
BRIDGE COMPANIES



Luten Bridge Brochure Pages:
 Bridge companies such as Luten Bridge mailed or personally delivered brochures, pamphlets, and postcards to potential clients such as county or city governments in an effort to procure contracts. This image shows the frontispiece of a 1921, leather-bound, Luten promotional calendar and address book (Author's Collection).

The Luten Bridge Company was one of the most prolific builders of concrete arch bridges in Tennessee. The Harriman Bridge, a seven span closed spandrel arch built in 1918, is typical of Luten's work (Author's Collection).

**LUTEN BRIDGE
COMPANY**


DESIGNERS and BUILDERS of
RE-INFORCED
CONCRETE
BRIDGES

❧

**Plans and Estimates
Furnished Free**

❧

OFFICES:
 YORK, PA.
 CLARKSBURG, W. VA.
 HUNTINGTON, W. VA.
 ATLANTA, GA.
 PALATKA, FLA.



Bridge over Tygart's Valley River at Grafton, W. Va. — Consisting of 6 spans with 18 ft. roadway and one 7 ft. sidewalk. Built by Luten Bridge Company for the County Court of Taylor County, W. Va. Steel trolley bridge in background.



BRIDGE COMPANIES

In the early nineteenth century, local builders or engineers built most bridges. However, formal bridge companies began to appear in the mid-1800s. Although only a handful existed by 1870, from then until the end of the century, a plethora of companies flourished in the United States. In 1901 twenty-eight bridge and structural companies consolidated to form the American Bridge Company, becoming one of the largest bridge companies in the country. In 1902, American Bridge consolidated with nine other firms to form the United States Steel Corporation. Although a number of national and regional companies continued to operate, the heyday of experimentation and enterprising start-up companies effectively ended. In the 1910s, the federal review process for bridge construction and standardized bridge plans further changed the industry. Still, numerous bridge companies continued to provide structural steel and construction teams for highway projects until the Great Depression. In the 1930s, a combination of factors that included bank closures, the reduction in road and bridge construction, and changing trends in the field resulted in the demise of most of the bridge companies in the United States. Those companies that did survive the Great Depression did so because they changed and adapted. Often they maintained only a passing resemblance to the firms they had been twenty or thirty years earlier, and sometimes, only the retention of the name.

A large number of the early nineteenth century companies, typically based in the Eastern United States, practiced in Tennessee and several kept branch offices in the state. A few well known national firms such as the King Iron Bridge Company, the Wrought Iron Bridge Company, the American Bridge Company, the Groton Bridge Company, the Champion Bridge Company, or the Luten Bridge Company maintained branch offices in the state. Many smaller firms also had representatives who traveled through the state bidding on bridge projects. These firms included the Youngstown Bridge Company, the Southern Bridge Company, the Cotton States Bridge Company, the Austin Brothers Bridge Company, the Penn Bridge Company, the Brackett Bridge Company, the Indiana Bridge Company, the New Columbus Bridge Company, and the Joliet Bridge and Iron Company.

No major bridge building companies originated in Tennessee in the nineteenth century. Local contractors or out-of-state bridge companies, some that had branch offices in the region, built most of Tennessee's bridges dating from the nineteenth century. From about 1890 through 1910, a number of small Tennessee companies worked for a few years and then vanished. Often the founders of these companies had worked for large out-of-state firms before forming their own companies, either on their own initiative or after losing their job as a result of the American Bridge Company (U.S. Steel) consolidation in 1901. Although the formation of the American Bridge Company eliminated many firms, in a certain sense, it created favorable conditions for a few local companies to operate (who in some cases probably made arrangements to purchase their steel from U.S. Steel).

**Cotton States
Bridge Co.**
OF ATLANTA, GA.
Division Office, NASHVILLE, TENNESSEE.

We design and build all classes of Steel Bridges, Tanks and Towers, and Steel Structural Work.
If you need a bridge write us and we will show you how to get it and tell you what it will cost. Write and get posted. It costs little and is worth much.

COTTON STATES BRIDGE CO.,
W. T. YOUNG, MGR.,
NASHVILLE, TENN.

Figure III-01, Bridge Company Advertisements: An advertisement for the Cotton States Bridge Company (left) in the *Carthage Post* newspaper (11 June 1903); and a postcard from the National Bridge Company (center) regarding its Luten patents which was mailed to county commissioners; paid advertisement (bottom) in the Chattanooga City Directory for the Converse Bridge Company (Author's Collection).



CONVERSE BRIDGE & STEEL CO.
CHATTANOOGA, TENN.

Designers, Fabricators, Erectors of
***Structural Steel for
Bridges and Buildings***

☐ Estimates furnished on request. ☐ Prompt shipment of Plain or Fabricated Material from stock.

HIGHWAY BRIDGES A SPECIALTY

In Tennessee two major companies existed that specialized in metal truss bridges. The Converse Bridge Company, based in Chattanooga, operated from about 1890 until the Depression. The Nashville Bridge Company, formed by Arthur Dyer in 1902, was far more prolific and played a pivotal role in bridge building in the Southeast. Dyer had served as an agent for some of the companies acquired by the American Bridge Company and used their demise to launch his own company. Major floods in 1901 and 1902, which destroyed many bridges in the state, were an economic boon to Dyer and his new company, though not to the counties. With an immediate need for numerous bridges, coupled with the diminished competition, Dyer's company was well positioned to enjoy rapid growth.

One major Tennessee bridge company specialized in concrete arch bridges. John Steel, initially in partnership with Otto Roehl as the Roehl and Steel Company, began a firm in Knoxville in the late 1910s. About 1925 Roehl pursued other business interests, and Steel entered a partnership with Thomas Lebby. The firm of Steel and Lebby built many bridges in the Southeast before going out of business during the Depression.

Until the formation of individual state highway departments in the 1910s, no overall system for federal control or guidance in road and bridge construction existed. Thus, counties or municipalities, generally through their quarterly or county courts, determined the selection of a bridge company and supervised construction. Since these officials were usually local farmers or businessmen who served on the court part time, their expertise was limited to what they had gained from practical experience with on-going bridge projects. Only a few counties employed an engineer on their staff to design bridges or to supervise the erection of a bridge by a bridge company.

From the mid-1800s until the 1910s, bridge companies used a variety of methods to bring their products and services to the attention of local officials. Companies advertised in publications such as city directories or professional journals. Bridge companies mailed catalogs to local officials or hand delivered them to court members on county court meeting days. Building from catalogs was so prevalent, historians sometimes call the period from the mid-1800s until the 1910s the "catalog bridge" period. These catalogs contained drawings or photographs of bridges the company had erected. They usually depicted different types of bridges and explained which were appropriate for certain lengths and applications.

An engineer who worked for the Luten Bridge Company in the 1920s provided the following description of how the Luten Bridge Company operated. It is typical of most companies:

They would send a representative out to the various Counties on County Court days--he would show a few photos as specimens of their work. They would visit a site where a County needed a bridge and would propose a concrete arch or series of arches from here to here and so many feet in width good for so many tons for a flat sum of so many dollars. They would start on the structure immediately and build it in a short time (Breedon 1975).

Often, a county advertised it needed a bridge built at a general site and bridge companies then bid on the project. Since most counties did not employ engineers, each bidder commonly selected the exact site and proposed a design for the bridge. After about 1910, companies frequently offered plans for both truss and concrete arch bridges for the court's selection. The County Court, or the bridge committee acting on behalf of the court, made its selection and

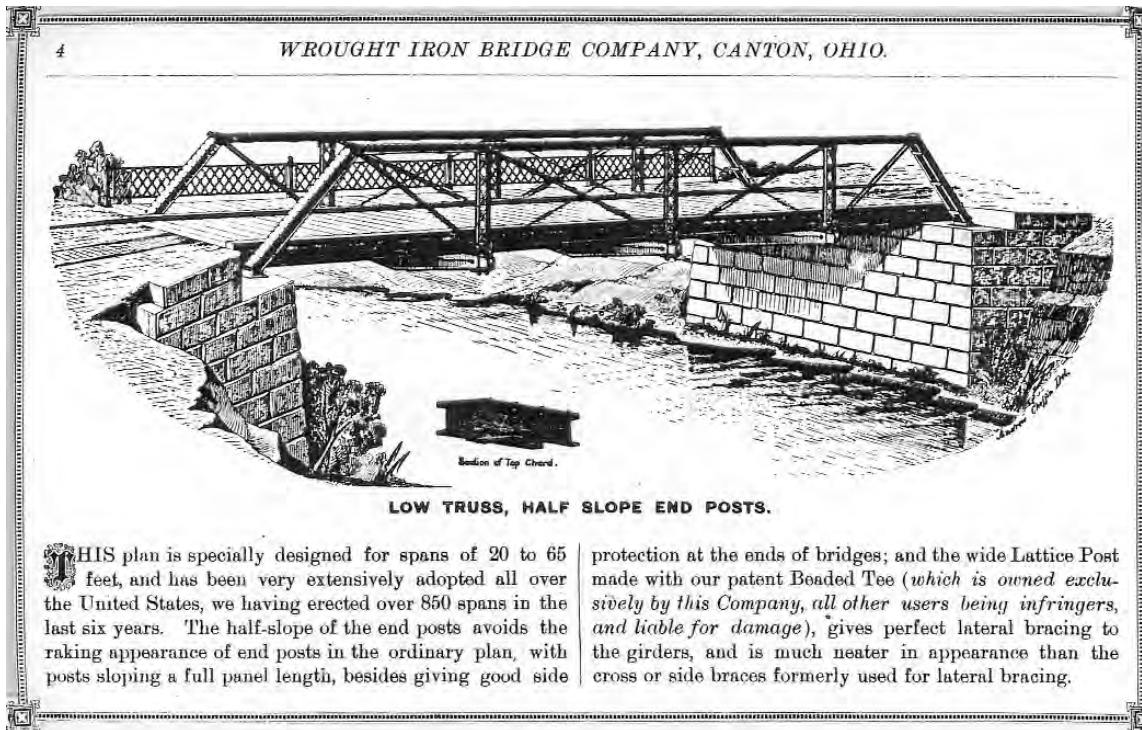


Figure III-02: An ad for a Pratt Half-hip pony truss from a Wrought Iron Bridge Company catalog published in 1883 (Tennessee State Library and Archives).

awarded a contract to the successful bidder. For a truss bridge, the company normally fabricated the truss members at its shops and sent them by rail to the closest stop and then by wagon to the proposed bridge site. The fabricator usually sent an erection plan that showed each bridge part keyed with a letter or figure explaining the assembly of the trusses and the erection of the span. The local agent supervised the erection of the bridge, usually hiring local labor (Kentucky 1982:19-20). Many Tennessee counties commonly awarded several subsequent contracts to a bridge company after it had satisfactorily completed the construction of a bridge.

Sometimes, counties erected larger scale bridges following a different procedure. For such bridges, counties or municipalities usually hired an engineer to design the bridge and then awarded a separate contract to a bridge company for its fabrication and erection. The county might contract the substructure separately, and it was not unheard of to have different companies responsible for the fabrication and the erection of the trusses.

During the late nineteenth century, diverse bridge companies actively vied to take the lead in the relatively new industry of metal truss bridge construction. This time was a period of intense competition, and many companies experimented with designs for truss types and individual components. Often these specialized designs became associated with a specific

PLEASE WRITE US ABOUT ANY BRIDGE WORK NEEDED

Austin Brothers Bridge Co., Atlanta, Ga.

Kind of bridge wanted..... Length of bridge..... Width of roadway.....

Are plans on file?..... Do you desire us to make plans.....? Hauling distance.....

Name of railway station to ship to..... Name of stream to be bridged.....

Is there a bridge at the location?..... Name of ferry or bridge.....

Is it to be a State Highway bridge?..... Date of next meeting of your board.....

Will you consider purchasing materials or contracting for building the bridge then?.....

Place of meeting..... Height of bridge above water..... Depth of water.....

Are the piers wanted..... Date of letting.....

Other information.....

.....

.....

.....

Have you any steel bridges not used and that you would like to have moved to a new location or that you wish to dispose of?

.....

.....

.....

Have you a stream that your county is not able to bridge on account of its size and cost and which you would like to have some one build and own and operate a toll bridge over?

.....

.....

.....

Have you any steel bridges with wooden stringers or wood trestle approaches that need to have steel stringers and steel trestle that you would like to have us estimate the cost of repairing?

.....

.....

Do you need some steel beam spans for short bridges? If so, please give the lengths and widths of roadway desired:

.....

.....

We build steel spans, steel cylinder piers, concrete piers, steel trestle bridges. We strengthen old bridges, furnish steel floor runners or treads and sell steel rods for concrete bridges. We make plans and estimates for bridges without charge.

.....

.....

.....

Name Post Office

County of State of

Official Title Date

49854

Figure III-03: One page flyer that the Austin Brothers Bridge Company circulated to county officials asking them to "please write us about any bridge work needed" (On file, TDOT).

CONTRACT

THIS AGREEMENT, made this 14th day of August, A. D., 1913

by and between VINCENNES BRIDGE COMPANY, of Vincennes, Indiana, party of the first part, and

Lincoln County Bridge Committee

of Lincoln County, State of Indiana, party of second part

WITNESSETH, that the party of the first part, for the consideration hereinafter mentioned,

agrees to furnish all material and build and construct for said party of the

second part one bridge over the creek at the mouth of the creek in Lincoln County, Indiana

[Handwritten notes and specifications follow, including details about bridge length, width, and location.]

and have the same completed on or before 1st day of September, A. D., 1913.

Said work shall be done in accordance with the plans and specifications hereunto attached, which are hereby made a part of this contract.

In consideration of the foregoing, materials to be furnished and work executed by said party of the first part, said party of the second part hereby agrees to pay said party of the first part the

sum of Five hundred and no/100 Dollars (\$500.00)

in the following manner, to-wit:

1913 (\$100), (\$100) and (\$300)

payable at the office of said company, Vincennes, Indiana.

And for the faithful performance of all and every article and agreement above mentioned, the parties hereto do hereby bind themselves and their successors each to the other firmly by these presents.

It is further agreed, by and between the parties hereto, that should the weather or condition of said stream be such as to prevent the completion of said work within the time above specified, or should the same be delayed by failure of the railroads to transport any portion thereof within such time, or from strikes or any other cause or causes beyond the control of said party of the first part, then the time for the fulfillment of this contract shall be extended for a period not less than that caused by such delay.

IN WITNESS WHEREOF, the said parties of the first and second parts have hereunto affixed

their hands and seals. Signed this 14th day of August, A. D., 1913

[Handwritten signatures and names of the bridge committee members.]

VINCENNES BRIDGE COMPANY
By [Signature]

Figure III-04: Bridge Contract for typical rural bridge in the early 1900s. Note that this is a one-page form with fill-in-the-blanks and a signature block (Lincoln County Contract Box).

company. Companies regularly used a specific decorative element--almost as a visual trademark and under some circumstances nearly as identifiable as a bridge plate. From these features, historians can sometimes determine which bridge company was responsible for erecting a bridge even in the absence of other information.

However, agents for these companies moved from company to company and occasionally started their own firms, frequently reusing specific features or motifs originally associated with another company. Gradually, experimentation and advances in bridge engineering eliminated many of the less efficient truss designs. The competitive bidding process that favored standards designs which could be produced cheaply resulted in the Pratt and Warren trusses and their variations dominating the metal truss bridge industry. By the early 1900s, bridge companies rarely if ever used patented elements previously associated with specific companies and increasingly simplified or eliminated decorative items.

Experimentation and individuality further declined when the American Bridge Company, a subsidiary of the U.S. Steel Corporation, absorbed many early companies between 1901 and 1903. Because of its size, this company dominated the bridge building industry, either through direct construction or by providing structural steel to other companies. In the early 1900s this company controlled ninety percent of the bridge tonnage in the United States (Kentucky 1982:20). Even so, numerous bridge companies continued to practice, although they often bought their steel from U.S. Steel.

The industry underwent a significant change in the late 1910s. The Federal Aid Act of 1916 allocated \$75 million to be spent under the direction of the Secretary of Agriculture over five years, but only through suitably equipped and organized state highway departments--thus compelling the few states without such agencies to organize them in order to receive federal aid for highway construction. By 1917, state highway departments existed in every state (McDonald 1928:1196). Each state highway department chose which road improvements to fund, conducted the surveys, developed plans, let the contracts, and supervised construction. In Tennessee, the state highway department designed virtually all bridges on its state route system. However, the Federal Bureau of Public Roads had review and approval authority over all of the state work. This federal review process, at least in part, led to the development of standard procedures and standard plans on file with each state highway department. These standard plans led to the demise of the "catalog bridge" period. In the 1920s, bridge companies accordingly altered their role to increasingly fabricate bridge components and erect bridges according to each state's standard designs. In addition, the bridge companies continued to design and fabricate bridges for counties on non-state system roads, typically smaller and less important structures.

However, the Great Depression resulted in the closure of most of these firms. The Steel and Lebbly firm exemplifies this change in the industry. A bank collapse in 1933 bankrupted the firm of Steel and Lebbly. Steel farmed for a short time and then worked for the V. L. Nicholson Company, a Knoxville contractor. In 1935 Thomas Lebbly applied to the Tennessee Valley Authority (TVA) for full or part time work of any nature. Lebbly's application stated that for the past ten years, his firm had maintained a large crew of up to 300 men working on bridges over the entire South and that his annual salary had been \$10,000. On his resume, as the "Cause for Leaving" the firm of Steel and Lebbly, Lebbly grimly wrote "DEPRESSION." Due to Lebbly's previous construction and bridge experience, TVA hired him to supervise construction work on the relocation of roads and bridges in the Norris and Wheeler Reservoirs at an

annual salary of \$4,500. Although his salary was less than half of what it had been about 1930, Leppy was one of the fortunate few who landed relatively good jobs in the construction field.

A few bridge companies diversified their workload and survived. The Nashville Bridge Company was one of the more successful firms following this trend. Beginning in 1915, the company had expanded into marine construction, building ship parts and barges. During the 1930s when most bridge companies across the country simply disappeared, the Nashville Bridge Company survived in large part due to its diversified interests in marine production. During this period, it also provided steel for and erected many state highway department bridges. In the 1940s, the company thrived as a result of World War II related contracts. Over the years, the Nashville Bridge Company decreased its bridge building and expanded its marine department and became a nationally recognized leader in the design and construction of towboats and barges before selling its bridge building component in 1972.

A brief historical discussion of bridge companies that have extant bridges in Tennessee follows. Bridge companies are arranged alphabetically. Very little information could be obtained about some of the individual bridge builders. Information about some of these builders is included in the individual bridge assessments contained in Chapter Six. The text for each bridge company includes a list of bridges, arranged chronologically, attributed to that company. The lists are not complete, as these firms may have built many other bridges in the state that are either no longer extant or that historians could not attribute them to a company through physical evidence or research. The list does not include firms such as the Memphis Bridge Company that practiced in Tennessee but which have no known remaining examples of their work in the state.

Different builders or companies were sometimes responsible for the design, fabrication, erection, or the substructure of a bridge. In this study, the author assigned a bridge to a specific company based on bridge plaques, research, or plans. A lack of complete knowledge about all the bridges may result in some inconsistencies, for example, assigning a bridge to the designer Tennessee State Highway Department based on plans rather than the actual fabricator (for example, Nashville Bridge Company) while assigning another bridge to the fabricator based on a plaque.

AMERICAN BRIDGE COMPANY, NEW

JERSEY: Around the turn of the century, business consolidations became a common practice. Mergers occurred in railroads, meat-packing, coal, leather, lumber, sugar, and other industries. Through such mergers, a single company could increase productivity and eliminate competition. One of the richest men in the United States and one of the country's leading industrialists, J. Pierpont Morgan, followed this trend. Morgan initiated a merger of bridge companies that resulted in the incorporation of



the American Bridge Company in New Jersey in May of 1900 under Percival Roberts, Jr. This company complemented Morgan's numerous holdings in the steel industry and, in an age of monopolistic business practices, assured the American Bridge Company a large market.

The formation of the American Bridge Company consolidated twenty-eight bridge and structural companies. Many of these companies had been leading bridge innovators of the late nineteenth century. Advancements in engineering practices had begun to eliminate experimentation in metal truss construction by the 1890s. However, the consolidation of these companies no doubt contributed to the end of an era of bridge design known for its plethora of aggressively competitive companies that featured innovative bridge designs and patented features. The formation of this company, through the elimination of many significant and innovative nineteenth century bridge companies, dramatically altered bridge building in the United States.

