

**Appendix B:**

**Bridge Builders and Designers Active in Maryland**

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The following companies and individuals are known to have designed and built bridges in Maryland, based on documentary research alone. Descriptive information on each company or person was compiled from several sources, including prior historic resource survey data, historical research materials, lists provided by Rita Suffness of the Maryland State Highway Administration, prior bridge inventories performed in Pennsylvania and Delaware, and Victor Darnell's *Directory of American Bridge Building Companies*.

### **A. and W. Denmead & Sons, Baltimore, Maryland**

This firm, located on the Canton waterfront of Baltimore, built bridges for Baltimore City during the 1850s.

### **A. J. Boyle, Baltimore, Maryland**

This firm built SHA bridge 3010, US 1 over the Patapsco River, in 1915.

### **American Bridge Company, Pittsburgh and Ambridge, Pennsylvania**

Founded in 1900, this massive bridge building company was the result of financier and U.S. Steel magnate J.P. Morgan's consolidation of twenty-eight formerly independent bridge companies, including several known to have marketed bridges in Maryland. In 1903, the American Bridge Company opened a huge new plant at Ambridge (Economy), Pennsylvania. Four additional companies, including the Toledo Bridge Company and the Virginia Bridge and Iron Company, were bought between 1901 and 1936.

American Bridge Company is known to have fabricated or built numerous bridges for the State Roads Commission between the 1920s and the 1960s.

### **Baltimore Bridge Company, Baltimore, Maryland**

Organized in 1869, this company was the direct successor to Smith, Latrobe and Company. The company was a major local competitor of Wendel Bollman's Patapsco Bridge Company and other Baltimore-based bridge building firms such as Campbell & Zell and H.A. Ramsay. Principals in the firm were the distinguished bridge engineers Charles Shaler Smith, Benjamin H. Latrobe, Jr., and his son Charles H. Latrobe. In 1876-1877, Smith built the nation's first high metal cantilever bridge, to carry the

Southern Railway over the Kentucky River. Charles H. Latrobe also served as chief engineer for the City of Baltimore's Jones' Falls Improvement Commission during the 1880s, and designed several truss bridges and three metal arch bridges for the city during his tenure.

### **Baltimore Ferro-Concrete Company, Baltimore, Maryland**

This firm constructed the Edmonson Avenue Bridge in Baltimore City, a multiple-span reinforced concrete arch bridge built between 1908 and 1910.

### **Bethlehem Steel Corporation, Bethlehem, Pennsylvania**

This mammoth steel corporation, engaged in many different steel-related manufacturing activities during the late nineteenth and twentieth centuries, is known to have built bridges in Maryland, such as the Paper Mill Road Bridge over the Gunpowder and the Deep Creek Bridge over Deep Creek Lake on U.S. 219 (MHT-G-III-B-028; no longer extant). One of the company's main plants was located at Sparrows Point, east of Baltimore City.

### **Buckey and Firestone, Frederick, Maryland**

This Frederick foundry built the Pedestrian Swinging Bridge (MHT-F-3-8), a suspension footbridge of iron, for the City of Frederick in 1885.

### **Campbell and Zell Company, Baltimore, Maryland**

This firm is known to have fabricated or built metal bridges in Maryland (primarily Baltimore City) during the late 1890s, including the fourteen-span plate girder Lexington Street-Douglas Street Bridge built for the city in 1892.

### **Charles Perring Company, Baltimore, Maryland**

This firm constructed the Cambridge movable span bridge over the Choptank River. The principle, Charles Perring, was listed in the 1937 "Who's Who in Engineering" as holding various bridge positions from 1898 to 1905 when he became the Chief Engineer for the Keystone Fireproofing Company in 1905. In 1910 he became associated with the firm, Barber and Perring, in Philadelphia. He was the Chief Engineer for the City of Baltimore from 1920 to 1928, and was consulting engineer from 1928 to 1941 in the firm of Perring and Remington.

