Winchester Bridge (Robert A. Booth Bridge)
Spanning North Umpqua River on the Pacific Highway
Winchester
Douglas County
Oregon

HAER OR-33

PHOTOGRAPHS
WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
U.S. Department of the Interior
Washington, DC 20013-7127

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HISTORIC AMERICAN ENGINEERING RECORD

WINCHESTER BRIDGE
(ROBERT A. BOOTH BRIDGE)
HAER OR-33

Location:	Spanning North Umpqua River on Oregon Route 99, Winchester, Douglas County, Oregon
Date of Construction:	1922-24
Structural Type:	Reinforced-concrete ribbed deck arch
Engineer:	Conde B. McCullough, Oregon State Highway Department
Builder:	H.E. Doering, Portland, Oregon
Owner:	Oregon Department of Transportation
Use:	Vehicular bridge
Significance:	The Winchester Bridge is the longest reinforced-concrete ribbed deck arch designed by Conde B. McCullough in the 1920s. It departs in aesthetic character from all his other deck arches in that it has a very strong Tudor and Gothic treatment of spandrel columns, curtain walls, and pedestrian lookouts. This long series of spans exemplifies McCullough's view that a reinforced-concrete arch should be favored in bridge design because of the "quiet, simple dignity of its lines."[1]
Project Information:	Documentation of the Winchester 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 Robert W. Hadlow, HAER Historian, 1990. Edited and transmitted by Lola Bennett, HAER Historian, 1992.
Related Documentation:	For more information on Conde B. McCullough, see HAER OR-54.

HISTORY

There has been a bridge spanning the North Umpqua River at Winchester, Oregon since the mid-nineteenth century. It was part of a major transportation route for both the military and civilians who traveled through the agriculturally rich Umpqua River Valley. Newspaper accounts in December 1861 reported a flood that carried away a bridge at this location. Presumably, local citizens rebuilt it. By 1887, because of increasing road traffic on the road, by then part of the Oregon-California Stage Route, Douglas County called for bids on a new "combination cantilever steel bridge" at the same location. Finally, a triple steel through-arch structure replaced this span in 1912.[2]

Oregon, since 1915, pushed to extend the Pacific Highway, a proposed major paved road from Portland to the California state line that followed the old stage route. Construction had reached Douglas County and the Umpqua Valley in the early 1920s. It included improving stream crossings at Myrtle Creek, Elk Creek, and the North Umpqua River. In mid-1922 the Oregon State Highway Commission began the bidding process for a reinforced-concrete seven deck-arch span over the North Umpqua at Winchester. The bridge would replace the steel through-truss structure that could not carry the heavy loads that planners believed would travel the Pacific Highway. It awarded the contract on July 25 to Portland builder, H. E. Doering. Work commenced on August 15 and nearly two years later, on April 26, 1924, the bridge was completed. On April 27, the state dedicated the nearly 800-foot structure to a recently retired State Highway Commissioner, Robert A. Booth. Its final cost was $132,759.90, with over $70,000 from the Federal Aid Highway Program and $60,000 from Douglas County.[3]

DESIGN AND DESCRIPTION

Conde B. McCullough, Oregon's bridge engineer from 1919 to 1936, designed a reinforced-concrete, seven span, deck-arch bridge to span the nearly 800-foot-wide North Umpqua River channel at Winchester. He chose the reinforced concrete construction instead of a more traditional steel through-truss design for this large span because he believed it was a more economically feasible path to take. McCullough had studied the economics of bridge design and concluded that reinforced-concrete spans were a wiser choice for tax dollars' use than the obvious alternative. While they cost more to construct, reinforced-concrete bridges had lower long-range maintenance costs.[4]

Critics of McCullough might argue that the channel at the North Umpqua was ill-suited to use of reinforced concrete construction. Nevertheless, he claimed that the situation there was not unlike that encountered in designing bridges for narrow rock-walled chasms. Reinforced-concrete bridges were easily used in spanning this type of channel because the ends of single solid- or ribbed-arches could be anchored to their rock walls. At the North Umpqua, McCullough found that the riverbed was solid basalt rock, to which he could directly attach bridge piers, without the need to drive wooden pilings.[5]

Conde B. McCullough's bridge at Winchester also demonstrates the engineer's flare for design. He used gothic arches on its curtain walls and balustrades. In addition, he added Tudor-style observation balconies at the entrances to the deck that he decorated with diamond-shaped inlaid tiling.

The bridge reads from north to south as follows: four 10'-2" deck girders, seven 112-foot ribbed deck-arches, two 10'-2" deck girders, all of reinforced concrete. Total length of the bridge, including 20'-4" abutments at each end, is 784'. Deck to stream bed distance averages 56 feet. Piers are solid and are anchored directly to basalt. Deck grade is a continuous -3.38% from

north to south. Deck width, curb-to-curb, is 19'-4". Width, out-to-out, is 22'-6". Curved decorative bracketing and a band of dentils below the balustrades add to the architectural interest of the structure.[6]

REPAIR AND MAINTENANCE

The Oregon State Highway Department's commitment to maintenance of the Winchester bridge has been sporadic. Early on, it was greatly concerned about problems caused by water pooling on the span's deck. Crews immediately installed drains, or weep holes. Later in the decade they painted precast sections of the railings with a special grey-colored paint, called "Cabot's Callopake," to prevent or arrest spalling and cracking caused by freeze and thaw cycles in western Oregon's damp climate. By 1929, bridge maintenance in Oregon all but ceased because of severe economic conditions brought on by the Great Depression. For example, faulty expansion joints, first noted in the late 1920s, waited until 1932 for repairs. Even so, they continue to be a major cause of concrete deterioration on the Winchester Bridge's road deck and have contributed to concrete erosion on arch ribs.[7]

