Dry Canyon Creek Bridge
Spanning Dry Canyon Creek on the Columbia River Highway
Rowena vicinity
Wasco County
Oregon

HAER OR-30



PHOTOGRAPHS
WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
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HISTORIC AMERICAN ENGINEERING RECORD

DRY CANYON CREEK BRIDGE
HAER OR-30

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| Location: | Spanning Dry Canyon Creek on the Columbia River Highway (now the Mosier-The Dalles Highway), 5.5 miles east of Mosier, Wasco County, Oregon<br>UTM: White Salem, Oregon Quad. 10/7631350/75059525 |
| Date of Construction: | 1921 |
| Structural Type: | Reinforced-concrete deck arch |
| Engineer: | Conde B. McCullough, Oregon State Highway Department |
| Builder: | Whitman & Kuckenberg, Portland, Oregon |
| Owner: | Oregon Department of Transportation |
| Use: | Vehicular and pedestrian bridge |
| Significance: | This single-span reinforced-concrete deck arch bridge was designed by Conde B. McCullough and completed in 1921. The main arch spans 75', while the total length of the bridge is 101'. This bridge is similar in design and detailing to the Shepperd's Dell Bridge, also on the Columbia River Highway. Both of these bridges are well suited to the landscape and environment in which they are placed, which was a characteristic feature of all structures built on this highway. This bridge is the fourth deck arch designed by McCullough for the State of Oregon and is significant as an early example of his work in reinforced concrete. |
| Project Information: | Documentation of the Dry Canyon Creek 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 Dry Canyon Creek Bridge is located on the Columbia River Highway at the easternmost section of this historic highway, between the city of Hood River and Chenoweth Creek at the northwest city limits of The Dalles. This portion of the scenic highway does not receive as much trafic as the western section because of its distance from Portland and the fact that most travelers use I-84 to travel the distance. After leaving the city of Hood River the driver notices the change in landscape qualities. The moist, green environment west of Hood River changes to arid conditions with Ponderosa Pine and Oregon White Oak predominating. The extensive irrigated fruit orchards of Wasco County are part of this landscape. Between Mosier and The Dalles the highway climbs through these orchards to the wind swept Rowena Plateau and Rowena Crest Overlook at an elevation of 718 feet. it descends through the Rowena Loops to Rowena.[1] The site of Dry Canyon Creek bridge is a barren plateau that offers panoramic vistas of the Columbia River to the east and west.

The state of Oregon really began moving with highway construction and development in 1917. The legislature placed the responsibility of highway construction in the hands of a three-man commission appointed by the Governor. This commission passed and submitted to the people $6 million bond bill together with other assisting legislation for highway development in Oregon.

The commission act was signed by Governor Withycombe on February 19, 1917 and the first commission was appointed March 1, 1917. It consisted of Simon Benson, chairman, W.L. Thompson, and E.J. Adams, who was succeeded mid-term by Robert A. Booth. The commission elected Herbert Nunn as State Highway Engineer and the highway work commenced. The commission adopted the main trunk line roads, previously recommended by the legislature and outlined by preceding commissions, as the official highway system of the state. These included the Columbia, Pacific, Roosevelt, Coast, the Dalles-California, and east-west Central Oregon routes--the system as whole being practically that of the present mainline state highway map.[2] On June 25, 1917 the commission went on record, as a war measure, to devote its resources to the completion of the two main trunk lines, the Columbia and Pacific highways. Oregon had awakened to the value of good roads as well as their economic necessity for moving agricultural products to market. State and local government forces joined hands to hasten construction of these two highways. By the close of 1918, eleven of the affected counties voted for the issuance of $4,017,000 in county bonds for the improvement of county roads and state highways in collaboration with the state highway commission's program.

In 1919 labor was again at hand, thanks to returning soldiers, and building materials were more available. With these advantages the commission started extending its lines at a more rapid pace. At the same time, funds from the Federal Aid Road Act of 1916 were coming into use. the number of motor vehicles in the state had increased from 11,857 to 48,632 and the demand for roads over which to operate them had become so great that the bond issue was authorized. In 1919 the legislature became even more generous than it had been in 1917 and increased the highway bonds by an additional $10 million. Additional revenue was appropriated by the imposition of a tax of one cent per gallon on all gasoline used in motor vehicles. Oregon became the first state to adopt the gasoline tax as a source of income for road building.

