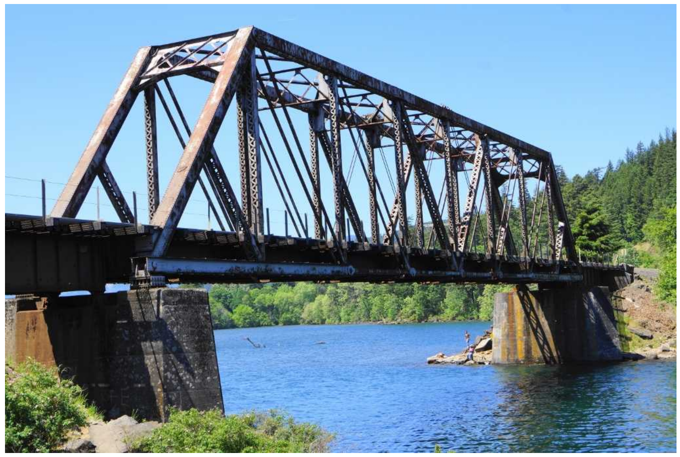
Historic Property Report

Resource Name: SP&S Railway Co. - Windriver Bridge (No. 58.8)

Property ID: 706792

Location



Address: BNSF Fallbridge Subdivision Milepost 58.8, Home Valley

Information

Number of stories: N/A

Construction Dates:

Construction Type	Year	Circa
Built Date	1913	☐

Historic Use:

Category	Subcategory
Transportation	Transportation - Rail-Related
Transportation	Transportation - Rail-Related

Historic Context:

Category
Transportation

Architect/Engineer:

Category	Name or Company
Engineer	Modjeski, Ralph
Builder	American Bridge Company

Thematics:

Local Registers and Districts

Name	Date Listed	Notes

Project History

Project Number, Organization, Project Name	Resource Inventory	SHPO Determination	SHPO Determined By, Determined Date
2016-09-06391, USCG, BNSF Bridge 58.8 Wind River Replacement Project	9/8/2016	Determined Eligible	Russell Holter, 12/2/2016

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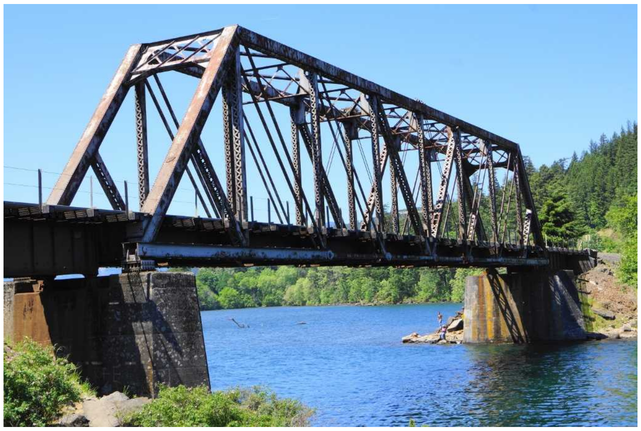
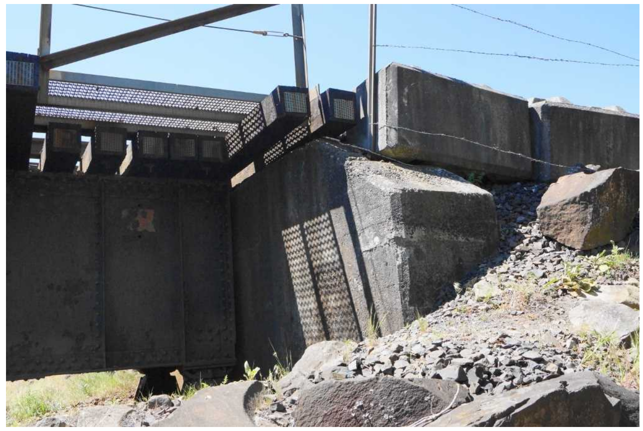
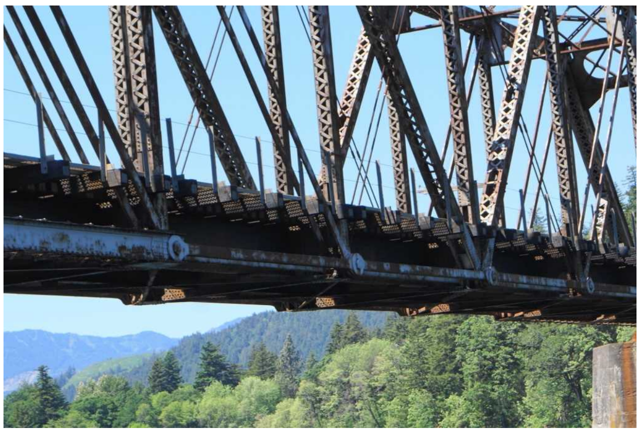
Photos



