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# NATIONAL REGISTER OF HISTORIC PLACES ELIGIBILITY EVALUATION

**Cedar Creek Bridge (Bridge No. 65)**

**Clark County, Washington**

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**AECOM**

**Prepared for**

**Clark County Department of Environmental Services**

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**NATIONAL REGISTER OF HISTORIC PLACES**

**ELIGIBILITY RECOMMENDATION FOR Cedar Creek Bridge (Bridge No. 65)**

**PURSUANT TO 36 CFR Part 60**

**1. NAME OF PROPERTY**

(historic): Cedar Creek Bridge

(other names/site number): Bridge No. 65

**2. LOCATION**

(street and number): Mile post 3.8 of NE Etna Road

(city or town): Ariel vicinity

(state) Washington (code) WA (county) Clark (code) 011 (zip code) 98603

**3. STATE/FEDERAL AGENCY CERTIFICATION**

Reserved

**4. NATIONAL PARK SERVICE CERTIFICATION**

Reserved

**5. CLASSIFICATION**

**Ownership of Property**: Public-Local

**Name of Related Multiple Property Listing**: Washington State Highway Bridges, 1941-1950

**Category of Property**: Structure

**Number of Resources within Property**: 1

**Number of Contributing Resources Previously listed in the National Register**: 0

**6. FUNCTION OR USE**

**Historic Functions**: TRANSPORTATION/road-related (vehicular)

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## 7. DESCRIPTION

**Architectural Classification**: OTHER: Continuous span, hollow box girder bridge

**Materials**: Foundation: reinforced concrete; Walls: N/A; Roof: N/A; Other: N/A

**Narrative Description**

The following description is an excerpt from Dana L. Holschuh, "Cultural Resources Survey of the Cedar Creek Bridge Replacement Project Area, Clark County, Washington," March 6, 2015. The figures noted in the excerpt are included in the "Additional Information" section.

> *Bridge 65 over Cedar Creek is a continuous span two-cell, single-box girder structure. The bridge is a single 75-foot span with a 25-foot cantilever that carries traffic along NE Etna Road, a minor rural collector, over Cedar Creek, approximately 142 feet (43 m) upstream from its confluence with the North Fork Lewis River (Krier et al 1992; Holstine 2015). It is constructed of cast-in-place, reinforced concrete with a wooden and metal guard rail and concrete curb on either side of the paved roadway. In addition to the guardrail, a metal utility pipe runs along the length of the southern side of the bridge.*

Additional details of the bridge include the indications of the falsework used for the concrete casting. Judging from the horizontal marks present on the concrete, the concrete was poured into falsework that consisted of approximately six-inch wood boards. The box girder consists of two interior cells with the exterior corners of the box featuring chamfered edges to prevent corner stress cracks. The bridge piers are hexagonal in section. The original drawings indicate that the piers are solid concrete. The hexagon shape is typical for stream and river crossings to improve hydraulic movement around the supports. Original drawings of the bridge from 1946 survive and are included in Appendix 1.

Modifications to the bridge that are apparent from the photographs contained in the Holschuh report include the addition of the metal w-beam guardrail supported by pressure-treated wood posts that are then bolted to the side of the concrete bridge. The standard application of the w-beam to vehicular bridges began in the late-1960s (Kirkland et. al. 2009) and in this application is a subsequent addition. It is unclear what the original guardrail type was, but vertical concrete scars on the side of the bridge potentially suggest the earlier locations of the vertical guardrail supports (See Appendix 2 for existing condition photographs). Aside from the modification to the guardrail no additional modifications are apparent. The resource therefore largely maintains its integrity of material, location, design, workmanship, setting, association, and feeling.

## 8. STATEMENT OF SIGNIFICANCE

**Applicable National Register Criteria**

_X_ A Property is associated with events that have made a significant contribution to the broad patterns of our history.

___ B Property is associated with the lives of persons significant in our past.

_X_ C Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.

___ D Property has yielded, or is likely to yield, information important in prehistory or history.

**Criteria Considerations**

N/A

**Areas of Significance**

Engineering; Transportation

**Period of Significance**

1946

**Significant Dates**

1946

**Significant Person**

N/A

**Cultural Affiliation**

N/A

**Architect/Builder**

Homer More Hadley, Engineer

## Narrative Statement of Significance

### Introduction

This statement of significance has been requested to address several specific aspects of potential historical significance related to the Cedar Creek Bridge. First, it reviews the applicability of the Advisory Council on Historic Preservation's (ACHP) "Program Comment Issued for Streamlining Section 106 Review of Actions Affecting Post-1945 Concrete and Steel Bridges." Second, it incorporates a discussion of how the bridge reflects the property type, historic context, and the registration requirements contained in the National Register Multiple Property Documentation Form (MPDF) prepared for "Washington State Highway Bridges, 1941-1950". Third, it places the Cedar Creek Bridge within the larger contexts related to the construction of continuous span, hollow-box girder bridges in Washington, particularly between 1936 and 1950, and also how the bridge fits into the engineering portfolio and accomplishments of Homer Hadley, an important bridge engineer in Washington. The Statement of Significance concludes with a Significance Summary.

This assessment builds upon work initially completed by Holschuh (2015) that assessed the Cedar Creek Bridge and recommended it "eligible for listing on the NRHP because it retains integrity of location, design, setting, materials, workmanship, feeling, and association. In addition, the bridge is eligible for listing under Criterion C, as it embodies the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, in this case Homer M. Hadley." Holschuh additionally concluded that the bridge is "one of the earliest examples of a concrete box girder bridge." At the request of Clark County, this previous evaluation is now revisited.

### Applicability of the Advisory Council on Historic Preservation's Program Comment Issued for Streamlining Section 106 Review for Actions Affecting Post-1945 Concrete and Steel Bridges

On November 2, 2012, the ACHP issued a Program Comment at the request of the U.S. Department of Transportation Federal Highway Administration to relieve it and other federal agencies from the requirement under Section 106 of the National Historic Preservation Act to consider the effects of undertakings on common bridges and culverts constructed of concrete or steel after 1945 (Federal Register 77: 222 (68794)) . Bridges of the types covered in the Program Comment were constructed in vast numbers from plans that quickly became standardized around the middle of the 20$^{th}$ century. These bridges are generally undistinguished from an engineering or architectural perspective, are considered to have little value for preservation in place, and are rarely viable candidates for relocation.