Federal aid for state highway construction became an important factor for many states, including Oregon. The total federal appropriations, between 1916 and 1925, amounted to $540,000,000 for post roads and $47,000,000 for forest roads. Oregon received 1½ percent of the post road funds and 9.7 percent of the forest road funds. With the passage of the 1921 appropriation came the plan for a connected system of roads for the whole nation, which became known as the "7 Percent System."

During the period 1920-1922 the routing of state highways through cities and towns was

given considerable thought and study by the Oregon State Highway Commission. The Commission chose the most direct routes, eliminating right-angle turns wherever possible and avoiding congested business districts. Additional considerations were given to the establishment of parks and camping sites.

Concrete bridge construction on the main highways were designed for 20-ton truck loading. the total expenditure for bridge construction, maintenance, and bettement work during the 1921-1922 biennium was $2,659,965.79. There were 318 bridges constructed in this period at a cost of $2,500,000. An aspect of the bridge work handled by the State Highway Department was the furnishing of designs and the supervising of construction for bridges on county roads. This service was furnished to the counties without charge in compliance with a state law directing the Highway Department to prepare designs for county bridges upon the requrest of County Courts. Altogether 169 designs were prepared during 1921 and 1922 for structures having spans in excess of 20'. Designs were also prepared for seventy-four structures with spans less than 20' long.[3] The bridge unit designed, planned and prepared specification; supervised construction; checked final and monthly estimates; and attended to all other work pertaining to bridges. The unit consisted of a general bridge office, a drafting office and a staff of field engineers and assistants.[4]

Through the 1920's federal aid for highways became a well-established governmental policy. The state of Oregon expected to receive from seven and one-half to ten million dollars in highway aid between 1923 and 1928.[5] In Oregon this total expenditure brought about 347.2 miles of paved highway; 369.4 miles of macadam; and 761.4 miles of grading with the state. A total of $1,311,300 was expended in bridge construction and design. The biennium closed with funds on hand and more available, many contracts under way and pending, and the highway program moving forward in high gear.[6]

In 1919 State Highway Engineer Herbert Nunn needed more engineers and draftsmen in the Oregon State Highway Department. Nunn offered Conde B. McCullough the position of State Bridge Engineer in the spring of 1919. McCullough accepted the position and brought with him his expertise in bridge construction. McCullough believed that aesthetics were an important aspect of bridge design, as well as economy of construction. The reinforced concrete arch became one of McCullough's favorite bridge types because of its simplicity, its engineering qualities, and its low maintenance costs.[7] McCullough is credited with perfecting the use of concrete, reinforced with steel bars, in Oregon bridge construction since the 1920s. Dry Canyon Creek is an early example of McCullough's single span deck arch construction, which is one of thirty-two such bridges in the state of Oregon.

This deck arch bridge, very similar in design to the Mosier Creek Bridge, also designed by Conde B. McCullough, is one of eight arch highway bridges built on the Historic Columbia River Highway between Troutdale and The Dalles (1913-1921). It contains the third smallest arch (75') of the single arch bridges--Eagle Creek (60'), and Multnomah Creek (67'). This bridge was constructed as part of the highway built between Mosier and Rowena in Wasco County at a cost of $29,282.77. The state paying $19,673.55, and the federal government cooperating in the amount of $9,609.77 for construction of this bridge.[8]

## DESIGN AND DESCRIPTION

About six miles east of Mosier the Columbia River Highway crosses a deep ravine at an elevation approximately 600 feet above the Columbia River. A bridge was necessary to span the ravine. The single span reinforced concrete deck arch bridge designed for this location was Conde B. McCullough's fourth arch bridge design for the Oregon State Highway Department. An early bridge log for the Mosier-the Dalles Highway describes the Dry Canyon Creek bridge, from west

to east, as having one 13-foot reinforced concrete slab span, with a 5-inch wearing surface, and a horizontal clearance of 19' along its 101-foot length. The open spandrel columns terminate in semicircular arched curtain walls. The triangles created at the junction point of arch and column, between the brackets, are recessed two inches with a pebble-dashed texture. This detail contrasts nicely with the remainder of the smooth concrete surface of the bridge. The spandrel columns are battered ⅛" per foot on all sides. The reinforcing bar in the spandrel columns consist of 6-1 inch verticals with ⅜-inch ties on 12-inch centers.

