WA C57

SR

HAER INVENTORY

Historic American Engineering Record
Department of the Interior, Washington, D.C.

1. SITE I.D. NO

2 INDUSTRIAL CLASSIFICATION: Bridges, Trestles and Aqueducts — 7 6 5 3

3 PRIORITY: 1

4 DANGER OF DEMOLITION? (SPECIFY THREAT) ☐ YES ☐ NO ☒ UNKNOWN

CAHP AKAP 1285H

MOVE: vertical lift

5 DATE: 1914

6 GOVT SOURCE OF THREAT: OWNER ADMIN

7. OWNER/ADMIN: Burlington Northern/BN-NP-UP

8. NAME(S) OF STRUCTURE: Steilacoom Creek Bridge

9 OWNER'S ADDRESS:
Pacific Division
800 Central Building
Seattle, Washington 98104

10. STATE: WA — COUNTY: 053 — COUNTY NAME: Pierce — CITY/VICINITY: Titlow — CONG DIST: 03

STATE / COUNTY / COUNTY NAME / CITY/VICINITY / CONG. DIST.

11. SITE ADDRESS (STREET & NO.)
Mile Post 10.03
S.T.R. 29 20N 2E

12. EXISTING SURVEYS: ☐ NR ☐ NHL ☐ HABS ☐ HAER-I ☐ HAER ☐ NPS ☐ CL6 ☐ CONF ☐ STATE ☐ COUNTY ☐ LOCAL ☐ OTHER

13 SPECIAL FEATURES (DESCRIBE BELOW): ☐ INTERIOR INTACT ☐ EXTERIOR INTACT ☐ ENVIRONS INTACT

14. UTM ZONE 10 — EASTING 531600 — NORTHING 5225340 — SIGN — SCALE ☒ 1:24 ☐ 1:62.5 ☐ OTHER — QUAD NAME: Steilacoom, Washington

UTM ZONE — EASTING — NORTHING — SIGN — SCALE ☐ 1:24 ☐ 1:62.5 ☐ OTHER — QUAD NAME

15. CONDITION: 70 ☐ EXCELLENT 71 ☐ GOOD 72 ☐ FAIR 73 ☐ DETERIORATED 74 ☐ RUINS 75 ☐ UNEXPOSED 76 ☐ ALTERED 82 ☐ DESTROYED 85 ☐ DEMOLISHED

16 INVENTORIED BY: Lisa Soderberg — AFFILIATION: HAER/Washington State Bridge Inventory — DATE: May 1980

17 DESCRIPTION AND BACKGROUND HISTORY, INCLUDING CONSTRUCTION DATE(S) HISTORICAL DATE(S) PHYSICAL DIMENSIONS MATERIALS, EXTANT EQUIPMENT, AND IMPORTANT BUILDERS ENGINEERS ETC

The double-track bridge over Steilacoom Creek, completed in 1914 by Northern Pacific, is a Strauss direct vertical lift bridge, and is the only one of its kind constructed in Washington. The design which replaced the usual counterweight cables, chains, sheaves, and winding drums of the vertical lift bridge with a system of counterbalanced levers and rack-and-pinion gearing, was patented by J.B. Strauss of Chicago, and was put on the market by the Strauss Bascule Bridge Company in 1912. The Steilacoom Creek Bridge was one of the first of this design to be constructed.

The bridge engineer and historian, H.G. Tyrrell, was quick to point out in a 1913 editorial in Engineering News that the design of the direct-lift bridge with "double balance levers," was not without precedent. It was a modification of the "familiar type known as the Dutch portal bridge," in which the span rises horizontally instead of revolving around a shore hinge.

The Strauss direct lift bridge possesses many of the design elements of the Strauss heel trunnion bascule (CONT OVER)

18. ORIGINAL USE: railroad bridge — PRESENT USE: railroad bridge — ADAPTIVE USE:

19 REFERENCES — HISTORICAL REFERENCES PERSONAL CONTACTS, AND/OR OTHER

"Direct-Lift Drawbridge Without Cables," Engineering News, Vol. 69, No. 23, 5 June 1913, pp. 1168-1170.
"The Strauss Direct Lift Bridge," Railway Age Gazette, 18 March 1913, pp. 553-555.
H.C. Tyrrell, "A comparison of Old and New Designs for Vertical Lift Bridge," Engineering News, Vol. 70, No. 3, 31 July 1913, pp. 225-226.

