HISTORIC COLUMBIA RIVER HIGHWAY,
SANDY RIVER BRIDGE AT TROUTDALE
Troutdale vicinity
Multnomah County
Oregon

HAER No. OR-36-A

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

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

HISTORIC COLUMBIA RIVER HIGHWAY, SANDY RIVER BRIDGE AT TROUTDALE

HAER No. OR-36-A

Location:	Spanning the Sandy River east of Troutdale on the Historic Columbia River Highway, Multnomah County, Oregon, beginning at milepost 14.2. UTM: 10/548770/5042750 Quads: Camas, Wash.--Oreg. and Washougal, Wash.--Oreg.
Date of Construction:	1912
Engineer:	Waddell and Harrington, Consulting Engineers, Kansas City
Builder:	Oregon Bridge and Construction Company, Portland
Owner:	Oregon Department of Transportation
Present Use:	Vehicular and pedestrian traffic
Significance:	First modern bridge constructed on what became the Historic Columbia River Highway. Designed by the premier bridge engineering firm of Waddell and Harrington, which also created the 1912 Steel Bridge, a through double-deck vertical lift truss of telescoping design, and the 1910 Hawthorne Bridge, a through vertical lift truss, both over the Willamette River in Portland.
Historian:	Robert W. Hadlow, Ph.D., September 1995
Transmitted by:	Lisa M. Pfueller, September 1996

PROJECT INFORMATION

This recording project is part of the Historic American Engineering Record (HAER), a long-range program to document historically significant engineering and industrial works in the United States. The HAER program is administered by the Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) Division of the National Park Service, U.S. Department of the Interior. The Historic Columbia River Highway Recording Project was cosponsored in 1995 by HABS/HAER, under the general direction of Robert J. Kapsch, Ph.D., Chief, and by the Oregon Department of Transportation (ODOT), Bruce Warner, Region One Manager; in cooperation with the US/International Committee on Monuments and Sites (ICOMOS), the American Society of Civil Engineers (ASCE), and the Historic Columbia River Highway Advisory Committee.

Fieldwork, measured drawings, historical reports, and photographs were prepared under the direction of Eric N. DeLony, Chief of HAER; Todd A. Croteau, HAER Architect, and Dean A. Herrin, Ph.D., HAER Historian. The recording team consisted of Elaine G. Pierce (Chattanooga, Tennessee), Architect and Field Supervisor; Vladimir V. Simonenko (ICOMOS/Academy of Fine Arts, Kiev, Ukraine), Architect; Christine Rumi (University of Oregon) and Pete Brooks (Yale University), Architectural Technicians; Helen I. Selph (California State Polytechnic University, Pomona) and Jodi C. Zeller (University of Illinois, Urbana-Champaign), Landscape Architectural Technicians; Robert W. Hadlow, Ph.D. (ASCE/Pullman, Washington), Historian; and Jet Lowe (Washington, DC), HAER Photographer. Jeanette B. Kloos, ODOT Region One Scenic Area Coordinator; and Dwight A. Smith, ODOT Cultural Resources Specialist, served as department liaison.

Additional information about the Historic Columbia River Highway can be found under the following HAER Nos.:

OR-36	HISTORIC COLUMBIA RIVER HIGHWAY
OR-36-B	HISTORIC COLUMBIA RIVER HIGHWAY, SANDY RIVER BRIDGE (Stark St. Bridge)
OR-36-C	HISTORIC COLUMBIA RIVER HIGHWAY, CROWN POINT VIADUCT
OR-36-D	HISTORIC COLUMBIA RIVER HIGHWAY, CROWN POINT
OR-24	LATOURELL CREEK BRIDGE
OR-23	SHEPPERDS DELL BRIDGE
OR-36-E	HISTORIC COLUMBIA RIVER HIGHWAY, BRIDAL VEIL FALLS BRIDGE
OR-36-F	HISTORIC COLUMBIA RIVER HIGHWAY, WAHKEENA FALLS FOOTBRIDGE
OR-36-G	HISTORIC COLUMBIA RIVER HIGHWAY, WEST MULTNOMAH FALLS VIADUCT