Company records provide the following information about the twenty-eight companies that formed American Bridge (Rowles 1984):

- AMERICAN BRIDGE WORKS, Chicago, Illinois. Axle Works closed in 1911; plant closed in May 1932, sold in 1937.
- BERLIN IRON BRIDGE COMPANY, East Berlin, Connecticut. Closed January 1909, property sold.
- BUFFALO BRIDGE COMPANY, Buffalo, New York. Closed April 1903, property sold.
- DETROIT BRIDGE AND IRON COMPANY, Detroit, Michigan. Closed November 1920 and part of property sold; all buildings demolished.
- EDGE MOOR BRIDGE COMPANY, Edge Moor, Delaware. Eyebars Plant dismantled in 1901; Plant closed April 1921, property sold.
- ELMIRA BRIDGE COMPANY (North Shop), Elmira Heights, New York. Continued in operation.
- GROTON BRIDGE COMPANY, Groton, New York. Closed September 1901 and property sold.
- GILLETTE-HERZOG MANUFACTURING COMPANY, Minneapolis, Minnesota. Iron Foundry closed in December 1905, continued in operation.
- HILTON BRIDGE COMPANY, Albany, New York. Closed February 1904 and property sold.
- HORSEHEADS BRIDGE COMPANY, Horseheads, New York. Closed April 1904 and property sold.
- KEYSTONE BRIDGE COMPANY, Pittsburg, Pennsylvania. (Eye-Bar Plant and Iron Foundry included.) Plant closed December 1904; part of the property sold; Tower Plant and Erection Tool House on site of the Keystone Shops.
- KOKEN IRON WORKS, St. Louis, Missouri. Iron Foundry closed in March 1908; plant closed 1928 and property sold.
- LASSIG BRIDGE AND IRON COMPANY, Chicago, Illinois. Closed October 1928 and property sold.
- LAFAYETTE BRIDGE COMPANY, Lafayette, Indiana. Closed April 1904 and property sold.
- MILWAUKEE BRIDGE COMPANY, Milwaukee, Wisconsin. Closed December 1909; Destroyed by fire and property sold.
- NEW JERSEY STEEL AND IRON COMPANY, Trenton, New Jersey. The Rolling

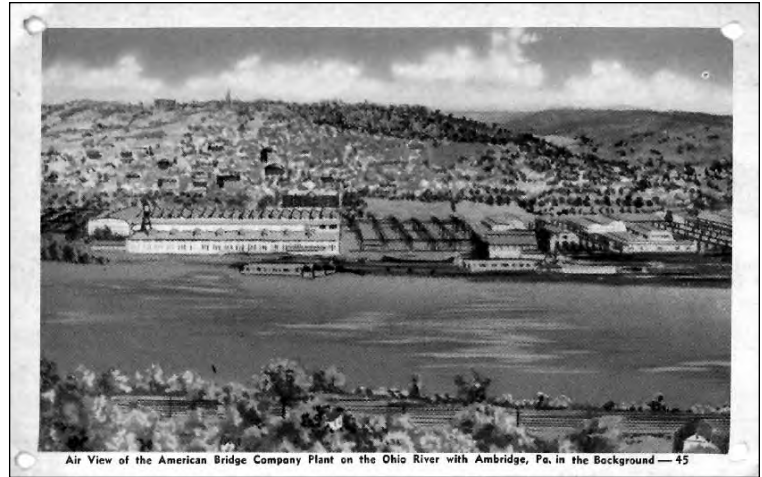
- Mills were dismantled in 1901; Bridge Plant continued in operation.
- PENCOYD IRON WORKS (A. & P. Roberts Company), Pencoysd, Pennsylvania. Eye-Bar Plant dismantled in 1903; Iron Foundry closed in February 1927; Property sold to Carnegie-Illinois Steel Corporation on 1 March 1937; Bridge Shop equipment retained, Bridge Shop Building leased from Carnegie-Illinois Steel Corporation.
- POST AND McCORD, Brooklyn, New York. Closed December 1915; Buildings demolished and lease of property relinquished.
- PITTSBURGH BRIDGE COMPANY, Pittsburg, Pennsylvania. Closed December 1903 and property sold.
- ROCHESTER BRIDGE COMPANY, Rochester, New York. Closed March 1903 and property sold.
- SCHULTZ BRIDGE COMPANY, McKees Rocks, Pennsylvania. Destroyed by fire February 1903; on leased ground, Not rebuilt.
- SHIFFLER BRIDGE COMPANY (48th Street Plant), West Homestead, Pennsylvania. Closed June 1921 and property sold.
- SHIFFLER BRIDGE COMPANY (Walker Works), West Homestead, Pennsylvania. Closed March 1904 and property sold.
- TOLEDO BRIDGE COMPANY (Old Plant), Toledo, Ohio. Closed November 1901 and property sold.
- TOLEDO BRIDGE COMPANY (New Plant), Toledo, Ohio. Closed temporarily.
- UNION BRIDGE COMPANY, Athens, Pennsylvania. (Iron Foundry included.) Eye-Bar Plant dismantled in 1901; Plant closed December 1907 and property sold.
- WROUGHT IRON BRIDGE COMPANY, Canton, Ohio. Closed November 1930 and property sold.
- YOUNGSTOWN BRIDGE COMPANY, Youngstown, Ohio. Closed April 1904 and property sold.

In addition to the above, there were two small plants at New Decatur, Alabama; and Fort Worth, Texas, which were not operated after the formation of the American Bridge Company, and the properties were sold.

Of the plants above mentioned, those at Pencoysd, Trenton, Edge Moor, Athens, Elmira, Pittsburgh (Keystone), Toledo (New Plant), Detroit and Chicago (Lassig) were equipped for the fabrication of railroad bridge work, as well as other heavy types of bridge and structural material to meet the demands of that time. The remainder of the shops were equipped only for highway bridge and light structural work.

Within a year of its own creation, the American Bridge Company merged with other concerns to form the United States Steel Corporation, perhaps the most spectacular illustration of business mergers of this era. Morgan controlled a number of companies engaged in the manufacture of steel products, encompassing eight production companies that included the American Bridge Company. For several years, these companies had purchased their steel from concerns owned by Andrew Carnegie. However, Morgan expanded the scope of his empire by financing the Federal Steel Company of Illinois, a firm that competed with Carnegie in the production of heavy steel. This action placed the empires of these two extraordinarily rich industrialists on a collision course. After negotiations, Carnegie, who was ready to retire and spend more time on his philanthropic activities, agreed to sell his interests to Morgan. The United States Steel Corporation, the world's first billion dollar corporation, emerged from this

Figure III-05: Historic Postcard of the American Bridge Company Plant in Pennsylvania (Author's Collection).



decision. Although the United States Steel Corporation had business rivals, it dominated the industry and practiced extensively around the world. The American Bridge Company continued to operate under its own name as a division of United States Steel.

The American Bridge Company had a branch office in Nashville in 1902-03. H.T. Sinnott, who had formerly been an agent with the Youngstown Bridge Company, and W.T. Young, who had formerly worked as an agent for the Groton Bridge Company, served as agents. Both men established their own firms in 1903, and the Nashville City Directories ceased carrying a listing for the American Bridge Company (Cotter 1916; Fisher 1951; Nashville City Directories; Rowles 1984; Wiebel 1960).

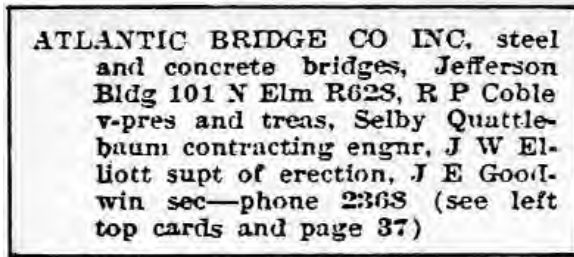
The survey identified three bridges that the American Bridge Company built (see Table III-01).

TABLE III-01: BRIDGES ERECTED BY THE AMERICAN BRIDGE COMPANY

ELIGIBLE? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE BUILT	TYPE
No	Lincoln	52- NonHighway-1	Elk River	1901-1902	1 Camelback Through
Yes: # 35	Lincoln	52-NonHighway-3	Elk River	1901	1 Camelback Through, and 2 Pratt Pony
Yes: # 38	Stewart	81- NonHighway-2	South Cross Creek	1902	1 Pratt Through

**ATLANTIC BRIDGE COMPANY,
GREENSBORO, NORTH CAROLINA:**

The Greensboro City Directories contains a listing for the Atlantic Bridge Company from 1926 to 1931. The officers of the company included Ralph P. Coble, vice-president and treasurer; Selby Quattlebaum manager and contracting engineer, James W. Elliott superintendent of erection, and Julius E. Goodwin secretary.



Source: 1926 *City Directory* Greensboro, North Carolina.

The firm listed itself primarily as the builder of steel and concrete bridges. However, its advertisement also stated (Greensboro City Directories):

- Contractors, Engineers, Builders
 - Steel and Concrete Bridges,
 - Athletic Stadiums and Buildings,
 - Structural Steel,
 - Concrete Piling, Foundations

The South Carolina bridge survey indicates that this firm worked with the Virginia Bridge and Iron Company on several projects in that state (Elling 1981). Also, the Virginia Survey indicates that this firm had a branch office in Roanoke (Diebler 1975). It is possible that the company erected trusses but was not a designer or fabricator.

The survey identified two bridges that the Atlantic Bridge Company built in Tennessee (see Table III-02).

TABLE III-02: BRIDGES BUILT BY ATLANTIC BRIDGE COMPANY

ELIGIBLE? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE BUILT	DESCRIPTION
Yes: #127	Morgan	65-00444-09.58	Emory River	1929	3 Camelback Through
No	Morgan	65-02378-07.84	Emory River	1929	2 Camelback & 1 Pratt Through, 1 Pratt Pony



BELL AND BELL, WATERTOWN, TENNESSEE:

The Smith, Dekalb and Wilson County Court Minutes contain references to this firm or the Bell Brothers building bridges in the 1925-30 period. The firm built several concrete bridges and culverts in southeast Wilson County near Watertown in the late 1920s. However, no other information was available about this company.

The survey identified two arch bridges that the Bell and Bell Company built in Tennessee (see Table III-03).

TABLE III-03: BRIDGES BUILT BY BELL AND BELL

ELIGIBLE? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE BUILT	DESCRIPTION
No	Smith	80-A0174-03.05	Hickman Creek	1925	2 Filled Spandrel
Yes: #124	Wilson	95-A0392-02.12	Fall Creek	1928	3 Filled Spandrel



BRACKETT (LOMAS) BRIDGE COMPANY, CINCINNATI, OHIO:

William Lomas began this firm in the 1870s as the Lomas Blacksmith Shop at 211 West Second Street in Cincinnati, Ohio. The company originally manufactured tools and general hardware but soon expanded into building bridges. By 1880 the firm had changed its name to Lomas Forge and Bridge Company. F. J. P. Brackett, superintendent of shops, purchased controlling interest of the company in 1898 and renamed it the Brackett Bridge Company.

Brackett served as president, George A. Brackett was secretary, and J. H. Hilton was chief engineer. In the early 1900s, the firm's offices were located in the Atlas Bank Building on Walnut Street. The Brackett Bridge Company continued in operation until the mid-1920s (Darnell 1984; Miars 1972; Ohio 1983).

The survey identified two bridges that the Brackett Bridge Company built in Tennessee (see Table III-04).

TABLE III-04: BRIDGES ERECTED BY BRACKETT (LOMAS) BRIDGE COMPANY

ELIGIBLE? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE BUILT	DESCRIPTION
No	Hardin	36-NonHighway-1	Beason Creek	1889	1 3-span continuous Pratt Pony
No	Giles	28-01891-00.02	Richland Creek	1902	1 Pratt Through

THE CHAMPION BRIDGE COMPANY, WILMINGTON, OHIO:

The Champion Bridge Company of Wilmington, Ohio, grew out of general construction work done by carpenter Zimri Wall prior to the Civil War. By 1860, Wall had begun to build timber bridges. In 1871, Wall and his brother Jonathan Wall developed the Z and J Wall Company to construct timber and wrought iron bridges. Within a year, the company again expanded, hiring Albert Bailey and changing its name to the Champion Iron Bridge and Manufacturing Company. As a result of experiments with wrought iron as a building



material for bridges, the Walls patented a design (#148,010) in 1874 for an iron trussed arch bridge. With Bailey, they promoted their patented arch as the "Champion Wrought Iron Arch."

In the mid-1870s the Champion Company attempted to expand by selling subscription loans. As a part of this expansion the company was incorporated in 1878 to manufacture iron bridges, farm implements, iron fences, and machinery. In order to construct steel bridges, the company altered its charter in 1881 and changed its name to the Champion Bridge Company. Also in 1881, Jonathan Wall patented a new design (#241,763) for a connection that several other companies used. In 1882 Jonathan Wall left the company and went to work for the Wrought Iron Bridge Company. He remained with this firm (absorbed by the American Bridge Company in 1902) until his death in 1925. Although Wall sold his actual stock in Champion in 1885 he remained interested in the company and maintained connections with it.

In the 1880s the Champion Bridge Company expanded, hiring new personnel such as engineer Abel C. Briggs in 1884. About this time, possibly due to the influence of Briggs, the company began to use steel rather than iron as a building material. The Champion Company was one of the first companies to promote the use of steel for smaller highway bridges.

Over the following years, the Champion Bridge Company constructed numerous bridges across the country, especially in the East and South. Its growth resulted in the construction in the mid-1880s of an erection plant in Birmingham, Alabama. By 1900 the company had

TABLE III-05: BRIDGES BUILT BY CHAMPION BRIDGE COMPANY

ELIGIBLE? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE BUILT	DESCRIPTION
Yes: #10	Morgan	65-NonHighway-1	White Oak Creek	1880, 1920	1880 substructure; 1 Warren Pony, est 1920
Yes: #19	Meigs	61-A0022-01.04	Sewee Creek	1884	1 Pratt Through
Yes: #29	Roane	73-A0330-00.84	Paint Rock Creek	1889	1 Pratt Bedstead Pony
No	Roane	73-A0323-02.19	Paint Rock Creek	1898	1 Pratt Bedstead Pony
No	Decatur	20-A0257-00.85	White Creek	1900 ca	1 Pratt Bedstead Pony
No	Marshall	59-A0129-00.04	Big Rock Creek	1902	1 Pratt Through
No	McMinn	54-A0235-00.05	Conasauga Creek	1903	1 Pratt Bedstead Pony
Yes: #49	Robertson	74-00979-01.58	Sulphur Fork Creek	1905	1 Camelback Through
No	Greene	30-A0082-00.34	Lick Creek	1906 est	1 Pratt Halfhip Pony
No	Polk	70-04313-13.67	Conasauga Creek	1907 ca	1 Pratt Halfhip Pony
Yes: #65	Meigs	61-NonHighway-1	Big Sewee Creek	1909-10	1 Pratt Bedstead Pony
No	Robertson	74-A0016-00.07	Red River	1910	1 Camelback Through
No	Greene	30-A0101-00.01	Lick Creek	1910 est	1 Pratt Halfhip Pony
No	Greene	30-A0106-00.01	Lick Creek	1910 est	1 Pratt Halfhip Pony
No	Greene	30-A0155-02.00	Roaring Fork Creek	1910 est	1 Pratt Halfhip Pony
No	Greene	30-A0204-00.73	Lick Creek	1910 est	1 Pratt Halfhip Pony
No	Greene	30-A0916-01.57	Lick Creek	1910 est	1 Pratt Halfhip Pony
No	Greene	30-A0973-01.35	Little Chucky Creek	1910 est	1 Pratt Halfhip Pony
No	McMinn	54-A0249-00.40	Chestuee Creek	1912	1 Pratt Halfhip Pony
Yes: #81	Meigs	61-A0028-00.23	Sewee Creek	1914	1 Pratt Through
No	Polk	70-02309-02.54	Ocoee River	1914	2 Camelback Through
No	Meigs	61-A0127-01.01	Gunstocker Creek	1915	1 Pratt Bedstead Pony
No	McMinn	54-A0201-00.20	Conasauga Creek	1915 est	1 Pratt Halfhip Pony
No	McMinn	54-A0298-00.89	Chestuee Creek	1915 est	1 Pratt Bedstead Pony
No	McMinn	54-A0509-00.04	Rodgers Creek	1915 est	1 Pratt Bedstead Pony
No	Morgan	65-A0173-02.33	Bone Campbell Creek	1915 est	1 Pratt Halfhip Pony
No	Polk	70-A0278-00.22	Four Mile Creek	1915 est	1 Pratt Halfhip Pony
Yes: #95	Meigs	61-NonHighway-2	Big Sewee Creek	1917	1 Pratt Bedstead Pony
No	Morgan	65-02394-04.50	Greasy Creek	1918 est	1 Pratt Halfhip Pony
No	Greene	30-02523-01.46	Little Chucky Creek	1919	1 Pratt Halfhip Pony
No	Greene	30-A0725-01.19	Cove Creek	1919	1 Pratt Halfhip Pony
No	McMinn	54-A0422-00.06	Oostanaula Creek	1920 ca	1 Pratt Halfhip Pony
No	Overton	67-A0294-00.21	East Fork Obey River	1920 est	1 Warren Pony
No	Robertson	74-A0126-02.14	South Fork Red River	1921	1 Pratt Through
No	Greene	30-02535-01.66	Lick Creek	1923	1 Pratt Halfhip Pony

relocated this plant to Atlanta, Georgia. Around 1900, Champion opened another office in Chattanooga with George E. Mattice as office manager and contracting agent. The Chattanooga City Directories list this firm from 1905 to 1907.

The Champion Bridge Company flourished in the 1880s and 1890s and did an extensive business until the Great Depression. However, as was true for many bridge companies, the Depression took a severe toll. In 1934 the company's stock was liquidated and the company's assets were offered for sale. No buyer could be found and three men associated with the company formed a partnership and reorganized the company. These men were Ed Rose (sales), C. L. Richardson (erection), and Ralph Miars (business management and shop production). The reorganized Champion Bridge Company diversified its interests and survived. The company's primary business is now the fabrication of structural steel (Chattanooga City Directories; Miars 1972; Ohio 1983; Simmons 1978).

This company practiced extensively in Tennessee. The survey identified thirty-five bridges that the Champion Bridge Company built in Tennessee (see Table III-05).

CHATTANOOGA BRIDGE COMPANY, CHATTANOOGA, TENNESSEE: The Chattanooga City Directories list the Chattanooga Bridge Company between 1903 and 1910. Mr. W. M. Hewitt served as president.

The survey identified three bridges that the Chattanooga Bridge Company built in Tennessee (see Table III-06).



TABLE III-06: BRIDGE BUILT BY CHATTANOOGA BRIDGE COMPANY

ELIGIBLE? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE BUILT	DESCRIPTION
Yes: #40	Hardin	36-NonHighway-1	Snake Creek	1903	1 Pratt Through
No	Cocke	15-A0405-00.02	Pigeon River	1909	2 Pratt Through
No	Greene	30-02358-00.63	Lick Creek	1913	1 Pratt Through

CHICAGO BRIDGE COMPANY, CHICAGO, ILLINOIS: Horace Ebenezer Horton attended Fairfield Academy in New York where he studied the classics and civil engineering. After graduation, he returned to his family's home in Rochester, Minnesota, where the county hired him as a surveyor. A year later, at the age of 23, Horton built his first bridge, a wooden arch bridge over the Zumbro River at Oronoco for \$4,000. Over the next ten years, Horace primarily worked as a bridge contractor in Minnesota, building a wide variety of structures. Although Horton worked as an independent contractor without a fabricating yard, his business was stable through the mid-1870s. Due to a slow economy, in the mid-1870s, Horton expanded his market area into Wisconsin and Iowa. In the 1880s, he expanded his market into Illinois.

In the late 1880s, Horton's work grew, in part due to his construction of the Dubuque High Bridge in Iowa, a large and impressive structure that enhanced his reputation. However, without his own fabricating yard, he experienced more and more difficulty in obtaining dependable and timely deliveries of fabricated bridge components. In 1888 and 1889, while not merging the companies, Horton joined forces with the Kansas City Bridge and Iron Company which owned a fabricating shop. In 1881, when the firm began in Kansas, the owners were George Wheelock, C. E. Moss, and A. M. Blodgett. George Wheelock was president, and he employed his younger brother William. Company records are not clear, but for these two years, apparently Kansas City Bridge fabricated the bridge materials and Horton erected the bridges.

In 1889, Horton and the Kansas City Bridge Company merged and formed a new combined company known as the Chicago Bridge and Iron Company. The new name not only indicated a new company but reflected a geographic shift that allowed the company to focus on a broader area which included the southern states. The directors elected Horton president and chief engineer, Blodgett vice-president, George Wheelock treasurer in charge of sales and contracting, and William Wheelock secretary. The company moved its fabrication facilities to the Washington Heights community south of Chicago, an area the city of Chicago annexed in 1906. In February of 1890, George E. King, an independent bridge contractor and nephew of Zenas King of King Iron Bridge Company, merged his company, the George E. King Bridge Company, with Horton's company. The three principal owners, Horton, Wheelock, and King and their respective companies, continued to operate under the name of each on new work. However, the Chicago Bridge and Iron Company shared the profits, a somewhat equivocal arrangement. King soon bought out Wheelock's interests.

The firm's work grew, and in 1893, Horton's son George T. Horton, joined the firm immediately upon graduation from Rensselaer Polytechnic Institute in Troy, New York. However, the Panic of 1893 and the four year recession that followed sharply curtailed the company's work. In an effort to support the company, the company expanded into building railroad roundhouses, locomotive turntables, roof trusses, and other fabricated items. The company developed its own design for an elevated water tank that began to bring in healthy revenues. Just as the company appeared to have survived the Panic of 1893, an extensive fire destroyed the plant in 1897. Horton wanted to rebuild, but King wanted to liquidate the firm. After negotiations, Horton purchased King's interests in 1898.

The company continued to diversify its services, and by World War I, it had essentially ceased building bridges. In the 1920s, the firm began to supply large storage tanks and special purpose structures to the oil industry in the Southwest and West, and the firm's varied interests carried

it through the Depression. In the 1940s, war related contracts that included the building of dry docks and landing ships for the navy greatly expanded the business. Since then, the company's products have included structures for hydroelectric power projects, the space program, nuclear power facilities, cryogenic and low temperature equipment, and structures for the oil and gas industry.

Today, the firm is an international corporation with annual revenues exceeding \$1 billion. Its headquarters are located in Plainfield, Illinois (CBI Industries 1987).

The survey identified one bridge that the Chicago Bridge Company built in Tennessee (see Table III-07).

