliest contributions were the bridges along the Columbia River Highway. Bridge designer K.P. Billner attempted innovative and creative designs with his bridges on the Columbia River Highway, and this bridge is an outstanding example of his early work in Oregon.

The bridge abutments are anchored to solid which helped to cut down on construction costs. Billner explained:

> From past experience with the bridges already constructed I have learned, that the principal opportunity for saving is in the abutments. This savings can be accomplished by a careful preliminary examination of the bridge site. I will endeavor, in my designs, to as far as possible cut out the concrete abutments and let the solid rock ledges serve in the place of the concrete.[5]

This bridge, like the Latourell Creek Bridge, is characteristic of this cost saving principle.

K.P. Billner approved the following specifications for the form work by The Pacific Bridge Company:

> The deck we would like to use 1" shiplap supported by joists on 2" centers. Joists to be either 2"x 10", 2"x 12", 3"x 8" or 3"x 10". The streses will not exceed 1000 # per sq. in.; and we think you need have no fear of any of the joists breaking as they did on the viaduct. The 1" material will certainly carry a 10½ slab for a 2' spacing of joists without noticeable deflection. We will have a longitudinal cap under every cross girder and a longitudinal stringer under the sidewalk girder bracketed out from the main form, and tied with bolts thereto, so that there will be

> no possibility of deflection of these parts. The form for the sidewalk girder will be of 2" material and every effort will be made to secure perfect alignment of 2'x 4' studs 21" on certers, these in turn to be kept in line by 4"x 4" wales, and the whole form arches, as the Construction Co. has nearly all the 1-inch material on the ground, and the cost of same is very great. We do not like to take any chances up in the air for our own safety, and would like to use sufficient wales and sires so that absolutely nothing can happen which would permit the walls to go out of line in any way."[6]

These specifications for falsework clarify the contractors desire to erect a first class structure that would not give in to the stresses of the concrete. They help to explain the method of false work construction before plywood increased in popularity and replaced the common shiplap lumber, which is now obsolete.[7] An August 6, 1914 letter from Billner to Lancaster states: "It is my opinion that the falsework for the Shepherd's Dell Bridge is the strongest and best erected of all built on the Columbia Highway." The weekly Engineer's Report of May 3, 1914, reveals that the process of cutting out footings for the Shepperd's Dell Bridge was slow because of the careful falsework construction and the dangerously steep conditions at the site.

This bridge has precast concrete balustrades with arched openings, caps and posts identical to those on Latourell Creek Bridge and other Columbia River Highway bridges. Topping the balustrades is a cast-in-place concrete cap and support brackets. The curved brackets below the deck terminate in a triangular motif above the spandrel columns. Basalt piers with concrete caps are found at each end of the bridge railings. At the west end of the bridge a basalt guard wall, which is a series of arches with cast concrete cap, abuts the basalt pier at the northwest corner of the bridge.

Shepperd's Dell Bridge is a conventional reinforced concrete arch bridge. The arch ribs are set more to the outside of the raodway than others. The spandrel columns are replaced by a longitudinal wall at the crown, unlike some arch bridges where the separation at rib and eck is maintained throughout. It is an elegant small bridge with an air of permanence that is most agreeable.[8]

A stairway and winding trail to the waterfalls originates at the southeast end of the bridge. the unusual cast-in-place railing on this stairway is a unique example of thin reinforced concrete construction techniques. Its sharp-angled design contrasts with the traditional balustrade form of the bridge railings.

On August 5, 1915 Roadmaster John B. Yeon notified contractors that they were not to cut any of the shrubbery or cut into the County's right-of-way without explicit instructions from the County Highway Engineer. "Actions of this kind ruin the looks of this road and cannot continue. We have exercised the greatest of care and incurred great expense in finishing out slopes on the Columbia River Highway, so that every one driving over same may appreciate and enjoy the beauty of the construction, as this Highway is in a case of its own and is not an every day County Road. it is a Highway that will be shown to the whole world and I wish to have your heartiest co-operation in the above suggestion."[9] Vegetation management is a current issue at this bridge site much of the bridge is hidden by the tall tree canopy.