OR-36-H	HISTORIC COLUMBIA RIVER HIGHWAY, MULTNOMAH CREEK BRIDGE
OR-36-I	HISTORIC COLUMBIA RIVER HIGHWAY, MULTNOMAH FALLS FOOTBRIDGE (Benson Footbridge)
OR-36-J	HISTORIC COLUMBIA RIVER HIGHWAY, EAST MULTNOMAH FALLS VIADUCT (Bridge No. 841)
OR-36-K	HISTORIC COLUMBIA RIVER HIGHWAY, ONEONTA GORGE CREEK BRIDGE
OR-36-L	HISTORIC COLUMBIA RIVER HIGHWAY, ONEONTA TUNNEL
OR-36-M	HISTORIC COLUMBIA RIVER HIGHWAY, HORSETAIL FALLS BRIDGE
OR-49	MOFFETT CREEK BRIDGE
OR-36-N	HISTORIC COLUMBIA RIVER HIGHWAY, TOOTHROCK & EAGLE CREEK VIADUCTS
OR-36-O	HISTORIC COLUMBIA RIVER HIGHWAY, TOOTHROCK TUNNEL
OR-36-P	HISTORIC COLUMBIA RIVER HIGHWAY, EAGLE CREEK BRIDGE
OR-36-Q	HISTORIC COLUMBIA RIVER HIGHWAY, EAGLE CREEK RECREATION AREA (Forest Camp)
OR-36-R	HISTORIC COLUMBIA RIVER HIGHWAY, MITCHELL POINT TUNNEL & VIADUCT (Tunnel of Many Vistas)
OR-36-T	HISTORIC COLUMBIA RIVER HIGHWAY, MOSIER TWIN TUNNELS
OR-36-U	HISTORIC COLUMBIA RIVER HIGHWAY, MOSIER CREEK BRIDGE (Bridge No. 498)
OR-30	DRY CANYON CREEK BRIDGE
OR-27	MILL CREEK BRIDGE
OR-56	COLUMBIA RIVER HIGHWAY BRIDGES

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 project (HAER No. OR-36).

HISTORIC COLUMBIA RIVER HIGHWAY

The Pacific Northwest's Columbia River Highway, later renamed the Historic Columbia River Highway (HCRH), was constructed between 1913 and 1922. It is one of the oldest scenic highways in the United States. Its design and execution were the products of two visionaries - Samuel Hill, lawyer, entrepreneur, and good roads promoter and Samuel C. Lancaster, engineer and landscape architect, with the assistance of several top road and bridge designers. In addition, many citizens provided strong leadership and advocacy for construction of what they saw as "The King of the Roads."

Often, the terms "scenic highways" and "parkways" are used synonymously. Scenic highways are best described as those roads constructed to provide motorists with the opportunity to see up-close the landscape's natural beauty. Parkways are roads or streets often associated with city beautiful campaigns, prevalent in the United States in the late 19th and early 20th centuries. They were part of a movement to create park-like settings out of wastelands. Many of the scenic highways in the United States are associated with the country's national park system and were built in the years following the First World War.

Beginning in the 1910s and early 1920s, the National Park Service (NPS) began construction of well-engineered paved roads with permanent concrete and masonry bridges and viaducts to make its park sites more accessible to an increasingly mobile tourist population. These included roads such as "Going-to-the-Sun Highway" in Glacier National Park and "All-Year Highway" in Yosemite National Park. The Historic Columbia River Highway, unlike many of its counterparts, was constructed through county-state cooperation. It became a state-owned trunk route or highway, part of a growing system of roads that criss-crossed Oregon.

