

SNAKE RIVER BRIDGE AT LYONS FERRY

(Lyons Ferry Bridge)

(Old Columbia River Bridge at Vantage)

State Route 261 spanning the Snake River, moved
from Vantage, WA, where it carried the North

Central Highway spanning the Columbia River

Starbuck vicinity

Columbia County

Washington

HAER No. WA-88

HAER
WASH
7-STARBUCK,
1-

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

PHOTOGRAPHS

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HISTORIC AMERICAN ENGINEERING RECORD
NATIONAL PARK SERVICE
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HISTORIC AMERICAN ENGINEERING RECORD
SNAKE RIVER BRIDGE AT LYONS FERRY
(Lyons Ferry Bridge)
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HAER
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Location: Spanning the Snake River on state route 261, Starbuck Vicinity, between Columbia and Franklin counties, beginning at mile point 14.80

UTM: 11/406640/5160460
11/406700/5159710

Quad: Starbuck, Wash.

Date of Construction: 1927, moved 1968

Engineer: Washington Department of Highways

Fabricator: Kuckenbergl and Wittman Company of Portland, Oregon

Owner: Washington Department of Highways, since 1977 the Washington State Department of Transportation, Olympia, Washington

Present Use: Vehicular traffic

Significance: The oldest extant steel cantilever bridge in Washington. It is a good example of early-twentieth-century cantilever bridge construction using carbon steel. The structure served first at Vantage Ferry on the Columbia River and then dismantled and reerected on the Snake River at Lyons Ferry.

Historian: Robert W. Hadlow, Ph.D., August 1993

History of the Bridge

The Snake River Bridge at Lyons Ferry was erected at its present location in 1968 following a long career as a major central Washington crossing of the Columbia River at Vantage. Dam building on the Columbia and Snake rivers was responsible for both the bridge's dismantling at Vantage and rebuilding at Lyons Ferry. It is a good example of early twentieth-century steel through cantilever design with sloped top chords and bottom chords. Its suspended Parker truss presents a definite break in structural form from the heavily-braced anchor and cantilever spans.

As early as 1915, residents of Grant and Kittitas counties sought a bridge across their common boundary, the Columbia River. Both counties had built roads leading to the river in the Vantage Ferry vicinity where a scow powered by a gasoline launch ferried two cars at a time across the water. Automobile traffic increased to the point that in 1917 the counties' governments purchased a four-car ferry, named the *Kitty-Grant* to operate toll free at the crossing. The state soon adopted the county roads leading to the river at Vantage as part of its route system, and they became part of the North Central Highway.¹

In 1923, the *Kitty-Grant* ferried 50,000 people across the Columbia at Vantage. It was evident to local officials that they needed to replace the vessel with a bridge. Early the next year, the Grant-Kittitas County Ferry Commission petitioned Congress and received a toll-bridge franchise for the crossing. It planned to build a 1,900' structure costing \$600,000. The commission had the option of seeking a joint bond issue to finance construction or look for private capital for the project. It chose the latter alternative and soon found local entrepreneur, Elbert M. Chandler, a retired director of the Washington Reclamation Service, interested in the venture. He formed the Vantage Ferry Bridge Company to build the span.²

Amid great enthusiasm for the new toll bridge on the North Central Highway at Vantage, Washington's governor, Louis F. Hart voiced strong opposition to the project. On principle, he firmly opposed building toll bridges on taxpayer-supported highways. In addition, officials with the United States Bureau of Public Roads, in Washington, D.C., advised him that the state would lose Federal-Aid Road Act funds to improve the North Central Highway if the counties went ahead with Chandler's toll bridge.³

The Vantage Ferry Bridge Company pressed on with its campaign, but in October the state of Washington received a restraining order from the Thurston County Superior Court in Olympia to stop

its fund-raising program. Toll bridge construction meant losing \$900,000 in federal aid for the North Central Highway--a part of a major east-west route connecting Spokane with Seattle. The case tested the state's authority to direct its highway program over county opposition. Moreover, it tested the federal government's power over the states, through the Bureau of Public Roads, to withhold aid dollars to protest projects that it disliked.⁴

