A SURVEY AND PHOTOGRAPHIC INVENTORY OF METAL TRUSS BRIDGES IN VIRGINIA 1865-1932

II. The Staunton Construction District

by

Dan Grove Deibler
Research Analyst

(The opinions, findings, and conclusions expressed in this report are those of the author and not necessarily those of the sponsoring agencies.)

Virginia Highway & Transportation Research Council
(A Cooperative Organization Sponsored Jointly by the Virginia Department of Highways & Transportation and the University of Virginia)

Charlottesville, Virginia

May 1975
VHTRC 75-R53

SUMMARY

Prior to 1932, road maintenance and construction in Virginia were largely the responsibility of the individual county governments. Bridge construction projects formed a natural part of these activities. Local responsibility resulted in a rich variety of bridge designs built by an equally diverse group of bridge companies. The following report on the eleven counties making up the Staunton Construction District discusses that diversity found in just one of the popular nineteenth century bridge forms — the metal truss bridge.

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As described in Part I of this series, the Virginia Highway & Transportation Research Council's research project dealing with the history and development of road and bridge building technology in Virginia includes a photographic survey and documentary inventory of the state's remaining metal truss bridges. The purpose of this photographic survey is to record the surviving trusses before the form becomes the next victim of assumed obsolescence and benign neglect and disappears from the American landscape. The research also has been directed toward relating these structures to developments in truss design and technology of the nineteenth century as well as toward obtaining information on the numerous bridge companies which specialized in truss bridge design and construction during the same period. This information, discussed in more detail in Part I, will then be used to establish a set of guidelines to aid in evaluating the historical and technological significance of any of the bridges before they are replaced in a sometimes rigid construction schedule.

The project is concerned with trusses designed and built prior to 1932, because until that year each county was responsible for construction and maintenance of its own road system. Since each county was left to its own devices, bridge construction was conducted on a rather individual basis. There were no applicable or mandatory statewide standards; county officials could thus pick designs and choose bridge companies as they wished. The study results for the Staunton Construction District, the first to be surveyed, rather clearly illustrate this variety.

The Staunton District (8) (Figure 1) was surveyed first for two reasons: (1) of the 8 districts it was known to have the largest number of pre-1932 trusses (144) built by a reasonable variety of bridge companies; and (2) it had compiled and maintained