TABLE III-07: BRIDGES BUILT BY CHICAGO BRIDGE COMPANY

ELIGIBLE? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE BUILT	DESCRIPTION
Yes: #57	Smith	80-NonHighway-3	Caney Fork River	1907-08	1 Camelback Through, 1 Pratt Deck, and 1 Pratt Halfhip Pony

CLINCHFIELD RAILROAD:

Interested citizens proposed a rail line between Cincinnati, Ohio, and Charleston, South Carolina, as early as 1827. Investors initiated construction on the line by the 1850s, but the Civil War halted work. In 1886 General John Wilder received a charter for the Charleston, Cincinnati, and Chicago Railroad ("3-C"), the forerunner of the modern Clinchfield line. Under Wilder, the railroad built a line from Kingsville, South Carolina, to Marion, North Carolina and in Tennessee from Chestoa to Johnson City. The Panic of 1893 resulted in the dissolution of the "3-C." Charles Hellier reorganized the line as the Ohio River and Charleston Railroad. In 1902 George Carterer bought the company and in 1905 renamed it the South and Western Railroad. In 1908 the company was chartered as the Carolina, Clinchfield and Ohio Railroad. In 1924, the Atlantic Coast Line and the Louisville and Nashville Railroad jointly leased the Carolina, Clinchfield, and Ohio Railroad and organized the Clinchfield Railroad to operate the line. In 1983 this line became the Clinchfield Division of the Seaboard System Railroad, now CSX Rail Transport (Hagedorn and Krawitz 1984; Hammerquist 1977).



The railroad built much of the Clinchfield between 1902 and 1915. It runs between Elkhorn, Kentucky, and Spartanburg, South Carolina and crosses Virginia, Tennessee, and North Carolina. Of its 390 total miles trackage (275 linear miles), 55.5 miles is in Tennessee running

across the northeast part of the State through Hawkins, Sullivan, Washington, Unicoi, and Carter Counties. The route lies across rugged terrain, and to maintain easy grades, the railroad built several impressive structures. These include viaducts, such as a spectacular timber viaduct near Johnson City, and fifty-five tunnels, including six in Tennessee. To provide grade separations with local roads, the railroad built numerous concrete structures, typically one span slab or arch spans over county roads. Six bridges on Tennessee's inspection system are single span structures providing a grade separation (see Table III-08).

TABLE III-08: BRIDGES BUILT BY CLINCHFIELD RAILROAD

ELIGIBLE? # IN CH. 6	COUNTY	NUMBER	CROSSING	DATE BUILT	DESCRIPTION
No	Sullivan	82-B0194-00.38	Road	1907	1 Filled Spandrel Arch
No	Washington	90-03964-03.95	Road	1907	1 Filled Spandrel Arch
No	Washington	90-04237-04.23	Road	1907	1 Filled Spandrel Arch
No	Washington	90-04242-00.48	Road	1907	1 Filled Spandrel Arch
No	Hawkins	37-A0603-02.92	Road	1910	1 Filled Spandrel Arch
No	Washington	90-03968-00.80	Railroad	1935 est	1 Timber Howe Pony



CONCRETE STEEL BRIDGE COMPANY, CLARKSBURG, WEST VIRGINIA:

Based in Clarksburg, West Virginia, the Concrete Steel Bridge Company was incorporated in 1914 with Frank Duff McEnteer as president and general manager. His partner was P. M. Harrison, who had previously worked for the York Bridge Company. McEnteer, born in 1882, held a variety of jobs as a draftsman and as an engineer with various construction companies after his graduation from Harvard College in 1905. For example, in 1912, McEnteer, as the construction engineer,

supervised the construction of Clarksburg's Palace Furniture Company, believed to be the first reinforced concrete building erected in West Virginia. This background obviously influenced McEnteer and his firm specialized in concrete bridges in the 50 to 100 foot range. However, the firm also built other reinforced concrete structures such as commercial buildings and industrial properties. By 1925, the firm had branch offices in Knoxville, Pittsburgh and Harrisburg (Pennsylvania), Huntington (West Virginia), and a subsidiary company in Florida. The firm diversified in the 1920s and purchased the Builders Supply Company of Clarksburg. By 1930, the company had designed and/or built more than one thousand highway and railroad bridges and numerous buildings in eleven states. Much of the firm's work was in West Virginia, and the company was in all probability the most significant builder of reinforced concrete structures in West Virginia in the early twentieth century. Like many bridge companies, the

Great Depression forced the company to close, and in 1931 the Concrete Steel Bridge Company was liquidated. McEnteer then worked for the West Virginia State Road Commission from 1932 until 1940. During World War II, McEnteer worked for a private firm on war contracts in the Middle East. From the end of World War II until his death in 1957, McEnteer worked as a consulting structural engineer, specializing in the design of highway bridges and industrial buildings (Kemp 1984; Lambert 1958; Wheeling 1916).

The survey identified one bridge that the Concrete Steel Bridge Company built in Tennessee (see Table III-09).

TABLE III-09: BRIDGES BUILT BY CONCRETE STEEL BRIDGE COMPANY

ELIGIBLE? # IN CH. 6	COUNTY	NUMBER	CROSSING	DATE BUILT	DESCRIPTION
No	Van Buren	88-A0015-01,75	Laurel Creek	1921	1 Filled Spandrel Arch

CONVERSE BRIDGE COMPANY, CHATTANOOGA, TENNESSEE:

About 1884, William H. Converse moved to Chattanooga from Ohio to become an agent for the nationally known Wrought Iron Bridge Company. He later served in the same capacity for the King Iron Bridge Company. Around 1890 Converse began working as a private bridge builder, and in 1893 he incorporated his firm as the Converse Bridge Company. The firm was located on the corner of Spring and Howard in the small community of Ridgedale just outside Chattanooga. Interestingly, as a locally prominent citizen, Converse served on the bridge committee for the regionally distinguished Walnut Street Bridge (#20, 33-03544-00.12). At that bridge's dedication ceremonies in 1891, a speaker praised Converse professionally as a bridge builder stating, "His ideas are up to the age, and he is a good safe business man."



Initially the company's officers were William H. Converse as president and F. J. Converse as vice-president with W. H. Converse and Dethic Hewitt Wood as the firm's engineers. The firm was reorganized in 1914. At that time William Converse moved to Florida but remained as a vice-president. F. J. Converse left the firm but continued to live in Chattanooga. Dethic Hewitt Wood, a Chattanooga native, became president, his son P. H. Wood was vice-president, and C. J. Wilhoite was treasurer. During the Depression, bridge work dropped sharply and the firm concentrated on providing structural steel for buildings. After the Depression the company no longer erected bridges. In 1957 the Illinois firm of Mississippi Valley Steel bought the firm. The Siskin Steel & Supply Company of Chattanooga now owns that business (American Illustrating ca. 1910; *Chattanooga Times* 4, 9 November 1945, 30 June 1957; Moore 1923).

The firm built many bridges in the Southeastern United States and advertised as builders of "STEEL BRIDGES" and "STRUCTURAL STEEL WORK for Buildings, Roof Trusses, Purling, Girders, Towers and Special Work Requiring Shearing, Sawing, Punching, Riveting, Bending, and Assembling of Steel Shapes" (Chattanooga City Directories). The survey identified twenty-six bridges the Converse Bridge Company built in Tennessee (see Table III-10).

TABLE III-10: BRIDGES BUILT BY CONVERSE BRIDGE COMPANY

HISTORIC? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE BUILT	DESCRIPTION
Yes: #21:	Montgomery	63-A0456-01.88	Sulphur Fork Creek	1890	1 Pratt Through
No	Montgomery	63-01853-07.84	Barton's Creek	1893	1 Pratt Through
No	Montgomery	63-A0458-03.62	Yellow Creek	1893	1 Pratt Through
No	Greene	30-02590-00.10	Lick Creek	1906	1 Pratt Through
No	Marion	58-A0510-02.56	Battle Creek	1906	1 Pratt Halfhip Pony
No	Marion	58-A0191-00.00	Sequatchie River	1907	1 Pratt Through
No	Campbell	07-A0137-01.98	Capuchin Creek	1908	1 Pratt Through
No	Carter	10-A0797-00.01	Elk River	1908	1 Camelback Through
No	Greene	30-A0930-02.18	Lick Creek	1908	1 Pratt Pony
Yes: #60	Greene	30-A0934-00.16	Lick Creek	1908	1 Pratt Halfhip Pony
Yes: #64	Grainger	29-A0051-00.06	Flat Creek	1909	1 Pratt Halfhip Pony
No	Hamblen	32-A0507-02.73	Nolichucky River	1909	3 Pratt Through
No	Polk	70-01154-02.67	Ocoee River	1909	1 Parker Through
No	Blount	05-A0860-00.00	Nine Mile Creek	1910	1 Pratt Through
No	Marion	58-A0060-01.29	Sequatchie River	1910	1 Pratt Through
No	Grainger	29-A0410-01.87	Richland Creek	1911	1 Pratt Halfhip Pony
No	Cocke	15-A0386-00.01	Pigeon River	1912	3 Pratt Through
No	Grainger	29-02548-01.80	Indian Creek	1912	1 Pratt Halfhip Pony
No	Greene	30-B0061-02.83	Lick Creek	1912	1 Pratt Halfhip Pony
No	Sullivan	82-02593-03.21	South Fork Holston River	1912	4 Pratt Through
No	Carter	10-A0144-00.01	Sinking Creek	1913	1 Pratt Halfhip Pony
No	Carter	10-A0299-00.01	Storage	1913	1 Pratt Halfhip Pony
No	Greene	30-A0912-01.95	Lick Creek	1913	1 Pratt Pony
No	Greene	30-B0091-00.96	Lick Creek	1913	1 Pratt Pony
Yes: #75	Sullivan	82-C0539-00.01	South Fork Holston River	1913	3 Pratt Through
No	Marion	58-A0189-00.70	Sequatchie River	1916	1 Pratt Through

COPE BRIDGE COMPANY, CHATTANOOGA, TENNESSEE:

The Chattanooga City Directories do not contain a listing for the Cope Bridge Company, but they do list Morris Cope and Oliver Cope as bridge contractors, agents or builders from around 1894 until 1907. The only extant bridge built under the company's name dates to 1902-1903. The 1897 City Directory lists Morris Cope as an agent for the Columbus Bridge Company. In 1908 the Cope Bridge Company closed. Both men then worked for the Converse Bridge Company, Morris Cope as a traveling salesman or agent and Oliver Cope as a Civil Engineer. Morris Cope stayed with Converse until about 1914 when he left to work for the Nashville Bridge Company for a year. Afterwards he left the bridge building business. Oliver Cope worked for Converse as an engineer until about 1920 and then as an estimator until he left the firm in 1934 (Chattanooga City Directories).



The survey identified one bridge that the Cope Bridge Company built in Tennessee (Table III-11).

TABLE III-11: BRIDGES BUILT BY COPE BRIDGE COMPANY

ELIGIBLE? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE	DESCRIPTION
Yes: #39	Sullivan	82-A0872-00.05	South Fork Holston River	1902-03	1 Camelback & 1 Pratt Through

COTTON STATES BRIDGE COMPANY, ATLANTA, GEORGIA:

Based in Atlanta, Georgia, this firm practiced in Tennessee in the 1903-1904 period. W.T.Young served as agent and manager. However, the Nashville City Directory only contains a listing for the firm in 1904 when Young had offices at 80 Arcade. This firm was said to manage the highway bridge business of the American Bridge Company in the South. Young left the firm to begin his own business and to work for the Nashville Bridge company (Burk 1903; Gold 1903; Nashville City Directories).



The survey identified one bridge that the Cotton States Bridge Company built in Tennessee (see Table III-12).

TABLE III-12: BRIDGES BUILT BY COTTON BRIDGE COMPANY

ELIGIBLE? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE	DESCRIPTION
No	Warren	89-A0143-02.55	North Prong Barren Fork River	1903	1 Pratt Through



Advertisement *Tennessee Highways*, October 1922.

FOSTER-CREIGHTON COMPANY, NASHVILLE, TENNESSEE:

Major Wilbur F. Foster had been an engineer for the Confederate Army during the Civil War and was later Nashville's City Engineer. As early as 1871, Robert T. Creighton had worked for him. For a short while after Foster resigned as City Engineer, Creighton also served in that position. Then in 1885 the two men with a third partner, each investing \$500, started a contracting firm. Foster and Creighton shortly purchased the interests of the third person, and the firm operated thereafter as the Foster-Creighton Company.

The firm initially took on small street jobs in Nashville, but after it purchased a quarry near Newsom Station in 1889, expanded to erecting bridge piers. Foster was a skilled map maker and produced several city and county maps. In 1893 the firm purchased a larger quarry that enabled it to expand into more substantial work such as the construction of Lock No. 3 for the Army Corps of Engineers on the Cumberland River.

The Panic of 1893 and the subsequent recession eliminated some of the firm's work. As a result, Major Foster became Works Director for the 1897 Tennessee Centennial Exposition, held at Nashville's West Side Park, renamed Centennial Park (one year after the actual centennial). The Foster-Creighton firm is well known in Tennessee for its association with this landmark event and especially for its erection of a replica of the Parthenon, a focal point of the Exposition. After the Exposition, the city of Nashville converted the Exposition's grounds to Centennial Park and retained the Parthenon. About 1910 Foster-Creighton erected two permanent bridges in the park, one (#66, 19-NonHighway-4) an early concrete arch span. In the 1931, the city of Nashville replaced the crumbling Exposition Parthenon, originally designed as a temporary structure, with a permanent structure of concrete that is now listed on the National Register. Hart, Freeland and Roberts served as architects, the Foster-Creighton firm built the structure, and Wilbur F. Creighton supervised construction.

Major Foster retired in 1906 and Creighton purchased his share of the company. In 1907 Harry Gould, who specialized in railroad bridges joined the firm. Until the mid-1910s when Gould left the firm, the company operated as the Foster-Creighton-Gould Company.

During this period, the firm expanded and worked on a variety of projects. The largest was probably the 1907-1910 construction of the Shelby (Sparkman) Street Bridge (#58, 19-03245-01.47) and the Jefferson Street Bridge (19-03258-00.40). The company built steel and concrete bridges but was especially innovative in the use of concrete. The Shelby Street Bridge contained six concrete trusses, probably one of the first bridges in the country to utilize such a design. In addition, the firm acquired a large limestone quarry in Alabama and provided stone for buildings and highway projects as well as for the iron furnaces in Birmingham. The firm also built river locks and dams during this period. When many of the firm's contracts for railroad bridges began to fade in the 1920s, the firm specialized in highway paving for many years.

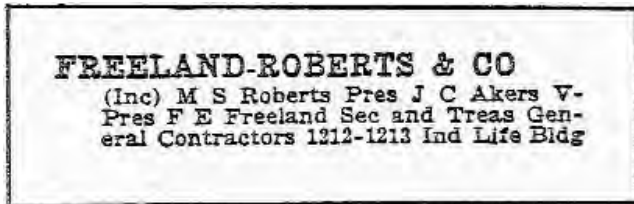
The Foster-Creighton Company always worked on a variety of projects and, due to this diversity, survived the Great Depression. Work in this period included a ready-mix concrete company in Nashville that flourished into the late 1940s before the firm sold it. The company expanded during World War II building military cantonments, airbases, and depots. This work included the construction of Camp Forrest at Tullahoma that involved housing for 25,000 troops, the placing of 110 miles of pipe, and 45 miles of roads. After World War II, the firm concentrated on bridge work and large commercial and industrial buildings. In 1969, the firm ceased highway paving and shifted its focus more strongly to bridges. The firm continued in operation until the 1990s (Creighton 1909; Creighton 1972; Creighton 1983; Creighton no date; *Engineering Record* 1909; Foster and Creighton 1941; *Roads and Streets* 1974; Waller 1972).

A 1974 profile on the company attributed its long-term success to the Creighton family. It stated, "Foster & Creighton has survived since 1885 by always having a qualified, trained family member ready for the top job in each generation, and by diversification and good market forecasting" (*Roads and Streets* 1974). Robert T. Creighton brought his son Wilbur Foster Creighton I into the firm as a bridge engineer in 1904, a fresh graduate from Vanderbilt University. He served as president from 1921-1958. Wilbur Foster Creighton Jr. served as the third-generation president from 1958 to 1973 and then as chairman of the board. Wilbur Foster Creighton III joined the firm in the early 1950s following graduation in civil engineering from Vanderbilt University and in 1973 became president of the company and chairman of the board until his retirement.

The survey identified four bridges that the Foster-Creighton Company built in Tennessee (see Table III-13).

TABLE III-13: BRIDGES BUILT BY FOSTER-CREIGHTON COMPANY

ELIGIBLE? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE	DESCRIPTION
Yes: #13	Davidson	19-NonHighway-8	Browns Creek	1888	1 Masonry Arch
Yes: #58	Davidson	19-03245-01.47	Cumberland River	1907-09	1 Parker & 2 Camelback Through, 1 Pratt Deck
No	Davidson	19-03258-00.40	Cumberland River	1907-10	1 Parker & 2 Camelback Through
Yes: #66	Davidson	19-NonHighway-4	Duck Pond	1910	1 Filled Spandrel Arch



1920-1921 Nashville City Directory.

FREELAND-ROBERTS AND COMPANY, NASHVILLE, TENNESSEE:

Martin S. Roberts and Francis Eugene Freeland formed this company about 1920. Roberts served as president, and Freeland served as secretary and treasurer. Louis R. Currey and J. C. Akers were also associated with the firm.

Although the Nashville City Directories continued to list Freeland-Roberts for several years, about 1925 the directories begin to also list the firm Hart-Freeland-and-Roberts. While Freeland-Roberts primarily worked as contractors and engineers, Russell Hart was an architect. Today the firm is known as Hart-Freeland-Roberts and is primarily an architectural-engineering company (Nashville City Directories).

The survey identified two bridges that Freeland-Roberts built in Tennessee (see Table III-14).

TABLE III-14: BRIDGES BUILT BY FREELAND-ROBERTS AND COMPANY

ELIGIBLE? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE	DESCRIPTION
Yes: #122	Davidson	19-SR045-02.01	Cumberland River	1927-29	1 Parker & 2 Camelback Through
Yes: #133	Knox	47-01262-04.68	Holston River	1930-31	3 Open Spandrel Through Arches



GROTON IRON BRIDGE COMPANY, GROTON, NEW YORK:

In 1877 the Groton Iron Works, a former blacksmith shop run by brothers Charles and Lyman Perrigo, and the Groton Separator Works, an agricultural equipment firm owned by Daniel Spencer and Frederick Avery, merged to form the Groton Iron Bridge Company. Although the Perrigo Brothers were leaders in the company, Ellery Colby and Frederick Avery actually ran the firm. Much of the work during this time related to four patents granted to Colby and Avery in August 1876

and February 1877. Later, Colby left the firm to found the Owego Bridge Company. During this early period, the firm primarily practiced in upstate New York.

In 1887 the company was reorganized and reincorporated as the Groton Bridge and Manufacturing Company. The company's greatest period of expansion and productivity followed this reorganization. During this time, the Conger family managed the firm with E.A. Landon.



Figure III-06: Historic postcard view of the Cherokee Bridge spanning the Tennessee River in Knoxville. The Groton Bridge Company erected this bridge in 1892 for the Cherokee Land Company for \$69,352 (Author's Collection).

In 1899 the American Bridge Company purchased Groton Iron. This third phase of the company's history lasted until 1901 when the American Bridge Company sold the Groton firm to its former owners who renamed it the Groton Bridge Company. After 1902 the company once again concentrated on local work in New York state. Due to reduced bridge work, the company diversified its interests and provided steel framing and other structural work. The firm eventually went out of business in the 1920s (Darnell 1984; Thurber 1983; Thurber 1983).

According to the Nashville City Directories, the Groton Bridge Company had an office in Nashville from 1898 until 1902 during the period the American Bridge Company owned it. This office was located at 79 Chamber Commerce, and the agents were M. S. Hasie and W.T.Young. While no additional information is available on M. S. Hasie, W.T.Young built bridges in Tennessee for many years. Between 1902 and 1906, Young worked as an agent for at least two other bridge companies, the Cotton States Bridge Company of Atlanta, Georgia, and the American Bridge Company of New York. In 1906 Young began his own bridge company, the W.T.Young Bridge Company. This firm was closely linked to the Nashville Bridge Company, and in 1922 Young phased out his firm and became a vice-president with the Nashville Bridge Company (Nashville City Directories).

During Groton's second developmental phase (1887-1899), county court minutes indicate that the Groton Bridge Company did a great deal of work in Tennessee (Bedford Roll 85, Part 2:212-13; Cheatham Volume G:323; Smith Volume 5:97; Volume 9:8, 349, 387, 522-23; Washington Volume N: 46-50). In spite of this, The survey identified only one bridge that the Groton Bridge Company built in Tennessee (see Table III-15).

TABLE III-15: BRIDGES BUILT BY GROTON IRON BRIDGE COMPANY

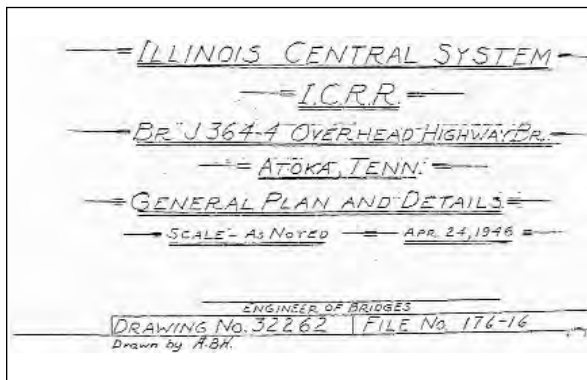
ELIGIBLE? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE	DESCRIPTION
No	Cheatham	11-A0360-00.31	Harpeth River	1898	1 Camelback Through



HIPCO, LIGONIER, INDIANA: No information was available about this company. The survey identified only one bridge that HIPCO built in Tennessee (see Table III-16).

TABLE III-16: BRIDGES BUILT BY HIPCO

ELIGIBLE? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE	DESCRIPTION
No	Benton	03-A0170-01.58	North Fork Harmon Creek	1920 est	1 Warren Pony



Title Box on Illinois Central Plan Sheet.

THE ILLINOIS CENTRAL RAILROAD, CHICAGO, ILLINOIS:

Formed in 1851, this state sponsored railroad was the first rail line whose construction was aided by a land grant act of the Federal government. Completed in 1856, the project plunged the Illinois government into debt. However, the initial line of 705.5 miles made it the longest railroad in the world. In 1867 it began to expand outside the state, primarily by acquiring existing lines, which avoided construction problems and eliminated competition. Within twenty-five years, the railroad contained 3,700 miles of lines in ten

states, and by 1900, it possessed an extensive network of rail lines in these states. Extending from the Northern Lakes to the Gulf of Mexico, the line was called the "Main Line of Mid-America."