Prior to issuing the Program Comment Request, FHWA worked closely with the National Cooperative Highway Research Program which published "A Context for Common Historic Bridge Types" (NCHRP 2005). That context revealed that a great many of the bridge structures built after 1945, are strictly utilitarian and lacking in distinctive engineering or architectural qualities.

The Program Comment applies to effects of undertakings on certain common concrete and steel bridges lacking distinction, not previously listed in or determined eligible for listing in the National Register of Historic Places, and not located within or adjacent to historic districts. At first glance, it appears as if the Cedar Creek Bridge may qualify for the provisions of the Program Comment. The bridge has not been previously listed in or determined eligible for listing in the NRHP, is not located within or adjacent to a historic district, and is not on the Washington list of bridges exempt from the Program Comment (see https://www.environment.fhwa.dot.gov/histpres/bridges_list.asp).

As noted in the Federal Register, the Program Comment applies to a variety of bridge types erected after 1945 that include reinforced concrete beam and girder bridges, but more specifically the pre-stressed concrete box beam bridges bridge sub-type (*Federal Register* 77: 222 (68794)). While the Cedar Creek Bridge is a concrete box beam bridge, it is not pre-stressed, as that bridge engineering advancement did not appear in the United States until its application at the Walnut Lane Bridge in Pennsylvania in 1950 (Dinges 2009; PennDOT 1997). Further, the historic context prepared by the National Cooperative Highway Research Program (NCHRP) to justify the Program Comment, does not discuss concrete box girder bridges that preceded the post and pre-stressed concrete structures (Mead and Hunt 2007; NCHRP 2005). Additional historic context studies have confirmed that concrete box girder bridges were only built in 4 states prior to 1950 as they were not commonly used nationally before that time (Degenkolb 1977; Mead and Hunt 2007). The highway departments of California and Washington appear to have been the most prolific and innovative users of box girder bridges between 1938 and 1950 (JRP Historical Consulting Services 2003). The Cedar Creek Bridge Project, therefore, does not appear to fall under the streamlined Section 106 process outlined in the ACHP Program Comment as it does not appear to fall under any of the bridge-type categories covered by the Comment.

## National Register Multiple Property Documentation Form: Washington State Highway Bridges, 1941-1950

The MPDF for Washington State Highway Bridges, 1941-1950 (Bruce et. al. 1991) was drafted to build upon the previous National Register Thematic Nomination (Soderberg 1980) for bridges constructed through 1940. The 1991 MPDF includes pertinent context and discusses the applicability of the NRHP criteria for slab, girder, or tee beam types of bridges that includes the overarching structural type of the Cedar Creek Bridge (i.e. box girder).[1] It also provided quantitative measures for assessing bridge significance and registration requirements for bridge types covered by the MPDF. The summary report that supported the development of the MPDF (Krier et al. 1992) discusses the Cedar Creek Bridge and gave it a numerical rating of "30" which placed the bridge into

[1] The continuous span hollow box girder bridge type is also discussed in the 1980 historic bridge thematic nomination (Soderberg 1980) but that nomination only includes bridges constructed prior to 1941.

a larger pool of structures considered for listing in the NRHP. When considered against other examples of the bridge type at the time (such as the Toppenish-Zillah Bridge), it was considered not as significant. The report also noted that the Cedar Creek Bridge was "not a continuous indeterminate structure and has no outstanding architectural and engineering details" (Krier et al 1992). Two independent bridge engineers were consulted for this evaluation and, contrary to this assertion confirmed that, in fact, the bridge is a continuous indeterminate structure. The structure was found to be statically indeterminate owing to some fixity at its pier and it would be classified as continuous since the loads on one span influence the forces on the other span (Whittington 2015; Maltby 2015). This is an important indicator of the use of the Hardy Cross method of balancing and distributing fixed-end moments in continuous indeterminate bridge structures (Holschuh 2015). It should also be noted that at the time of the evaluation in 1992, the structure was not 50 years old and was subject to NRHP Criterion Consideration G and thus would have had to be of exceptional significance (NPS 1997). The bridge is no longer subject to Criterion Consideration G.

Property Type: Bridges Built Between 1941 and 1950 – Continuous Concrete Spans

Constructed in 1946, the Cedar Creek Bridge falls within the chronological time frame of the 1991 MPDF and it is included under the "Continuous Concrete Spans" property type. As noted in the MPDF, "continuous spans {consist} of slab, girder, or tee beam construction" (Bruce et al 1991). An additional facet of this property type and an initial measure of importance is the span length. The MPDF notes that "like the simple spans, only those of at least fifty feet in length were found to have engineering merit" (Bruce et al 1991). The Cedar Creek Bridge span extends to 75 feet, so it meets this initial measure of merit.

Significance and Registration Requirements

According to the 1991 MPDF, bridges covered by the document should "convey, either through architectural design or historical associations or both, conditions, events, and technological advances peculiar to the period 1941-1950" (Bruce et al 1991). Significance could also be expressed through:

- exceptional engineering, artistic, and historical qualities;
- the successful use of new design techniques and material fabrications developed during the previous decade (the 1930s); or served as prototypes for new construction methods, architectural styles, and aesthetic standards that have continued to the present day;
- elements that illustrate the transition from past preferences in bridge design to new models of artistic expression, and because they represent especially harmonious blendings of manmade structures with their natural surroundings; or
- bridges that are monuments to the ingenuity of state and local transportation agencies in completed highway bridge construction, despite the difficult and challenging circumstances engendered by war and post-war conditions.

In order for a bridge to be included in the MPDF, therefore, the structure would need to satisfy at least one of these registration requirements within its respective historic context and the applicable NRHP Criteria.

The 1991 MPDF discusses bridges that fail to meet the 50 year standard would be eligible if they "have achieved significance in their local context because of their ability to convey a sense of the richness, technical advances, social and political turbulence, and qualities of human resourcefulness that distinguished the decade of the 1940s." Since the Cedar Creek Bridge is now over 50 years old, this requirement would not apply.

