OHIO CONNECTING RAILWAY, BRUNOT'S ISLAND BRIDGE
(Pennsylvania Railroad, Panhandle Division, Bridge 1.90)
Pennsylvania Historic Railroad Bridges Recording Project
Spanning Ohio River at Brunot's Island
Pittsburgh
Allegheny County
Pennsylvania

HAER No. PA-509

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
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Location:	Spanning Ohio River at Brunot's Island, Pittsburgh, Allegheny County, Pennsylvania.
USGS Quadrangle:	Pittsburgh West, Pennsylvania (7.5-minute series).
UTM Coordinates:	17/581385/4479785
Dates of Construction:	1889-90 (substructure); 1901, 1903, 1913-16 (superstructure).
Basis for Dating:	Secondary sources.
Designers:	Max J. Becker (Chief Engineer, Ohio Connecting Railway), substructure; J. C. Bland (Engineer of Bridges, Pennsylvania Railroad), superstructure.
Fabricator:	American Bridge Co. (Pittsburgh).
Builders:	Drake & Stratton Co., substructure; American Bridge Co. (Pittsburgh) and Seaboard Construction Co., superstructure.
Present Owner:	Norfolk Southern Railroad.
Present Use:	Railroad bridge.
Structure Types:	Riveted Parker through truss; pin-connected Pratt deck truss; riveted Warren deck truss; riveted plate-girder trestle.
Significance:	The Brunot's Island Bridge is significant for its complexity, carrying rail traffic in four directions across the Ohio River on a system of high viaduct spans and through trusses. Innovative methods were used to erect the main channel span in 1890, and to replace it in 1915. When completed, the 523'-0" Parker through truss was the world's longest riveted simple truss span.
Historian:	Justin M. Spivey, April 2001.

Project Information:

The Historic American Engineering Record (HAER) conducted the Pennsylvania Historic Railroad Bridges Recording Project during 1999 and 2000, under the direction of Eric N. DeLony, Chief. The project was supported by the Consolidated Rail Corporation (Conrail) and a grant from the Pennsylvania Historical and Museum Commission (PHMC). Justin M. Spivey, HAER engineer, researched and wrote the final reports. Preston M. Thayer, historian, Fredericksburg, Virginia, conducted preliminary research under contract. Jet Lowe, HAER photographer, and Joseph E. B. Elliott, contract photographer, Sellersville, Pennsylvania, produced large-format photographs.

Description and History

Pittsburgh's difficult geography has always presented a challenge to transportation, whether by water, land, or air. As early as the 1880s, the network of downtown railroad bridges and tunnels began to limit throughput. The Ohio Connecting Railway Company, incorporated on 20 November 1886, sought to provide a more direct connection between coal fields in the West Virginia panhandle and steel mills in northeastern Ohio — traffic which did not have to enter the city center. A three-mile route, mostly on a bridge over the Ohio River, would connect the Pittsburgh, Cincinnati, Chicago & St. Louis Railroad (PCC&SL) on the south bank with the Pittsburgh, Fort Wayne & Chicago Railway (PFW&C) on the north, both subsidiaries of the Pennsylvania Railroad (PRR).[1] Because the river was essential to inland shipping, the Ohio Connecting Railway's biggest challenge was to design and build a bridge with adequate clearance for navigation. *Engineering News* reported in October 1887 that construction would begin soon, to be "completed in about a year," but other sources indicate that the railroad did not obtain authorization from Congress to cross the river until 14 May 1888. At any rate, work did not begin until February 1889.[2] When the Ohio Connecting Railway opened to traffic on 10 October 1890, it was leased to PCC&SL and operated by PRR's Lines West entity.