Samuel Hill, once an attorney for James J. Hill and his large railroad empire, and later a Pacific Northwest investor and entrepreneur, was the state of Washington's most vocal good roads spokesman in the late 19th and early 20th centuries. He promoted good roads at Seattle's Alaska-Yukon-Pacific Exposition in 1905, and shortly thereafter helped to establish the department of highway engineering at the University of Washington. With little success in convincing the Washington State Legislature to fund a major highway along the Washington side of the Columbia River, Hill found more receptive ears and pocketbooks with Oregon lawmakers and Portland area businessmen. Construction began on the Columbia River Highway in 1913. By 1922, it was complete, covered in a long-wearing and smooth-riding asphaltic-concrete pavement.[1]

Hill hired Samuel Lancaster, an experienced engineer and landscape architect to design the Columbia River Highway. Lancaster was noted for the boulevards that he created around Seattle's Lake Washington in the first decade of the 20th century as a component of the city's Olmsted-designed park system. In 1909 Lancaster had become the first professor of highway engineering in Hill's department at the University of Washington. Lancaster had accompanied Hill and others to Paris in 1908 for the First International Road Congress, and afterwards the delegation toured western Europe to learn about continental road-building techniques. By 1912, Lancaster was conducting road-building experiments at Hill's estate, Maryhill, 100 miles east of Portland on the Washington side of the Columbia. Seeing roads in the park-like setting of the Rhine River Valley had inspired Hill to build a highway along the Columbia River Gorge. The route they subsquently created was not a parkway, in the truest sense, but instead a scenic highway.[2]

The Columbia River Gorge's natural features distinguish it as the ideal setting. This relationship between the natural landscape and the Historic Columbia River Highway was described best by locating engineer John Arthur Elliott. He wrote, "All the natural beauty spots were fixed as control points and the location adjusted to include them." The road passed several waterfalls and rock outcroppings, including Thor's Heights (Crown Point), Latourell Falls, Shepperd's Dell, Bishop's Cap, Multnomah Falls, Oneonta Gorge and Falls, Horsetail Falls, Wahkeena Falls, and Tooth Rock. Natural features were made an integral component of the Columbia River Highway.[3]

According to Lancaster, "There is but one Columbia River Gorge [that] God put into this comparatively short space, [with] so many beautiful waterfalls, canyons, cliffs and mountain domes." He believed that "men from all climes will wonder at its wild grandure [*sic*] when once it is made accessable [*sic*] by this great highway." In addition, the promoters sought to create a route that utilized the most advanced techniques available for road construction. In reflecting on the work's progress, Lancaster acknowledged that because of the country's rugged climate, with its wind and rain and winter weather, it had been "slow and tedious and somewhat more expensive than ordinary work." Nevertheless, he and his associates felt they were accomplishing a worthwhile task because, "for if the road is completed according to plans, it will rival if not surpass anything to be found in the civilized world."[4]

In an more practical light, many observers saw the HCRH as a lifeline connecting Portland with the many commercial and agricultural areas along the Columbia River. Some even

envisioned it as part of a spider web of similarly constructed routes radiating out towards central and eastern Washington and northern Idaho, meeting routes leading to other parts of the region and nation.

The Historic Columbia River Highway was a technical and civic achievement of its time, successfully mixing sensitivity to the magnificent landscape and ambitious engineering. The highway has gained national significance because it represents one of the earliest applications of cliff-face road building as applied to modern highway construction. Lancaster emulated the European styles of road building in the Columbia River Gorge, while also designing and constructing a highway to advanced engineering standards. Throughout the route, engineers held fast to a design protocol that included accepting no grade greater than 5 percent, nor laying out a curve with less than a 200' turning radius. In rare cases where a tighter curve was used, Lancaster reduced grades and widened pavement. The use of reinforced-concrete bridges, combined with masonry guard rails, guard walls, and retaining walls brought together the new with the old--the most advanced highway structures with the tried and tested. In building the HCRH, Lancaster artfully created an engineering achievement sympathetic to the natural landscape.[5]

In the days before the formation of a comprehensive state highway plan, Multnomah, Hood River, and Wasco counties cooperated, sometimes unwillingly, with the newly-formed Oregon State Highway Commission (1913) in constructing the Columbia River Highway. Initially a group of recently elected Multnomah County commissioners, strong supporters of the proposed route, resolved that the highway commission take charge of its road building activities, with access to $75,000 in county tax revenues. Soon crews surveyed the route through Multnomah County and constructed one mile of road.