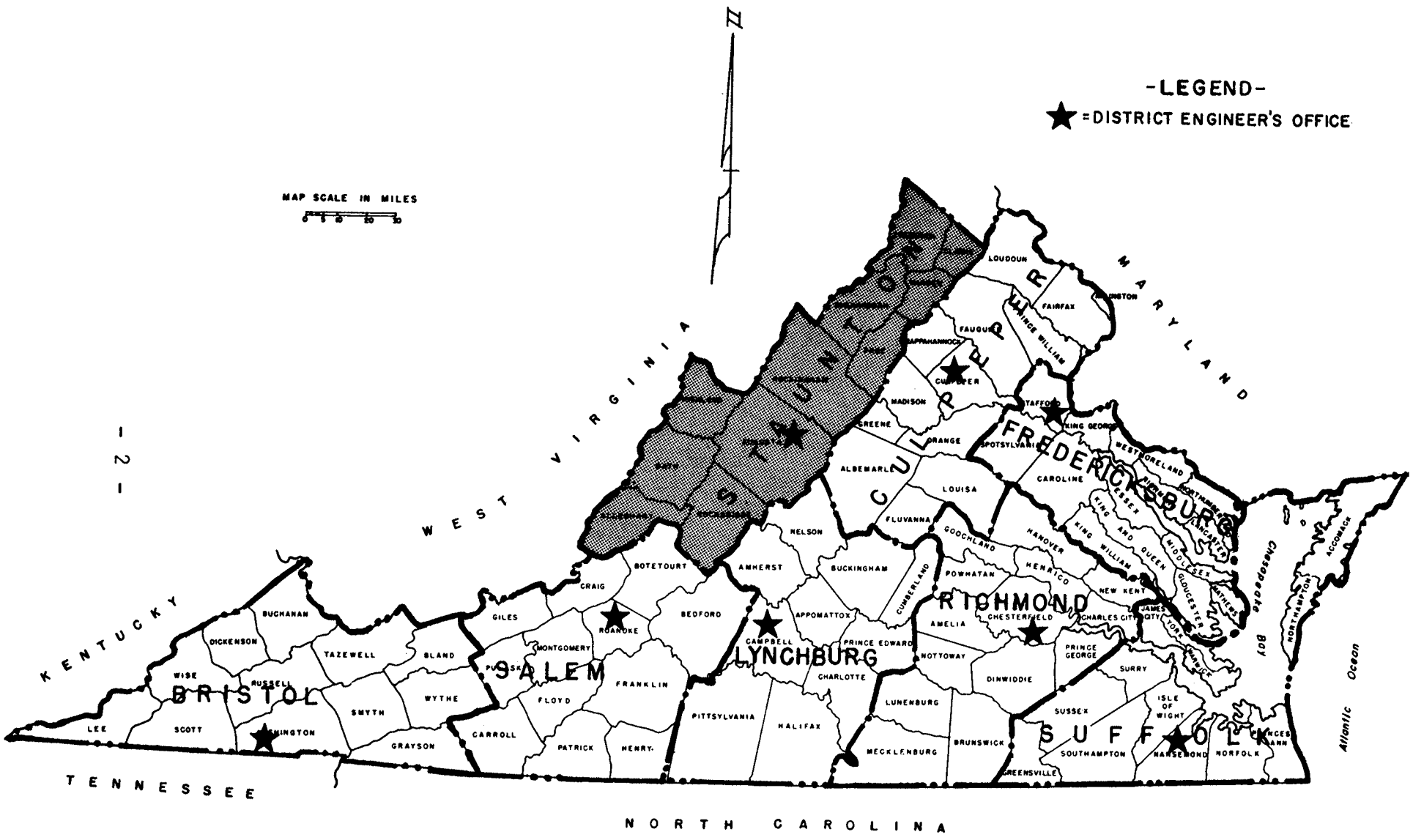


Figure 1. Staunton Construction District map outline.

an excellent records system related to all of these trusses. It seemed the logical place to begin.

The findings for the Staunton District place the majority of trusses in the 1890 to 1920 decades, with over one-half of these truss bridges (94) being located in three of the eleven counties making up the district (Table 1). Since these three counties, Augusta, Rockbridge and Rockingham, cover about 45 percent of the District's total geographic area, this seems to be a reasonable correlation. It also reflects several geographic and social factors: (1) the relatively flat, open terrain of the Shenandoah Valley, laced with a profusion of rivers and streams, fostered the development of a thinly dispersed agrarian population that required an extensive and widely distributed road network; (2) an ostensibly conscientious and effective county construction program built and maintained this extensive network of roads and bridges; and (3) over the years, the Staunton District has acquired a number of trusses from other districts for use on its secondary roads where traffic conditions are more in keeping with the carrying capacity of these older trusses.

Any conclusions to be drawn from this survey at this point must be viewed within its geographic scope — an eleven county highway district. The most obvious, and possibly the only, way to evaluate any statistics compiled from the survey would be to determine how the extant trusses deviate from or substantiate the general trends in truss design and technology as each progressed into the twentieth century. By 1900, mass production of standard structural parts and shapes by a limited number of steel manufacturers assured a certain similarity in truss design regardless of which particular bridge company fabricated a bridge. Fully ninety percent of all highway truss bridges being build in the 1890's were of either the Pratt or Whipple types; specific features as well had been adopted to the exclusion of others. J. A. L. Waddell, in his 1884 work on bridge building and design,[1] stated the superiority of certain details and features in preference to others: inclined end posts/batter braces were much superior to vertical ones (Figures 2 and 3); lacing bars were superior to latticing (Figures 4 and 5); pin-connected low/pony trusses were acceptable for short spans from 65-90 feet (Figure 6); while spans in excess of 90 feet required pin-connected through/high trusses (Figure 7); and those in excess of 200 feet should employ inclined top chords (Figure 8). A gradual change from pin connections to riveted connections (cf Figures 9 and 10) occurred in truss technology, but an exact dating procedure based on this detail would be difficult to establish. Given two trusses, one having pin connections one having riveted connections, the pin-connected truss would probably be the earlier one but there is no apparent way of stating how much earlier. The usual practice was for Triangular/Warren type trusses (Figure 11) to have riveted connections and Pratt type trusses (Figure 6) to have pin connections; however, this was not inviolable. Prior to the 1890's, it had been common to find trusses

Table 1. Truss Types in the Staunton District.