(CONT OVER)

20 URBAN AREA 50 000 POP OR MORE? ☐ YES ☒ NO

21. HCRS REGION: NW

22. PUBLIC ACCESSIBILITY: ☒ YES, LIMITED ☐ YES, UNLIMITED ☐ NO ☐ UNKNOWN

23. EDITOR / INDEXER

24 LOCATED IN AN HISTORIC DISTRICT? ☐ YES ☒ NO — NAME — DISTRICT I.D. NO

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Description (continued)

bridge which was developed a few years prior to the vertical lift bridge. Like the Strauss bascule, the lifting mechanism of the direct lift bridge consists of a parallel link counterweight which moves on fixed trunnions, or pivot points.

The lifting mechanism which consists of a concrete counterweight supported by a steel truss is mounted on braced tower posts on either side of the moveable span. Two hangers link the lift span to the counterweight mechanism. The 96 foot riveted pony truss crossing Steilacoom Creek can be raised to allow the passage of ship traffic by the radial movement of two rocking counterweight levers which rotate on a trunnion on top of the tower, and on a trunnion on top of a link strut. This system of counterweights, trusses, hangers, and links forms a jointed frame in the shape of a parallelogram which is proportioned so as to be in perfect equilibrium in all positions; the main trunnion reaction on the top of the tower is constant and always vertical. In a contemporary article in Engineering News, the author asserted that the perfect equilibrium of the moving parts of the Strauss direct lift bridge would ultimately result in lower power consumption.

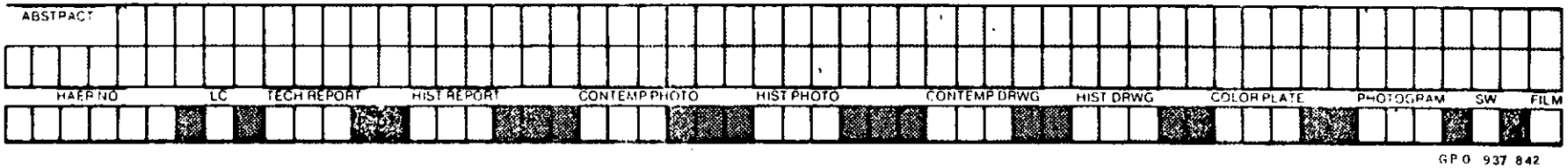
The operating mechanism of the direct lift bridge consists of a vertical rack on each tower post which gears to corresponding spur pinions on the lift span. Gears and a 25 hp motor are at each end of the bridge, and are connected through an equalizing shaft, which enables the four corners of the span to move together at all times. The lifting mechanism is controlled in the operator's cabin which is located on the truss. In the event of power failure, the bridge could be opened and closed by hand. When the bridge is in the closed position, it is locked at both ends in order to prevent vertical or lateral movement, while the heavy moving loads of the railroad cars roll across the truss.

An article in the March 18, 1913 issue of Railway Age Gazette enumerated the advantages of this new Strauss design. Among the design features that were noted was the long sliding guidings which prevent binding and power loss. The cost and trouble of maintaining and renewing cables and sheaves was eliminated in this Strauss design which did not incorporate the use of cables, chains or equalizing devices into the lifting mechanism. Another advantage to the Strauss design was the fact that the hangers supported the lift span and reduced the dead load stress of the truss. Consequently the truss could be erected in the open position without the use of falsework. The trusses could be built out from the hanger points as cantilevers, and connected at the center.

In response to an article in Engineering News which copiously detailed the attributes of this new Strauss design, H.G. Tyrrell emphasized that direct-lift bridges with double-balance levers are practicable and economical for small lifts only. The 96 foot Steilacoom Creek bridge definitely fits Tyrrell's criteria of an economical design. The maximum vertical lift of the bridge is 43 feet 6 inches, and provides a clear headway of 50 feet. It was designed to lift a weight of 15 tons.

An Engineering News article reported that an unusual feature of the Steilacoom Creek Bridge was the overhead struts connecting the two towers. The additional structural support between the towers was necessary because the towers could be carried only by the piers, and could not be braced from the trestle approaches.