Erection of the first Ohio Connecting Railway bridge captivated the American engineering press. Located where Brunot's Island divided the Ohio River into two channels, the new structure was popularly known as the Brunot's Island Bridge. The main (north) channel span, a subdivided camelback truss 523'-0" long, was the world's longest simple truss to be floated into position.[3] In combination with a similar back channel span of 413'-0" and a high viaduct across the island, it made for a structure of impressive proportions. The erection procedure, devised by the Keystone Bridge Co. of Pittsburgh, departed from the usual practice of building falsework on barges. Because the 915-ton main channel span was 65'-0" deep, with a lower chord 75'-0" above the river, it would have been unstable atop floating falsework. Instead, the contractor built falsework on temporary piles alongside the island, erected the truss, and transferred the falsework to barges only for the final step of floating the truss into position.[4] Engineering journals published drawings and photographs of the truss towering above the river

during various stages of this process. Once the main span was in place, the contractor moved the falsework around to another set of temporary piles driven across the back channel. Because the back channel did not have to be kept open for navigation, that span could be erected in place.

Each of the Brunot Island Bridge's spans has been replaced at least once during the twentieth century. In the original configuration, a single track diverged from the PCC&SL main line on the south bank and turned northeast onto the bridge. After crossing the bridge, the track proceeded onto a plate-girder trestle and turned northwest to merge with the PFW&C main line on the north bank. Through subsequent additions, the bridge was made to carry traffic in four directions, then on two tracks. At one point it even had an unusual fifth leg, a privately owned siding on Brunot's Island. The south end of the bridge was converted into a wye in 1901, with a new west leg connecting to the Pittsburgh, Chartiers & Youghiogheny Railroad. The following year, Duquesne Light Company added a timber trestle parallel to the high viaduct for coal deliveries to its plant on the island. The siding was rebuilt in 1914 but has since been removed.[5] To connect with a recently completed freight bypass around the north side of Pittsburgh in 1903, PRR added an east leg to the north end of the bridge. This development dramatically increased the number of trains using the Ohio Connecting Railway, leading to reconstruction of the bridge as a two-track structure from 1913 to 1915. Not all of the spans had to be replaced because the wye spans were already capable of carrying two tracks.[6] As a result, the present structure has spans of at least three different ages (see Table 1). Remarkably, these are supported on the original stone piers built by Drake & Stratton Co. in 1889. Anticipating future increases in traffic, Ohio Connecting Railway Chief Engineer Max J. Becker had designed the piers to accommodate a two-track superstructure.[7]

Table 1. Span table for Brunot's Island Bridge, numbered from south to north.

Span No.	Description	Span length	Pier spacing
1	Pin-connected Pratt deck truss on 11-degree curve, 1890 Trusses relocated from Span No. 2 to create wye, 1901 Replaced with riveted Warren truss, 1913-15	121'-9"	123'-6"
2	Pin-connected Pratt deck truss on 11-degree curve, 1890 New pin-connected Pratt deck truss installed to create wye, 1901	121'-9"	123'-6"
3	Pin-connected subdivided camelback through truss, 1890 Replaced with riveted Parker through truss, 1914-15	413'-0"	416'-0"
4 to 14	Pin-connected fish-belly Pratt deck trusses, 1890 Replaced with riveted Warren deck trusses, 1913-15	171'-0"	1,925'-0"
15	Pin-connected subdivided camelback through truss, 1890 Replaced with riveted Parker through truss, 1914-15	523'-0"	525'-0"
16	Pin-connected Pratt deck truss, 1890 New pin-connected Pratt deck truss installed to create wye, 1903	137'-6"	140'-0"
Trestle	Riveted plate girders, 1890 New riveted plate girders, 1914-15	various	1,294'-11"
		Total	4,547'-11"

Source: "The Reconstruction of the Ohio Connecting Bridge," *Railway Age Gazette* 60, No. 7 (18 Feb. 1916): 311.