The two main concrete piers are battered ¼" per foot, with the outside faces remaining vertical. there are pebble-dashed panels, recessed 2" deep, on the outside face of the piers. The piers rise to become part of the railing on both ends of the bridge. The piers are reinforced concrete the full width of the bridge. The spandrel columns attached to the piers take on the appearance of pilasters. the bottom 16' of the piers were filled with grouted rock above the abutments. The precast railings have three small arched openings between posts and are topped with a concrete cap. There are expansion joints in all rail posts. the railing is supported by curved, decorative brackets. The sides of the approach spans have solid walls with no ornamentation.

The crossing of this deep ravine with a small arch bridge is compatible to the precedents established in the western portion of the Columbia River Highway, Shepperd's Dell bridge being an example of these similarities of arch span and open spandrel columns. This bridge type became a popular form in Oregon for spans under 100'. The abutments are secured in solid rock and were determined on site by the resident engineer, Christ Fauerso. The arch is elliptical in shape and is fixed, with no hinges.

From 1916 to 1920 highway construction proceeding sections east from Hood River to The Dalles, and was delayed by a right-of-way problem with the railroad between Hood River and Mosier.[9] The highway eventually ran inland away from the riverbank alignment of the railroad, becoming the most expensive road work yet undertaken because of the need to build the Mosier Twin Tunnels.[10] When the last pavement was finally laid near the Dalles in 1922, the Columbia River Highway opened an era of comfortable and convenient auto travek through the gorge.

As highway use began to change in the late 1920's, this roadway began to hinder travel. Cars in the late twenties were faster, better built and over six times more numerous. In the ten-year period from 1916 to 1926 the number of passenger cars on the road in Oregon increased from 33,917 to 215,832.[11] Before long the scenic highway was overtaxed by the larger vehicles and increased number of trucks that were needed to haul goods to market. In the 1950s, the construction of a modern highway at river level made this section of the Columbia River Highway desirable only to tourists and local residents.

## REPAIR AND MAINTENANCE

Maintenance records for this bridge show that little repair work was necessary until the 1940s. After the casting of the handrail cap a cement wash was aplied which is about ¼" thick. It was feared that the sand used in the concrete mix was causing the cracking in this outer layer. The sand used came from the McClure Ranch on Hog Canyon ans was fine, sharp and dark in color. Repairs were made to the handrails and curbs in the 1940s.[12] In 1954 the bridge was visibly scaling and there was concrete disintegration over the entire structure. the south side of the bridge is in an advanced state of disrepair, because the hot sun has caused expansion and contraction of the reinforcing bar resulting in cracking, moisture penetration and severe concrete deterioration. In the summer of 1990 the bridge was undergoing extensive concrete repairs. Damaged concrete was being removed, deteriorated reinforcing bar replaced, and formwork laid to recast the concrete in damaged sections of the bridge.

## ENDNOTES

1. Dwight Smith, Columbia River Highway Historic District, National Register of Historic Places Nomination Form, Oregon Department of Transportation, 1984, p.24.

2. Ralph Watson, Glimpses at Highway History, vol. VII (Salem: Oregon State Highway Commission, 3 April 1950), p.I.

3. Oregon State Highway Commission, Fifth Biennial Report, 1921-1922, p.60.

4. Ibid., p.77.

5. Ibid., pp.18-23.

6. Ibid.; Glimpses at Highway History, vol. VIII, p.2.

7. C.B. McCullough, Economics of Highway Bridge Design (Chicago: Gillette Publishing Company, 1929), p.23.

8. Oregon State Highway Commission, Fifth Biennial Report, p.507.

9. Oregonian, 1 March 1918, p.6.

10. Oregonian, 24 March 1919, p.9.

11. Diane Ochi, Columbia River Highway: Options for conservation and Reuse (Cascade Locks, Oregon, 1981), p.29.

12. P.M. Stephenson believes that the concrete was being ground too fine, which cause the bridges to flake and spall. (Lou Pierce and P.M. Stephenson interview, 4 June 1980.)

ADDENDUM TO
DRY CANYON CREEK BRIDGE
~~Kosier~~ Rowena vicinity
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PHOTOGRAPHS

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