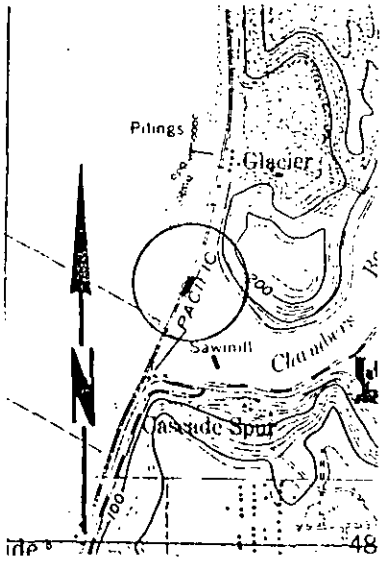
The stark steel form which was fabricated and erected by the American Bridge Company, is blatant in its bold adherence to its functional purpose. Although the design of the Steilacoom Creek Bridge was limited to short spanned structures, it is significant in its demonstration of the evolution and experimentation of bridge design during the early 20th century, in its demonstration of the way in which the concepts of bascule bridge design were merged with the design concepts of the vertical lift bridge.

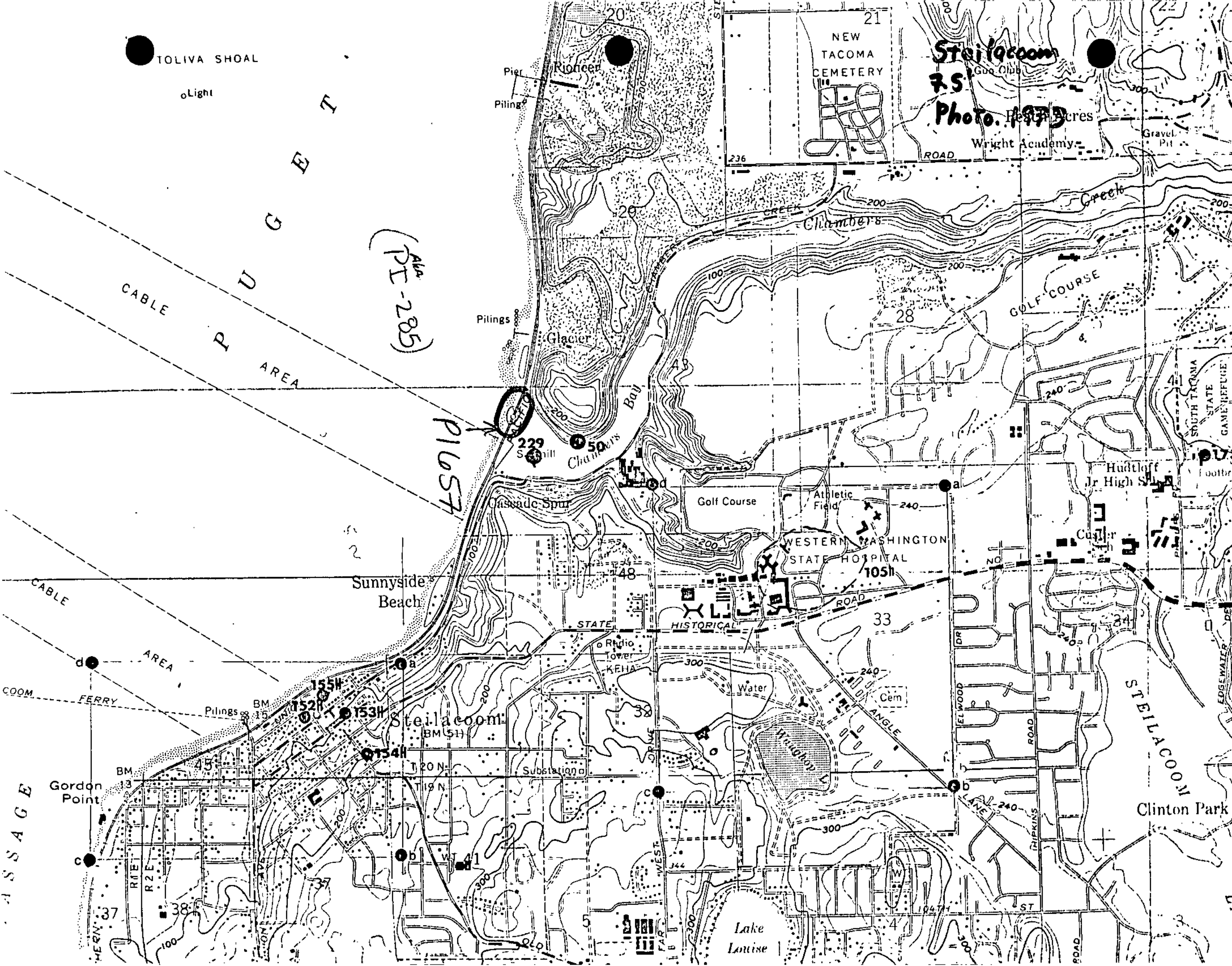


GPO 937 842

References (continued)
Philip L. Kaufman, "The 'Heel Trunnion' Bascule Bridge," Engineering News, Vol. 67, No. 18, 2 May 1912, pp. 830-833.

25. Photos and Sketch Map of Location





TOLIVA SHOAL
Light
PUGET
CABLE AREA
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PASSAGE
FERRY
Pier
Piling
Pioneer
Pilings
Glacier
aka PI-285
PI657
229
Sawmill
50
Chambers Bay
Cascade Spur
Sunnyside Beach
NEW TACOMA CEMETERY
Steilacoom 7.5' Photo. 1973
Gun Club
Wright Academy
Gravel Pit
ROAD
Chambers Creek
GOLF COURSE
Golf Course
Athletic Field
WESTERN WASHINGTON STATE HOSPITAL