It initially entered Tennessee between 1880 and 1885 with a line running from Fulton south to Jackson and Grand Junction. It extended southeast to Memphis by 1890. Between 1893 and

1896, the railroad extended this branch northward through Covington and Dyersburg to Fulton by the purchase of the Chesapeake, Ohio, and Southwestern Railroad (formed in 1882 from the merger of the Paducah and Elizabethton Railroad and the Memphis Paducah and Northern Railroad). The Illinois Central Railroad continues to operate in Tennessee. From 1972 to 1988 this railroad operated under the name Illinois Central Gulf Railroad, but it now operates under the name Illinois Central (Corliss 1950; Stover 1975).

The survey identified six bridges that the Illinois Central Railroad built in Tennessee (see Table III-17).

TABLE III-17: BRIDGES BUILT BY THE ILLINOIS CENTRAL RAILROAD

ELIGIBLE? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE	DESCRIPTION
No	Lauderdale	49-01482-00.04	Road	1910 est	1 Filled Spandrel Arch
No	Lauderdale	49-A0485-01.85	Road	1910 est	1 Filled Spandrel Arch
No	Tipton	84-01476-00.28	Road	1940 est	1 Filled Spandrel Arch
No	Tipton	84-A0252-01.33	Road	1940 est	1 Filled Spandrel Arch
No	Shelby	79-D0064-00.41	Railroad	1944	1 Kingpost Pony
No	Tipton	84-01473-00.65	Railroad	1944	1 Kingpost Pony

JOLIET BRIDGE AND IRON COMPANY,

JOLIET, ILLINOIS: Robert C. Morrison, a local contractor and bridge engineer since 1883, played a pivotal role in the organization of the Joliet Bridge and Iron Company. Incorporated in 1896, the firm built a new plant and offices on Collins Street in Joliet near the Illinois State Penitentiary. In the late 1890s, the firm employed seventy-five people and specialized in designing and building steel bridges. The firm had a branch office in Memphis from 1909 until 1911 under George A. Larimer. This firm closed around 1912 or 1913 when Morrison died.

In 1919 Morrison's son began a new firm known as the Joliet Bridge and Construction Company that was incorporated in 1950. This firm is currently in operation in Joliet. In 1982 the officers were Robert Morrison as president, George Morrison as vice-president, and Raymond Morrison as secretary-treasurer (Joliet City Directories; *Joliet Illustrated* 1897; Joliet Services Directory, 1982; Morrison 1982).



The survey identified three bridges that the Joliet Bridge and Iron Company built in Tennessee (see Table III-18).

TABLE III-18: BRIDGES BUILT BY JOLIET BRIDGE AND IRON COMPANY

ELIGIBLE? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE	DESCRIPTION
Yes: #50	Coffee	16-P0001-00.02	Duck River	1906	1 Pratt Through
No	Sumner	83-B0090-01.08	Bledsoe Creek	1908	1 Pratt Through
Yes: #70	Polk	70-01223-02.53	Hiwassee River	1911	1 Parker and 2 Pratt Through



**KEYSTONE BRIDGE COMPANY,
PITTSBURG, PENNSYLVANIA:**

Piper and Shiffler organized a bridge firm named for themselves about 1862 under the leadership of industrialist Andrew Carnegie. In 1865 J. H. Linville and Piper bought Piper and Shiffler's plant and formed the Keystone Bridge Company. The company was innovative in specific design elements and developed a tubular column of riveted circular segments. In the early 1890s, it became the Keystone Bridge Works of Carnegie Steel Company. The

American Bridge Company acquired it in 1900. American Bridge closed the plant in December 1904 and sold part of the property (Darnell 1984; Diebler 1975; Rowles 1984).

The survey inventoried one bridge that Keystone Bridge Company built in Tennessee (see Table III-19).

TABLE III-19: BRIDGES BUILT BY KEYSTONE BRIDGE COMPANY

ELIGIBLE? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE	DESCRIPTION
Yes: #15	Carter	10-A0634-01.93	Doe River	1889	1 Pratt Through

KING IRON BRIDGE AND MANUFACTURING COMPANY, CLEVELAND, OHIO:

With no formal training, Zenas King acquired his initial experience in the bridge industry by working in the 1850s as an agent for the Mosely Iron Bridge Company in Cincinnati, Ohio. Although the firm built some wooden bridges, it specialized in a tubular wrought iron arch bridge design for which Mosely held the patent. Thomas Mosely relocated his firm to Boston in the early 1860s.



King branched out on his own in the late 1850s and established a company in Cincinnati, Ohio, where he soon became partners with Peter Frees in building boilers and bridges. Probably largely based on King's experience, these two men took out a patent (#33,384) in 1861 for the design of a tubular arch--in essence, a modification on Mosely's own tubular arch. King and Frees improved Mosely's design by making their top chord a rectangular tube rather than the triangular design Mosely had used. However, King and Frees's partnership soon dissolved, and King retained the bridge building portion.

In 1871 King incorporated his firm in Cleveland as the King Iron Bridge and Manufacturing Company. In the same year he opened another plant in Iowa, which the city of Iowa partly financed. Within a year this plant closed, and King opened another plant at Topeka that the city of Topeka partly financed. This plant also closed within a year. During these early years, the firm participated in a variety of business activities including roof trusses, piers, and jail construction.

King's patented tubular arch, essentially a bowstring truss, was not immediately popular. It utilized less metal than many trusses of that time and was thus cheaper. The combination of these factors and its airy graceful appearance led many people initially to doubt its strength. Although King took out many patents and constructed various types of bridges, the arch seems to have been the firm's trademark design for several years. However, by the late 1870s, the firm began to focus more on the Double Intersection Pratt design.

In addition to King Iron's 1861 patented tubular arch, Zenas King took out other patents such as an 1864 patent (#45,051) for a new draw bridge. In 1866 King acquired a new patent (#58,266) which revised his earlier 1861 patent for the tubular arch, changing the bottom chord. This design featured a hollow, bowed rectangular upper chord in compression and paired rods in tension for a bottom chord. Vertical suspension-rods and diagonal bracing connected these chords. The only bowstring truss in Tennessee, the Kelso Bridge in Lincoln County (#6, 52-A0183-05.54), utilizes this design. In addition to a bridge company plaque, the bridge contains a plaque identifying the patent date and number.

King Iron's 1884 catalog stated it was the largest highway bridge works in the country and that it had already built over 5,000 bridges (including at least thirteen in Tennessee) and continued to build about 250 a year. This catalog also claimed that "wrought iron bridges of our make are now in use in nearly every state in the Union--being well known in Maine, California and Texas, as well as all the Middle and Western States" (King Iron 1884).

The firm's name changed to the King Bridge Company about 1892 when King died. His three sons then ran the firm. The firm had a branch office in Chattanooga, Tennessee from 1887 to 1903. Between 1887 and 1896, C. E. Hamlin was the local agent. The next year C. C. Stewart was the agent, but in 1898 C. C. Morrison became the local agent and remained so until 1903 when this branch office closed. It was not until 1902 that the Chattanooga City Directories reflect the firm's name change from King Iron to the King Bridge Company. In 1906 the company was sued and was officially dissolved. The company was later revived as the King Bridge Company of New Jersey. In 1923 Norman C. King, another family member, reorganized the firm in Cleveland as the King Bridge Company. The Cleveland City Directories listed the firm until the 1940s (Chattanooga City Directories; Cleveland City Directories; Darnell 1984; Deibler 1975; Jochims 1991a, 1991b; King Iron 1884; Miars 1972; Ohio 1983; Rose 1950; Simmons 1978, 1979, 1989; Spero 1980; Wallen 1920).

King Iron's Catalog of 1884 listed twelve bridges that it had erected in Tennessee (King Iron 1884). Only one remains (#6, 52-A0183-05.54). This catalog also listed a jail in Chattanooga that the firm had built.

The survey identified seven bridges that the King Iron Bridge and Manufacturing Company built in Tennessee (see Table III-20).

TABLE III-20: BRIDGES BUILT BY KING IRON BRIDGE AND MANUFACTURING COMPANY

ELIGIBLE? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE	DESCRIPTION
Yes: #6	Lincoln	52-A0183-05.54	Elk River	1878	1 Bowstring Through
Yes: #17	Lincoln	52-A0487-04.85	Elk River	1889	1 Double Intersection Pratt Through and 1 Pratt Halfhip Pony
No	Marion	58-A0081-00.64	Sequatchie River	1890	1 Pratt Through
Yes: #24	Marion	58-A0502-00.36	Battle Creek	1891	1 Pratt Through
Yes: #25	Sequatchie	77-NonHighway-1	Sequatchie River	1893	1 Pratt Through
No	Marion	58-A0185-00.51	Sequatchie River	1897	1 Camelback Through
Yes: #37	Giles	28-A0153-01.95	Elk River	1902	1 Pennsylvania Petit Through

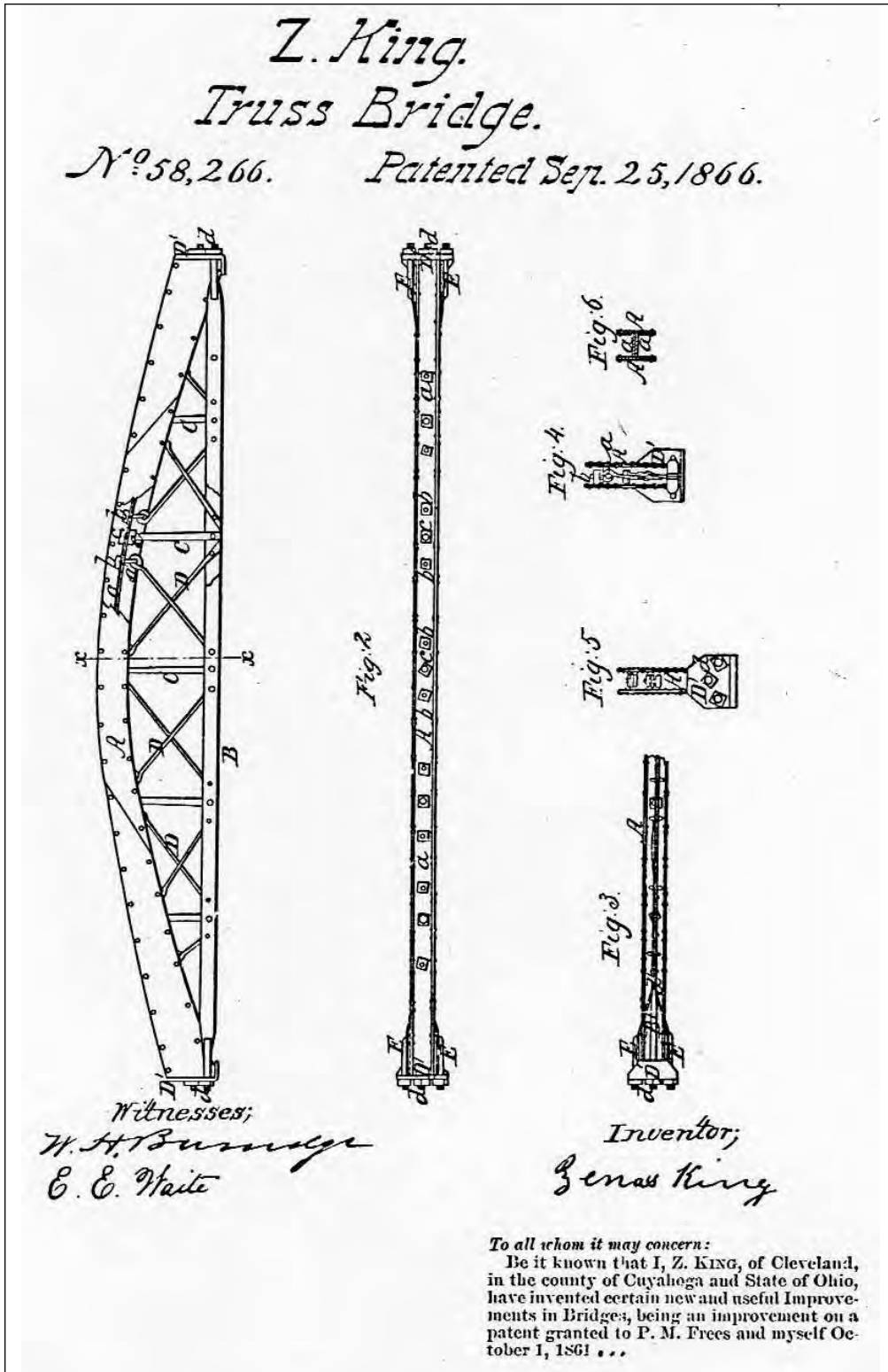
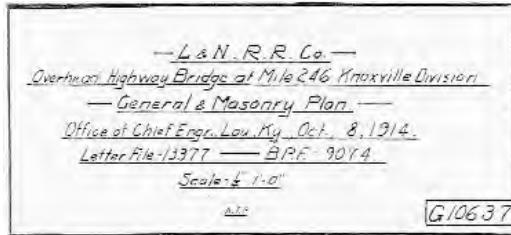


Figure III-07: Patent for King Iron Tubular Truss.



Title Box on L&N Plan Sheet.

LOUISVILLE AND NASHVILLE RAILROAD:

Up to 1850, Tennessee did not have an operational railroad, and to respond to this transportation need, in the 1850s the state began subsidizing the construction of rail lines. The state's efforts resulted in such growth that by 1860 Tennessee ranked third in the South in railroad mileage. The Louisville & Nashville Railroad was one of these lines that developed in this period. In 1850 Kentucky granted a charter for a line from Louisville to

the Tennessee state line, and in 1852 Tennessee granted a charter for the remainder of the line in Tennessee. Due to many difficulties, the company did not complete the line until 1859.

Over the years, this rail line acquired other lines and expanded extensively. Not only has it substantially impacted Tennessee's growth and history, but it is also one of the most significant rail lines in the region. It currently operates under the name CSX Transportation.

The survey identified thirty-one bridges that the Louisville and Nashville Railroad built for grade-separated crossings with local roads (see Table III-21).

TABLE III-21: BRIDGES BUILT BY LOUISVILLE AND NASHVILLE RAILROAD

HISTORIC? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE BUILT	DESCRIPTION
No	Humphreys	43-A0195-00.63	Road	1905	1 Filled Spandrel Arch
No	Polk	70-A0356-02.40	Road & Branch	1906 est	1 Filled Spandrel Arch
No	Campbell	07-A0622-00.29	Railroad	1910	1 Queenpost Pony
No	Davidson	19-B0269-01.17	Hogan Road	1910 est	1 Filled Spandrel Arch
No	Monroe	62-A0384-01.77	Road	1910 est	1 Filled Spandrel Arch
No	Monroe	62-A0810-00.18	Road	1910 est	1 Filled Spandrel Arch
Yes: #69	McMinn	54-A0214-00.10	Railroad	1911	1 Kingpost Pony
No	Knox	47-A0061-01.39	Railroad	1913	1 Queenpost Pony
Yes: #74	Polk	70-A0317-02.09	Railroad	1913	1 Queenpost Pony
No	Roane	73-A0391-00.64	Railroad	1913	1 Queenpost Pony
No	Anderson	01-A0052-01.49	Railroad	1914	1 Queenpost Pony
Yes: #82	Monroe	62-A0520-02.45	Railroad	1914	1 Queenpost Pony
No	Davidson	19-D0480-00.20	Litton Street	1915 est	1 Filled Spandrel Arch
No	Polk	70-A0317-01.12	Railroad	1915 est	1 Queenpost Pony
No	Williamson	94-A0054-00.00	Road	1915 est	1 Filled Spandrel Arch
Yes: #96	White	93-A0415-00.19	Railroad	1917-18	1 Queenpost Pony
Yes: #97	Anderson	01-02444-06.74	Railroad	1918	1 Kingpost Pony
Yes: #99	Giles	28-A0340-00.83	Railroad	1918	1 Kingpost Pony
No	Benton	03-A0275-04.01	Road	1920 est	1 Filled Spandrel Arch

No	Benton	03-A0439-01.25	Road	1920 est	1 Filled Spandrel Arch
No	Blount	05-02397-00.86	Railroad	1920 est	1 Queenpost Pony
No	Blount	05-A0005-00.08	Railroad	1920 est	1 Queenpost Pony
No	Dickson	22-A0338-00.02	Road	1920 est	1 Filled Spandrel Arch
No	Lawrence	50-03168-00.85	Railroad	1922	1 Kingpost Pony
No	Polk	70-04313-13.95	Railroad	1925	1 Queenpost Pony
No	Davidson	19-C0300-00.14	Road	1925 est	1 Filled Spandrel Arch
No	Davidson	19-C0301-00.18	Road	1925 est	1 Filled Spandrel Arch
No	Smith	80-NonHighway-1	Railroad	1930 est	1 Pratt Pony
No	Smith	80-NonHighway-2	Railroad	1930 est	1 Pratt Pony
No	Lawrence	50-01761-00.07	Railroad	1942	1 Queenpost Pony
No	Sumner	83-A0391-00.54	Railroad	1945	1 Queenpost Pony

LUTEN BRIDGE COMPANY, INDIANAPOLIS, INDIANA:

In 1894 at the age of 25, Daniel B. Luten received a Bachelor of Science degree in Civil Engineering from the University of Michigan. He then taught civil engineering at the University of Michigan for one year and worked as an assistant to Professor Charles E. Greene. Greene was an authority on arch analysis and the author of *Greene's Graphic Method of Truss and Arch Analysis*. No doubt, Greene influenced Luten with his opinions regarding the superiority of concrete arch bridges to other designs and materials.



After one year as an Assistant Professor, Luten became an instructor in Civil Engineering at Purdue University, Lafayette, Indiana. Luten remained for five years at Purdue where he taught arch design, stereotomy, and theory of hydraulics. During these years, he experimented with arch designs and concrete and published his findings in professional journals.

In 1900 Luten left the academic world and practiced general civil engineering for one year. Then around 1901, Luten moved to Indianapolis to specialize in the design and construction of concrete arch bridges. He formed his own company, the National Bridge Company. The Indianapolis City Directories list the firm under that name from 1903 until 1916. The directories do not contain a listing for the firm between 1917 and 1919, but they do individually list Luten as an engineer. From 1920 to 1941, the Indianapolis City Directories

contain a listing for the Luten Engineering Company. From 1942 until 1945, shortly before his death at the age of 76, the directories list Luten individually as a map manufacturer (Indianapolis City Directories; *Indianapolis News* 1946).

During its existence, Luten's firm specialized in concrete arch bridges and was a national leader in encouraging the use of concrete arches over many types of steel trusses. Luten himself was a pioneer in concrete arch designs and applied for and received many patents. Luten claimed concrete bridges were practically indestructible and unaffected by weather. Labor and materials were usually available locally. Since they would not rust, did not need new wooden decks installed every few years, nor need painting as steel trusses did, Luten promoted them as substantially superior structures (Luten Bridge Company 1910; National Bridge Company 1907).

Luten's firm grew and by 1907 it claimed to have erected over 700 such bridges. Also, by 1907 Luten's company had representatives working alone or through established companies in Los Angeles, Topeka, Chicago, Connecticut, Iowa, and Philadelphia. By the early 1910s, his firm had designed and erected over 4,000 concrete arch bridges and had twenty-four engineers located throughout the United States. Through the 1910s Luten's firm dominated the industry, primarily due to the numerous patents he held. However, in 1918 he lost a court case that found his patents invalid, thus depriving Luten of his exclusive use of many design features (*Engineering and Contracting* 1918; Herbst and Rottman 1986; MacDonald 1918).

Work by the Luten Bridge Company in Tennessee dates to at least 1913. A few bridges exist that have plaques reading: BUILT BY LUTEN 1913 NASHVILLE, TENNESSEE. However, the Nashville City Directories never listed the Luten firm (Nashville City Directories). By 1915, according to several remaining plaques, the Luten firm was based in Knoxville. However, the Knoxville City Directories do not contain a listing for the firm until 1921. The Knoxville City Directories continued to list the firm until 1946 (Knoxville City Directories).

George Daugherty was president of the Knoxville branch office. Daugherty worked in Tennessee in the 1910s as an agent for the Luten branch office in Pennsylvania. In this capacity, he met his future wife while building a bridge in Loudon County, and they subsequently settled in Knoxville. Luten's offices were initially located in The Richard Building but he soon moved them to the Mercantile Building. In the 1920s, W. H. Long was vice-president, L. G. Brown was treasurer, and D. H. Daugherty was secretary. As was typical in the 1930s, the Depression reduced their work load, and the firm's employees soon included only George Daugherty. Although the Knoxville City Directories list the Luten Bridge Company until 1946, Daugherty headed other business interests listed at the same address (*Knoxville Journal* 1966; *Knoxville News-Sentinel* 1966).

Daugherty's firm was the contractor responsible for erecting, in the Knoxville area, the Knox County Jail, the East High School, the Austin High School, the Sequoyah Hills Presbyterian Church, Grant's Department Store, and Mann's Funeral Home.

The Luten Bridge Company was a very prolific bridge company in the United States and built many bridges in Tennessee. The survey inventoried seventy-one bridges that the Luten Bridge Company built in Tennessee (see Table III-22).