Boosters stumped for the route's completion to the Hood River County line. Local clubs sent out men and boys for weekend work parties to show public support for the undertaking. One photograph from the period, depicts work parties with picks and shovels in hand and placards such as "Gang No. 7, Portland Ad Club, Stalwarts," or "Gang No. 3, Portland Realty Board, We will ROCK the Earth." The highway received much patronage, although some citizens were less than enthusiastic about its construction. Opponents showed their views with placards declaring, "I WON'T WORK, To Hell With Good Roads, We Don't Own Autos." Many "mossbacks" had no use for good roads and were satisfied traveling the network of rutted, narrow, steeply-graded backwoods trails. Nevertheless, the public generally supported the highway's construction. Multnomah County Commissioners levied a

direct tax sufficient to fund road building to the Hood River County line, and subsequently, the people voted a $1 million bond issue to pave the road with asphalt.[6]

Other counties similarly supported construction of the Columbia River Highway. In 1914, Hood River County voters approved the sale of $75,000 in bonds to initiate their portion of the construction. Finally, in 1915, Wasco County commissioners financed a survey to locate the route through their jurisdiction. By 1916, though, the state highway commission was reorganized and given a greater mandate over state highway construction, taking much of it out of local hands. Passage of the Federal Aid Road Acts of 1916 and 1921 gave the Oregon State Highway Commission matching funding to complete the HCRH through Wasco County, and eventually to complete the route to its eastern terminus at Pendleton, in Umatilla County, by the early 1920s. At the same time, the state, working with counties west of Portland, completed another portion of the Columbia River Highway to the sea at Astoria. Eventually it became part of the national highway system and was designated part of U.S. 30.[7]

By the late 1930s, construction of Bonneville Dam, a New Deal project aimed at providing flood control on the Columbia River and generating electricity, caused a realignment of a portion of the HCRH near Tooth Rock and Eagle Creek, in eastern Multnomah County. It was evident that the old highway was too outdated to provide safe efficient travel for modern motor traffic. By 1954 it was bypassed in its entirety from Troutdale to The Dalles by a new water-level route. This new road was subsequently upgraded to a four-lane divided roadway and eventually renamed Interstate 84. Only portions of the old route remained as a reminder of its early modern highway engineering accomplishments.

SANDY RIVER BRIDGE AT TROUTDALE

The Sandy River Bridge at Troutdale is one of two beginning points of the Historic Columbia River Highway (HCRH) The other is the Sandy River Bridge (Stark Street) (HAER No. OR-36-B), which connects Stark Street with the Historic Columbia River Highway at milepost 16.7.[8] Both Sandy River bridges are the only steel truss spans on the highway. Constructed in 1912, the Sandy River Bridge at Troutdale is the oldest structure on the Historic Columbia River Highway and the oldest state-owned metal truss bridge in Oregon.[9] Multnomah County built it as part of a large farm-to-market road improvement campaign of the 1910s. The bridge initially served nearby rural residents from the rolling fields high above the Columbia River east of Troutdale. Just

east of the bridge, the county road rose steeply, with 10 to 20 percent grades to reach an elevation nearing 700 feet in the district near Chanticleer Inn, 22 miles from downtown Portland.[10]