COUNTY \ TRUSS TYPE	LOW (Pony)					
	PRATT half-hip	PRATT full-slope	TRIANGULAR	TRUSS LEG/BEDSTEAD	CAMELBACK Pratt	CAMELBACK Modified
ALLEGHENY COUNTY		3 - 1910			1 - 1910 1 - 1913	
AUGUSTA COUNTY	6 - ND	2 - 1914 1 - ND	4 - ND	3 - ND	3 - 1899 1 - 1915 1 - ND	1 - 1904
BATH COUNTY	1 - ND	1 - 1909 2 - 1910 1 - 1921 1 - ND				
CLARKE COUNTY						
FREDERICK COUNTY		1 - 1917		1 - ND		
HIGHLAND COUNTY		1 - 1917 1 - ND 1 - ND (modified)				
PAGE COUNTY	1 - ND					
ROCKBRIDGE COUNTY	1 - ND	2 - 1917 1 - ND	1 - 1922 1 - 1923 1 - 1924 2 - 1927 1 - 1931 1 - ca. 1910		1 - 1908 1 - 1912	
ROCKINGHAM COUNTY	2 - 1898 6 - ND	1 - 1909 1 - 1915 7 - ND	1 - 1928 2 - ND			
SHENANDOAH COUNTY				2 - ND	1 - ND	1 - 1916
WARREN COUNTY		1 - 1910				
TOTAL	17	28	14	6	10	2

THROUGH (High)

ND - no date.
* - stylistic attribution.

PENNSYLVANIA Petit	PRATT single-intersection	TRIANGULAR single-intersection	TRIANGULAR double-intersection	WHIPPLE double-intersection	TOTAL
	3 - 1896 2 - 1910 2 - 1916 4 - ND				16
	1 - 1890 2 - ND 1 - 1896 2 - 1897 1 - 1900 4 - 1907 1 - 1914	1 - ND			35
	1 - ND	1 - 1922 1 - 1923			9
					0
					2
	1 - 1916 2 - ND				6
	1 - 1908				2
	2 - 1890 1 - 1913 1 - 1916 1 - ND				18
	1 - 1905 1 - 1925 2 - 1906 6 - ND 2 - 1908 1 - 1913 2 - 1916 2 - 1925		3 - 1903	1 - 1898	41
2 - ND	3 - 1898 2 - ND	3 - 1923			14
					1
2	55	6	3	1	144

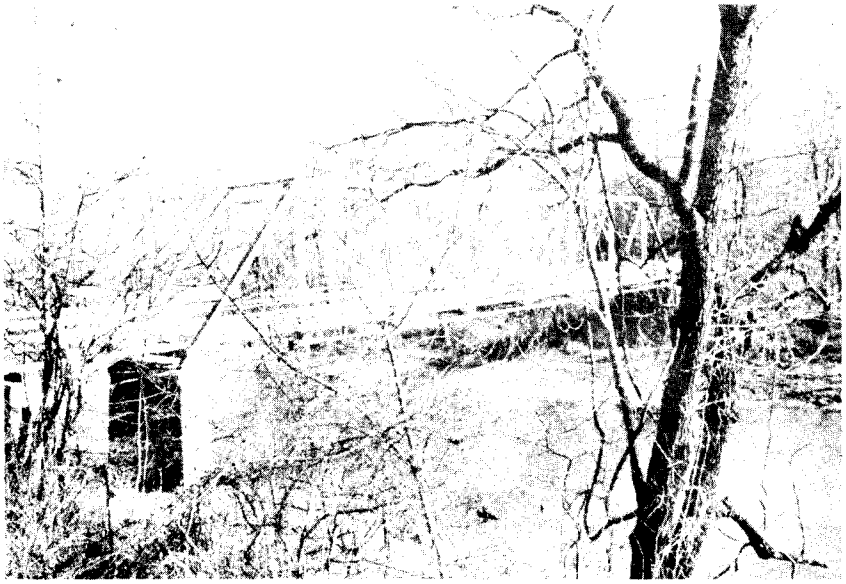


Figure 2. Through/high Pratt truss with inclined end posts/batter braces. (Bath County; see form/photo number 08-08-3.)

Figure 3. A low Truss Leg bridge with the less satisfactory vertical end posts. (Augusta County; see form/photo number 08-07-14.)

Figure 4.

An intermediate post comprised of two vertical channels connected with lacing bars. (Rockbridge County; see form/photo number 08-81-15.)