Historic Context – Reinforced Concrete Box Girder Bridges (1936-1950s)

Reinforced concrete bridges were first erected in the United States as early as 1889 (Alvord Lake Bridge) in San Francisco but it was not until the early 20th century that it became a more common method of bridge construction (Cleary 2007). With internal metal reinforcement, improved metallurgy, and refined construction methods, engineers became adept at designing innovative bridges that could feature longer spans with cast-in-place or prefabricated girders (Cleary 2007). Bridge engineers utilized concrete to initially imitate designs of masonry bridges thus handling the compressive loads and stresses similarly to their stone antecedents. For much of the early twentieth century, concrete was fashioned into a number of architecturally pleasing bridge forms that could serve as embellishment, particularly for bridges situated in very visible locations such as those designed by Conde McCullough on the Oregon Coast (Hadlow 2001). As the century progressed, however, engineers began to utilize concrete in a number of novel ways in order to provide more efficient and cost-effective designs for spans up to 100 feet in length, improve roadway widths, and to introduce a more modest bridge aesthetic that would minimize their physical presence particularly in scenic natural settings (JRP 2003; Holstine and Hobbs 2005). This movement towards minimalism reflected the growing influence of the Modernist art and architectural movement that also found expression in engineered structures. Indeed, "bridge designers sought economy and simplicity in structural features, clean lines, and a lack of ornamentation" during this period (Holstine and Hobbs 2005: 16; Holschuh 2015: 21). To some degree in California and Washington, concrete's economy was further driven by the shortage of inexpensive steel structural components particularly in the post-World War II period and the rapid development of interstate highways (JRP 2003; Cleary 2007).

The Cedar Creek Bridge design reflects the transition in bridge design and construction that utilized hollow box girders and that first started in Washington in the 1930s and progressed into the 1950s. While bridges throughout Washington utilized a variety of concrete slab, beam, and girder structural configurations during this period, the Cedar Creek Bridge structure is associated with the emergence of the continuous span, reinforced concrete, hollow box girder as an important regional bridge sub-type that first emerged in 1936 when Pierce County erected the Purdy Bridge (HAER WA-101; NRHP-listed) near Gig Harbor that featured a 190 foot center span supported by box girders (Lawrence 1993). Only four states (that included Washington and California) utilized the box girder prior to 1950 (Degenkolb 1977; Mead and Hunt 2007). Engineer Homer More Hadley, then of the Portland Cement Association, was integral to the proliferation of reinforced concrete box girder bridges throughout Washington, but particularly in Pierce County (See next section for additional information on Homer Hadley). Hadley developed close ties to Pierce County Engineer Forrest R. Easterday in the 1930s as the county quickly adopted the box girder into its bridge design portfolio, particularly for bridges that necessitated longer spans. The Pierce County engineers and Hadley were prolific contributors to *Engineering News Record*, *Western Construction,* and *Pacific Builder and Engineer* in the late-1930s and were eager to convey the benefits of box girder construction to audiences with case studies of bridges such as the Purdy Bridge (1936), Mashell River Bridge (1936), and the Gehring Road Bridge (1938) (White 1938; Easterday 1938). Additional box girder bridges were erected by local county road agencies in the 1930s in Yakima and Grays Harbor counties as well as by the Washington Department of Highways whose first longer-span box girder bridge was erected over the Naches River in 1938 (Lawrence 1993). A broader adoption of the box girder bridge type in Washington did not occur, however, until after World War II. Clark County constructed its first two box girder structures with spans that exceeded 50 feet in 1946 over Cedar Creek and the Washougal River. Longer span concrete box girder bridges were built in the late-1940s in King, Yakima, and Clallam counties.

The hollow box girder concrete bridges erected during this period are distinguished from examples erected in the mid to late-1950s by their lack of pre or post-stressing. Pre-stressed box girder bridges represented an important innovation in structural concrete. French engineer Eugene Freyssinet is generally acknowledged as having developed some of the earliest bridge designs that utilized pre-stressed concrete in box girder bridges in the 1920s (Condit 1982; Degenkolb 1977). The adoption of pre-stressed concrete in the United States did not begin until 1950 with its most significant application at the Walnut Lane Bridge in Fairmont Park in Philadelphia, Pennsylvania which began construction 1949 and opened to traffic in 1951 (PennDOT 1997; JRP 2003; Dinges 2009). It should be noted that the Oregon Department of Transportation and federal Bureau of Public Roads designed and built the Rogue River Bridge at Gold Beach in 1932 using Eugene Freyssinet's prestressing method of decentering and stress control for the concrete arch structures. This method, however, did not specifically place the reinforcing rods in tension like later prestressing methods (Hadlow 1990; JRP 2003). The pre-stressed concrete bridge was quickly applied to box girder bridge designs and became one of the most commonly used structural designs for road bridges by the 1960s (JRP 2003; Dinges 2009). The box girder bridges constructed in Washington prior to the 1950s, therefore, were an important precedent for future bridges that utilized pre and poststressing innovations.

Homer More Hadley

Homer More Hadley, an accomplished and innovative engineer, built numerous mid-20th century bridges throughout Washington State, using a variety of construction methods and materials. Hadley was born in Cincinnati, Ohio, and raised in Toledo. He worked as a surveyor in North Dakota and as a topographical engineer for the U.S. Geological Survey in the southwest. Before settling in Seattle, Washington, he worked on a surveyor crew for the Great Northern Railroad and Copper River Railroad in Alaska, and for the Canadian Northern Railroad in Vancouver, British Columbia. During World War I, Hadley built concrete ships and barges in Philadelphia for the Emergency Fleet Corporation. After the war, while employed as an engineer in Seattle School District's architectural office, he proposed a controversial floating bridge supported by concrete pontoons across Lake Washington. Although not Hadley's design, the Mercer Island Bridge/Lake Washington Floating Bridge was ultimately built, and it opened in 1940, setting the precedent for future floating bridges.

