BESSEMER & LAKE ERIE RAILROAD, ALLEGHENY RIVER BRIDGE
Pennsylvania Historic Railroad Bridges Recording Project
Spanning Allegheny River, east of Pennsylvania Turnpike (I-76)
Oakmont vic.
Allegheny County
Pennsylvania

HAER No. PA-508

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HISTORIC AMERICAN ENGINEERING RECORD
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HISTORIC AMERICAN ENGINEERING RECORD

BESSEMER & LAKE ERIE RAILROAD, ALLEGHENY RIVER BRIDGE

HAER No. PA-508

Location:	Spanning Allegheny River, east of Pennsylvania Turnpike (I-76), Oakmont vicinity, Allegheny County, Pennsylvania.
USGS Quadrangle:	New Kensington West, Pennsylvania (7.5-minute series).
UTM Coordinates:	17/599830/4487865
Dates of Construction:	1917-18.
Basis for Dating:	Secondary sources.
Designers:	H. T. Porter (Chief Engineer, Bessemer & Lake Erie Railroad) and C. G. E. Larsson (Assistant Chief Engineer, American Bridge Co.).
Fabricator:	American Bridge Co.
Builders:	Arthur McMullan Contracting Co. (New York), substructure; American Bridge Co., superstructure.
Present Owner:	Transtar, Incorporated.
Present Use:	Railroad bridge.
Structure Type:	Continuous deck truss.
Significance:	The Bessemer & Lake Erie Railroad bridge at Oakmont was designed by two U.S. Steel subsidiaries — the railroad and the American Bridge Company — as a showpiece for their parent company. This structure not only introduced new silicon steel to American bridge construction, but also helped revive continuous truss design.
Historian:	Justin M. Spivey, April 2000.
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

The two main ingredients for steel arrive at Pittsburgh mills from opposite directions: coke from the Monongahela River valley to the south, and iron ore from boats on Lake Erie to the north. The Bessemer & Lake Erie Railroad (B&LE) is among several routes built to connect Pittsburgh with the ore docks. Although known best for its association with steel magnate Andrew Carnegie, who reorganized the railroad under its present name in 1900, the B&LE has roots in the mid-nineteenth century.[1] The Shenango and Allegheny Railroad, incorporated in 1865 as the Bear Creek Railroad, constructed the first twenty-one miles of route in Mercer County. Later extensions brought the line south to Butler in 1883, and north to Conneaut Harbor, Ohio, in 1892, by which time it was known as the Pittsburgh, Shenango and Lake Erie (PS&LE).[2] The PS&LE depended on connections with other lines, however, to reach the first city in its name.

Carnegie's involvement officially began in April 1896, in backing construction of the Butler & Pittsburgh Railroad to provide a more direct connection to Pittsburgh's steel mills. Within eighteen months, this company constructed a line crossing the Allegheny River from Butler to reach East Pittsburgh. Upon completion, it merged with the PS&LE to form the Pittsburgh, Bessemer & Lake Erie Railroad (reorganized in 1900 as the B&LE). Carnegie sold the B&LE to the U.S. Steel Corporation in 1901. The B&LE and several connecting railroads carried ore for U.S. Steel and its successor, USX, for most of this century. In 1988, USX spun off its transportation subsidiary as Transtar, Incorporated, which operates the line at present.[3]

After its completion in 1897, traffic on the B&LE increased so rapidly that its single-track route soon became inadequate. As soon as 1900, *Railroad Gazette* was reporting on the railroad's growing pains, noting that its piecemeal route was not "well calculated to handle a heavy traffic with economy."[4] One major bottleneck was the Allegheny River Bridge, a 3,538'-2"-long, single-track structure that included 1,737'-0" of trestle approach on the north end. The B&LE announced in 1916 that it would soon replace the bridge with a record-setting double-track structure.[5]

The present bridge is actually shorter than its predecessor because the north trestle approach was buried in an embankment. Long continuous trusses replacing simple spans, however, garnered attention from the engineering press. The present structure is 2327'-2" long, all of which is deck truss except for one 60'-0" girder at the north end. Proceeding south from the girder, there is a 150'-0" simple truss, a three-span continuous truss (272'-0" over the river's north bank, then 349'-7" and 347'-1" over the back channel), and another three-span continuous truss (347'-1" over an island, 520'-1" over the main channel, and 272'-0" over the south bank). Truss depth varies in accordance with span length, with gracefully sloping bottom chords making the transition between different depths. The pier spacing is the same as its predecessor, except for piers A and B under the simple truss span.