In 1916, well after other, more eastern sections of the HCRH were completed, Multnomah County cut a new, 1½ mile-long road through 200-foot rock bluffs, along the south side of the Sandy River. This new route eliminated excessive grades and achieved a water-level road from the Sandy River Bridge at Troutdale to the new Sandy River Bridge (Stark Street), completed in 1914.[11] Both bridges served as a feeders for traffic along the Historic Columbia River Highway, which in this part of Multnomah County was simply a realignment over gentle grades of existing county roads.[12] Estimated construction cost was $23,600.[13]

DESIGN AND DESCRIPTION

The Sandy River Bridge at Troutdale, from west to east, was constructed of one 40'-0" steel plate girder span and two nine-panel 162'-0" Pratt through-truss spans (9 x 18'). Its 18' roadway was constructed of a tongue-and-groove deck covered with asphalt. A four-foot plank sidewalk with timber railing cantilevered out from the south elevation on a continuation of the wooden deck beams. Horizontal clearance was 17'-5" and vertical clearance was 14'-5".[14]

Waddell and Harrington, a well-known Kansas City bridge engineering firm, designed this structure shortly after they completed the 1912 Steel Bridge, a telescoping vertical lift structure spanning the Willamette River in nearby downtown Portland. The main spans of the Sandy River Bridge at Troutdale appear to be standard riveted steel Pratt through-truss structures. Inclined end posts and upper chords were made from rolled steel channel and plate with latticed bracing. Truss vertical chords consisted of rolled angle steel and lattice. Portal bracing was made from angle steel, lattice, and gusset plates. Sway bracing was angle steel and gusset plates arranged in a lattice form. Diagonal bracing for the Pratt trusses consisted of angle steel and intermediate bracing plates. Lower chords were made from heavier rolled steel with bracing. The lower chords were pin-connected to shoes affixed to the piers.

Truss protection barriers, or steel guard fences, about 3' high and consisting of steel angle frames with intermediate lacing, were placed inside the truss panels above the deck curbs to prevent vehicles from damaging the superstructure. A sidewalk was placed on the upstream or south elevation of the bridge and consisted originally of 2" x 8" planking and 3" x 8" stringers on

6" x 6" cantilevered deck beams that also supported tongue-and-groove deck planking. A standard highway guard-rail type barrier, constructed of timber posts and 2" x 6" stock was placed horizontally, serving as the sidewalk handrail.[15]

Designers used two types of piers in constructing the Sandy River Bridge at Troutdale. The west pier of the plate girder span and the east pier of the east Pratt truss are simple reinforced-concrete batter structures founded on bedrock. The west pier of the west Pratt truss and the intermediate pier shared by both Pratt trusses consist of pairs of battered circular bents connected by solid web walls. Stream foundation conditions no doubt dictated the types of piers used on the bridge. The use or arrangement of piling is unknown, but the Sandy River, as its name implies, is a wide stream with a gravel bed, with bedrock most likely some distance below the stream floor.

Masonry guard walls consisting of ashlar basalt with a screeded concrete cap served as entryways at both ends of the bridge. These features were probably not original to the bridge's construction, but were added latter in the 1910s while masons were constructing retaining walls and guard fences along nearby sections of the Historic Columbia River Highway.

REPAIR AND MAINTENANCE

The Sandy River Bridge at Troutdale has served the Historic Columbia River Highway and the Multnomah County road system since 1912 with relatively few modifications. Nevertheless, repeated encounters with oversized vehicles have damaged truss members, portal panels, and decking. As early as 1922, when the Oregon State Highway Department first began maintaining the Sandy River Bridge at Troutdale, inspectors noted the need to repair the structure for these reasons.[16]

By 1930, the state bridge engineer, Conde B. McCullough expressed concerns over the Sandy River Bridge's live load capacity. A request to transport a large boulder across the bridge prompted his interest. The boulder was on its way to serve as a monument to the HCRH's visionary, Samuel Hill, near the former location of Chantilcleer Inn. McCullough calculated that the 25-ton rock, along with a 7-ton trailer would stress the floor system "to a point equal to three-fourths of the elastic limit of the material." He saw this as the "extreme limit" for this bridge.[17]