In 1920, Hadley left the Seattle School District and began working for the Portland Cement Association, promoting the increased use of cement for large-scale projects. He traveled to Japan in 1923 after the Great Kanto earthquake to study the earthquake's effects on different types of structures. During the mid-1930s, Hadley designed one of the United States' first paving machines (Esser 2003; Hadley 1936). In 1946, Hadley retired from Portland Cement Association and began working as a private engineering consultant. As a member of the Earthquake Committee, Seattle Section, American Society of Civil Engineers (ASCE), he participated in reporting and making recommendations on the 1949 Pacific Northwest earthquake. During the late 1950s and early 1960s, Hadley and his son Richard designed several buildings in Juneau, Alaska, all of which survived the Great Alaskan Earthquake of 1964. Later in his career, he began designing steel bridges, including the Parker River Bridge, erected over the Yakima River between Benton City and Kiona. In 1962, the Iron and Steel Institute (AISC) awarded the bridge first prize for "the most beautiful bridge of its class in the United States" (Esser 2003).

Hadley's contributions to the field of engineering are not only reflected in his bridge designs, but in patents, publications and listings of his works in the NRHP. Between 1936 and 1968, the United States Patent Office published six Hadley patents: one related to Hadley's "concrete laying machine," and five for inventions related to bridge and building construction (Hadley 1936; Hadley 1938; Hadley 1939; Hadley 1956; Hadley 1964; Hadley 1968). Hadley's article entitled "Concrete in Sea Water: A Revised Viewpoint Needed" was published in 1942 in the *Transactions of the American Society of Civil Engineers*, and he contributed material to "Continuous Hollow Girder Concrete Bridges" (1941) and "A Handbook for Engineers" (1942), both issued by the Portland Cement Association. These publications reflected Hadley's role in promoting the box girder construction method in nationally distributed publications. In addition, Hadley's steel delta girder designs were featured in the *Modern Steel Construction* April 1962 article entitled "Delta Girders Offer Advantages for Long Spans" and *Civil Engineering*'s May 1966 article entitled "The Bridge Delta

Girder: Single-Webbed and Double-Webbed" ("Delta Girders Offer Advantages for Long Spans" 1962; Esser 2003). Furthermore, many of Hadley's Washington State bridges have been listed in, or determined eligible for, the NRHP. Hadley worked until his death in July 1967.

While employed with the Portland Cement Association, Hadley began designing innovative concrete bridges in Washington State, mostly Pierce County, beginning in the mid-1930s. One of his first was the McMillin Bridge (1934), a reinforced concrete through truss bridge.[2] At the time, its 170-foot main span was the "longest reinforced-concrete span, exclusive of arches, that has been built to date [1936] in the United States and demonstrated the use of concrete for a design that traditionally conformed to the structural properties of timber and steel (Berry and Runciman 1936 as quoted in Lawrence, Purdy Bridge HAER Report, 1993; Soderberg 1982: 23-24). Hadley also suggested the design for the Purdy Bridge (1936), constructed over Henderson Bay, one of the few box girder bridges within the United States, and with the longest single span among concrete-girder forms (Soderberg 1982: 29; Lawrence, Purdy Bridge HAER Report, 1993).

World War II brought bridge building in the United States to a virtual standstill, but, immediately following the war, Hadley continued using the hollow box girder concrete design in Washington State bridges. One of his first postwar bridges, Cedar Creek Bridge (Bridge No. 65) (1946) is a continuous 75-foot span, two cell, single box girder, with a 25-foot cantilever that carries traffic along N.E. Etna Road over Cedar Creek. The bridge reflects the continuity of box girder bridges designed immediately after World War II in Washington State. Bridges constructed between 1945 and 1950 typically consisted of concrete slab and reinforced concrete rigid frame designs that required minimal steel or timber, as bridge designers sought economy and simplicity in structural features, clean lines and lack of ornamentation. During the postwar era, Hadley used the box girder design in several local transportation agency bridges, and by the 1950s, the design was used in a broader range of geographic areas throughout Washington State including Clark, Pierce, King, Yakima, and Clallam counties.

## Comparative Analysis

The purpose of this comparative analysis of box girder bridges erected between 1936 and 1957 is to provide an assessment of how box girder bridge designs during this period developed and conveys how the Cedar Creek Bridge fits into this larger engineering movement. This analysis discusses bridges with hollow box girders that were either previously listed in the NRHP, previously

[2] It should be noted that Soderberg (1979) describes the the McMillin Bridge as "significant, not only because of its hollow-box construction, but also because it demonstrates the use of concrete for a design that traditionally evolved and conformed to the structural properties of timber and steel." Later authors, such as Lawrence (McMillin Bridge 1993), consistently refrain from characterizing the bridge as exhibiting hollow box construction. WSDOT bridge engineer Robert H. Krier noted that while the pier shafts featured circular voids in the McMillin Bridge, the truss members of the structure consisted of solid concrete sections with no voids (Krier 2015). The bridge, therefore, would not be considered an example of hollow box construction.

determined eligible for the NRHP, discussed in the two MPDFs or HAER documents, or identified by the Washington Department of Transportation as examples of important box girder bridges. These resources are listed in Table 1 (See Appendix 3). After a review of Table 1, it appears that three, two cell, single box girder bridges with spans that exceeded 75 feet erected in the Washington State prior to 1941 were listed in the National Register. The Cedar Creek Bridge shares many similar characteristics with these previously listed resources and represents one of the first box girder bridges with a span of over 75 feet erected in the state following World War II.

Table 1 also provides an understanding of how the box girder design was applied in a variety of other reinforced concrete and steel bridge engineering contexts. From the Purdy Bridge (1936) to the Benton City-Kiona Bridge (1957), the box girder's use during this period reflects its versatility in a variety of different applications and engineering contexts. Also, another example of Homer Hadley's significant innovative bridge engineering applications is that the Benton City-Kiona Bridge, the third cable stay bridge in the United States and the first to consist of concrete and steel, also includes box girder spans.[3]

**NRHP Significance Summary**

After considering the registration requirements found in the 1991 MPDF, the historical information concerning box girder bridges constructed in Washington between 1936 and 1957, and the career of Homer Hadley, the Cedar Creek Bridge appears eligible for the National Register of Historic Places under Criteria A and C. Under Criterion A, the Cedar Creek Bridge is associated with a period of bridge building in Washington that reflected the continuity of post-war box girder bridge designs with pre-war designs and the engineering and design of continuous indeterminate structures that applied the Hardy Cross method of balancing and distributing fixed-end moments. Under Criterion C, the bridge represents one of the first post-war, single box, double cell reinforced concrete bridges designed in the state to feature a span that was 75 feet or more in length. Washington was only one of the four states to use this bridge type prior to the 1950s and the box girder is a significant as a regionally important bridge type. The bridge lacks decorative rails and other embellishments, but is indicative of the modernist approach to minimal bridge design that emphasized the efficient use of materials. The box girder bridge would become one of the most frequently used bridge types in the United States by the 1960s with the integration of pre and post-stressing and the single box girder would serve as an important precedent for these later bridges. The Cedar Creek Bridge is also significant for its association Homer Hadley as the work of a master bridge engineer. Hadley was integral to the innovative application of box girders to a variety of long span bridge types between 1936 and 1957. The single box, two cell Cedar Creek Bridge is a simplified, but a nonetheless important expression of his minimalist design ethic.