Despite Becker's foresight, the decision to add a second track was slow in coming because of the expense involved. Internal correspondence reveals that PCC&SL operating staff discussed an additional track as early as 1910. It is also evident that PRR management, who controlled the financing of major projects, did not agree that the change would be worthwhile. Early plans therefore contemplated spending a limited amount on widening only the river spans and leaving a single-track viaduct across the island.[8] This failed to produce results, and the issue foundered for more than two years. In November 1912, one memorandum noted that PRR management wanted a study of alternative solutions, which "resulted in several meetings but appears to have been aborted."[9] The correspondence is silent on why PRR suddenly authorized an expenditure of $1.5 million in January 1913. From that point on, costs escalated in a way more typical of public works projects. As construction drew to a close in early 1916, it was discovered that track and signal work had not been included in the original budget, so additional funds would be needed.[10] PCC&SL cited a figure of more than $1.8 million when reporting the final cost to the U.S. Railroad Administration; an outside source stated $2.3 million.[11] Whatever the exact amount of increase, PRR's original reluctance was vindicated.

Reconstruction of the Brunot's Island Bridge for two tracks was as challenging, if not more so, than erection of the original single-track structure. This time, the contractors had to maintain traffic on the railroad while work proceeded. In replacing the high viaduct spans over the island, Seaboard Construction Co. was able to erect new spans 5 through 13 on falsework adjacent to the existing structure on its west side. (Spans 4 and 14, which fit into pockets on the piers supporting the main and back channel spans, had to be replaced panel by panel.) Crews

jacked up each old span and moved it laterally off the piers, then shifted a new one into its place, averaging 35 minutes apiece. Obio Connecting Railway records indicate that Duquesne Light Company purchased some of the old spans to rebuild its siding on the east side of the viaduct.[12] Presumably the spans were moved directly onto new piers built at the company's expense. Work on the high viaduct began in June 1913 and was complete by January 1915.

Meanwhile, in April 1914, American Bridge Co. began the most challenging phase of the project, replacing the main channel span while keeping the Ohio River open for navigation. Because the new truss was 90'-10" deep and two tracks wide, it could be erected around the old one with room to spare. Although the design called for a simply supported Parker througb truss, American Bridge took the unusual step of selecting a continuous cantilever erection method. Long simple truss spans of that era typically had pinned connections, which are easier to align than dozens of rivet boles at each panel point. The continuous cantilever method dictated that the main channel truss have riveted connections, however, making it the world's longest riveted simple truss span. Erection crews started at the piers on either end. As each crew proceeded inward on the main channel truss, they temporarily assembled pieces of the back channel truss on the other side of the pier to balance their work. (After connecting the two halves at mid-span, they removed these counterweights. The material was then assembled — a second time — on falsework in the back channel.) Another innovative procedure was used to replace the floor system on the main channel span. Prefabricated sections of floor beams and stringers were lifted from barges and temporarily attacbed at a level beneath the old floor system. Workers removed the old floor system and raised the new one, replacing one panel at a time in 40-minute intervals between trains.[13] The main channel span stood complete on 20 June 1915, although records indicate that work continued elsewhere into 1916. Except for removal of the Duquesne Light Company spur at an unknown date, the bridge seems to have been little altered since. It continues to serve as a significant link in the freight railroad lines passing through and around downtown Pittsburgh.

Notes

1. George H. Burgess and Miles C. Kennedy, *Centenniol History of the Pennsylvonia Roilroad Company, 1846-1946* (Philadelphia: Pennsylvania Railroad Company, 1949), 429; Thomas T. Taber III, *Railroods of Pennsylvonio: Encyclopedio ond Atlas* (Muncy, Pa.: Thomas T. Taber III, 1987), 411.

2. "New Bridges," *Engineering News ond American Contract Journol* 18 (29 Oct. 1887): 304; cf. Coverdale & Colpitts, Consulting Engineers, *The Pennsylvonio Roilroad Company, Description of Importont Bridges ond Stotions* (New York, 1945), 26, typescript in folder "PRR Office of Secretary, Studies by Consultants and Published Reference Materials, 1855-1958," Box 1, Penn Central Railroad Records, Manuscript Group 286, Pennsylvania State Archives, Harrisburg, Pa.

3. "Floating Long Spans Into Place," *Engineering News ond Americon Railway Journol* 24, No. 38 (20 Sep. 1890): 253. The Chesapeake & Ohio Railroad's bridge at Cincinnati held the record for simple truss length at 542'-6"; see David B. Steinman, "World's Most Notable Bridges," *Engineering News-Record* 141, No. 24 (9 Dec. 1948): 94.