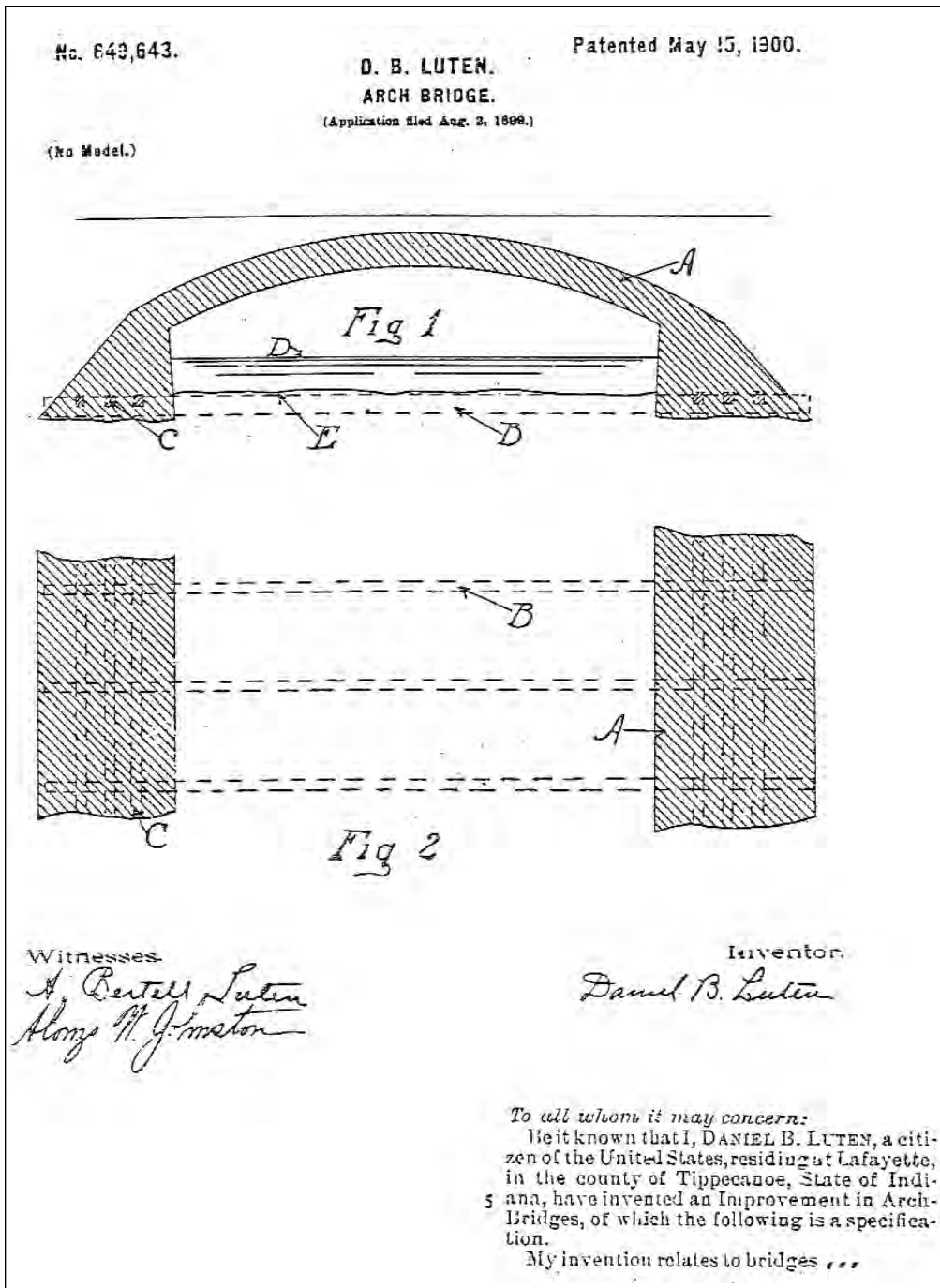


Figure III-08: Patent for Luten Arch Bridge.

TABLE III-22: BRIDGES BUILT BY LUTEN BRIDGE COMPANY

HISTORIC? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE BUILT	DESCRIPTION
No	Bedford	02-A0260-00.36	Flat Creek	1913	2 Filled Spandrel
No	Davidson	19-F0209-00.18	Branch	1913	1 Filled Spandrel
No	Maury	60-B0021-01.59	Snow Creek	1913	2 Filled Spandrel
Yes: #79	Giles	28-01891-04.77	Big Creek	1914	2 Filled Spandrel
No	Loudon	53-SR072-03.01	Fork Creek	1914	1 Filled Spandrel
No	Loudon	53-SR072-08.78	Clear Creek	1914	1 Filled Spandrel
Yes: #80	Loudon	53-02507-08.23	Pond Creek	1914	1 Filled Spandrel
No	Wilson	95-A0328-00.12	Beech Log Creek	1914	2 Filled Spandrel
No	Wilson	95-A0731-00.02	Branch	1914	2 Filled Spandrel
No	Blount	05-A0004-00.51	Baker Creek	1915	1 Filled Spandrel
No	Knox	47-02407-05.46	Stock Creek	1915	1 Filled Spandrel
No	Knox	47-03771-00.34	Fourth Creek	1915	1 Filled Spandrel
No	Knox	47-A0040-01.43	Stock Creek	1915	1 Filled Spandrel
No	Knox	47-D0841-00.61	Roseberry Creek	1915	1 Filled Spandrel
No	Knox	47-D0959-01.98	Stock Creek	1915	1 Filled Spandrel
No	Sevier	78-02421-09.85	Birds Creek	1915	1 Filled Spandrel
No	Sevier	78-A0491-00.56	West Prong Little Pigeon River	1915	1 Filled Spandrel
No	Wilson	95-A0265-01.33	Round Lick Creek	1915	3 Filled Spandrel
No	Wilson	95-A0282-00.23	Neal Branch	1915	1 Filled Spandrel
Yes: #86	Roane	73-01226-00.50	Emory River	1915-18	7 Filled Spandrel
No	Carter	10-A0273-03.15	Doe River	1916	4 Filled Spandrel
No	Carter	10-A0702-00.81	Buck Creek	1916	2 Filled Spandrel
Yes: #89	Unicoi	86-A0068-00.89	Nolichucky River	1916	1 Filled Spandrel
No	Sumner	83-A0086-00.01	Station Campbell Creek	1916-17	1 Filled Spandrel
No	Cocke	15-SR160-05.04	Dry Fork Creek	1917	1 Filled Spandrel
No	Grainger	29-01213-02.49	Richland Creek	1917	1 Filled Spandrel
No	Roane	73-03698-00.10	Black Creek	1917	1 Filled Spandrel
No	Unicoi	86-SR107-03.27	Indian Creek	1917	1 Filled Spandrel
No	Cocke	15-SR160-09.00	Slate Creek	1917-19	1 Filled Spandrel

Yes: #98	Blount	05-NonHighway-1	Little River	1918	3 Filled Spandrel
No	Cocke	15-SR160-03.50	Clay Creek	1918	2 Filled Spandrel
No	Giles	28-A0057-01.43	Big Creek	1918	2 Filled Spandrel
No	Unicoi	86-A0049-00.02	South Indian Creek	1918	2 Filled Spandrel
No	Cocke	15-SR035-08.17	Clear Creek	1919	1 Filled Spandrel
No	Cocke	15-SR035-09.65	Clear Creek	1919	1 Filled Spandrel
No	Rutherford	75-A0195-02.19	Fall Creek	1919	1 Filled Spandrel
No	Blount	05-A0003-00.91	Baker Creek	1920	2 Filled Spandrel
No	Giles	28-A0401-00.03	West Fork Shoals Creek	1920	1 Filled Spandrel
Yes: #100	Smith	80-01068-03.16	Hickman Creek	1920	4 Filled Spandrel
No	Wilson	95-A0727-00.03	Stoner's Creek	1920	1 Filled Spandrel
No	Campbell	07-SR009-24.12	Big Creek	1921	1 Filled Spandrel
No	Jefferson	45-A0145-00.01	Lost Creek	1921	1 Filled Spandrel
Yes: #103	Wilson	95-02036-01.51	Round Lick Creek	1921	2 Filled Spandrel
No	Dekalb	21-A0278-03.69	Dry Creek	1922	2 Filled Spandrel Rib
No	Dekalb	21-A0312-00.41	Clear Fork Creek	1922	2 Filled Spandrel Rib
Yes: #115	Giles	28-A0002-00.23	Factory Creek	1922	1 Filled Spandrel Rib
No	Wilson	95-A0197-03.48	Cedar Creek	1922	2 Filled Spandrel Rib
No	Wilson	95-01067-14.07	Lick Creek	1923	1 Filled Spandrel
No	Blount	05-SR035-05.34	Little River	1924	3 Filled Spandrel
No	Campbell	07-SR116-00.04	New River	1924	1 Open Spandrel
No	Maury	60-A0161-02.91	Duck River	1925	3 Filled Spandrel
Yes: #128	Carter	10-03939-00.10	Doe River	1926	3 Filled Spandrel Rib
No	Rutherford	75-B0084-00.09	Lytle Creek	1927	2 Filled Spandrel Rib
No	Warren	89-A0419-01.40	Hickory Creek	1927	1 Filled Spandrel Rib
No	Wilson	95-02032-07.54	Smith Fork Creek	1927	2 Filled Spandrel Rib
No	Wilson	95-A0318-00.01	Rocky Branch	1927	2 Filled Spandrel Rib
No	Wilson	95-A0470-01.04	Barton's Creek	1927	1 Filled Spandrel Rib
No	Wilson	95-A0499-02.87	Cedar Creek	1927	1 Filled Spandrel Rib
No	Wilson	95-A0519-01.53	Cedar Creek	1927	1 Filled Spandrel Rib
No	Wilson	95-A0717-00.29	Spring Creek	1927	2 Filled Spandrel Rib
No	Wilson	95-A0725-00.29	Branch	1927	1 Filled Spandrel
No	Humphreys	43-01781-04.15	White Oak Creek	1928	2 Filled Spandrel Rib
No	Loudon	53-02551-03.67	Sweetwater Creek	1928	2 Filled Spandrel Rib

No	Wilson	95-01058-05.56	Barton's Creek	1928	2 Open Spandrel
No	Wilson	95-02032-07.53	Smith Fork Creek	1928	2 Filled Spandrel Rib
No	Carter	10-SR037-22.33	Doe River	1929	5 Filled Spandrel Rib
Yes: #128	Stewart	81-A0330-01.41	Standing Rock Creek	1929	1 Open Spandrel
No	Grainger	29-A0096-00.08	Indian Creek	1930	1 Filled Spandrel Rib
Yes: #134	Anderson	01-A0136-01.96	Hinds Creek	1931	1 Filled Spandrel
No	Dekalb	21-A0050-04.20	Smith Fork Creek	1934	3 Filled Spandrel Rib
No	Knox	47-A0129-00.08	Roads	1936	5 Open Spandrel

MOUNT VERNON BRIDGE COMPANY, MOUNT VERNON, OHIO:

About 1871-1880 John Braddock established the Mount Vernon Bridge Works in Mount Vernon, Ohio. Braddock served as president and John Ewalt of the First National Bank served as the secretary-treasurer. With about thirty employees, the firm specialized in small highway bridges. In 1886, the company erected a larger plant. The expense of this plant combined with problems in constructing a three-span bridge across the Potomac River caused financial problems for the firm. The Panic of 1893 and the subsequent recession exacerbated the firm's fiscal difficulties, forcing the company to close in 1894.

The plant stood idle until September of 1897 when James Westwater purchased the plant and received a new charter for the Mount Vernon Bridge Company. The company was incorporated in October 1900. By 1910, the firm employed about 240 workers. On 10 February 1910, the 1886 frame building burned. Soon thereafter, the company erected a new group of brick buildings.

Westwater was a contractor and not experienced in bridge building; however, as president, he employed experienced bridge people. For example, he hired James Israel as his local representative and who served as secretary-treasurer until 1909. At that time, Westwater sold his interests to Israel who became president until 1919. During these years, his son George Israel served as secretary-treasurer. Irving Wolverton joined the company in 1899 as chief engineer and served as vice-president from 1909 to 1919 and as president from 1919 to 1930. Clyde Conley began working for the company in 1902 as a draftsman. Conley served as secretary from 1914 to 1930 when he became president.

The Mount Vernon Bridge Company erected many significant projects in the twentieth century. These include bridges across the Ohio River at Madison, Indiana, at Pomeroy, Ohio, and across the Mississippi and the Missouri Rivers. In 1940 the firm built (at that time) the world's longest double leaf bascule lift bridge in Lorain, Ohio, and in Louisiana it built the three longest simple spans in America. Between 1940 and 1955, the company won seven awards from the American Institute of Steel Construction. After the mid-1950s, the company went through several owners until the mid-1960s when the Cooper-Bessemer Corporation, now known as the Cooper Industries-Energy Services Group, purchased it (Lorey 1976; Williams 1912).

In Tennessee, the Mount Vernon Bridge Company erected the old Bordeaux Bridge in 1889. This bridge contained four Parker through trusses. However, when Davidson County replaced the Bordeaux Bridge in 1916, as was common, the county decided to reuse the truss spans at another crossing that carried less traffic. The Nashville Bridge Company re-erected two spans at different locations in southwest Davidson County (only one is extant, #16, 19-NonHighway-2). As part of the arrangement, Davidson County gave Nashville Bridge the remaining two spans. Nashville Bridge stored one span until 1924 when it re-erected it, along with three 1924 truss spans, in the Rock Island Bridge in Warren County (#112, 89-04261-11.60). The disposition of the fourth truss from the Bordeaux Bridge is unknown.

TABLE III-23: BRIDGES BUILT BY MOUNT VERNON BRIDGE COMPANY

ELIGIBLE? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE BUILT	DESCRIPTION
Yes: #16	Davidson	19-NonHighway-2	South Harpeth River	1889	1 Parker Through
Yes: #112	Warren	89-04261-11.60	Collins River	1889 and 1924	1 1889 Parker Through, 1 1924 Parker Through, and 2 Warren Pony by Nashville Bridge

NASHVILLE BRIDGE COMPANY, NASHVILLE, TENNESSEE:

Arthur Dyer was born in Massachusetts in 1868. However, the South had so impressed his father Charles Henry Dyer, who had served in the Union Army during the Civil War, that Charles Dyer moved his family to Chattanooga in 1871. Dyer graduated from Chattanooga High School in 1887 and from Vanderbilt Engineering School in 1891. Dyer was unable to attend the additional year of college that was then required to obtain a Civil Engineering degree; however, he was awarded a degree in 1945. After graduation Dyer worked for the Phoenix Iron Company of Phoenixville, Pennsylvania, and the Phoenix Bridge Company until 1893. In 1894 he worked for the Light House Board in Washington, and for the Milliken Brothers in New York in 1895 (Dyer 1949:432-433).



The recession that followed the Panic of 1893 resulted in Dyer losing his job with the Milliken Brothers. Unable to find work in New York, he returned home to live with his parents in Chattanooga and began bidding as an individual on small bridge projects. While so engaged,

Figure III-09: Photograph of Arthur J. Dyer (Tennessee State Library and Archives, DB #1302).



Dyer met H. T. Sinnott, the Nashville agent for the Youngstown Bridge Company, who offered him a job. Accepting the offer, Dyer primarily worked for Youngstown on bridge designs. However, Dyer and Sinnott pursued freelance work, and the 1897 and the 1900 Nashville City Directories contain a separate listing for "Sinnott and Dyer (A. J.) Civil Eng. and Contractors." As an independent contractor, Dyer worked on the 140-foot Giant See Saw at the 1897 Tennessee Centennial and the Aerio-Cycle at the Buffalo Exposition in New York.

In 1898 Dyer married Elizabeth Buttorff, a graduate of the prestigious Ward's Seminary in Nashville and the daughter of Henry W. Buttorff, founder of Phillips and Buttorff Manufacturing Company. Dyer's job and marriage cemented his ties to Middle Tennessee, and he made his home there until his death in 1958. Arthur and Elizabeth Dyer were the parents of four children, two sons who worked for their father at the Nashville Bridge Company, another son, and a daughter who left the state after her marriage. The oldest child, Harry Buttorff Dyer, received a degree in civil engineering from Lehigh University in 1921. Arthur Dyer Jr. graduated from Culver in 1925, and after less than a year of marriage, died in 1928 in Panama City while working on a bridge project. Their third son was Wesley H Dyer. The Dyers' daughter Mary married George H. Devenmuehle of Chicago, where they lived. Elizabeth Buttorff Dyer was active in Nashville's civic life and served as president of the Young Women's Christian Association and served on the board of the Community Chest. Arthur Dyer also served on various civic associations, was chairman of the Smoke Commission and the Planning and Zoning Commission, and was member and chairman of the State Planning Board. He was also on the Transportation Trustees Board of Nashville and served as its chairman for eighteen years. Dyer was a member and a vice-president of the American Society of Civil Engineers and served on the board of the American Institute of Steel Construction. (Dyer 1949:433).

In 1899-1900, the American Bridge Company purchased Dyer's employer, the Youngstown Bridge Company. Dyer briefly worked for the American Bridge Company, including assisting in the design of the Mulberry Bridge (#35, 52-NonHighway-3) in Lincoln County in 1901. However, Dyer soon left American Bridge and, with \$750 of borrowed money, entered a partnership with Sinnott. The partnership ended in 1902 when Dyer purchased Sinnott's interest and started his own company (Nashville Bridge Company 1958:23). Sinnott continued to list his business as the H. T. Sinnott Bridge Company in the Nashville City Directories from 1903 to 1907. The 1907 Nashville City Directory, the last year it contains a listing for Sinnott, also lists him as an agent for the Bellefontaine Bridge and Iron Company.

Major spring floods in 1901, 1902, and 1903 destroyed a large number of bridges in Tennessee. These floods, in combination with the elimination of numerous small bridge companies due to the creation of the American Bridge Company, were fortuitous for the bridge building industry and created a business opportunity for Dyer. Evidently, sometime in 1901, Dyer began his own firm. The Stewart Quarterly Court Minutes indicate that Dyer bid in December 1901 on a Stewart County project as an agent for the Nashville Bridge Company (Stewart Quarterly Court Minutes 1901:1:174-180). From 1902 to 1904, the Nashville City Directories list the Nashville Bridge & Construction Company. John D. Anderson served as president, Watkins Crockett as vice-president, Robert D. Goodlett as secretary, and Arthur J. Dyer as general manager (Waller 1972:116). The firm's first major job involved the fabrication and erection of the steel framework in 1902 for the Arcade, an enclosed shopping area that is a landmark in downtown Nashville and listed in the National Register.

In late 1903 or 1904 Dyer, along with two associates, W. T. Young and Leslie M. Ross, re-organized the Nashville Bridge Company with a capital of \$15,000 (Dyer 1949:433). Dyer later purchased their interests. Dyer served as president until 1940, when he became chairman of the board. Dyer remained involved with the firm until his death in 1958. Initially, Young served as vice-president and Ross as secretary. In the early 1900s, the Nashville City Directories contain separate and independent listings for the W.T. Young Bridge Company and the Nashville Bridge Company but listed both at the same address. During these years, county court minutes contain separate bids from both the W. T. Young Bridge Company and the Nashville Bridge Company. The contract books for the Nashville Bridge Company contain contracts for both firms. From 1899 to 1921, the Nashville City Directories contain a listing for the W.T. Young Bridge Company, but in 1921, Young became a vice-president with Nashville Bridge, and the Nashville City Directories ceased listing his company.

Dyer began his company with a wagon and one regular employee but grew quickly. The company's plant was located on the east bank of the Cumberland River in an industrial area, opposite Nashville's downtown. Its location provided easy access to both water transport and rail service, an important asset for a bridge company. In a brief article on the company, a local newspaper visited the company's five-acre site in 1909 and concluded that the:

fire-proof buildings which comprise their plant make it the most up-to-date one of its kind in the South. Their new six-story concrete office building, recently finished, is the most complete private office building in the city. This company builds most anything in the line of concrete or steel, and the buildings in their own plant prove conclusively that they thoroughly understand the most modern construction methods (*Nashville Banner*, 22 May 1909).

Figure III-10: Advertisements from the Nashville City Directories in the early 1900s for the Nashville Bridge Company and the W.T. Young Bridge Company. Note that both were located at the same address and had the same phone number.



The Nashville Bridge Company initially built many small truss bridges in the state but gradually expanded throughout the Southeast building bridges across major rivers. It practiced primarily in the South but also shipped bridges to many Central and South American countries. Due to the firm's success in South America, it opened a branch office in Columbia. Research and field work in Tennessee indicate the Nashville Bridge Company was the most prolific company practicing in Tennessee. While the company primarily built truss bridges, it also erected a few concrete arch bridges. On a regional level, it came to be recognized for its work in movable bridges, and the firm erected several along the Gulf Coast. In 1928, during the erection of one of these bridges in Panama City, Dyer's son James died in a construction related accident. By the mid-twentieth century the company claimed to have built over half of all the bascule bridges in Florida (Nashville Bridge Company ca. 1980).

Due to the passage of the Federal Aid Highway Act of 1916 and the subsequent development of standardized plans and greater involvement of state highway departments in bridge design, bridge construction changed in the 1910s. To survive, many bridge companies, including the Nashville Bridge Company, diversified their interests. In 1915 Nashville Bridge Company expanded into the marine field. The first marine project was the construction of a small floating derrick hull for the Army Corps of Engineers. Although World War I curtailed bridge work in the United States, it generated the need for war related equipment. During World War I, Nashville Bridge built four sea-going oil tank barges for the Emergency Fleet Corporation. It also received contracts to provide various ship parts and barges. The company's first tow-boat, named NABRICO, was a small 75 horsepower single screw semi-diesel tug built in 1920, specifically designed to tow sea-going barges down river to New Orleans.

The end of World War I and the infusion of federal money to state highway departments resulted in massive road building programs in the late 1910s and 1920s. With these favorable economic conditions and after its success in marine work, in 1922-1923, the Nashville Bridge Company expanded with the construction of a new steel plant in Bessemer, Alabama. In 1924, the company expanded the Bessemer facility with the erection of a structural steel galvanizing plant for the construction of transmission towers.

After working for the company from 1921 to 1926, Dyer gave his son Harry Buttorff the choice of managing the Bessemer plant or staying in Nashville and taking charge of the Marine Department. Harry Dyer chose to take over operations of the Marine Department. He soon implemented an ambitious plan to build barges on a production line basis and launch them from pivoted arms, a technique never used before. This new method proved very successful and the company's barge business expanded substantially.