### **Columbia Bridge Works, Dayton, Ohio**

This bridge company originated in 1848 as a builder of timber bridges under the management of D.H. and C.C. Morrison. Morrison received patents for his bridge design in 1858, 1867, and 1871. Bridges marketed by the firm included Pratt, Whipple, Triangular, and Arch Trusses, as well as several rigid suspension spans. The company was active until at least 1898. The company is reputed to have built the 1889 Devilbiss Bridge over the Monocacy River in Frederick County (MHT-F-3-2), a two-span pin-connected Pratt through truss, in conjunction with the Wrought Iron Bridge Company.

### **Fairchild Engineering and Airplane Corporation**

Harry Kahn of this firm designed the only aluminum bridge in Maryland, SHA bridge 13046 in 1961.

### **Forsyth, Thomas S.**

Built Bridge B4, the Jericho Covered Bridge (BA 361) over the Little Gunpowder River, in 1865. He was listed in Houston's 1867 city directory as a "machinist" at 116 North Bond Street, and listed in the 1877 patron list in Hopkin's atlas as a resident of Pikesville and still a machinist. He had moved there that year from his native Baltimore City.

### **Fort Pitt Bridge Company, Pittsburgh and Canonsburg, Pennsylvania**

The main office of this firm was located in Pittsburgh, but in 1894 the old Canonsburg shop of the Pittsburgh Architectural Iron Works were purchased. In 1933, the Fort Pitt Bridge Company bought the Massilon Bridge Company of Massilon, Ohio. The Fort Pitt company is known to have built the Rocks Bridge, a riveted Pratt through truss crossing Deer Creek and erected in 1934 (MHT-HA-1576).

### **Groton Bridge and Manufacturing Company, Groton, New York**

This company began in 1878 as the Groton Iron Bridge Company; its name was changed to Groton Bridge and Manufacturing Company in 1887 and then to Groton Bridge Company in 1901. In addition to metal bridges, the firm made woodworking machinery, straightening machines, and metal punches. The company was acquired by the American Bridge Company in 1900, but sold to its former owners in 1901. The firm continued to build bridges at least as late as 1914. Several pin-connected Pratt pony

trusses of the mid-1890s (MHT-F-3-5, MHT-F-4-5, and MHT-F-4-6) are known to have been fabricated or built by the Groton Bridge and Manufacturing Company in Maryland.

#### **H.A. Ramsay and Sons, Baltimore, Maryland**

This prominent Baltimore iron works was responsible for fabrication and construction of at least three Baltimore City metal truss bridges built under authority of the Jones' Falls Improvement Commission during 1881.

#### **Henry G. Perring Company, Baltimore, Maryland**

This firm, led by prominent Baltimore City civil engineer and sometime planning official Henry G. Perring, is known to have built at least one movable bridge for the State Roads Commission, Bridge 9008 carrying State Route 795 over Cambridge Creek, a double-leaf bascule flanked with six concrete girder spans and built in 1938.

#### **J.E. Greiner Company (later Greiner Engineering), Baltimore, Maryland**

This Maryland-based bridge design company was founded in 1908 by John Edwin Greiner, a distinguished bridge engineer who had previously specialized in railroad bridges for the Baltimore and Ohio Railroad and other railways. Led by Greiner and longtime associate Hershel Heathcote Allen, the J.E. Greiner Company designed many significant bridges for the State Roads Commission, including the 1916 Hanover Street Bridge, a Rall-type rolling lift bascule bridge; the Thomas J. Hatem Memorial Bridge and Governor Harry W. Nice Memorial Bridge, major Susquehanna and Potomac river crossings built in 1940; and the first Chesapeake Bay Bridge, built between 1947 and 1952. The latter three monumental bridges were built as a result of the state's acceptance of the Greiner firm's significant planning report, *Maryland's Primary Bridge Program*, completed in 1938 for the State Roads Commission.

#### **J.G. Clarke and Company (later Clarke Bridge Company), Baltimore, Maryland**

This Baltimore company is known to have built bridges between 1879 and 1883, for Baltimore City.

#### **J.L. Robinson Construction Company, Baltimore, Maryland**

Founded in 1912 by James L. Robinson, this company built several significant spans for Baltimore City between 1925 and 1935, including the Clifton Avenue Bridge, the Mount

Washington Viaduct, and the Forty-first Street Bridge. The firm was no longer in business after 1936.