4. "Floating the Ohio Connecting Railway Channel Span," *Engineering ond Building Record* 22, No. 15 (13 Sep. 1890): 230.

5. Kenneth J. Kobus and Jack Consoli, *The Pennsy in the Steel City: 150 Yeors of the Pennsylvonia Railrood in Pittsburgh* (Pennsylvania Railroad Technical & Historical Society, 1996), 66; cf. "P. C. C. & St. L. Ry., Pittsburgh Division, O. C. Ry., Pittsburgh, Pa., Brunot's Island Plan to Accompany Siding Agreement with the Duquesne Light Company" (1 Apr. 1914), in folder 39, "Ohio Connecting Railway," Eastern Ohio Grand Division General Superintendent Files, Box 2, Pennsylvania Railroad Records, Historical Collections and Labor Archives, Paterno Library, Pennsylvania State University, State College, Pa. [hereinafter cited as OCR File].

6. "The Reconstruction of the Ohio Connecting Bridge," *Railway Age Gazette* 60, No. 7 (18 Feb. 1916): 311.

7. "Ohio Connecting Railway and Bridge at Pittsburgh," *Roilroad Gazette* 22, No. 25 (20 Jun. 1890): 430. Some of the trestle piers were relocated during the 1913-15 reconstruction, with new piers built by Bates & Rogers Construction Co. of Chicago.

8. P. A. Bonebrake, PCC&SL Pittsburgh Division Superintendent, to McCarty, 29 July 1910, in OCR File.

9. McCarty, to W. C. Downing, PCC&SL Pittsburgh Division Superintendent, 14 Nov. 1912, in OCR File.

10. G. L. Peck, PRR Lines West General Manager, to J. C. Bland, Engineer of Bridges, 14 Jan. 1913; Benjamin McKeen, General Manager, PRR Lines West, to McCarty, 28 Jan. 1916, in OCR File.

11. G. LeBoutillier, U.S. Railroad Administration Superintendent, to I. W. Geer, PCC&SL General Superintendent, 5 Jan. 1920, in OCR File; cf. Joseph White and M. W. von Bernewitz, *The Bridges of Pittsburgh,* 1st ed (Pittsburgh: Cramer Printing & Publishing Co., 1928), 77.

12. *Roilway Age Gazette,* "The Reconstruction of the Ohio Connecting Bridge," 311-12; cf. J. C. McCullough, PRR Lines West Superintendent, to McCarty, 20 Mar. 1916, in OCR File.

13. "Longest Riveted Simple Trusses Erected around Old Bridge by Cantilever Method," *Engineering Record* 72, No. 3 (17 July 1915): 82-84.

Acknowledgments

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Additional Sources

1. Milepost 1.90, region/division/branch 222223, aperture card files, Consolidated Rail Corp., Philadelphia, Pa. [transferred to Norfolk Southern Railway Co., Atlanta, Ga.].

2. "Builders' and Contractors' Engineering Plant No. CVI: Erection of the Ohio Connecting Railroad Bridge," *Engineering Record* 23, No. 2 (13 Dec. 1890): 25-27.

3. "False Works for Main Spans of Ohio Connecting Railway Bridge," *Engineering News and American Railway Journal* 24, No. 39 (27 Sep. 1890): 276.

4. "Floating a 523-ft. Bridge Span," *Railroad Gazette* 22, No. 34 (22 Aug. 1890): 579.

5. "Floating the Ohio Connecting Bridge," *Railroad Gazette* 22, No. 37 (12 Sep. 1890): 631-32.

6. "Floating the Ohio Connecting Railway Channel Span," *Engineering and Building Record* 22, No. 12 (23 Aug. 1890): 178.

7. "Ohio Connecting Railroad Bridge at Brunot's Island," *Engineering Record* 23, No. 3 (20 Dec. 1890): 40-41; No. 4 (27 Dec. 1890): 58-60; and No. 5 (5 Jan. 1891): 76-77.