In 1935, sidewalk planking showed signs of deterioration and masonry walls needed repointing. The eastern-most panels of the

downstream, or north, truss of the second main span were subjected to continual damage from truck traffic. Glenn S. Paxson, Oregon State Bridge Engineer, wrote in 1937 that he believed that the problem was greater than the bridge's extremely narrow deck. He saw the "big trouble" as the compound curve at the east end of the structure, because its alignment "would naturally throw westbound [traffic] into the down stream side of the truss." He saw the need both for installation of horizontal guard rails, or shear rails, on the down stream truss to protect it from any more damage and for realigning the bridge's eastern approach Unfortunately, on further investigation, the division engineer, E. A. Collier, concluded that to undertake excavation of the solid rock at the bridge's eastern approach to realign the compound curve was very expensive. In the end, the curve was not changed and two sets of rolled steel horizontal guard rails were placed at 5' and 10' above the deck and running for three panels, from L_0 to U_3L_3. Nevertheless, they were not in place before another vehicle collided with a vertical member and so badly damaged it that it was "stretched beyond the elastic limit" and needed replacing.[18]

At the same time, inspectors noted deterioration in the deck system. In 1938 they found that the ends of the 6" x 6" transverse wooden deck beams were deteriorating, and while the road deck could still safely carry traffic loads, the sidewalk sagged at points where it was attached to the beams. By 1948, inspectors recommended a complete replacement of the Sandy River Bridge's deck system at a cost of over $15,000. By the 1950s, the deck system was rebuilt. This overhaul included removing the wooden deck beams and planking and replacing it with steel beams and stringers and a reinforced-concrete deck. The new sidewalk included a steel support system, attached to the new road deck, and covered with treated planking. Most likely, during the deck reconstruction, the bridge's east masonry approach rails were replaced with treated timber posts and "W" rail.[19]

From the 1950s through the early 1990s, the Sandy River Bridge at Troutdale has required little more than routine maintenance, such as cleaning and repainting. One complaint repeated by state bridge inspectors has been the structure's hazardous narrow roadway, prompting calls for its replacement.

ENDNOTES

[1]For good syntheses of the Pacific Northwest good roads' movement, see John Kevin Rindell, "From Ruts to Roads: The Politics of Highway Development in Washington State" (M.A. thesis, Washington State University, 1987) and Hugh M. Hoyt, Jr., "The Good Roads Movement in Oregon, 1900-1920" (Ph.D. diss., University of Oregon, 1966); Oral Bullard, *Lancaster's Road: The Historic Columbia River Scenic Highway* (Beaverton, OR: TMS Book Service, 1982), 31; Ronald J. Fahl, "S. C. Lancaster and the Columbia River Highway: Engineer as Conservationist," *Oregon Historical Quarterly* 74, no. 2 (June 1973): 112.

[2]Fahl, "S. C. Lancaster and the Columbia River Highway," 105-07.

[3]John Arthur Elliott, "The Location and Construction of the Mitchell Point Section of the Columbia River Highway" (C.E. thesis, University of Washington, 1929), 3.

[4]Samuel C. Lancaster to Amos S. Benson, 7 February 1914, folder "Multnomah County, 1914," box 4, RG 76A-90, Oregon State Archives, Salem.

[5]Dwight A. Smith, "Columbia River Highway Historic District: Nomination of the Old Columbia River Highway in the Columbia Gorge to the National Register of Historic Places, Multnomah, Hood River, and Wasco Counties, Oregon" (Salem, OR: Oregon Department of Transportation, Highway Division, Technical Services Branch, Environmental Section, 1984), 3.