Construction began in early 1916, with the erection of a parallel filling trestle, its towers interspersed with those of the existing bridge.[6] The filling trestle, rebuilt from another B&LE structure that formerly spanned Bull Creek at Culmerville, allowed the railroad to create the embankment without interrupting traffic on the main track. Expressing dismay at this apparent waste of steel, *Engineering News* remarked, "It is not often in any part of the country that a perfectly serviceable steel viaduct is treated in this way.... [Here] two such viaducts, side by side, are being buried."[7] The embankment, however, allowed U.S. Steel to dispose of 1.2 million cubic yards of slag from its mills, which may have outweighed the scrap value of the steel trestles.

Meanwhile, the New York contracting firm of Arthur McMullan began work on the piers. Anticipating double-tracking of the line, the B&LE had already built foundations wide enough for double-track piers. McMullan's crews simply extended the five main piers under the river spans to a width sufficient to carry the new double-track bridge alongside the existing single-track structure. At the embankment, however, the contractor had to build a new foundation and abutment pier (Pier A) to retain the fill. McMullan also constructed a new Pier B, which had to resist the uplift of the new continuous truss.[8] American Bridge Company fabricated the new superstructure and erected it atop the completed piers. The company used cantilever erection, working outward from the piers to meet at mid-span over the river channel. Old and new structures shared the piers until the new structure was completed and the old one removed. Crews then shifted the new structure sideways to occupy the center line of the piers.

C. G. E. Larsson, Assistant Chief Engineer of the American Bridge Company, another U.S. Steel subsidiary, collaborated with B&LE Chief Engineer H. T. Porter on the design. With the trusses continuous across two piers, train loads are distributed among the three spans, requiring less material than an equivalent series of simple spans. *Engineering News-Record* called the design "strikingly original" and a "sharp departure from prevailing practice," because it broke a lull in cantilever construction during the early twentieth century.[9] Larsson and Porter's success depended on several special features, including a counterweight block to resist uplift at the south abutment; extra-large rivets; and a new silicon steel used in high-strength eye-bars. The bridge was clearly intended as a showpiece for U.S. Steel.

Notes

1. Michael Bezilla, "Bessemer & Lake Erie Railroad," Keith L. Bryant, ed., *Encyclopedia of American Business History and Biography: Railroads in the Age of Regulation, 1900-1980* (New York: Facts on File, 1988), 31-2.

2. Transtar, Inc., "Bessemer & Lake Erie and Union Railroad Companies," April 2000. URL: http://www.tstarinc.com/bessemer-union/bessemer-history.html.

3. Ibid.

4. "The Bessemer Heavy Traffic Freight Route," *Railroad Gazette* 32, No. 51 (21 Dec. 1900): 846-7.

5. "To Replace Oakmont Bridge on Bessemer & Lake Erie Railroad," *Engineering Record* 73, No. 11 (11 Mar. 1916): 367.

6. "Begins Reconstruction of Allegheny River Bridge," *Engineering Record* 73, No. 23 (3 Jun. 1916): 744.

7. "Steel Viaduct Replaced by Fill Dumped from Second Steel Trestle," *Engineering News* 77, No. 8 (22 Feb. 1917): 322-3.

8. "Extending Piers for Double-Tracking B. & L. E. Allegheny River Bridge," *Engineering News* 77, No. 11 (15 Mar. 1917): 426-8.

9. "Continuous Trusses of Silicon Steel Feature New Allegheny River Bridge," *Engineering News-Record* 80, No. 18 (2 May 1918): 848. See also David B. Steinman, *Suspension Bridges and Cantilevers: Their Economic Proportions and Limiting Spans* (New York: Van Nostrand, 1913).

Acknowledgment

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Additional Sources

1. Richard Cook, *The Beauty of Railroad Bridges in North America, Then and Now* (San Marino, Calif.: Golden West Books, 1987): 76-7.

2. Milepost 63.49, region/division/branch 402211, aperture card files, Consolidated Rail Corp., Philadelphia, Pa. [transferred to Norfolk Southern Railway Co., Atlanta, Ga.].