Over the years, the Nashville Bridge Company decreased its bridge building and expanded its Marine Department. While many bridge companies closed during the Great Depression, the Nashville Bridge Company continued to operate, in large part due to its diversified interests in marine production. However, in addition to the marine work in the 1930s, Nashville Bridge continued to provide steel for a variety of general construction projects and road projects that included the fabrication and erection of many state highway department bridges.

In 1940, Arthur Dyer stepped down as president of the company and became chairman of the board. His son Harry became president of the Nashville Bridge Company during an expansion period for the firm when it shifted its work focus and erected several new buildings at the Nashville plant. In the late 1930s, in anticipation of possible involvement in World War II, the United States began contracting for war related materials, and the Nashville Bridge Company expanded its operations to meet this demand. Prior to World War II, Nashville Bridge had employed about 1,100 persons, but during World War II, both the Bessemer and Nashville plants devoted their resources exclusively to the construction of defense equipment and employment reached more than 1,300 (Nashville Bridge Company 1961). By 1 May 1944, Nashville Bridge's war production included five U.S. Navy barracks vessels, six U.S. Navy covered lighters, thirty-seven U.S. QMC deck barges, eleven U.S. QMC oil barges, four U.S. QMC water barges, ten U.S. QMC cargo barges, fourteen U.S. Navy subchasers, and two U.S. Mine sweepers. The size of some of this equipment taxed the lock system on the Cumberland River, but Nashville Bridge delivered all of them without seriously damaging the crafts (Douglas 1961:306). For these efforts, Nashville Bridge earned the Navy "E" four times during the war.

Following World War II, Nashville Bridge concentrated on improving the operating efficiency of towboats and barges, decreasing its bridge building activities. The firm's marine efforts included designing and patenting several elements used in the industry. This work earned the company a national reputation for barge and towboat design and construction. Nashville Bridge became the world's largest builder of inland barges.

By the 1960s, the Bessemer and Nashville plants employed over 1,400 workers. The Nashville plant fabricated steel structures and built shallow-draft towboats and river barges. The Bessemer plant fabricated bridges, television and radar towers and operated one of the largest galvanizing works in the entire South. Throughout the twentieth century, Nashville Bridge was a leader in Nashville's industrial community. Local projects included the structural steel dome of the Municipal Auditorium, and the Belle Meade Shopping Center. A 1961 company publication stated that the firm's "most spectacular recent job is the fabrication of a 310-foot

tower to assemble and serve the Saturn Space Ship” (Nashville Bridge Company 1961). This structure was reputedly the tallest structure in the world on wheels (Kerr, West, and Gish file).

By the 1990s, the Nashville Bridge Company complex of industrial and office buildings, still located on the original site on the north bank of the Cumberland River in downtown Nashville, contained eight major buildings, six built between 1909 and 1945. The main building is a six-story office tower erected in 1908-1909, expanded in 1923 and again in 1965. Interestingly, the main public access to the building was at the fifth floor level from an elevated walkway off the Shelby Street Bridge (#58, 19-03245-01.47) rather than from an entrance at ground level on the river bank. The complex includes a circa 1910 fabrication shop that the company expanded circa 1918 and again during World War II. As part of its war related production, the company purchased additional land in the late 1930s and 1940s and about 1938 built a locker house as a changing room for workers. In the 1940s, the company erected three large steel buildings to house shops, boat assembly areas, and welding operations. In 1955, after the city restricted parking for employees on the Shelby Street Bridge, a new bridge ramp to the office was built that included an elevated parking area of steel construction erected between the bridge and the office. The company erected smaller buildings about 1960 and 1981.

In 1969 the Dyer family sold the Nashville Bridge Company to Whale Electronics which later that same year sold it to the American Ship Building Company. In 1972 American Ship sold the bridge and structural building aspects of the company and officially renamed the Nashville office NABRICO. Other owners followed, and while the firm’s name is now officially Trinity Marine, most Middle Tennessee residents still refer to it as the Nashville Bridge Company. By the mid-1990s, the Nashville office employed about 200 workers. In the late 1990s, the City of Nashville purchased the Nashville Bridge Company site as part of its redevelopment project associated with the construction of the Coliseum. The city demolished most of the buildings associated with the Nashville Bridge Company site in 1997-98. In anticipation of relocating from downtown Nashville, several years ago the company had bought a site in nearby Ashland City where it relocated its operations.

The company’s contract book documents that the firm built at least four hundred metal truss and concrete arch bridges in Tennessee. The survey identified seventy-three extant bridges that the company erected (see Table III-24). The survey identified five bridges that the W. T. Young Bridge Company, apparently in conjunction with the Nashville Bridge Company, erected (see Table III-25).

Figure III-11: Photograph of the Nashville Bridge Company facility in Nashville prior to its demolition in the 1998 for construction of the Coliseum, which is shown in the background. Nashville Bridge’s six story office tower remains. The bridge spanning the Cumberland River is the Shelby Street Bridge (#58, 19-03245-01.47).



TABLE III-24: BRIDGES BUILT BY NASHVILLE BRIDGE COMPANY

HISTORIC? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE BUILT	DESCRIPTION
No	Hickman	41-NonHighway-2	Duck River	1903	1 Pennsylvania Petit Through
Yes: #41	Maury	60-NonHighway-1	Duck River	1903	1 Pennsylvania Petit Through
Yes: #42	Humphreys	43-NonHighway-1	Duck River	1903-1904	2 Camelback Through
Yes: #45	Bedford	02-A0048-00.38	North Fork Creek	1904	1 Pratt Through
Yes: #46	Davidson	19-D0981-02.00	Harpeth River	1904	3 Warren Pony
Yes: #55	Hickman	41-NonHighway-1	Duck River	1907	1 Pennsylvania Petit Through
No	Hickman	41-NonHighway-4	Duck River	1907	1 Pennsylvania Petit Through
No	White	93-02188-02.33	Caney Fork River	1907; 1930	2 Pratt Through
No	Davidson	19-C0539-00.10	Sulphur Creek	1908	1 Warren Pony
Yes: #59	Dekalb	21-A0028-01.21	Smith Fork Creek	1908	2 Warren Pony
Yes: #61	Van Buren	88-NonHighway-1	Cane Creek	1908; 1924	1 Pratt Through
Yes: #63	Franklin	26-A0406-00.33	Wagner Creek	1909	1 Pratt Through
No	Giles	28-A0335-00.14	Jenkins Creek	1909	1 Warren Pony
No	Putnam	71-A0030-00.03	Big Indian Creek	1909	1 Warren Pony
No	Macon	56-06289-00.83	Middle Fk Goose Cr	1910	1 Warren Pony
No	Sumner	83-B0119-00.07	Bledsoe Creek	1910	1 Warren Pony
Yes: #68	Humphreys	43-A0340-00.01	Hurricane Creek	1911	1 Pratt Through
No	Wayne	91-A0121-01.11	Fortyeight Creek	1911	1 Pratt Through
No	Davidson	19-D0752-01.60	Harpeth River	1912	1 Pratt Through
No	Sumner	83-A0434-00.24	Station Camp Cr	1912	1 Warren Pony
No	Sumner	83-A0489-02.21	Maxwell Branch	1912	1 Warren Pony
No	White	93-A0178-00.17	Calfkiller River	1912	1 Warren Pony
Yes: #73	White	93-A0285-00.95	Lost Creek	1912	1 Pratt Pony
No	Hickman	41-NonHighway-5	Duck River	1913	2 Pratt Through
No	Robertson	74-A0438-03.98	Brushy Creek	1913	1 Warren Pony
Yes: #76	Sumner	83-NonHighway-1	Caney Fork Creek	1913	1 Warren Pony PTC
No	White	93-00571-00.82	Post Oak Branch	1913	1 Warren Pony
No	Williamson	94-A0232-00.19	Harpeth River	1913	1 Warren Pony

No	Cumberland	18-A0814-02.62	Laurel Creek	1914	1 Warren Pony
No	Perry	68-00921-01.02	Buffalo River	1914	1 Pennsylvania Petit Through
No	Rutherford	75-NonHighway-1	W Fk Stones River	1914-1916	1 Pratt Through
No	Campbell	07-A0094-00.32	Elk Fork Creek	1915	1 Warren Pony
No	Hardin	36-A0133-01.54	Indian Creek	1915	1 Pratt Through
No	Sumner	83-A0444-00.30	East Camp Creek	1915	1 Warren Pony
No	Van Buren	88-A0118-00.10	Rocky River	1915	1 Warren Pony
No	Campbell	07-A0102-01.63	Elk Fork Creek	1916	1 Warren Pony
No	Humphreys	43-A0039-03.15	White Oak Creek	1916	1 Warren Pony PTC
No	Smith	80-A0167-00.51	Hickman Creek	1916	1 Warren Pony
Yes: #90	Washington	90-B0586-00.00	Watauga River	1916	1 Pennsylvania Petit Through
No	Coffee	16-A0377-01.46	Baschaw Creek	1916-1917	1 Warren Pony
Yes: #91	Grainger	29-A0025-02.62	Hogskin Creek	1916-1917	1 Camelback Through
No	Coffee	16-A0348-01.92	Duck River	1917	1 Pratt Pony
No	Hawkins	37-01197-03.81	Holston River	1917	2 Pennsylvania Petit Through
Yes: #93	Hawkins	37-A0131-01.67	Poor Valley Creek	1917	1 Warren Pony
No	Humphreys	43-A0055-00.04	Little Richland Cr	1917	1 Warren Pony
No	Humphreys	43-A0348-00.34	Camp Branch	1917	1 Warren Pony
No	Sumner	83-B0039-00.01	Little Trammel F Cr	1917	1 Warren Pony
No	Hickman	41-NonHighway-3	Duck River	1918	2 Pratt Through
No	Morgan	65-A0191-03.08	Clear Fork River	1918	1 Pratt Through
No	Dekalb	21-SR264-03.27	Smith Fork Creek	1919	2 Pratt Through
No	Macon	56-A0450-04.66	Goose Creek	1919	1 Warren Pony
No	Wayne	91-01773-06.97	Buffalo River	1919	3 Pratt Through
No	Williamson	94-A0434-00.68	W Harpeth River	1919	1 Warren Pony
No	Franklin	26-A0345-01.88	Rose Creek	1920	1 Warren Pony
No	Giles	28-A0058-00.42	Big Creek	1920	1 Warren Pony
No	Franklin	26-02106-07.70	Boiling Fork Creek	1921	1 Warren Pony
No	Giles	28-01902-03.23	Little Bradshaw Cr	1921	1 Filled Spandrel
No	Overton	67-A0419-01.98	E Fork Obey River	1921	1 Warren Pony
No	Perry	68-A0302-03.85	Poole Lake	1921	2 Filled Spandrel
No	Williamson	94-01921-01.80	S Harpeth River	1921	1 Warren Pony

No	Williamson	94-01921-03.20	S Harpeth River	1921	2 Warren Pony
Yes: #104	Giles	28-A0334-00.33	Jenkins Branch	1921-1922	1 Filled Spandrel
No	Giles	28-01873-01.40	Elk River	1922	3 Pratt Through
No	Warren	89-A0425-00.86	W Fk Hickory Cr	1922	2 Filled Spandrel
No	Williamson	94-A0266-00.08	Rutherford Creek	1922	1 Warren Pony
No	Cannon	08-00501-02.93	Brawley's Fork Cr	1923	1 Warren Pony
No	Dickson	22-A0047-00.18	Yellow Creek	1923	1 Pratt Through
No	Putnam	71-A0303-03.94	Falling Water River	1923	1 Warren Pony
No	Wayne	91-A0292-02.63	Butler Creek	1923	2 Warren Pony
Yes: #112	Warren	89-04261-11.60	Collins River	1924; 1889	2 Parker Through & 2 Warren Pony
No	Fentress	25-00452-02.04	Wolf River	1925	1 Pratt Through
No	Jackson	44-SR085-15.52	Jennings Creek	1926-1927	1 Pratt Through
Yes: #151	Davidson	19-NonHighway-3	Drake's Creek	1941	1 Kingpost Pony

PTC indicates Polygon al Top Chord.



THE W. T. YOUNG BRIDGE COMPANY, NASHVILLE:

W.T.Young worked closely with Arthur Dyer and the Nashville Bridge Company, beginning in the early 1900s. In the early 1900s, the Nashville City Directories contain separate and independent listings for the W. T. Young Bridge Company and the Nashville Bridge Company but listed both at the same address. Although county court minutes often contain separate bids from both the W.T.Young Bridge Company and the Nashville Bridge Company, the contract

books for the Nashville Bridge Company contain contracts for both firms. From 1899 to 1921, the Nashville City Directories contain a listing for the W.T.Young Bridge Company, but in 1921, Young became a vice-president with Nashville Bridge, and the Nashville City Directories ceased listing his company.

TABLE III-25: BRIDGES BUILT BY THE W.T.YOUNG BRIDGE COMPANY (NASHVILLE BRIDGE COMPANY)

HISTORIC # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE BUILT	DESCRIPTION
Yes: #43	Maury	60-NonHighway-2	Duck River	1903-1904	1 Camelback Through
No	Williamson	94-A0066-00.64	Harpeth River	1904	1 Pratt Through
Yes: #56	Smith	80-A0206-00.47	Lick Creek	1907	1 Pratt Pony
No	Williamson	94-01917-04.79	South Harpeth River	1908	1 Warren Pony
No	Cheatham	11-A0017-00.77	Half Pone Creek	1913	1 Warren Pony

NEW COLUMBUS BRIDGE COMPANY, COLUMBUS, OHIO:

The Columbus City Directories first list the Columbus Bridge Company in 1885-1886. Located on Stanton, it advertised it was available for "Bridge Building and Structural Iron Work." Early officers included DeWitt C. Sawyer (or Sawyer), president; B. J. Arthur, vice-president; Theodore G. Gordan, treasurer; F. C. Lewis, engineer and superintendent; and R. A. Sawyer, J. A. Hedges, and C. R. Martens.



In 1894 the Columbus Bridge Company merged with the Capitol Construction Company under William Cleveland, resulting in a different name, the New Columbus Bridge Company. Located on Curtis Avenue, William N. Cleveland served as president, Harmon R. Hepburn as vice-president and treasurer, and Frank J. Shaffer as secretary. The American Bridge Company's records (Rowles 1984) do not enumerate the New Columbus Bridge Company as one of the firms that it purchased in 1900-1901. However, the Columbus City Directories listed this company as the American Bridge Company, Columbus Plant from 1901 to 1904-1905. After 1905, the city directories no longer listed the company. The Capitol Construction Company continued to operate until Cleveland's death in the 1930s (Darnell 1984; Ohio DOT 1983; Rowles 1984; Weitzel 1981).

The survey inventoried two bridges that the New Columbus Bridge Company erected in Tennessee (see Table III-26).

TABLE III-26: BRIDGES BUILT BY NEW COLUMBUS BRIDGE COMPANY

ELIGIBLE? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE BUILT	DESCRIPTION
Yes: #26	Bradley	06-A0165-00.21	Candies Creek	1895	3 Pratt Half-hip Pony
Yes: #31	Sullivan	82-NonHighway-1	Beaver Creek	1898	1 Pratt Through



PENN BRIDGE COMPANY, BEAVER FALLS, PENNSYLVANIA:

Timothy S. White practiced as a carpenter and general contractor from about 1840 until 1859. About 1859, he expanded and began manufacturing wooden bridges. In 1868 he again expanded and began building iron truss bridges. During these years, the firm probably operated as the Penn Bridge and Machine Works. Soon afterward, in the early 1870s, his factory on Fifth Avenue in New Brighton burned. White and his sons then moved the business across the river to Beaver Falls where it

operated as the Penn Bridge Company. White may have first used this name in 1879 when the firm received the contract for the Fellerman Bridge over Beaver Creek between Beaver Falls and Eastvale. The firm was still in operation as late as 1903 when its officers were H.W. Reeves, president; James F. Merriman, secretary; and John Reeves, treasurer (Bausman 1904; Darnell 1984; Historical Commission of the Centennial 1938).

The survey inventoried one bridge that the Penn Bridge Company erected in Tennessee (see Table III-27).

TABLE III-27: BRIDGES BUILT BY PENN BRIDGE COMPANY

ELIGIBLE? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE BUILT	DESCRIPTION
Yes: #9	Giles	28-00966-03.54	Big Creek	1884	1 Warren Pony



ROANOKE BRIDGE COMPANY (CAMDEN IRON WORKS) (ROANOKE IRON AND BRIDGE WORKS), ROANOKE, VIRGINIA:

The Roanoke Bridge Company was organized 14 February 1906 with E. C. McComb as president, J. B. Botts as vice-president and treasurer, S. H. Heironimus as assistant treasurer, and S. H. Holland as secretary. The firm obtained all its structural steel from Virginia Bridge and Iron until 1911 when it built its own shops that employed 100-120 people. The company practiced primarily in the South and had branch offices in Atlanta, Georgia; Rock Hill, South Carolina; and Jacksonville, Florida.

A 1912 local publication listed the company's most notable recent contracts. These included the Reliance Bridge in Polk County (#72, 70-SR315-00.02), the only bridge by Roanoke that the survey identified in Tennessee (see Table III-28), a 700-foot bridge with a draw span in Maryland, and thirty-three bridges in Wise and Lee Counties in Virginia (Jack 1912). By 1912 the firm employed a total of about 350 people.

However, the company failed shortly after this, and the Camden Iron Works of Salem, Virginia, purchased it. This Camden Iron Works had been organized in about 1887 to manufacture structural and ornamental iron and wrought steel fences. Soon after its organization, Mr. Orran D. Oakley became the sole owner, and the company later specialized in the construction of jails. After Camden Iron Works acquired the Roanoke Bridge Company about 1915, it re-organized the firm as the Roanoke Iron and Bridge Works. The company still builds bridges and jails under the management of the Oakley family (Buhrman 1981; Darnell 1984; Jack 1912).

TABLE III-28: BRIDGES BUILT BY ROANOKE BRIDGE COMPANY

ELIGIBLE? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE BUILT	DESCRIPTION
Yes: #72	Polk	70-SR315-00.02	Hiwassee River	1912	5 Pratt Through

**SOUTHERN BRIDGE COMPANY,
BIRMINGHAM, ALABAMA:**

The Southern Bridge Company was located in Birmingham and operated in the Southeast region from at least 1910 to 1920. Research did not uncover any other information about the company. The survey inventoried only one bridge that the Southern Bridge Company erected in Tennessee (see Table III-29).

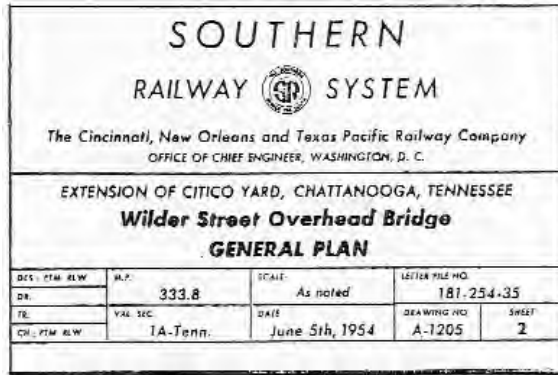


However, an employee of the Southern Bridge Company left the firm to work in East Tennessee. In 1912, at the age of 25, E. N. "Pop" Matthews came to Washington County as an employee of the Southern Bridge Company to work on the Smith Bridge (90-A0900-00.97). While working on this project, he met his future wife who lived on the farm bordering the bridge. Due to the traveling required, Matthews left the Southern Bridge Company in 1920 and formed the Matthews Construction Company that concentrated on projects in Upper East Tennessee (*Johnson City Press Chronicle* 1983).

Matthews did not maintain a formal office but worked from his home, depending largely on word-of-mouth advertising. When he had bridge projects, he recruited unemployed farm workers who lived near the projects as his laborers. He and his son Ed Matthews Jr. built several bridges in the Washington, Greene, Carter, Sullivan, Unicoi, Hamblen, and Cocke Counties area. One of the firm's projects involved the relocation in 1941 of the Del Rio Bridge, originally built in 1916 in Cocke County, to Watauga Flats in Washington County (#90, 90-B0586-00.00).

TABLE III-29: BRIDGES BUILT BY SOUTHERN BRIDGE COMPANY

ELIGIBLE? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE BUILT	DESCRIPTION
No	Washington	90-A0900-00.97	Nolichucky River	1901-1902	2 Pratt Through and 1 Pratt Pony



Title Box on Southern Plan Sheet.

SOUTHERN RAILWAY: Southern Railway was formed in 1894 through the merger of thirty existing rail lines. In an age of massive monopolies and vast business concerns, Drixel, Morgan, and Company organized the merger. J. P. Morgan chose Samuel Spencer as president. Primarily serving the Southeast, this line prospered throughout the twentieth century and by 1980 was the ninth largest in the country. In 1982 it merged with Norfolk and Western, becoming the fourth largest system in the United States.

The railroad's more challenging bridges from an engineering standpoint would have been on its rail lines (which this survey did not inventory). The bridges it built on public roads tended to be simple structures that provided a grade separation with the railroad. The survey inventoried twelve highway bridges that Southern Railway erected in Tennessee (see Table III-30).