The Vantage Ferry Bridge Company appealed the court ruling, but in the meantime the state began its own plans to construct a bridge at Vantage. The State Highway Commissioner recommended to state lawmakers that they approve a \$320,000 funding request for the structure. In May, the Washington Supreme Court upheld the Thurston County Superior Court's injunction against the Vantage Ferry Bridge Company's toll bridge project. The state proceeded with its plans and called for bids on 1 December for a 2,475' bridge with a 520' steel cantilever section--the longest main channel span in the state until the Longview Bridge exceeded it a few years later. Construction began in January 1926. The structure was part of Washington's largest-ever bridge-building program to that point, which included several structures near Everett and one over the Puyallup River in Tacoma.⁵

Design and Description

The Washington Department of Highways originally built the Columbia River Bridge at Vantage Ferry/Snake River Bridge at Lyons Ferry as a Federal-Aid Road Act project. It found three sites on the Vantage Ferry portion of the Columbia River for the new structure. After careful study it determined that one about 1,000' upstream from the ferry landing at Vantage, on the west side of the river, offered the best crossing. All three had their advantages. One, two miles down river, offered solid rock foundations--ideal pier anchorages--all across the stream, but it was prone to ice jams in the winter and the department feared that these conditions might damage bridge piers. A site up river two miles also had a solid rock base, but cliffs to the west made approach work costly. The site near Vantage, where the state highway met ferry landings after dropping down to the river elevation from the high surrounding plateau gave the best approaches to the new span. Nonetheless, the river foundations were marginal, but the department concluded that excavations for pier footings were less costly than bridge approaches. The river at this point was 2,500' wide at high water and 800' wide at low water, with a swift 55' deep channel. These conditions necessitated building a structure consisting of many short approach spans with several bents to disperse dead load, and a

long cantilevered mid-section to avoid costly and impracticable falsework for arch spans.⁶

Construction began on 26 January 1926 for a 2,475' structure. The arrangement of spans was symmetrical and consisted of:

two 40' reinforced-concrete deck girder spans
six 56' reinforced-concrete deck girder spans
two 168'-9" steel Pratt deck-truss spans
one 220' steel through cantilever truss anchor arm
one 160' steel through cantilever truss span
one 200' steel Pratt truss suspended span
one 160' steel through cantilever truss span
one 220' steel through cantilever truss anchor arm
two 168'-9" steel Pratt deck truss spans
six-56' reinforced-concrete deck girder spans
two 40' reinforced-concrete deck girder spans
9-panel Pratt deck trusses were 26-feet-deep,
each 18'-9"
total length in steel--1,297'-6"
total length for main spans--960'
--forty-eight 20' panels
total length for suspended and cantilever spans
--520'
road deck, curb-to-curb, measured 20'.
No sidewalks.

The steel anchor spans and cantilever spans have sloped top and bottom chords for structural balance. This arrangement, instead of a horizontal bottom chord, also permitted using shorter main piers, reducing the amount of concrete needed but still achieving a 70' clearance at mid-channel for shipping traffic on the river. The suspended span is connected to the cantilevers through sliding joints, in part used during erection and later to provide for structural expansion and contraction due to temperature changes and live load. The contractor, Kuckenberg-Wittman Company of Portland, bid \$628,496.25 to erect the carbon steel main spans and approaches.⁷

Foundations near the east shore were solid rock only 60' below low water. This made excavations simple, with approach span piers and bents resting firmly on rock. The western foundations were quite different with dense sand, gravel, and rocks encountered for 190'. The approach piers and bents were sunk in the gravel using caissons and coffer dams for excavation, but both channel piers required firmer, deeper foundations and rocks, especially on the west pier, prevented using open caissons for excavation. Instead pneumatic caissons were sunk between 58 and 75' and the dumb bell-shaped piers were poured.⁸

Work continued on the bridge throughout 1926 and early 1927. Steel members except for sway bracing were either shop-riveted rolled channel steel with lattice or angle steel with lattice. Railing continued this design with top and bottom rails and lacing. The toll-free, state-owned bridge opened to much fanfare on 8 September 1927.⁹

Dismantling and Reconstruction

The Columbia River Bridge at Vantage served on the North Central Highway, later called U.S. 10, from 1927 until 1963 when the Department of Highways replaced it with a four-lane steel through-arch bridge. Throughout the 1950s, 60s, and 70's the U.S. Army Corps of Engineer constructed several dams along the Columbia and Snake rivers for hydroelectric power to tame their flow for flood control and barge traffic. The Corps built Wanapum Dam down river from the Vantage Ferry Bridge in the late 1950s and early 1960s as part of this project, flooding the riverside town and its bridge.