BNSF Bridge 58.8 over the Wind River

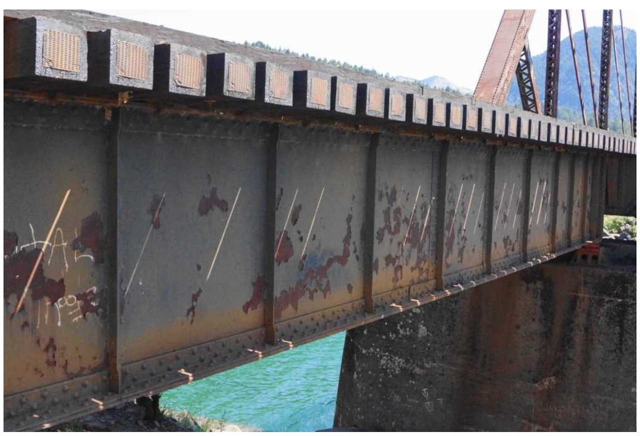


BNSF Bridge 58.8 abutment



BNSF Bridge 58.8 Pratt Truss, lower chord

BNSF Bridge 58.8 pier and bridge footing



BNSF Bridge 58.8 Deck Plate Girder approach span

Historic Property Report

Resource Name: SP&S Railway Co. - Windriver Bridge (No. 58.8) Property ID: 706792

Inventory Details - 9/8/2016

Common name: Wind River RR Bridge 58.8

Date recorded: 9/8/2016

Field Recorder: Matthew Sneddon

Field Site number:

SHPO Determination

Detail Information

Characteristics:

Category	Item
Structural System	Metal - Steel
Form Type	Bridge - Pratt Truss
Form Type	

Surveyor Opinion

Property appears to meet criteria for the National Register of Historic Places: Yes

Property is located in a potential historic district (National and/or local): No

Property potentially contributes to a historic district (National and/or local): No

Significance narrative: Bridge 58.8, constructed in 1913, is an example of a pin-connected, Pratt through truss bridge with two 50-ft-long steel Deck Plate Girder (DPG) approaches based on a turn-of-the-twentieth-century standardized Northern Pacific Railway Company design.

Bridge 58.8 appears eligible under Criterion A for its association with the historic Spokane, Portland & Seattle (SP&S) Railway Company, significant for its design, construction, and unusual corporate history as a collaboration between the GN and NP railway companies (please see Sneddon and Schultz, "Cultural Resources Survey for the BNSF Bridge 58.8 Replacement Project," 2016 for a more detailed history of the SP&S and Bridge 58.8). The bridge’s erection in 1913, five years after this section of the railroad became operational, represents the intense pace of the construction that utilized temporary measures to carry tracks over difficult obstacles. Due to the sizable span required to bridge the Wind River where it emptied into the Columbia River, SP&S crews initially built timber trestles that were later replaced by a more permanent structure, Bridge 58.8.

By virtue of its connection with the SP&S, the bridge is associated with James J. Hill, Francis Clarke, Louis Hill, and other railroad industry executives responsible for building and operating the line. However, the association is indirect and insufficiently represent an individual’s significant contributions. Bridge 58.8 was only one of many components of the line, and no evidence has been uncovered that shows Hill or any other executives had a significant role in the bridge’s selection, location, design, or other aspect of its history. Bridge 58.8 appears ineligible for the NRHP under Criterion B.

Bridge 58.8 is an example of a historically significant design eligible under Criterion C that illustrates both 1) the “American System” of bridge engineering developed in the late nineteenth century, characterized by pin-connected, steel-truss through spans—typically a Pratt or Pratt variant—that made extensive use of latticed channel beams and posts and eyebar connectors; and 2) a standardized Northern Pacific design developed by renowned bridge engineers Ralph Modjeski and George Morison (ASCE 2012; Weingardt 2005:60). The American system reflected the nature of railroad development in the United States in the second half of the nineteenth century, when facility of manufacture, ease of field erection, ability to be transported in pieces, and minimization of field riveting were characteristics well suited to construction of the transcontinental railroads and branch lines.Northern Pacific’s standardized bridge design effort represents an important development in railroad engineering at the turn of the twentieth century, when competition between rival railway companies, extensive roadbuilding projects, and increasingly heavy rolling stock shaped the practice of bridge design. In contrast to longer span bridges that are highly individualized responses to terrain, planned use, and available funds, the Northern Pacific sought to develop a system of components that could be used separately or together depending on the length of span required. In the case of Bridge 58.8, the length required was 308 feet, which they spanned with two 50-ft DPGs and one 200-ft Pratt truss supported by two concrete abutments and completed with timber pile bents.