### **Jones and Thorne, Baltimore, Maryland**

This company performed the masonry abutment construction for the Cedar Avenue Bridge in Baltimore City in 1889-1890.

### **King Iron Bridge and Manufacturing Company, Cleveland, Ohio**

The King Bridge Company was begun in 1858 by Zenas King, who had built iron bridges as well as timber spans and combination structures, designing his first all-iron bridge in 1859. In 1861, King patented a tubular arch bridge; in 1871, he incorporated his company, which by 1884 possessed the largest highway bridge works in the United States. In 1893, the name of the firm was changed to King Bridge Company; the company was active until several years after World War II. The King company is known to have built several pin-connected Pratt pony trusses and bowstring arch pony trusses in Maryland between 1870 and 1895, including the Waverly Street Bridge at Westernport, a bowstring through arch truss built in 1892 (HAER No. MD-83; no longer extant).

### **Lloyd Family and their associates, Chambersburg, Pennsylvania**

During the early nineteenth century, the Lloyd family of Chambersburg, Pennsylvania (north of Hagerstown, Maryland), were prominent master masons who built numerous stone arch bridges throughout western Maryland (primarily Washington County). James Lloyd, one of the family's most experienced masons, was also involved in the B&O Railroad's construction of the 1829 Carrollton Viaduct, a stone arch bridge that was the earliest railroad viaduct constructed in the United States. Associates of the Lloyd family included Silas Harry, John Weaver, and Jabez Kenney.

### **McClintic-Marshall Construction Company, Pittsburgh, Pennsylvania**

This significant twentieth century bridge building firm was founded in 1900 by Howard Hale McClintic and Charles Donnell Marshall, fellow Lehigh University graduates who had both been employed by Shiffler Bridge Works before that company was absorbed by the American Bridge Company. An independent firm until it became a division of Bethlehem Steel in 1931, McClintic-Marshall designed and fabricated structural steel components for numerous large-scale engineering and architectural projects, including the lock gates for Gatun Locks at the Panama Canal (1913), the steel supports for the dome of Pittsburgh's Cathedral of Learning, and the George Washington Bridge over the Hudson

at New York City (1929-1931). During the 1920s, the company was the world's largest independent steel fabricating firm, with numerous branch offices and plants throughout the United States. In 1924, the McClintic-Marshall company built the Glendale Road Bridge over Deep Creek Lake in Garrett County, a two-span Pennsylvania (Petit) truss with substruts (MHT-G-III-B-083; HAER No. MD-88). McClintic-Marshall also is known to have fabricated the 1913 Matthews Bridge, a two-span Parker truss crossing Loch Raven Reservoir (no longer extant), and the 1932 Fairview Bridge (MHT-WA-I-462), a riveted Pratt through truss in Washington County.

### **Murray and Hazelhurst, Baltimore, Maryland**

This company is known to have built bridges for Baltimore City between 1857 and 1869.

### **National Bridge Company, York, Pennsylvania**

Founded in 1902, this was the first company formed by Daniel B. Luten, whose concrete arch designs attained prominence and popularity throughout the eastern United States between 1900 and 1930. An 1894 civil engineering graduate of the University of Michigan who was influenced by the City Beautiful movement, Luten held more than thirty bridge-related patents, including ones for a "Highway Bridge of Plain Design" and a "Park Bridge of Attractive Design." By 1907, according to a company catalog, Luten's firm had designed more than 700 bridges; by 1919, some 17,000 spans had been designed by the company. Luten's firm is known to have built a number of reinforced concrete arches, to Luten designs, in Maryland.

### **Nelson & Buchanan (also Gilbert & Nelson and Nelson Construction Company), Chambersburg, Pennsylvania**

Nelson & Buchanan were agents for the Pittsburg Bridge Company until about 1900, when they began a series of independent bridge companies. The Nelson Construction Company is known to have built early reinforced concrete arch bridges in Washington County Maryland, between 1906 and 1910.

### **Palmer and Lambdin**

This firm built SHA bridge 3071 in 1947.