The Winchester Bridge's roadway, at 19'-4" seemed adequate to accommodate two lanes of traffic in the mid-1920s. Yet, within a few years, an increased size of automobiles, and especially of trucks, posed a safety hazard for vehicles meeting oncoming traffic. In the same light, many bridges, including the one at Winchester, received considerable damage from trucks unable to negotiate the narrow clearances. McCullough, in 1929, reported that "loaded trucks" had "fractured" rails because they had carried oversized loads that had gouged the surface of rails and precast panels. It necessitated "an expenditure for cleaning and patching" of all the parts that compose balustrades.[8]

In 1934, McCullough suggested that the Highway Department widen the Winchester Bridge's roadway to 24 feet and add to this a sidewalk on each side. He believed that it could be done without modification to the structure below the deck and estimated costs at between $24,000 and $30,000. Depression-era austerity measures probably prevented the department from acting on McCullough's recommendations. In the years after World War II, Highway Department officials began to consider widening the Pacific Highway to four lanes. They planned to completely bypass the Winchester bridge by constructing a new, multi-laned structure.[9]

Inspections of the Winchester Bridge in the last twenty-five years reveal continuous spalling of concrete balustrade components. By the mid-1980s, the Bridge Section of ODOT's Highway Division became concerned about scouring around the base of pier six. It was rip-rapped with bags of premix concrete. A thorough inspection of the whole structure in November 1986 revealed that while the deck appeared to be in good condition, beams that supported it, along with some arch ribs, had much spalled concrete and exposed rebar. One report suggested that there was between fifty to one-hundred percent section loss of the lower rebar in some beams. Inspectors determined the cause as being two-fold. Deck joints had leaked continuously since construction, and rebar was originally placed too close to the surface of the beams and became extraordinarily susceptible to corrosion.[10]

At present, the Highway Division of ODOT has not determined what course to take with the Winchester Bridge. Widening the structure without compromising its aesthetic qualities would be costly. Other alternatives, including replacing the structure, has come under fire from preservationists. Finally, restricting its use to automobile traffic would hurt tourism revenues because drivers of "Class A" motor homes would bypass the secondary route through Winchester.[11]

ENDNOTES

1. C.B. McCullough, "The Design of Concrete Highway Bridges With Special Reference to Standardization," Engineering and Contracting 43 (24 March 1915), p.270.

2. Salem Oregon Statesman, 16 December 1861; Roseburg (Oregon) Review, 7 October 1887; 25 January 1889; Stephen Dow Beckham, Land of the Umpqua: A History of Douglas County, Oregon (Roseburg, Oregon: Douglas County Commissioners, 1986), p.195.

3. Beckham, p.195; OSHD, Fifth Biennial Report, 1921-1922, p.263; OSHD, Ninth Biennial Report, 1929-1930, p.111; OSHD, Seventh Biennial Report, 1925-1926, p.293; OHSD, Fifth Biennial Report, 1921-1922, p.263.

4. C.B. McCullough, Economics of Highway Bridge Types (Chicago: Gillette Publishing Co., 1929), pp.103-06.

5. Ibid.

6. ODOT, Bridge Section Files, "Bridge Log, Oakland Shady Highway No. 234, Mile Post 12.21"; ODOT, Bridge Section Files, "Bridge Plans, Winchester Bridge (No. 0839), Drawings 1771-1789."

7. ODOT, Bridge Section Maintenance Files, Winchester Bridge (No. 0839), "Bridge Maintenance Repairs and Renewals, 1924 to 1932"; C.B. McCullough to A.G. Skelton, 1 July 1927, Winchester Bridge (No. 0839), ODOT Bridge Section Maintenance Files; Conde B. McCullough, "Maintenance and Repair of Bridges," Journal of the American Concrete Institute 35 (February 1939) pp.235-9; "Discussion of a paper by Conde B. McCullough--Maintenance and Repair of Bridges," Journal of the American Concrete Institute 35 (June 1939) p.256; "Bridge Inspection and Maintenance Record," 9 October 1934, 29 July 1937, 23 January 1938, 8 September 1941, Winchester Bridge (No. 0839), ODOT Bridge Section Maintenance Files.

8. McCullough, Economics of Highway Bridges, p.161.

9. C.B. McCullough to R.H. Baldock, State Highway Engineer, 12 January 1934; K.D. Lytle, Division Engineer, to M. Stephenson, Bridge Engineering Assistant, 27 March 1951, Winchester Bridge (No. 0839), ODOT Bridge Section Maintenance Files.

10. "Bridge Inspection and Maintenance Report for 17 April 1967"; "Underwater Inspection Report for 25 September 1985"; "Bridge Inspection Report for 8 November 1986"; Ray Cranston, Region 3 Bridge Inspector, to Oliver Parent, Bridge Design, 10 November 1986, Winchester Bridge (No. 0839), ODOT Bridge Section Maintenance Files.

11. James Norman, Project Manager, notes, 9 July 1987; Larry Christiansen, Staff Assistant for Policy an Planning, to Jim Gix, Region 3 Engineer, 22 August 1988, "Winchester Bridge over the North Umpqua River File," ODOT Environmental Section Files.