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[3] The first bridges that exhibited the cable stay, the Chow Chow Bridges over the Quinalt River, were log and wood plank logging bridges not designed by an engineer, and likely unknown to Hadley (Holstine and Hobbs, 2005: 59; Email from Holstine to Manning 2016).

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The bridge does not appear to be eligible for the NRHP under Criterion B as this criterion "is generally restricted to those properties that illustrate (rather than commemorate) a person's important achievements" (National Park Service 1997). While associated with the significant engineer Homer Hadley, this significance is best addressed under Criterion C. The bridge does not have the potential to yield information and is therefore not significant under Criterion D.

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Soderberg, Lisa. Historic Bridges and Tunnels in Washington State Thematic Resources. National Register of Historic Places Inventory Nomination Form. August 1980.

White, E.A. "High Concrete Bridge for Low Cost." *Engineering News Record* (September 1, 1938).

Whittington, Stephen, PE, SE. Email from Jean Singer to Stephen Whittington, November 3, 2015.

## 10. GEOGRAPHICAL DATA

Acreage of Property: approximately 1 acre

UTM References: Easting: 1101310 Northing 226946 (Washington State Plane South)(Datum: HARN (feet)

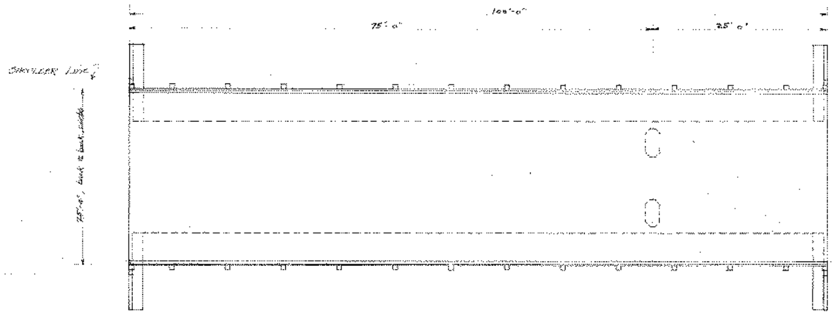
Verbal Boundary Description: The longitudinal boundary extends from each of the pavement seals at either end of the bridge. The lateral boundary extends to the transverse edges of the structure.

Boundary Justification: The boundary includes all of the components and elements historically associated with the Cedar Creek Bridge.

## 11. FORM PREPARED BY

Kirk Ranzetta, Ph.D., Senior Architectural Historian
Shoshana Jones, J.D., M.A., Architectural Historian
AECOM, 111 SW Columbia, Suite 1500, Portland OR 97201
503-222-7200

**Appendix 1: Original Drawings of Cedar Creek Bridge (#65). Courtesy of Clark County.**

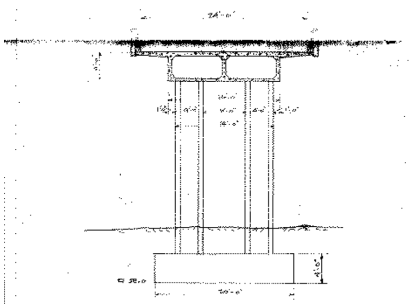



## PLAN
SCALE: 1/8 IN = 1 FT

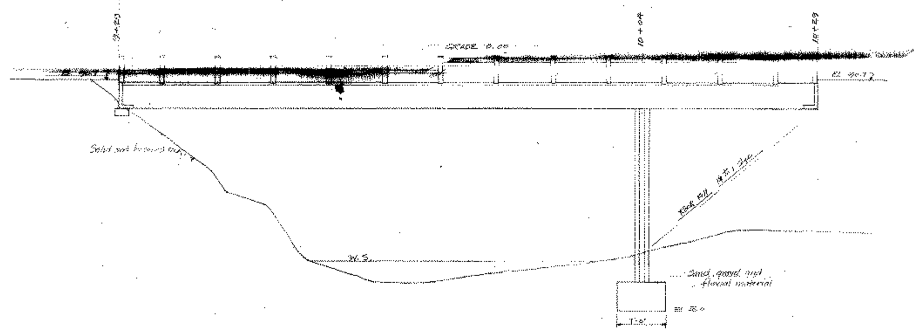
LOADING: H 15
IMPACT: 25%
CONCRETE: 3500 #/in² AT 28 DAYS
REINFORCEMENT: INTERMEDIATE GRADE, DEFORMED
n = 10
STRESSES: AASHO, 1944.

## ESTIMATE OF QUANTITIES

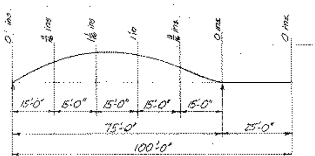
| | |
|---|---|
| STRUCTURE EXCAVATION | 71 CY. |
| CONCRETE CLASS A | 136 CY. |
| CONCRETE CLASS F | 22 CY |
| REINFORCEMENT | 33880 lbs. |
| WOOD RAILING | 1398 M.B.M. |
| STRUCTURAL STEEL | 573 lbs. |