TABLE III-30: BRIDGES BUILT BY SOUTHERN RAILWAY

HISTORIC? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE BUILT	DESCRIPTION
No	Hawkins	37-A0337-00.24	Road	1905 est	1 Filled Spandrel
No	Hawkins	37-A0461-00.05	Road	1905 est	1 Filled Spandrel
No	Hawkins	37-A0830-00.06	Road	1905 est	1 Filled Spandrel
No	Hamilton	33-A0838-00.41	Road	1907	1 Filled Spandrel
No	Hamilton	33-A0851-00.29	Road	1907	1 Filled Spandrel
No	Hamilton	33-E0068-01.54	Road	1909 est	1 Filled Spandrel
No	Hamilton	33-E0073-00.87	Road	1909 est	1 Filled Spandrel
No	Knox	47-A0122-01.33	Road	1915 est	1 Filled Spandrel
No	Greene	30-A0486-01.86	Road	1920 est	1 Filled Spandrel
No	Hamilton	33-B0515-00.66	Road	1920 est	1 Filled Spandrel
No	Hamilton	33-E0066-00.15	Southern Railroad	1920 est	1 Queenpost Pony
No	Hamilton	33-SR002-03.33	Wauhatchie Pike	1933 est	1 Filled Spandrel

STEEL AND ROEHL BRIDGE COMPANY AND THE STEEL AND LEBBY BRIDGE COMPANY, KNOXVILLE, TENNESSEE:

Otto Roehl and John Steel formed the Steel and Roehl Bridge Company in Knoxville in the late 1910s and practiced together until about 1924, specializing in concrete designs. John Steel then entered into a partnership with Thomas Leppy as the Steel and Leppy Bridge Company that lasted until 1933 when a bank collapse forced the company to close. Steel advocated concrete arch designs, and his firm built few truss bridges. (The survey inventoried only one, #80-A0138-00.18, the Betty's Bend Bridge in Smith County, erected after the devastating March 1929 flood washed out a concrete bridge under construction, and the county insisted on changing the design; *Carthage Courier* 1972a, Smith County Court Minutes Volume 25:477-478).



After World War I, a variety of factors changed concrete arch building in Tennessee. By the late 1910s, concrete arch bridges were becoming increasingly popular. In addition, a lawsuit in 1918 largely negated the concrete arch patents of the Luten Bridge Company, making it easier for other companies to compete with Luten. Also, engineers had developed new designs for concrete arches that did not rely on the traditional barrel arch. Tennessee native John Steel took full advantage of this new development after returning to Knoxville in about 1919 and opened a bridge company. His main rival in the East Tennessee region was the nationally known Luten Bridge Company that specialized in filled spandrel arch bridges. Perhaps in an effort to set itself apart and perhaps due to Steel's European schooling, the Steel-Roehl-Leppy firm used more visually distinctive designs such as the open spandrel arch design. Steel and Roehl built the oldest known extant open spandrel arch in Tennessee, the 1921 Rainbow Bridge in Greene County (#102, 30-NonHighway-1). Not only content to build open spandrel deck arches, the firm also built through or "Rainbow" arches such as one in Lawrence County that is no longer extant (Steel 1920s). This firm significantly expanded the range of concrete arch design in Tennessee, playing a major role in the transition from traditional concrete arch designs that imitated masonry arches to a more innovative use of concrete.



Otto Roehl was active in the construction business in Knoxville for many years. After working briefly as an accountant in Virginia, Roehl moved to Knoxville in 1912 and formed the O.T. Roehl Construction Company, which he later sold to his brother Jay. He then formed a partnership with Harry Gevin. This firm built several local structures including Knoxville's Broadway Viaduct. In the late 1910s, Roehl formed a partnership with John Steel. This partnership, which lasted until about 1924, operated under the name Roehl and Steel as well as the Steel and Roehl Bridge Company. After the partnership dissolved, Roehl became Knoxville's City Manager (Mayor) in 1927-1928. During his term, the city undertook a number of important projects that included

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Knoxville's first 100-foot wide thoroughfare. Also, he was instrumental in having a concrete arch design selected for the Henley Street Bridge (#132, 47-SR033-06.72). Roehl played an important role in the consolidation of the city's two telephone companies. Later, Roehl served as president of the Knoxville Marble Company. During the Depression, he headed Knoxville's Civil Works Administration and Federal Emergency Relief Administration. In 1938 Roehl became Knoxville's Safety Director, and in the 1940s, he became head of the Knoxville Housing Authority. Roehl died 16 January 1967 at the age of 80 (*Knoxville Journal* 17 January 1967; *Knoxville News Sentinel* 2 April 1973).

John Steel was born in January 1892 in Fayetteville, North Carolina. When he was seventeen, his parents agreed for him to begin an apprenticeship with the American Bridge Company. He worked on a construction crew building the Florida East Coast Railroad in 1909. Steel attended Trinity College (Duke University) and obtained a degree in civil engineering from the University of Minnesota. He also briefly attended France's Ecoles Ponts et Chaussées (School of Bridges and Causeways) where his training convinced him of the superiority of concrete arch bridges. In 1917, during World War I, Steel became a combat pilot with the American Expeditionary Forces in France.

Steel came to Knoxville about 1920 and entered into a bridge building partnership with Otto Roehl that lasted until about 1923 or 1924. In April 1924 Steel formed a new partnership with another civil engineer, Thomas D. Leppy. Steel and Leppy had offices in Knoxville and worked primarily in Tennessee, Mississippi, North Carolina, West Virginia, and Kentucky. Lindbergh's flight across the Atlantic in 1927 renewed Steel's interest in flying and he purchased a plane. He often flew Leppy and himself to bridge projects, landing on nearby bottoms, occasionally flying under some of the larger bridges they had built. Steel sometimes flew aerobatics with an aerial circus out of Knoxville, and while doing this in 1933, crashed his plane on the grounds of the Tennessee School for the Deaf.

In 1933 the bank in which Steel and Leppy had their operating capital collapsed, forcing the firm to close. The firm was at that time working on the Swann Bridge near Dandridge (45-SR009-16.52) which their bonding company completed. Steel farmed for a short time, relatively unsuccessfully, but soon returned to the construction business, working for the V. L. Nicholson Company, a Knoxville contractor. There he worked on several viaducts and buildings in the Knoxville area that included viaducts on Hill Avenue, Oak Street, 17th Street, and Western Avenue. During World War II, at the age of fifty, Steel volunteered for duty. He served with ground forces in Africa, Italy, and Yugoslavia and suffered severe wounds twice but remained on duty in Europe past V-E day in 1945. Steel entered World War II as a major and finished a full colonel. After the war, Steel returned to the Nicholson Company. Steel died 14 May 1980 at the age of 88 (*Deaderick* 1976:207; *Knoxville Journal* 22 February 1979; 15 May 1980).

Thomas Dotterer Leppy was born 23 June 1896 in Summerville, South Carolina. Leppy attended the College of Charleston and graduated with an A. B. degree in 1915. He then attended the Massachusetts Institute of Technology, where he took a S. B. degree in Mechanical Engineering in 1917, as well as Harvard University where he received a B. S. degree in Mechanical Engineering also in 1917. He specialized in mechanical and electrical engineering and naval construction.

Leppy served in the Navy from July 1917 through June 1919 as superintendent of construction and repair of ships. From July 1919 to January 1923, he worked as a partner in the engineering firm of Williams and Leppy in Yazoo City, Mississippi, which specialized in central power stations



Figure III-12:
 Photograph of the Rainbow Arch in West Point, Lawrence County, under construction 1920s; demolished 1958 (Mrs. John Steel Collection).

and distribution systems. From January 1923 to March 1924, Leby was a partner in the Knoxville firm of Morgan and Tate, where he supervised about 100 employees and designed and contracted the building of a four story reinforced concrete warehouse.

In April 1924 Leby and John Steel formed a partnership that specialized in the design and construction of concrete and steel bridges. In a resume prepared in 1934, Leby described the work of the company (Tennessee Valley Authority, 1934-1951):

Our work during this period consisted of making all surveys of new bridge projects, designs of suitable structures for these sites, estimating the costs and selling the job. We maintained a complete organization, consisting of, at times, ten to twelve separate units operating over the entire South. During this time we built a good many notable structures throughout the South, many of which are unique, due to their advanced engineering characteristics, considerably ahead of the custom in this country. I personally handled much of the contract work with city and county officials, some of the design work, most of the estimating, purchasing and planning of operation, details of men, and supervised the bookkeeping and cost accounting.

Leby was primarily interested in the construction aspects of bridge building, the supervision of the costs, the purchase of the materials, and supervision of the major activities of the field forces. Steel was chiefly involved in designing the bridges and selling the firm's engineering services with secondary involvement in directing the field forces.

The firm primarily constructed bridges, including dismantling and re-erecting existing bridges as well as building new designs. The amount of construction work reached a maximum of about \$500,000, and the firm employed from 25 to 300 persons a year. Leby stated his earnings were about \$10,000 per year during the late 1920s.

With the 1933 closure of the Steel and Leiby firm, Leiby found himself in need of a job during the Great Depression. In January 1934, he applied to the Tennessee Valley Authority (TVA) for full or part time work of any nature. On his job application to TVA, Leiby starkly wrote "DEPRESSION" as his "Cause for Leaving" his last job with Steel and Leiby. TVA was looking for someone in the Construction and Maintenance Division who would primarily supervise construction work on the relocation of roads and bridges in the Norris and Wheeler Reservoirs. Leiby quickly took the job, beginning his work in February 1935 at a salary of \$4,500. At TVA, Leiby's job responsibilities focused on supervising general construction work, including bridges. He was promoted several times, and at his death on 1 September 1951, he was the Chief of the Construction and Maintenance Branch at Chattanooga (TVA 1934-1951).

The Roehl and Steel Bridge Company and the Steel and Leiby Bridge Company erected several bridges in Tennessee (see Table III-31 and Table III-32).

TABLE III-31: BRIDGES BUILT BY STEEL AND ROEHL BRIDGE COMPANY

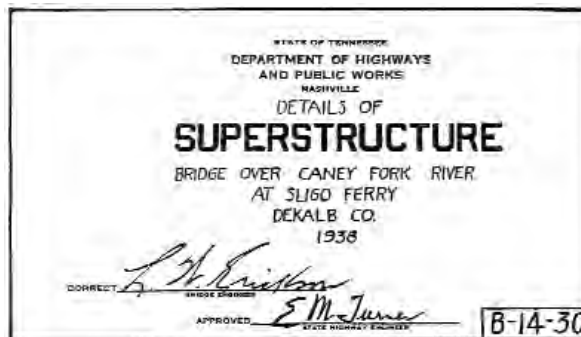
HISTORIC? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE BUILT	DESCRIPTION
No	Greene	30-02592-05.86	Guest Creek	1921	1 Filled Spandrel
No	Greene	30-A0988-01.21	Little Chucky Creek	1921	1 Filled Spandrel
Yes: #102	Greene	30-NonHighway-1	Camp Creek	1921	1 Open Spandrel
No	Greene	30-02391-16.03	Union Temple Creek	1922	1 Filled Spandrel
No	Greene	30-A0163-03.17	Hoover Creek	1922	1 Filled Spandrel
Yes: #106	Sevier	78-01284-00.56	Bird's Creek	1922	1 Filled Spandrel
No	Sevier	78-01284-00.89	Bird's Creek	1922	1 Filled Spandrel
No	Grainger	29-01213-11.98	Bethel Branch	1923	1 Filled Spandrel
No	Grainger	29-01328-00.91	Branch	1923	1 Filled Spandrel
No	Grainger	29-02473-00.24	Richland Creek	1923	1 Filled Spandrel
No	Grainger	29-A0412-00.22	Branch	1923	1 Filled Spandrel
No	Greene	30-A0309-01.23	Lick Creek	1923	1 Filled Spandrel
No	Greene	30-A0309-02.19	Lick Creek	1923	1 Filled Spandrel
No	Greene	30-A0949-01.50	Little Chucky Creek	1923	1 Filled Spandrel
No	Morgan	65-02378-12.80	Branch	1923	1 Open Spandrel
Yes: #110	Polk	70-02268-01.51	Conasauga River	1923	1 Open Spandrel

TABLE III-32: BRIDGES BUILT BY STEEL AND LEBBY BRIDGE COMPANY

HISTORIC? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE BUILT	DESCRIPTION
No	Greene	30-A0202-00.06	Lick Creek	1924	1 Open Spandrel
No	Greene	30-A0309-00.62	Lick Creek	1924	1 Filled Spandrel
Yes: #113	Greene	30-A0909-00.21	Nolichucky River	1925	4 Filled Spandrel Rib
Yes: #121	Knox	47-01262-01.16	Roseberry Creek	1927	1 Open Spandrel
No	Hamilton	33-SR148-00.99	Branch	1928	3 Open Spandrel
Yes: #126	Campbell	07-A0080-00.49	Stinking Creek	1929	2 Filled Spandrel
No	Campbell	07-A0080-00.80	Stinking Creek	1929	2 Filled Spandrel
No	Smith	80-A0138-00.18	Caney Fork River	1929-1930	3 Pratt Through
No	Knox	47-C0199-01.42	Beaver Creek	1930 est	1 Filled Spandrel

TENNESSEE STATE HIGHWAY DEPARTMENT:

In 1915 the Tennessee State Legislature passed legislation to form the State Highway Department. The state gave this agency the task of developing a state highway plan and controlling highway construction and maintenance. The Federal Aid Road Act of 1916, which provided federal money to states through qualified state highway departments, provided additional funding for highway construction in Tennessee. The state reorganized the state highway department in 1919. During the 1922 gubernatorial election, the state highway department became a major issue. Upon election, Governor Austin Peay reorganized the department and in 1923 created a commissioner level position in his cabinet. Peay re-named the agency the Department of Highways and Public Works, the name it held until 1972 when the state changed the name to the Tennessee Department of Transportation.



Title Box on Tennessee Department of Highways Plan Sheet.

Until the mid-1920s, the department was in a transitional period in bridge design and built few bridges, primarily due to limited funding from a state or federal level. Other factors included inconsistent or different goals and priorities (local roads versus inter-state routes) of the Federal Aid Acts of 1916 and 1921 as well as the department's three reorganizations between 1915 and 1923. The state used somewhat varied and more experimental designs for bridges built from 1915 to 1923 than for those it built later. They were also narrower in width (about eighteen feet) than the twenty foot width that became standard in the 1930s. The types of bridges

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chosen, such as K-trusses and open spandrel arches, designs that the state's engineers generally abandoned by the 1930s, indicate this experimental stage. The bridges that the state highway department built during this early stage and county built bridges also differ sharply. For example, the department's bridges used heavier members and the trusses used riveted connections while many county bridges still used lighter, pinned connected Pratt (and derivative) trusses through the 1920s.

By the mid-to-late 1920s, the department began receiving more substantial funding and built a larger number of bridges. During the next few years, the department standardized the types of bridge it built as well as specific design elements. The state designed most bridges on state routes, but firms such as the Nashville Bridge Company fabricated and erected them.

Today the department is still the lead agency in bridge construction in the state. Chapter Two contains a more detailed history of the department. The survey identified over 100 extant bridges that the state highway department designed (see Table III-33).

TABLE III-33: BRIDGES BUILT BY TENNESSEE STATE HIGHWAY DEPARTMENT

HISTORIC? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE BUILT	DESCRIPTION
Yes: #101	Madison	57-01644-00.05	S Fk Forked Deer	1920-1921	1 Warren Through
No	Hawkins	37-A0355-00.18	Bradley Creek	1920-1922	1 Filled Spandrel
Yes: #107	Warren	89-A0278-00.31	Rocky River	1922-1923	1 Open Spandrel
Yes: #108	Montgomery	63-00973-03.88	Cumberland River	1922-1925	1 K Through
Yes: #111	Giles	28-NonHighway-1	Elk River	1923-1924	1 Warren Through PTC
No	Warren	89-SR001-26.63	Caney Fork River	1924-1925	2 Parker Through
No	Cheatham	11-SR001-04.76	Harpeth River	1924-1926	1 Pratt Through
No	Montgomery	63-00973-02.06	Branch	1925	1 Filled Spandrel
Yes: #114	Hardin	36-A0446-00.43	Indian Creek	1925-1926	1 Filled Spandrel
No	Davidson	19-SR006-20.11	Dry Creek	1926	2 Filled Spandrel
No	Cheatham	11-01948-00.45	Big Turnbull Creek	1926-1927	3 Open Spandrel
No	Grundy	31-SR002-02.70	Elk River	1926-1927	1 Warren Pony
No	Campbell	07-03749-03.40	Big Creek	1926-1928	1 Warren Pony
Yes: #118	Cocke	15-SR009-21.60	French Broad River	1926-1928	3 Open Spandrel
Yes: #119	Jackson	44-SR056-10.96	Cumberland River	1926-1928	1 K Through
No	Lauderdale	49-SR210-03.38	Forked Deer River	1926-1928	1 Pratt Through
Yes: #120	Morgan	65-A0450-03.25	Emory River	1926-1928	1 Warren Pony
No	Morgan	65-SR029-19.94	Rock Creek	1926-1928	2 Filled Spandrel
No	Scott	76-SR029-08.98	New River	1926-1928	3 Warren Through
No	Obion	66-SR211-02.82	Obion River	1927-1928	1 Pratt Through
No	Carter	10-SR037-22.86	Watauga River	1927-1929	3 Pratt Through
No	Loudon	53-SR002-06.75	Tennessee River	1927-1929	6 Parker Through
Yes: #123	Hancock	34-SR070-01.65	Clinch River	1928	1 Warren Through PTC
No	Bedford	02-SR010-09.96	Duck River	1928-1929	1 Parker Through
No	Davidson	19-SR024-16.34	Mill Creek	1928-1929	1 Filled Spandrel
No	Giles	28-SR015-09.71	Branch	1928-1929	1 Filled Spandrel
No	Hamilton	33-SR017-08.07	Chickamauga Cr	1928-1929	1 Parker Through
No	Madison	57-SR005-10.79	S Fk Forked Deer	1928-1929	1 Pratt Through
No	Meigs	61-SR058-05.22	Hiwassee River	1928-1929	1 Parker Through
No	Montgomery	63-SR012-15.4I	Red River	1928-1929	1 Parker Through
No	Montgomery	63-SR012-20.6R	Ringgold Creek	1928-1929	1 Warren Through PTC

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No	Clay	14-SR052-19.32	Cumberland River	1928-1930	1 Parker Through
No	Hancock	34-SR066-06.48	Clinch River	1928-1930	1 Warren Through-Polygonal Top Chord
Yes: #125	Henry	40-SR076-30.34	Tennessee River	1928-1930	1 Parker Through
No	Stewart	81-SR076-10.31	Cumberland River	1928-1930	2 Parker Through
No	Hamilton	33-SR002-14.85	Chickamauga Creek	1929	1 Camelback Through
No	Warren	89-SR286-00.64	Big Hickory Creek	1929	1 Pratt Through
No	Davidson	19-SR024-20.71	Stones River	1929-1930	1 Parker Through
No	Dickson	22-SR048-24.06	Furnace Creek	1929-1930	2 Filled Spandrel
No	Hickman	41-SR048-13.60	Duck River	1929-1930	1 Parker Through
No	Knox	47-SR073-01.12	Tennessee River	1929-1930	1 Warren Through-Polygonal Top Chord
Yes: #129	Marion	58-SR002-21.19	Tennessee River	1929-1930	2 Parker Through
Yes: #130	Roane	73-SR058-11.92	Tennessee River	1929-1930	1 Parker Through
Yes: #131	Sullivan	82-SR036-05.01	Holston River	1929-1930	3 Open Spandrel
No	Wilson	95-SR010-20.91	Cumberland River	1929-1930	1 Parker Through
No	Cumberland	18-SR001-34.20	Piney Creek	1929-1931	1 Open Spandrel
No	Marion	58-SR002-16.56	Sequatchie River	1929-1931	1 Pratt Through
No	Cheatham	11-SR049-09.53	Sycamore Creek	1930	1 Pratt Through
No	Cumberland	18-SR068-12.81	White's Creek	1930	1 Warren Pony
No	Davidson	19-SR100-01.06	South Harpeth River	1930	1 Warren Through
No	Davidson	19-SR100-06.37	Harpeth River	1930	1 Camelback Through
No	Morgan	65-SR299-09.89	Emory River	1930	3 Warren Through-Polygonal Top Chord
No	Rhea	72-SR029-31.81	Whites Creek	1930	1 Warren Through-Polygonal Top Chord
No	Shelby	79-SR014-07.11	ICG RR & Nonconnah Creek	1930	1 Camelback Through
No	Warren	89-SR286-02.59	Barren Fork River	1930	4 Warren Through-Polygonal Top Chord
No	Wayne	91-SR069-03.66	Second Creek	1930	1 Warren Pony
No	Williamson	94-SR011-07.73	Wilson Branch	1930	1 Filled Spandrel
No	Campbell	07-SR090-06.07	Clear Fork Creek	1930-1931	1 Pratt Pony
No	Cheatham	11-SR049-05.05	Cumberland River	1930-1931	1 Parker Through
No	Montgomery	63-SR013-01.54	Yellow Creek	1930-1931	2 Pratt Through
No	Roane	73-SR001-14.91	Clinch River	1930-1931	1 Parker Through

No	Shelby	79-SR057-02.72	Cypress Creek	1931	1 Filled Spandrel
No	Washington	90-SR034-23.04	Watauga River	1931	1 Parker Through
No	Cocke	15-SR009-10.56	French Broad River	1931-1932	3 Parker Through
No	Dekalb	21-SR264-03.94	Walker Creek	1931-1932	1 Pratt Through
No	Smith	80-SR024-13.36	Caney Fork River	1931-1932	1 3-Warren Through
No	Lincoln	52-SR015-22.46	Elk River	1932	1 Parker Through
No	Cheatham	11-SR049-00.45	Harpeth River	1932-1933	1 Parker Through
No	Coffee	16-SR002-12.74	Duck River	1932-1933	1 Warren Through PTC
No	Jefferson	45-SR009-16.52	French Broad River	1932-1933	1 Parker Through
No	Knox	47-SR009-10.0n	Holston River	1932-1933	1 3-Parker Through
No	Shelby	79-SR003-12.73	Gayoso Branch	1932-1933	1 Filled Spandrel
No	Humphreys	43-SR013-24.61	Big Richland Creek	1933	1 Warren Pony
No	Cocke	15-SR032-32.05	Douglas Lake	1933-1934	1 Continuous 3-span Parker Through
No	Bedford	02-SR130-10.82	Duck River	1934	2 Warren Pony
No	Dyer	23-SR078-07.93	Obion River	1934	1 Pratt Through
No	Grundy	31-SR056-32.10	Collins River	1934	2 Warren Pony
No	Rutherford	75-SR010-19.81	Stones River	1934	1 Parker Through
Yes: #138	Greene	30-SR070-08.48	Nolichucky River	1934-1935	1 Continuous 3-span Warren Deck
Yes: #139	Smith	80-SR025-11.32	Cumberland River	1934-1936	1 Continuous 3-span Parker Through
No	Cheatham	11-SR112-04.79	Sycamore Creek	1935-1936	1 Pratt Through
No	Bedford	02-SR016-13.08	Dry Creek	1937	1 Filled Spandrel
No	Knox	47-SR073-06.60	Little River	1937-1938	1 Warren Through PTC
No	Giles	28-SR011-01.66	Sugar Creek	1938	1 Warren Pony
No	Hamilton	33-SR002-09.48	Railroad Tracks	1938	1 Camelback Through
No	Lincoln	52-SR050-02.59	Cane Creek	1938	1 Warren Pony
No	Sevier	78-SR071-15.85	Roaring Fork Cr	1938	1 Filled Spandrel
No	Sullivan	82-SR075-00.22	Holston River	1938	3 Parker Through
No	Jackson	44-SR053-01.26	Martin Creek	1938-1939	1 Warren Through PTC
No	Anderson	01-SR009-10.75	Clinch River	1938-1940	1 Continuous 3-span Warren Through
No	Dickson	22-SR001-15.42	Wildcat Branch	1939	1 Filled Spandrel
No	Dickson	22-SR001-15.64	Branch	1939	1 Filled Spandrel
No	Hickman	41-SR050-29.62	Boat Branch	1939	1 Filled Spandrel

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No	Knox	47-SR001-04.10	N Fk Turkey Creek	1939	1 Filled Spandrel
No	Maury	60-SR007-15.24	Duck River	1939	1 Parker Through
No	Bradley	06-SR002-21.13	Hiwassee River	1939-1940	1 Parker Through
Yes: #150	Fentress	25-SR028-29.24	Wolf River	1939-1940	1 Pratt Through
No	Perry	68-SR013-01.31	Buffalo River	1939-1940	2 Warren Through PTC
No	Carter	10-SR037-17.59	Doe River	1939-1941	1 3-Warren Deck
No	Smith	80-SR024-02.96	Round Lick Creek	1940	1 Warren Through PTC
No	Sumner	83-SR109-14.96	Tuckers Creek	1941	1 Filled Spandrel
No	Warren	89-SR056-11.77	Barren Fork River	1941-1942	2 Warren Through PTC
No	Davidson	19-SR001-19.20	Browns Creek	1942	1 Filled Spandrel
No	Bedford	02-SR016-22.93	Duck River	1943	1 Pratt Through
No	Rutherford	75-SR096-18.48	E Fk Stones River	1944	1 Warren Through PTC
No	Sevier	78-00687-13.36	Little Pigeon River	1944	1 Pratt Through

PTC indicates Polygonal Top Chord.