[6]Ronald J. Fahl, "S. C. Lancaster and the Columbia River Highway: Engineer as Conservationist," *Oregon Historical Quarterly* 74, no. 2 (June 1973): 111; Samuel C. Lancaster, "The Revelation of Famous Highways: A Symposium,"in *American Civic Annual* (n.p., 1929), 109.; see photograph in the Oregon Historical Society collection, negative no. 38744; C. Lester Horn, "Oregon's Columbia River Highway," *Oregon Historical Quarterly* 66, no. 3 (September 1965): 261.

[7]*Second Annual Report of the Engineer of the Oregon State Highway Commission* (Salem, 1916): 26-30.

[8]Dwight A. Smith, "Columbia River Highway Historic District: Nomination of the Old Columbia River Highway in the Columbia Gorge to the National Register of Historic Places, Multnomah, Hood River, and Wasco Counties, Oregon" (Salem: Oregon Department of Transportation, Highway Division, Technical Services Branch, Environmental Section, 1984): 33.

[9]Dwight A. Smith, James B. Norman, and Pieter T. Dykman, *Historic Highway Bridges of Oregon* (Portland: Oregon Historical Society Press, 1989): 135.

[10]Fred Lockley, *History of the Columbia River Valley, from The Dalles to the Sea* (Chicago: S. J. Clarke Publishing Co., 1928): 832-33.

[11]"Sandy Cut-Off is Beautiful as Park Boulevard, Stretch Reaches From Troutdale, and Is Hard Surfaced," *Portland Oregon Journal* (13 August 1916): sec. 2, p. 9.

[12]Fred Lockley, *History of the Columbia River Valley, from The Dalles to the Sea* (Chicago: S. J. Clerke Publishing Co., 1928): 832-33.

[13]See cost figures in "Bridge History Record of Maintenance--Repairs and Renewals, No. 2019," 1935-53, p. 1, in Bridge Maintenance Files, Bridge Section, ODOT, Salem.

[14]"Bridge History Record of Maintenance--Repairs and Renewals, No. 2019," 1935-53, p. 1, in Bridge Maintenance Files, Bridge Section, ODOT, Salem.

[15]"Bridge Inspection Report, No. 2019," by E. G. Ricketts, 4 November 1949; Bridge Inspection and Maintenance Report, No. 2019," by E. G. Ricketts, 13 October 1937, both in Bridge Maintenance Files, Bridge Section, ODOT, Salem.

[16]"Bridge Maintenance. Repairs and Renewals, No. 2019," 1922-37, in Bridge Maintenance Files, Bridge Section, ODOT, Salem.

[17]Conde B. McCullough, State Bridge Engineer, to W. D. Clarke, 30 September 1930, in Bridge Maintenance File, No. 2019, Bridge Section, ODOT, Salem.

[18]G. S. Paxson, Bridge Engineer, to E. A. Collier, Division Engineer, 22 December 1937, in Bridge Maintenance File, No. 2019, Bridge Section, ODOT, Salem. See also E. A. Collier to R. H. Baldock, State Highway Engineer, 20 December 1937; and Collier to Baldock, 3 January 1938; and R. H. Baldock, by G. S. Paxson, to J. N. Bishop, Maintenance Engineer, 19 March 1938; and "Bridge History Record of Maintenance--Repairs and Renewals, No 2019"; all in ibid.

[19]"Bridge Inspection and Maintenance Report, No. 2019," by E. G. Ricketts, 13 October 1937; "Bridge Inspection and Maintenance Report, No. 2019," by C. C. Meisel, 28 April 1938; "Bridge History Record of Maintenance--Repairs and Renewals, No. 2019;

all in Bridge Maintenance Files, Bridge Section, ODOT, Salem. See also"Sandy River Bridge at Troutdale, No. 2019," drawings 9404, 9405, and 9406, Drawing File, Bridge Section, ODOT, Salem.

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DATA LIMITATIONS

Research materials on the Sandy River Bridge at Troutdale were wide-ranging and included articles in period popular magazines, trade journals, newspapers, state highway department maintenance files and correspondence, and county roadmaster's records. A search at the local Troutdale Historical Society was helpful.