The Washington Department of Highways decided against extending the present structure's piers to accommodate the rising river. The bridge's narrow two-lane deck had become unsafe for high volume traffic, as had the highway's winding Vantage Hill grade to the river. The department decided to replace the bridge and built new roadway approaches as part of its plan to upgrade this portion of U.S. 10 to a four-lane divided highway, eventually part of Interstate 90.¹⁰

Once the new Vantage Ferry bridge was completed in 1963, the Washington Department of Highways dismantled the old structure and placed it in storage for reuse at another site. Several years later, the Corps built Lower Monumental Dam on the Snake River down stream from Lyons Ferry, a popular and historic crossing used since 1859. The bridge with its narrow road deck was suitable for relocation on secondary highways such as the route passing through Lyons Ferry, and the Bureau of Public Roads would finance part of the reconstruction costs.¹¹

Lyons Ferry, first known as Palouse Ferry because it is at the confluence of the Palouse and Snake rivers, became an important crossing in 1862 when the Mullan Road was opened between Fort Walla Walla, Washington Territory, and Fort Benton, on the Missouri River, in latter day Montana. For decades a private stream-powered toll ferry, relying on strong currents, carried passengers for 1,200' across the Snake. Rising waters behind the dam meant longer crossings and slower river flow.¹²

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The Washington Department of Highways decided to re-erect the Vantage Ferry Bridge at Lyons Ferry and rebuild county approach roads, and designate them as route 261, part of the state's secondary highway system. The department predicted in 1968 that by 1985 over 1,000 vehicles per day would travel across the new Lyons Ferry Bridge to connect with state primary highways and to gain access to Corps of Engineers- and state-owned parks along the river.¹³

The Vantage Ferry Bridge was erected at Lyons Ferry in 1968 at a cost of \$976,261. The Department of Highways contracted with Peter Kiewit and Sons Company of Vancouver, Washington, to construct ten intermediate reinforced-concrete piers, and with Murphy Brothers, Incorporated, of Spokane to reassemble the superstructure and build new concrete approaches. The bridge as it appears at Lyons Ferry consists of the following, reading south to north:

- one 100' prestressed concrete beam
- one 99'-3" prestressed concrete beam
- two 168'-9" steel Pratt truss deck spans
- one 220' steel through cantilever truss anchor arm
- one 160' steel through cantilever truss span
- one 200' steel Pratt truss suspended span
- one 160' steel through cantilever truss span
- one 220' steel through cantilever truss anchor arm
- two 168'-9" steel Pratt deck truss spans
- one 99'-9" prestressed concrete beam
- one 100' prestressed concrete beam
- total length in steel--1,297'-6"
- total length for main spans--960'
 - forty-eight 20' panels
- total length for suspended and cantilever spans
 - 520'
- total length of bridge--2,040' (2,475' at Vantage)

The bridge appears nearly the same as it did at Vantage Ferry. The piers are similar (battered, squared dumbbell-shaped), but not identical to those poured at Vantage. The bridge's sloped bottom chords, combined with tall concrete piers founded on solid rock just below the river floor and rising out of the Snake's deep waters behind Lower Monumental Dam gave adequate ship clearance for river traffic. The contractor reassembled the shop-riveted members with nuts and bolts instead of field rivets. The concrete approach spans are fewer, but each is longer than on the original structure. Total concrete span length is reduced to fit the new location. Finally, new reinforced-concrete decks were poured on the reassembled structure, and modern safety barrier railing was used on the entire structure in place of the original

angle steel and lattice railing.¹⁴

Repair and Maintenance

The Vantage Ferry/Lyons Ferry bridge was structurally sound when dismantled in 1963. Contractors sandblasted all members, ground rivet holes, and straightened kinked sway bracing and gusset plates prior to erecting the steel structure at Lyons Ferry. Concrete decks on the Lyons Ferry bridge show aging signs with transverse cracking. In 1987, a concrete collar was poured around the north main pier's west column to reinforce bearing pad anchors. A fracture critical inspection in 1990 revealed no irregularities at key joints.¹⁵

For additional information and a comparative study of the evolution of cantilever design in Washington, see:

WASHINGTON KING COUNTY SEATTLE
WASHINGTON STATE CANTILEVER BRIDGES (HAER No. WA-106)

Data Limitations

The quality of research resources were widely varied for this bridge. A comprehensive microfiche index of the *Wenatchee World* newspaper was available at several locations. Scrapbooks from the Washington State Library's Pacific Northwest Room and its statewide microfilmed newspaper holdings proved invaluable. Records for the Snake River Bridge at Lyons Ferry in the Bridge Preservation Section, Washington State Department of Transportation also included several documents pertaining to its previous existence at Vantage Ferry. The Bridge Preservation Section's historical photograph collection contains a few studio quality images of the bridge at Vantage Ferry. Finally, a local historical society in Ellensburg may hold an album of construction photographs taken at Vantage.