Criterion D most commonly applies to properties that contain or are likely to contain information bearing on an important archaeological research question. Bridge 58.8 is not likely to yield information important in prehistory or research theories concerning historical development.

Physical description: Bridge 58.8 over the Wind River is an example of a combination steel bridge composed of two 50-ft-long DPG approaches and a central 200-ft-long Pratt truss supported by two concrete piers and two concrete abutments. The Pratt truss, a configuration derived from a design patented in 1844 by Caleb and Thomas Pratt, is typically characterized as a truss with bottom chords and diagonals in tension and top chords and vertical posts in compression, except for the verticals adjacent to the inclined ends (Holstine and Hobbs 2005:255). This concept of load distribution is generally expressed in the Wind River Bridge through the use of heavy laced channels as structural members for the top chord and vertical posts and the relatively thin eyebars used for most of the diagonals and the bulk of the bottom chord. A plaque on one of the west inclined ends reads “American Bridge Company of New York U. S.A.” The corner where the date of manufacture was once stamped is broken off.

The bridge generally represents a standardized design developed for the Northern Pacific Railway Company by prominent bridge engineers Ralph Modjeski and George Morison. The central span consists of two Pratt trusses connected by girders beneath the bridge deck and portal bracing between the top chords. Each truss is composed of six full and two half 25-ft-long, 32-ft 9-in high panels for a total span of 200 ft from center-to-center of the end pins in the bearing supports. The bridge is symmetrical along the two axial centerlines. Panel configurations are of three types: end (half) panels have hip struts to brace the inclined ends; the next two sets of panels from each end have diagonal eyebar stays; and the two center panels have cross-bracing consisting of laced channel diagonals sloping up from the center of the bottom chord to the top chord, and oppositely sloped rods with turnbuckles to adjust the tension in the diagonal. The cross-bracing differed from the standardized design, which specified two eyebars. The heavier laced channels used instead of eyebars for the diagonal stays likely reflected the high-speed design requirement for the line, and the adjustable rod “counters”—likely added later—were sometimes used in one or more central panels in Pratt trusses to better handle the tensions caused by moving loads (Calvert 2000). The primary connection points between panels are made with pins, a common feature of truss bridges designed between 1880 and 1915 (Gasparini and Simmons 1997:132). Shop and field riveting were used to join other structural elements.

The truss bridge deck is supported by a substructure divided into units by the panel configuration; that is, the trusses are connected widthwise by a girder or web plate riveted to vertical posts, and two stringer girders running lengthwise are in turn riveted to the web plates. Timber railroad ties bolted across the top of the stringer girders support the rails. The substructure is braced in an X-pattern on the bottom between web plates, and in a W-pattern between the stringer girders under the railroad ties. Cross-braces also extend between the pin-connection brackets at the bottom of the vertical posts to further stiffen the bottom chords of the truss. Wood guardrails and a metal grate catwalk with a metal angle iron and wire railing run the length of the span.

Each DPG forms a rectangular box 6 ft, 6 in wide from centerline-to centerline of the girders, 6 feet tall by 50 ft long. Girders are built up from several plates riveted together, and connected together by Warren truss lateral bracing at the top and bottom, and internal cross-bracing at regular intervals. Railroad ties are bolted directly to the top of the DPG.

Two types of bearing systems support the central span on each end: a fixed-pin hinge bearing bolted to a steel shoe on the east end and a roller-type expansion bearing on the west end that the designer believed better distributed force loads to masonry bridge support structures (Modjeski 1901:64). Similarly, the ends of each DPG appear to be supported with fixed-type at one end and a sliding-type at the other, both bolted to a cast steel shoe or pedestal.

The bridge supports battered, reinforced-concrete abutments and piers. In plan, the top of the piers forms an irregular hexagon, with two long parallel sides lengthwise and shorter segments at each end that meet at a point. Piers have a long wing wall that protects the footing from erosion by the river. The piers are approximately 47 feet tall from footing to bridge, 33 ft wide at the top sloping to 38 ft 5 in where it meets the wing wall near the typical water level, and notched at the top to accept the DPG.

The abutments, located upslope from the piers, are approximately 38 feet tall from footing to bridge, 20 ft 4 in wide at the base and 14 ft at top, which is capped by a 25 ft wide T-cap to support transition from DPG to tracks supported by ballast at the abutment's edge.

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