### **Patapsco Bridge and Iron Works, Baltimore, Maryland**

This was Wendel Bollman's second independent firm and was the direct successor to W. Bollman and Company. The Patapsco Bridge Company was formed in 1865 by Bollman and built numerous bridges in Maryland and throughout the United States until the company was dissolved upon Bollman's death in 1884. The only known extant Bollman truss bridge built by the firm is the nationally significant Bollman truss at Savage, Maryland.

### **Penn Bridge Company, Beaver Falls, Pennsylvania**

This firm was organized in 1868 by T.B. White & Sons, with its original plant at New Brighton, Pennsylvania. In 1878, the bridge works were moved to Beaver Falls; the firm was reorganized and incorporated as the Penn Bridge Company in 1887. In Maryland, Penn Bridge Company may possibly have built the 1878 Poffenberger Road Bridge crossing Catoctin Creek in Frederick County, a Double-Intersection Pratt truss span (MHT-F-2-5, Bridge # F-2203).

### **Pennsylvania Steel Company, Steelton, Pennsylvania**

This firm is known to have built a riveted Pratt through truss for the Western Maryland Railroad in 1905, to cross the C&O Canal near Kiefers, and the Bush River Bridge, a single-leaf bascule span built in 1913 for the Philadelphia, Baltimore and Wilmington Railroad (photographed for HAER No. MD-45, Northeast Railroad Corridor Recordation).

### **Phoenix Bridge Company, Phoenixville, Pennsylvania**

This firm built the Baltimore City bridge BC6510 for the Baltimore Department of Public Works for the Loch Raven Reservoir in 1922.

It was formed in 1884 from Clarke, Reeves and Company, a Philadelphia firm, which was formed in 1870 by Thomas C. Clarke and the Reeves Company which controlled the Phoenix Iron Company. When Clarke left in 1884, the company was succeeded by the Phoenix Bridge Company. The company is known to have published its "Album of Designs" in 1870, 1873, 1884, 1885, and 1888; however, it was probably an annual issue. Phoenix was a vertical operation, from smelting its own ore to designing and erecting its own bridges. The firm favored the through or high Pratt and Whipple truss systems and patented a compression member called the Phoenix column, which was a series of vertical segments riveted together and forming a cylindrical column. The company primarily built railroad bridges but not exclusively. An unattributed advertisement boasted a rather comprehensive repertoire, being "engineers and builders

of bridges, viaducts, roofs, turntables, elevated railroads, ocean piers, and all structures of iron and steel." Poors' Directory (1887) listed David Reeves as president and W. H. Reeves as superintendent. The "Album of Designs" for 1888 listed Adolphus Bonzano as chief engineer and contained an extensive list of constructed bridges. It is also of interest that James A. L. Waddell, noted bridge engineer and historian, worked for Phoenix between 1886 and 1892.

### **Pittsburg Bridge Company, Pittsburgh, Pennsylvania**

This company was established in 1878, incorporated in 1881, and was a major manufacturer of metal truss bridges prior to its absorption by the American Bridge Company in 1900 (the Pittsburg Bridge Company, though a division of American Bridge, operated under its own name as late as 1903). The Pittsburg Bridge Company is known to have fabricated and built the Old Mill Road Bridge over Owens Creek in Frederick County, an 1882 pin-connected Pratt through truss (MHT-F-6-2).

### **Roanoke Iron and Bridge Company (also Roanoke Bridge Company), Roanoke, Virginia**

This firm, which built primarily metal truss bridges, was organized in 1906 and merged with the Camden Iron Works of Salem, Virginia, in 1914. During the 1920s and 1930s, the Roanoke Iron and Bridge Company built several spans under State Roads Commission auspices, including the 1923 Patuxent River Bridge carrying State Route 214 (MHT-AA-761), a riveted Camelback through truss, and two 1932 Camelback pony truss bridges (MHT-CE-999 and MHT-HA-1577).