VINCENNES BRIDGE COMPANY, VINCENNES, INDIANA: Frank L. Oliphant, John P. Oliphant, and Jacob L. Riddle incorporated the Vincennes Bridge Company in Indiana in 1898 for the purpose of fabricating structural steel for bridges. Until the 1920s, the firm's work consisted primarily of small I-beam spans and pony truss bridges. Although the firm undertook jobs in twenty-seven states, it primarily practiced in Illinois and Indiana. The firm changed its name in 1932 to the Vincennes Steel Corporation (Cooper 1981; Vincennes Library).

The survey inventoried eight bridges that the Vincennes Bridge Company erected in Tennessee (see Table III-34).

TABLE III-34: BRIDGES BUILT BY VINCENNES BRIDGE COMPANY

HISTORIC? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE BUILT	DESCRIPTION
No	Lincoln	52-A0414-00.05	Elk River	1907	1 Parker Through
Yes: #84	Obion	66-NonHighway-2	Indian Creek	1914	1 Warren Pony
Yes: #84	Perry	68-NonHighway-1	Buffalo River	1914	1 Camelback Through
No	Jackson	44-A0118-00.01	Roaring River	1915	1 Pratt Through
No	Cumberland	18-A0523-00.55	Daddy's Creek	1915 est	1 Warren Pony
No	Robertson	74-NonHighway-2	Storage	1915 est	1 Pratt Half-hip Pony
No	Weakley	92-NonHighway-1	Spring Creek	1915 est	1 Pratt Through
Yes: #92	Dyer	23-NonHighway-1	Lake	1917	1 Pratt Pony Swing

VIRGINIA BRIDGE AND IRON COMPANY, ROANOKE, VIRGINIA:

The Virginia Bridge and Iron Company was first formed in 1888 as the American Bridge Works. In the early years, C. C. Wentworth was manager, Joseph Hunter was superintendent, and J. B. Hartung was foreman. However, a large fire and the recession that followed the Panic of 1893 created economic problems for the company and forced it to reorganize about 1895. At that time, Samuel Walton of Tazewell purchased the company. Financed and reorganized by a group of Roanoke businessmen, the company opened on 1 November 1895 under the name Virginia Bridge and Iron Company. Known locally as the "Bridge Works," the company originally specialized in light highway bridges and structural steel, employing about seventy-five people. By 1904, the firm employed over 300 people and had a capacity of about 12,000 tons of manufactured products annually; the largest capacity of any bridge and iron works in the South. At a local level, it was a vital factor in Roanoke's economy, second in influence only to the Norfolk and Western Railway (Isaacs 1904).



C. Edwin Michael headed the new company. Michael had come to Roanoke in 1889 and worked for the American Bridge Company where he rose to the position of secretary and treasurer in 1892. In 1895 he became the secretary and treasurer of the newly reorganized Virginia Bridge and Iron Company. In 1904, he became the vice-president and general manager, and later the same year, president of the company. Michael held this position until 1936 (*Roanoke World News*, 29 January 1934, 26 June 1946). Other officers in the 1910s included T. T. Fishburne as vice-president and treasurer, J. B. Fishburn as second vice-president, A. Z. Drozdov as chief engineer and J. K. Graham as general manager.

Figure III-13: Historic Postcard View of the Memphis Plant of the Virginia Bridge and Iron Company, circa 1920 (Author's Collection).



In the early twentieth century, the company grew rapidly. In addition to its twelve-acre plant at Roanoke, by 1906 it owned a plant in Charlotte, North Carolina. In about 1908-1909, the company opened a branch plant on a five acre site in Atlanta. The Memphis City Directories first listed the firm in 1904 with Vernon Smith as general manager. In about 1909, the firm opened another branch plant on a ten acre site in Memphis. The 1914 Memphis City Directory lists the plant at Moorehead Avenue and Union Railway with the contracting office in the Porter Building. The firm seems to have been closely associated with the Memphis Bridge Company whose general manager was also Smith. The Memphis plant remained open until after the end of World War II, although it was sold to the Tennessee Coal, Iron and Railroad Company, a subsidiary of U.S. Steel in 1936.

By 1910 the company's principal product was railroad bridges, but it also built highway bridges and produced structural steel for buildings and industrial purposes. For example, in 1910, the company manufactured over 3,000 steel railroad cars. During this period the company practiced primarily in the Southeast United States and employed about 1,600 people. In 1912, the company claimed the capacity of its shops was larger than that of all similar shops combined south of Pennsylvania and Ohio (Jack 1912). As bridge building changed in the United States after the passage of the Federal Aid Act of 1916, Virginia Bridge and Iron Company continued to diversify its efforts as did many other bridge companies. It produced steel cars for railroad lines, tanks, steel for power houses and hydro-electric developments, steel stadiums, and drum gates for a dam associated with the Panama Canal (Roanoke World News, 29 January 1934).

In 1922 the company expanded again through the acquisition of a fabricating plant in Birmingham. By the 1930s the company had offices in Birmingham, Memphis, Atlanta, New York, New Orleans, Los Angeles, Charlotte, Dallas, and El Paso, as well as its headquarters in Roanoke (Roanoke Times, 27 January 1933). At that time it was the third largest steel fabricating company in the United States (Roanoke World News, 29 January 1934).

Compared to many other bridge companies that collapsed during the Great Depression, the Virginia Bridge and Iron Company survived the early years of the Great Depression with a relatively prosperous and stable business; probably in large part due to its diverse production (Roanoke Times,

27 January 1933). However, the Tennessee Coal, Iron and Railroad Company of Birmingham, Alabama, the largest producer of steel in the South and a subsidiary of the U.S. Steel Corporation, bought the company in January of 1936 (*Roanoke Times*, 24, 31 January, 5 February 1936). The plant's operations in Roanoke continued as the Virginia Bridge Company, primarily in manufacturing and erecting steel bridges and other structures such as coal cars for the railroad. The firm retained most of its personnel, although new management replaced many of the top officers (*Roanoke Times*, 12 March 1939; *Roanoke World News*, 26 June 1946).

Production for World War II greatly increased the company's output. By 1942, the company's plants at Roanoke, Memphis, and Birmingham were working nearly full time on government related contracts (*Roanoke World News*, 20 January 1941). During the early 1940s, the company fabricated steel for ships, portable military bridges, landing barges, factories, dry docks, cranes, and numerous buildings for the armed forces. In 1942, the government awarded the Roanoke plant the Army and Navy "E", an award for excellence first initiated in 1906. The government intended for this award to honor and boost the morale of those people serving the war effort at home. In an elaborate ceremony, the government presented the company a large flag with a white star and gave each of the 897 employees a lapel pen. The Virginia Bridge Company claimed to be the first structural steel fabricator in the country to receive this award. The government had similarly honored the Virginia Bridge and Iron Company during World War I when the United States Shipping Board awarded the company the "E" flag for its work in the production of merchant shipping (*Roanoke Times* 30 August 1942; *Roanoke World News*, 27 August, 30 October, 24 November 1942). In 1943, the government honored the company with the same award. Due to war production, the company had hired over 400 new employees since it had received the award the previous year (*Roanoke World News*, 26 October 1943).

After World War II, the company continued the production of structural steel for diverse building projects under the ownership of the American Steel Company. However, wage disputes with the United Steel Workers union eventually closed the plant (Barnes 1968:179).

The Virginia Bridge and Iron Company built many bridges in the South including Tennessee. Many of its pony trusses in this state have distinctive splayed verticals. The survey inventoried seven bridges that the firm erected in Tennessee (see Table III-35).

TABLE III-35: BRIDGES BUILT BY VIRGINIA BRIDGE AND IRON COMPANY

HISTORIC? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE BUILT	DESCRIPTION
Yes: #54	Perry	68-NonHighway-2	Buffalo River	1906	1 Camelback Through and 1 Pratt Pony
No	Bledsoe	04-A0080-00.43	Sequatchie River	1915 est	1 Pratt Pony
No	Sullivan	82-B0514-00.66	Sluice Branch	1915 est	2 Pratt Through
Yes: #87	Anderson	01-A0088-03.53	Clinch River	1916	1 Camelback & 2 Pratt Through, 1 Pratt Pony
No	Lincoln	52-NonHighway-2	Walker Creek	1916	1 Pratt Pony
No	Hamblen	32-02461-05.11	Nollichucky River	1917	3 Pratt Through, 1 Pratt Pony
No	Hamilton	33-03552-01.78	Citico Rail Yard	1926	2 Warren Through



WROUGHT IRON BRIDGE COMPANY, CANTON,

OHIO: David Hammond formed the Wrought Iron Bridge Company in 1866 in Canton, Ohio. This firm was one of the most productive bridge companies in the United States in the nineteenth century and energized the bridge building industry with its diverse patents. As one bridge historian has noted, "it would be difficult to overestimate the importance of this firm to the history of metal bridge engineering in [Ohio] and [the] nation" (Simmons 1978). The company was a manufacturing mainstay in Canton until it closed about 1930 with the onset of the Great Depression.

David Hammond, who was raised on a farm outside Canton, became a carpenter's apprentice in 1848 at the age of 18 and continued in that trade until about 1860. For the next six years he worked in the area as a contractor building bridges (Danner 1904:1349). He soon developed a patented combination truss in cooperation with John Laird, a local foundry owner and the first builder of iron bridges in Stark County, and Washington Reeves, a local metalworker. Laird's foundry was one of the earliest industries in Canton and by 1867 had grown to sizable

proportions. In 1867, Laird's firm, often called the Wrought Iron Works of John Laird and Company, built eighteen bridges, including three in Indiana and one in Michigan. In 1864, Hammond and Reeves formed a partnership and patented a bowstring arch truss. Unhappy with the small nature of their bridge contracts, Hammond formed a separate company about 1865-1866, the Wrought Iron Bridge Company, also called the Canton Wrought Iron Bridge Company. Reeves continued to operate his firm at the same facility as Hammond until 1870 when Hammond and Reeves ended their partnership. The next year, the same year Laird retired, Hammond incorporated his bridge company (Ashback-Sladik and Fraser 1991; Heald 1949:628-629).

Rather than specializing in a trademark bridge type, Hammond's Wrought Iron Bridge Company, which erected bridges throughout the continental United States, "successfully manufactured and distributed a seemingly infinite variety of bridges" (Simmons 1978:16). The company erected nearly all forms of truss, arch, swing and plate bridges and iron piers. Perhaps most uniquely, the company had a patented design in several categories. Most of the patents for the company were in the name of Hammond and A. B. Abbott, another officer in the company. These patents included No. 102393 (1870) for a tubular arch girder, No. 135802 (1873) for arch-girder bridges, and No. 150152 (1874) for iron truss bridges.

In the early 1870s, Hammond built a new fabricating plant in Canton. The firm grew steadily through the 1870s, becoming "perhaps the most prolific 19th century iron bridge fabricator in the country" (Ashback-Sladik and Fraser 1991:1). The firm's business doubled from \$200,000 in 1871 to \$400,000 in 1872 and increased in 1873 to \$500,000, a level that held steady through the 1880s. In 1879, the firm employed 150 people (Perrin 1879:344). By 1881, the company employed nearly 300 people and was the third largest company in Canton (Heald 1949:629). Interestingly, perhaps due to its fast growth, the company moved repeatedly. The company's offices and works originally were located at the east end of Third Street opposite the railroad depot. In the early 1880s, the firm moved to a site at East Ninth, Oak and Saxton Streets. About 1892, the company located its facility at the corner of Dueber Avenue and Bridge Street in 1892 (Canton City Directories).

During this period of phenomenal growth, the company attracted progressive engineers. In 1877 the company employed E. J. Landor, the first professionally trained engineer in Canton. Landor

designed and built the “Y” bridge at Zanesville, the only bridge in the Muskingum Valley from Zanesville to the Ohio River to withstand the 1913 flood (Heald 1949:630). Over the years, personnel in key positions changed fairly often, a somewhat unusual occurrence during this period when typically one person or a family dominated a firm's development. Initially David Hammond served as president, H. R. Wise as treasurer, William Britton as secretary, and Job Abbott as chief engineer. After Hammond vacated the position of president in 1880, several individuals filled that job: C. Aultman from 1881 until his death in December 1884, A. B. Abbott from 1886 to 1894, E. J. Landor from 1895 to 1897, and F. Herbrock from 1898 to 1899. Men serving as vice-presidents included A. Hurford from 1881 to 1885, David Hammond from 1886 to 1887, E. J. Landor from 1888 to 1894, and H. A. Kennedy from 1898 to 1899. The position of secretary-treasurer was held by C. H. Jackson from 1881 to 1885 and F. M. Wyant from 1886 to 1899. Landor became chief engineer in 1886. While Abbott remained a director of the firm, he left Canton in the 1870s to become one of the organizers of the Toronto Bridge Company in about 1879 and later, in 1883, the Dominion Bridge Company, serving as president of both of these companies. In about 1890 Hammond disposed of his financial holdings in the company, although he remained vice-president for a few years. In about 1891-1892, Hammond helped form a rival bridge works, the Canton Bridge Company, in which he was a stockholder and president from 1892 to 1896. Hammond then semi-retired but continued working with the company in an advisory capacity as vice-president (Heald 1949:630).

During the nineteenth century, bridge companies often published catalogs about their companies as a marketing tool, and the Wrought Iron Bridge Company was no exception. The company published the *Designs of Wrought Iron Bridges* in 1874 that included a history of iron bridge building and articles about the strength and durability of iron bridges (Simmons 1978:16). Its 1880 catalog, only two pages long and accompanied by a two-sided business card, provides a brief list of bridges that the company had built but noted that it had built over twenty-four miles of bridges in the United States and Canada, stressing its superiority of their work in either truss or arch bridges (Wrought Iron 1876).

By 1881 the company had erected bridges in twenty-five states and Canada, totaling about 3,300 bridges. Employing 270 individuals, it was a significant factor in Canton's economy as the city's third largest employer and claimed to have erected more highway bridges than any other bridge company in the country (Perrin 1881:337). The firm's 1883 pamphlet, by now a substantial catalog, stated that it had erected over 4,600 spans in 26 states and Canada and Mexico. It claimed that it was the first highway bridge firm to “put in testing machinery for ascertaining the actual strength of iron used in construction, and are the only firm in this special business practically applying tests to material received and work built at their shops” (Wrought Iron 1883:2). In the company's 1885 catalog, it claimed to be one of the largest companies specializing in highway bridges on the continent and had erected bridges in thirty different States, Canada, and Mexico (Wrought Iron 1885:2). One of these bridges was a Triple Intersection Pratt erected in 1879 at Aurora, Indiana, which the firm identified as the longest highway truss bridge in the United States (Wrought Iron 1883:8). By the late 1970s, bridge historians believed that this was the only Triple Intersection Pratt remaining in the country (Comp and Jackson 1977:8).

The company had offices in Chattanooga in the 1880s with W. H. Converse as its agent (Chattanooga City Directories).

In its 1883 catalog (Wrought Iron 1883:22-23), the firm listed five bridges in Tennessee that it had erected. These bridges were a 75 x 12-foot iron truss at Cleveland, a 125-by-18 foot Column and

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Channel Arch in Chattanooga, a 135-by-18 foot Double Intersection Truss at Chickamauga, and a 150-by-16-foot Column and Channel Arch at Boyd Station. Of these five, only the pony Pratt truss (#5, 06-A0184-00.64) at Cleveland remains. In the 1885 catalog, the firm said it had built 1,350-foot of bridges in Bradley, Rutherford, Hamilton and Loudon counties. In addition to the Chickamauga bridge listed in 1883, it also listed a two span (40 x 12 and 45 x 12-foot) bridge in Loudon County, a 100 x 12-foot span in Rutherford County, and a three span (each 50 x 20-foot) bridge in Chattanooga (Wrought Iron 1885:23). None of these bridges remain.

In 1901-1902, the American Bridge Division of U.S. Steel bought twenty-eight companies, including the Wrought Iron Bridge Company. U.S. Steel merged these companies to form the American Bridge Company, a subsidiary of U.S. Steel Corporation. Due to the economic situation that the Great Depression created, U.S. Steel closed the plant at Canton in the fall of 1930 and sold the property (Miers 1972:15; Rowles 1984):

The surveyed inventoried two bridges that this company erected in Tennessee (see Table III-36).

TABLE III-36: BRIDGES BUILT BY WROUGHT IRON BRIDGE COMPANY

HISTORIC? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE BUILT	DESCRIPTION
Yes: #5	Bradley	06-A0184-00.64	Candies Creek	1877-1878	1 Pratt Pony
Yes: #12	Bradley	06-A0163-00.19	Candies Creek	1886	3 Pratt Pony

YOUNGSTOWN BRIDGE COMPANY, YOUNGSTOWN, OHIO: In January 1878, H. G. Morse and C. J. Morse began this firm in Youngstown as the Morse Bridge Company. Other men associated with the company were H. O. Bonnell, Scott Bonnell, J. L. Botsford, and J. H. McEwen. The company built iron bridges, roofs, boilers, and towers but specialized in railroad and highway truss bridges until the American Bridge Company absorbed it in 1904.



Location was critical to bridge companies due to their reliance on rail service. The 1880-1881 Youngstown City Directory notes the prime location of the firm near the Mahoning River on a level tract of land between two rail lines “where every desirable facility for side and yard tracks is amply afforded, enabling them to receive the raw materials at their doors, and to load the heaviest bridge girders, by means of derricks, immediately on board the cars in their yards, from whence they ship direct by every railroad centering in Youngstown” (*Youngstown City Directory* 1880-1881:217). In 1880, the company worked from two main buildings, an office, a ware-room, and smaller outbuildings; and employed about one hundred people (*Youngstown City Directory* 1880-1881:218; *Youngstown Vindicator* 1949).

Around 1890 the firm became known as the Youngstown Bridge Company. This company kept a branch office in Nashville from 1894 to 1901. During those years, H. T. Sinnott was the company’s Nashville agent. In 1900, the Nashville City Directories also listed A. J. Dyer (see Nashville Bridge Company) as its agent (Nashville City Directories). The company received contracts for a few small bridges in the area, for example the 1891 Dog Creek Bridge in Cheatham County (not extant). During these years Charles Evan Fowler was the company’s chief engineer. His first major project with Youngstown was designing Knoxville’s Gay Street Bridge (#27, 47-03775-00.26) which received national attention for its aesthetic design.

The American Bridge Company purchased the Youngstown Bridge Company in 1904 and closed the plant. American Bridge dismantled the facility and relocated the equipment to its Ambridge plant at Ambridge, Pennsylvania (Butler 1921:674; Rowles 1984).

The survey inventoried only one bridge that the Youngstown Bridge Company erected in Tennessee (see Table III-37).

TABLE III-37: BRIDGES BUILT BY YOUNGSTOWN BRIDGE COMPANY

HISTORIC? # IN CH. 6	COUNTY	BRIDGE NUMBER	CROSSING	DATE BUILT	DESCRIPTION
Yes: #27	Knox	47-03775-00.26	Tennessee River	1896-1898	1 5-span Continuous Pratt Deck-Arched