## CROSS-SECTION
SCALE: 1/8 IN = 1 FT




## ELEVATION
SCALE: 1/8 IN = 1 FT



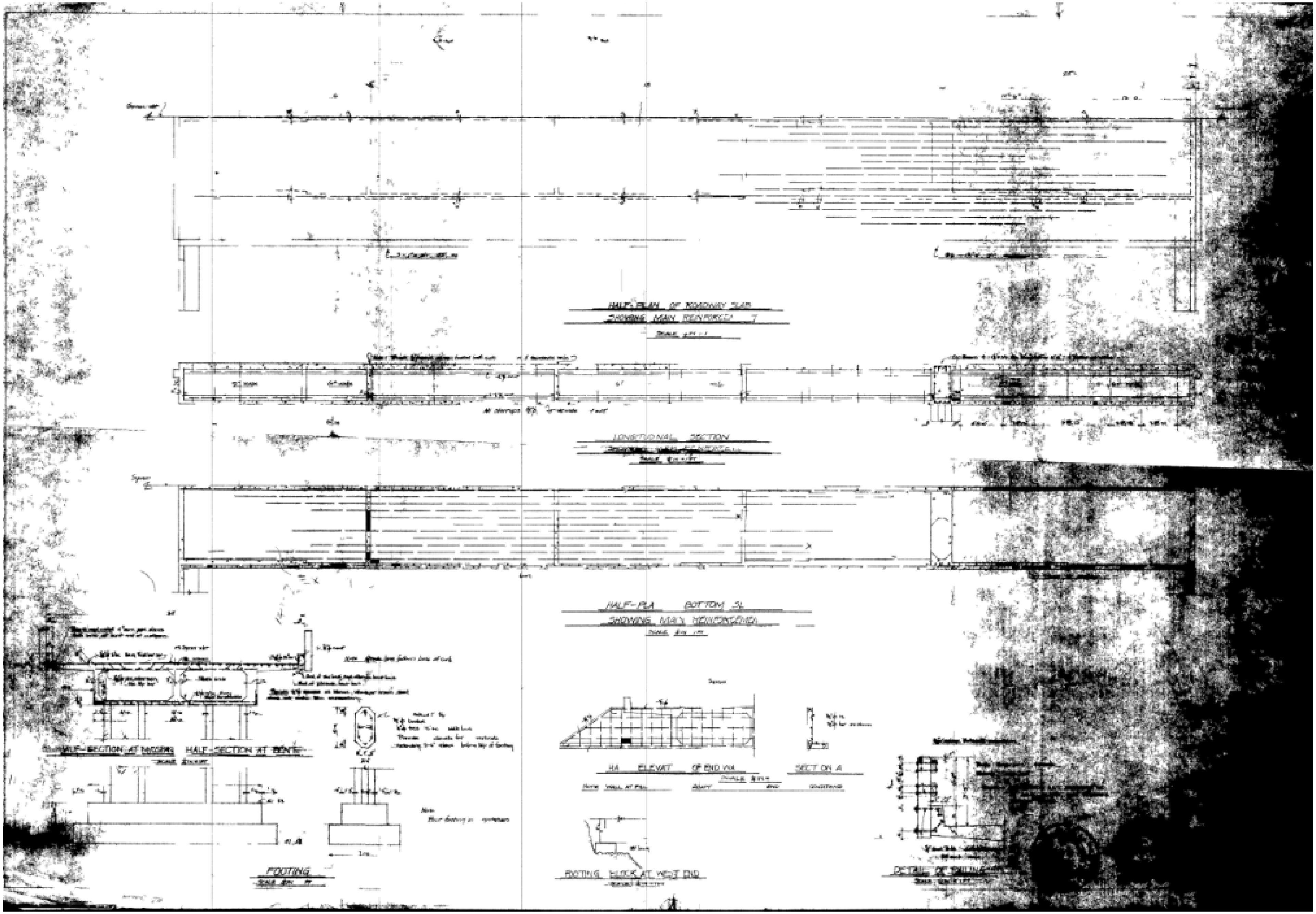

## CAMBER DIAGRAM
Showing heights above grade to which deck is to be constructed while carried on falsework.

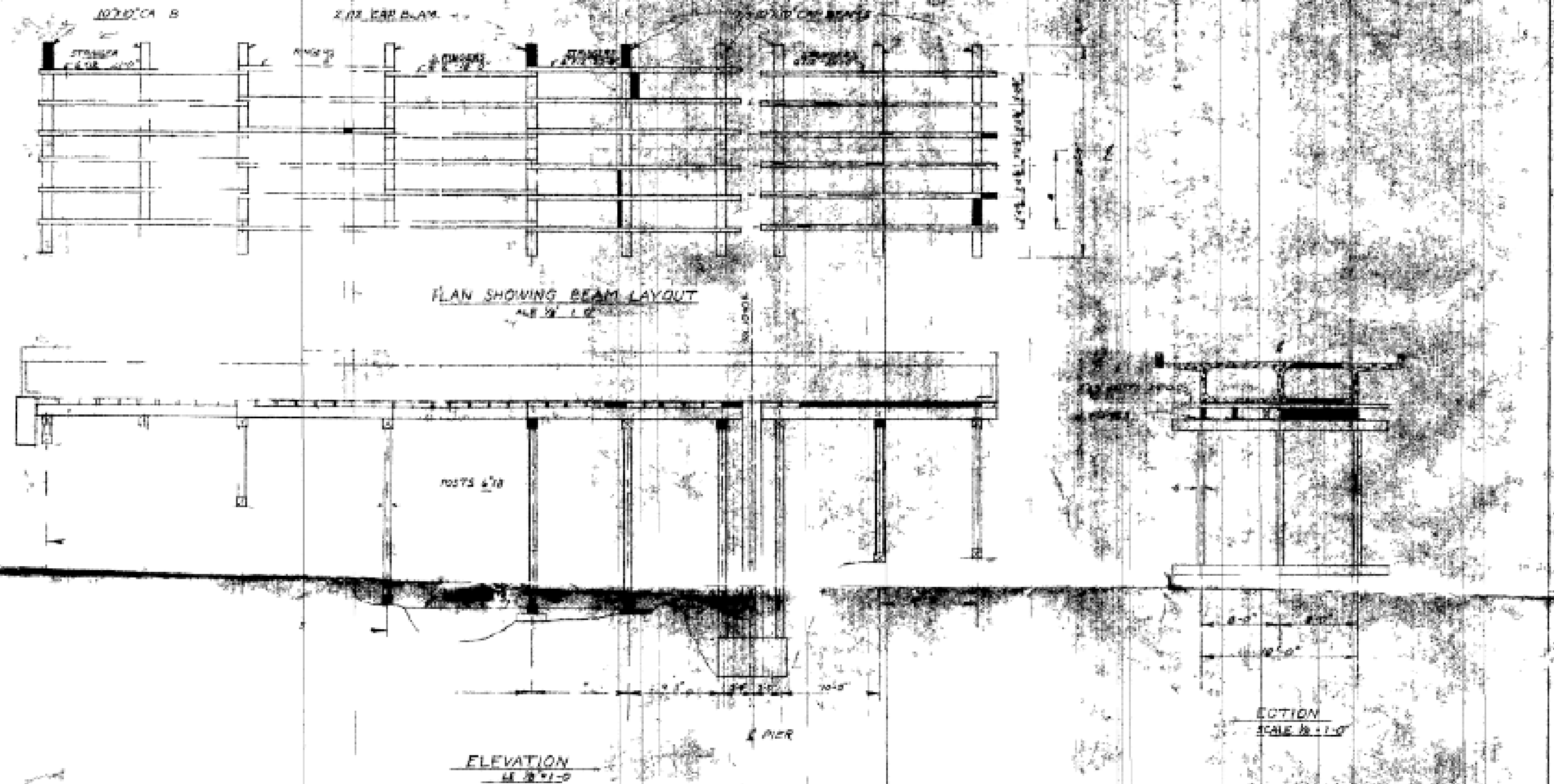
CLARK COUNTY ROADS
VANCOUVER, WASHINGTON