### **Smith Bridge Company (later Toledo Bridge Company), Toledo, Ohio**

This company was founded by Robert W. Smith in 1867, initially to manufacture Smith's patented pre-cut timber trusses. By 1875, Smith Bridge Company had begun building and heavily marketing wrought iron truss bridges, although the firm continued to advertise its capabilities in timber and combination timber-and-iron design and fabrication. Smith sold the company in 1890 and its name was changed to Toledo Bridge Company. In 1901, the firm was one of twenty-eight bridge companies consolidated by J.P. Morgan to form the American Bridge Company. The Smith Bridge Company, and the Toledo Bridge Company, built several Pratt trusses in Maryland during the late nineteenth century.

### **Smith, Latrobe and Company, Baltimore, Maryland**

This firm was organized in 1866 by distinguished bridge engineers Charles Shaler Smith and Benjamin H. Latrobe, Jr. In 1869, the firm became the Baltimore Bridge Company.

### **Strobel Steel Construction Company, Chicago, Illinois**

The Strobel Company provided the Rall-type rolling lift bascule machinery for use on the 1916 Hanover Street Bridge, built by J.E. Greiner Company for the State Roads Commission.

### **Valentine Shockey Ironworks, Cumberland, Maryland**

This Cumberland area ironworks built an iron cable suspension bridge over Will's Creek in 1820, to a design by suspension bridge pioneer James Finley.

### **Vincennes Bridge Company, Vincennes, Indiana**

This Indiana company is known to have designed and built the Westernport Bridge, a riveted Pratt through truss at Westernport, Maryland, crossing the Potomac River, between 1910 and 1923 (MHT-AL-VI-D-227).

### **W. Bollman and Company (later Patapsco Bridge Company), Baltimore, Maryland**

Based in Baltimore, this highly significant bridge building company was founded in 1858 by former B&O master of road Wendel Bollman, to market his patented Bollman truss (patented 1851-1852) as well as other proprietary or patented bridges such as the Pratt truss. Bollman joined John Clark and John H. Tegmeyer as partners in the firm (Tegmeyer had advertized the Bollman truss as early as 1855 in trade periodicals). W. Bollman and Company was active in building metal truss bridges for the B&O until the firm was reorganized in 1865 as the Patapsco Bridge Company (see reference).

### **Waddell and Hardesty, New York, New York**

This firm was the third successor of a bridge firm founded in 1887 by noted bridge engineer and historian of civil engineering, J. A. L. Waddell. In existence from 1927 to 1945 as Waddell and Hardesty, the firm developed the vertical lift bridge as a specialty. This firm is responsible for Bridge 2053, which carries Maryland 181 over Spa Creek in Annapolis, Maryland. Bridge 17006, Maryland 18 over Kent Narrows, was designed in

1952 by the seventh generation firm, Hardesty and Hanover. Both bridges are Chicago trunnion bascule bridges.

### **Wrought Iron Bridge Company, Canton, Ohio**

Organized in 1864 by David Hammond and incorporated in 1871, the Wrought Iron Bridge Company heavily marketed a patented metal arch-truss bridge throughout the eastern United States. Job Abbott, who joined the firm in 1872, later organized the Toronto Bridge Company and the Dominion Bridge Company of Canada. In 1874, the firm published its *Book of Designs*, which included a patented "Hammond and Abbott Arch Bridge." One of the leading metal bridge manufacturers in the nation during the latter part of the nineteenth century, the Wrought Iron Bridge Company was a strenuous advocate of the advantages of wrought iron bridges over timber or cast iron spans. The Wrought Iron Bridge Company was taken over by the American Bridge Company in 1900. The Wrought Iron Bridge Company is known to have built several Pratt through trusses in Maryland during the late nineteenth century.

### **York Bridge Company, York, Pennsylvania**

This company, formed circa 1900, was a successful marketer of metal truss bridges to Maryland state and county officials during the first two decades of the twentieth century, building both Pratt through trusses and Pratt pony spans.

### **Youngstown Bridge Company, Youngstown, Ohio**

The firm known as Morse Bridge Company operated from 1878 to ca. 1888 when the name was changed to the Youngstown Bridge Company. It advertised in Engineering News as producing "bridges and buildings". In operation until 1900, when it was absorbed by the American Bridge Company, the firm built Waverly Street Bridge over George's Creek in Westernport, Allegany County, in 1891.