REPAIR AND MAINTENANCE

Maintenance records for this bridge indicate that in the 1930s repairs were necessary to the curbs, handrails and spindles. Heavy moss growth was evident so the bridge was cleaned and painted with a coat of atlas cement. In 1937 there was evidence of spindle spalling. Between 1940

and 1969 little maintenance was performed on the bridge. By 1969 ninety five percent of the spindles in the railings were deteriorated with the reinforcing bar exposed. A solid concrete wall replacement was suggested to replace the spindles on this bridge. In the late 1980s the original spindles were replaced with identical reproductions. In the summer of 1990 an analysis of other "Columbia River highway bridges of the same vintage revealed similar spindle deterioration, which suggests that the reinforcing bar was located too close to the surface of the concrete.

ENDNOTES

1. Alice Benson, Simon Benson: North West Lumber King (Portland: Binfords & Mort, 1971), p.115.

2. Lewis A. McArthur, Oregon Geographic Names, Fifth edition (Portland: Western Imprints, Oregon Historical Society Press, 1982), p.665.

3. Samuel C. Lancaster, The Columbia: America's Great Highway (Portland: Kilham Stationery and Printing Company, 1926), p.65.

4. Oregon State Highway Commission, First Annual Report, 1914, p.188.

5. K.P. Billner, Letter to S.C. Lancaster, 8 September 1914, (Roadmaster Files, Oregon Historical Society, Portland, Oregon.)

6. F.W. Crock, Pacific Bridge Co., Letter to K.P. Billner, 7 September 1914, (Roadmasters Collection, Oregon Historical Society.)

7. Ralph Lockyear and Lewis McArthur, Interview, 3 August 1990.

8. Louis F. Pierce, Esthetics in Oregon Bridges: McCullough to Date, p.5, (Dwight Smith Files, Oregon Department of Transportation.)

9. John B. Yeon, Letter to contractors, 5 August 1915, (Roadmasters Collection, Oregon Historical Society, Portland, Oregon.)

ADDENDUM TO
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(Shepperd's Dell Bridge)
(Young Creek Bridge)
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Note: For shelving purposes at the Library of Congress, Troutdale vicinity in Multnomah County was selected as the "official" location for the various structures in the Historic Columbia River Highway documentation.

James Norman, Photographer, September 1995.

HAER No. OR-23-5	GENERAL VIEW OF SHEPPERDS DELL BRIDGE, FACING SOUTHWEST.
HAER No. OR-23-6	GENERAL VIEW OF SHEPPERDS DELL BRIDGE, FACING NORTHWEST. SAME PHOTO AS HAER No. OR-36-26.

Jet Lowe, HAER Photographer, July 1995.

HAER No. OR-23-7	FIRST SECTION OF 190 DEGREE PANORAMIC VIEW, SHEPPERDS DELL BRIDGE AND TRAIL.
HAER No. OR-23-8	SECOND SECTION OF 190 DEGREE PANORAMIC VIEW, SHEPPERDS DELL BRIDGE.
HAER No. OR-23-9	THIRD SECTION OF 190 DEGREE PANORAMIC VIEW, SHEPPERDS DELL BRIDGE AND TRAIL.
HAER No. OR-23-10	FOURTH SECTION OF 190 DEGREE PANORAMIC VIEW, SHEPPERDS DELL BRIDGE TRAIL.
HAER No. OR-23-11	DETAIL OF CONCRETE AND STONE RAILINGS ON STAIRCASE LEADING FROM SHEPPERDS DELL BRIDGE TO TRAIL.
HAER No. OR-23-12	SHEPPERDS DELL BRIDGE PLAQUE DETAIL.