Hudtloff Jr High Sch
Custer
SOUTH TACOMA STATE GAME REFUGE
STATE HISTORICAL ROAD
Radio Tower KEHA
Water
Cem
ANGLE LANE
Waughop L
Steilacoom
BM 15
BM 51
Substation
T 20 N
T 19 N
BM 13
Gordon Point
R 1 E
R 2 E
ELWOOD DR
STEILACOOM
Clinton Park
Lake Louise
104TH ST

PI 0657

References (continued)
Philip L. Kaufman, "The 'Heel Trunnion' Bascule Bridge," Engineering News, Vol. 67, No. 18, 2 May 1912, pp. 830-833.

25. Photos and Sketch Map of Location

27 2 1

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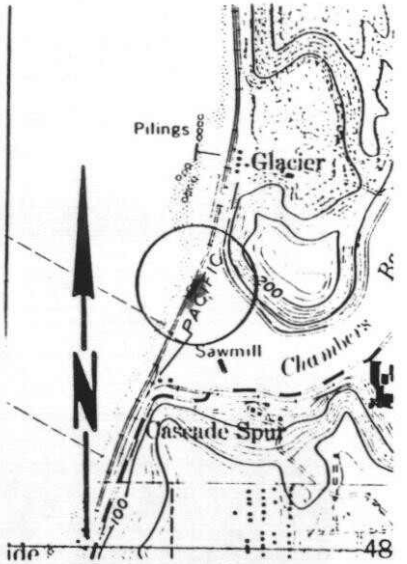

STEILACOOM CREEK BRIDGE

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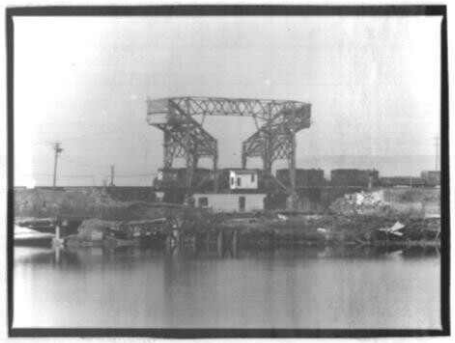

Historic Register Report

Historic Name: Steilacoom Creek Bridge

Address: Spans Steilacoom Creek
City: Steilacoom
County: Pierce

Download nomination form

Historic Use: Transportation
Style: None
Built: 1914
Architect:
Builder: American Bridge Company

Smithsonian Number: 45PI00657
Date Listed: 3/13/1981
Listing Status: WHR
Classification: STR
Resource Count: 1
Area of Significance: Engineering
Level of Significance: Local
Listing Criteria:

Statement of Significance

Photos