**C.R.P. 46-2**
**REPLACING BRIDGE No. 65**
**SECTION 'A'**

SCALE VERT 1/8" = 1'-0" HOR 1/8" = 1'-0"
FIELD WORK
OFFICE WORK
TRACED
CHECKED

APPROVED 3 June 1946
COUNTY ENGINEER
SHEET 2 OF 8 SHEETS.


HALF-PLAN OF ROADWAY SLAB
LONGITUDINAL SECTION
HALF-SECTION AT BENTS
FOOTING
FOOTING BLOCK AT WEST END
DETAIL OF RAILING




NOTES

1. 3/4" CHAMFER ALL EXPOSED CORNERS
2. FORMS TO BE IN ACCORDANCE WITH STANDARD CON TRUCTION PRACTICE
3. SWAY BRACING TO BE ACCORDANCE WITH STANDARD CONSTRUCTION PRACTICE

FALSEWORK PLANS
BRIDGE No. 65
CLARK COUNTY ROADS
APPROVED Aug 22 1946
BY [signature]
COUNTY ENGINEER

NIEMAN COMPANY IN
20 MAIN ST VANCOUVER WA.

300-65
5 2
7 23

**Appendix 2: Existing Condition Photographs (from Holschuh 2015)**

## Historic Inventory Report

## Photos

Bridge 65, looking west
2015

Metal and wooden guardrail, cast-in-place concrete pillar north side of Bridge 65, looking west
2015

Cast-in-place reinforced concrete pillars, underside of box girders
Underside of Bridge 65, looing west/southwest
2015

Eastern abutment, Bridge 65
2015

spalling visible on underside
Underside of box girders, concrete pillars
2015

Concrete pilings on east shore of Cedar Creek
2015

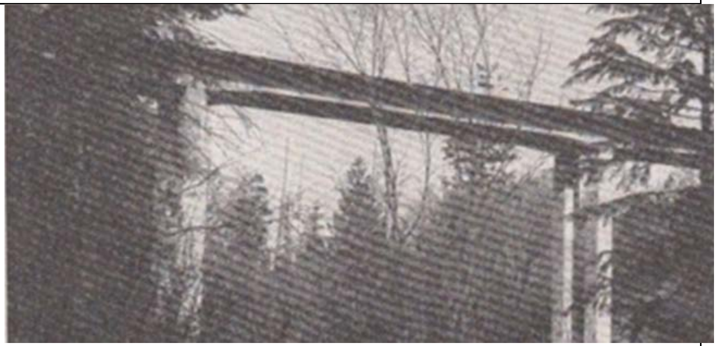
Utility pipe and guardrail along southern side of Bridge 65
2015

Bridge 65 deck/roadway, looking west
2015

Bridge 65, looking east/southeast
2015

western abutment, Bridge 65
2015

**Appendix 3: Table of Hollow Box Girder Bridges in Washington**

| Name | Year built | County | Type | Main Span Length (ft.) | NRHP status | Method of Determination | Photo of Bridge |
|---|---|---|---|---|---|---|---|
| Purdy (#302/105) | 1936 | Pierce | Concrete Box (two combine d cells) | 190 | Listed, HAER, WA-101 | Nomination |  http://www.loc.gov/pictures/resource/hhh.wa0455.pho tos. 370529p/ |
| Squally Creek/Gehring Road (#14203A) | 1937 | Pierce | Concrete Box (two separate d single cells) | 90 | Recommended Eligible | Krier and George 2007 |  *Engineering News Record*, September 1, 1938 (p 265) |
| Mashell Bridge (#24164A) (carries Alder Cutoff Rd.) | 1937 | Pierce | Concrete Box | 70 | Recommended Eligible | Krier and George 2007 | No photo |

| Name | Year built | County | Type | Main Span Length (ft.) | NRHP status | Method of Determination | Photo of Bridge |
|---|---|---|---|---|---|---|---|
| Sixth Street Bridge | 1937 | Grays Harbor | Concrete Box (four separate boxes – with transverse beams) | 73 | Recommended Eligible | Krier and George 2007 |  https://www.google.com/maps/place/Aberdeen,+WA/@46.978707,123.8316273,3a,72.4y,337.78h,96.65t/data=!3m7!1e1!3m5!1sxMLA8OgWR93GqSc5HqD6XQ!2e0!6s%2F%2Fgeo1.ggpht.com%2Fcbk%3Fpanoid%3DxMLA8OgWR93GqSc5HqD6XQ%26output%3Dthumbnail%26cb_client%3Dmaps_sv.tactile.gps%26thumb%3D2%26w%3D203%26h%3D100%26yaw%3D151.44098%26pitch%3D0!7i13312!8i6656!4m2!3m1!1s0x5492247f3034a8c5:0xabd9edf9f075 9975!6m1!1e1 |
| Winnifred Street Bridge (#1130) | 1941 | Pierce | Concrete Box (single box with two cells) | 75 | Listed | Nomination |  http://www.theirminesourstories.org/?cat=4 |