Project Information

This project is part of the Historic American Engineering Record (HAER), National Park Service. It is a long-range program to document historically significant engineering and industrial works in the United States. The Washington State Historic Bridges Recording Project was co-sponsored in 1993 by HAER, the Washington State Department of Transportation (WSDOT), and the Washington State Office of Archeology & Historic Preservation. Fieldwork, measured drawings, historical reports, and photographs were prepared under the general direction of Robert J. Kapsch, Ph.D., Chief, HABS/HAER; Eric N. DeLony, Chief and Principal Architect, HAER; and Dean Herrin, Ph.D., HAER Staff Historian.

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The recording team consisted of Karl W. Stumpf, Supervisory Architect (University of Illinois at Urbana-Champaign); Robert W. Hadlow, Ph.D., Supervisory Historian (Washington State University); Vivian Chi (University of Maryland); Erin M. Doherty (Miami University), Catherine I. Kudlik (The Catholic University of America), and Wolfgang G. Mayr (U.S./International Council on Monuments and Sites/Technical University of Vienna), Architectural Technicians; Jonathan Clarke (ICOMOS/Ironbridge Institute, England) and Wm. Michael Lawrence (University of Illinois at Urbana-Champaign), Historians; and Jet Lowe (Washington, D.C.), HAER Photographer.

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ENDNOTES

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⁵ Presumably \$320,000 was not the entire projected cost for the state-built bridge. A matching grant from the Federal-Aid Road Act fund most likely was part of the financial package; "Vantage Ferry Bridge Scheme Starts Fight," *Wenatchee World*, 31 January 1925, 2; "Vantage Ferry Bridge Job on 1925 Program," *Wenatchee World*, 3 March 1925, 3; "Uphold Action Barring Vantage Bridge, High Court Gives Okeh in Dispute!," *Wenatchee World*, 22 May 1925, 1; Call for Bids Vantage Ferry Bridge Dec. 1," *Wenatchee World*, 27 October 1925, 5; "Will Start Work on \$628,000 Vantage Bridge This Week, New Bridge Span to be 2,475 Feet," *Wenatchee World*, 13 January 1926, 1; Charles E. Andrew, "Recent Bridge Work of the Washington State Highway Department," *Western Construction News*, 2 (10 March 1927): 30-32.

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¹⁰ "New Four-Lane Highway to Replace Vantage Road," *Wenatchee World*, 6 October 1960, 2; "Work to Start This Year on New Bridge at Vantage," *Wenatchee World*, 17 January 1961, 8.

¹¹ "Old Vantage Bridge Trucked to Snake River Site for a New Career," *Seattle Post-Intelligencer*, 4 August 1968, 21; "Old Vantage Bridge Going Into Storage," *Seattle Times*, 6 November 1962, 18.

¹² "Old Vantage Bridge Trucked to Snake River Site for a New Career,"

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¹⁴ David P. Swanson to C. G. Prah, Director of Highways, 18 August 1967; L. M. Robertson to George Stevens, 25 September 1967; and G. S. Lloyd to Paul Schuett, 20 May 1983, in "Snake River Bridge at Lyons Ferry, No. 261/125," Correspondence Files; and, "Snake River Bridge at Lyons Ferry, No. 261/125," Kardex Card File, both in Bridge Preservation Section, Washington State Department of Transportation, Olympia, WA [WSDOT].

¹⁵ Robertson to Stevens, 25 September 1967; "Columbia River Bridge at Vantage, No. 7/201," Bridge Inspection Report, 29 June 1962, by N. J. F[avero], in "Snake River Bridge at Lyons Ferry, No. 261/125," Correspondence File, Bridge Preservation Section, WSDOT; "WSDOT Historic Bridge Inventory--Snake River Bridge at Lyons Ferry" [1990], held by Environmental Unit, WSDOT.