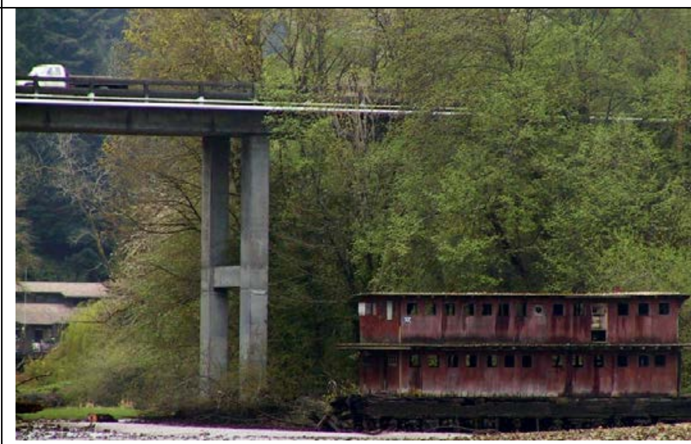
| Name | Year built | County | Type | Main Span Length (ft.) | NRHP status | Method of Determination | Photo of Bridge |
|---|---|---|---|---|---|---|---|
| Cedar Creek (#65) | 1946 | Clark | Concrete Box (single box with two cells) | 75 feet | Eligible (Holschuh 2015) | (30 pts in Krier et al 1992) |  Holschuh 2015. |
| Toppenish – Zillah Bridge (carries Meyers Road) (# 485) | 1947 | Yakima | Concrete Box (single box with two cells) | 118 feet (4 interior spans) | Listed | Nomination |  https://fortress.wa.gov/dahp/wisaard/ |

| Name | Year built | County | Type | Main Span Length (ft.) | NRHP status | Method of Determination | Photo of Bridge |
|---|---|---|---|---|---|---|---|
| Donald – Wapato Bridge (#396) | 1948 | Yakima | Concrete Box (two separate boxes with single cells) | 90 (middle span) | Listed | Nomination |  https://fortress.wa.gov/dahp/wisaard/ |
| Patton/Green River (#3015) | 1950 | King | Concrete Box and Steel Box (two separate boxes with single cells) | 100 | Listed | Nomination (Over 30 points in Krier et al 1992) |  https://fortress.wa.gov/dahp/wisaard/ |

| Name | Year built | County | Type | Main Span Length (ft.) | NRHP status | Method of Determination | Photo of Bridge |
|---|---|---|---|---|---|---|---|
| Stuck River (#24204A) | 1949 | Pierce | Concrete Box | 71 (total) 3 spans | Recommended Eligible | (Krier and George 2007) |  https://www.google.com/maps/@47.2120455,-122.2419579,3a,27.1y,308.84h,87.53t/data=!3m6!1e1!3m4!1sys6ejT4rSSoZMPObnDbiA!2e0!7i13312!8i6656!6m1!1e1 |
| 15th Avenue Bridge (Seattle) | 1949 | King | Concrete Box (two separate boxes with single cells) | 106 | Eligible | Section 106 report (Mishkar et. al. 2009) |  Mishkar, et. al. 2009. |

| Name | Year built | County | Type | Main Span Length (ft.) | NRHP status | Method of Determination | Photo of Bridge |
|---|---|---|---|---|---|---|---|
| Hoko River (#112/10) | 1950 | Clallam | Concrete Box | 64 | Not Eligible | (Krier et al 1992) | No photo |
| North Twin (#3142) | 1951 | King | Concrete Box(two separate boxes with single cells) | 80 feet | Eligible | (HPI on WISAARD) |  https://fortress.wa.gov/dahp/wisaard/ |
| South Twin (#3143) | 1951 | King | Concrete Box | ? | Eligible | (King County Cultural Resources 2001) | No photo |

| Name | Year built | County | Type | Main Span Length (ft.) | NRHP status | Method of Determination | Photo of Bridge |
|---|---|---|---|---|---|---|---|
| North Fork Snoqualmie River (#1221) | 1951 | King | Steel Box and Concrete Box | 77 (total) 1 span | Not Eligible | (George 2001) |  http://www.panoramio.com/photo_explorer#view=photo&position=135&with_photo_id=10105355&order=date_desc&user=1712723 |
| Portage Canal Bridge (# 116/5) | 1951 | Jefferson | Steel Box | 250 | Eligible | (Nominated to NRHP – not listed – later determined eligible) HPI WISAARD |  http://www.peninsuladailynews.com/article/20130906/NEWS/309069977 |

| Name | Year built | County | Type | Main Span Length (ft.) | NRHP status | Method of Determination | Photo of Bridge |
|---|---|---|---|---|---|---|---|
| Oak Park/Washougal River (#500/24) | 1954 | Clark | Concrete Box (single box with two cells) | 140 (total) 4 spans in main structure | Not Eligible | (George 2001) |  http://www.transystems.com/Home/Markets/Freight-Rail/Bridges/Projects/BNSF-Bridge-24-8-over-Washougal-River.aspx |
| Judd Creek (#3184) | 1953 | King (Vashon Island) | Concrete Box | 113 total (five spans) | Eligible | (HPI on WISAARD) |  http://mvdirona.com/Trips/QuarterMasterHarbor2002/ |

| Name | Year built | County | Type | Main Span Length (ft.) | NRHP status | Method of Determination | Photo of Bridge |
|---|---|---|---|---|---|---|---|
| Mabton-Sunnyside/ Yakima River (#241/5) | 1954 | Yakima | Concrete Box (single box with two cell) | 159 (5 spans in main structure) | Not Eligible | (George 2001) |  http://www.dailysunnews.com/photos/2014/may/09/31551/ |
| Benton City - Kiona/Yakima River (#225/1) | 1957 | Benton | Steel Box & Cable-stayed (four boxes with single cells) | 170 | Eligible | Nominated (not listed) (George 2001) |  https://fortress.wa.gov/dahp/wisaard/ |