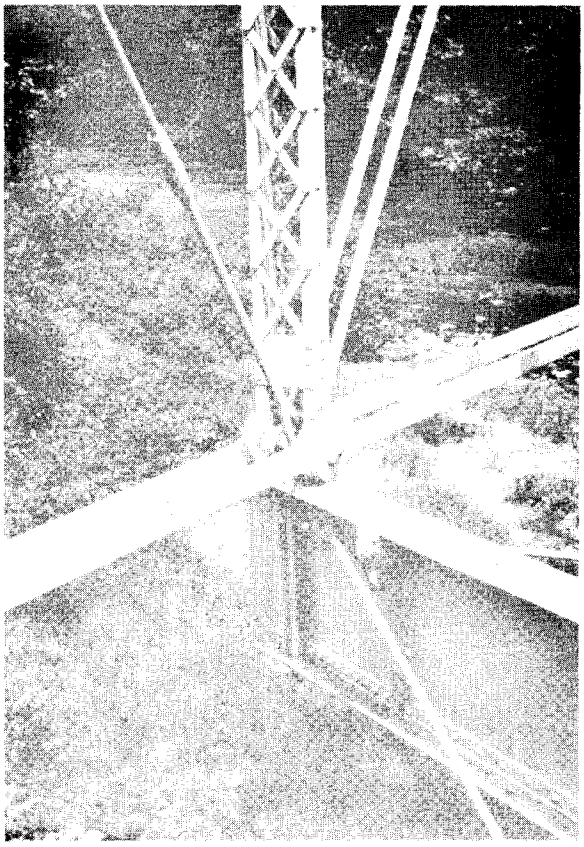


Figure 5.

An intermediate post whose two vertical channels are connected be latticing. (Rockbridge County; see form/photo number 08-81-6.)

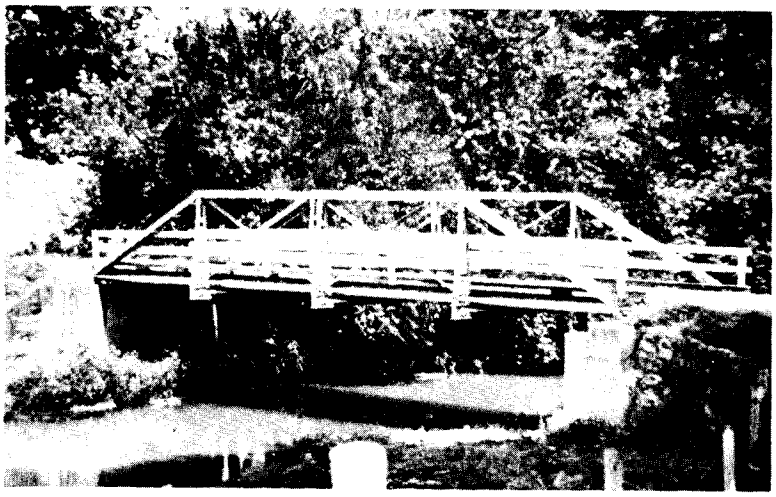


Figure 6. A typical pin connected Low/Pony truss used for a 58-foot span bridge. (Rockingham County; see form/photo number 08-82-7.)

Figure 7. A typical Through/High truss bridge having a span length of 115 feet. (Augusta County; see form/photo number 08-07-21.)

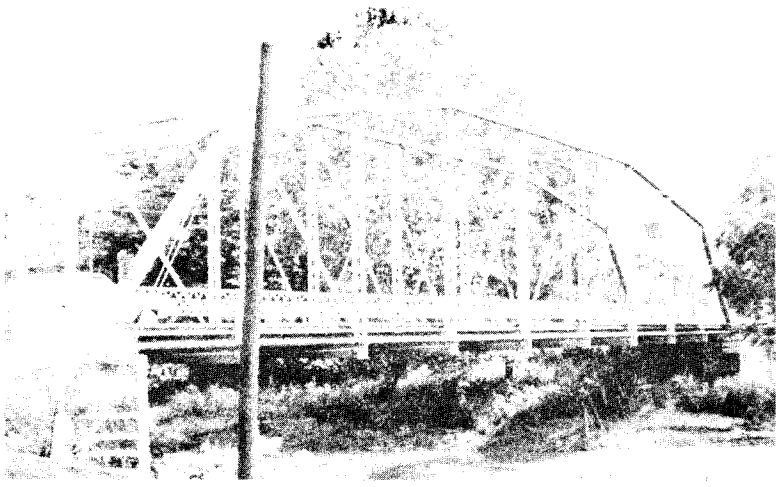


Figure 8. A typical Through Camelback truss bridge whose inclined top chords rendered it more economical for exceptionally long spans; span length 150 feet. (Augusta County; see form/photo number 08-07-27.)

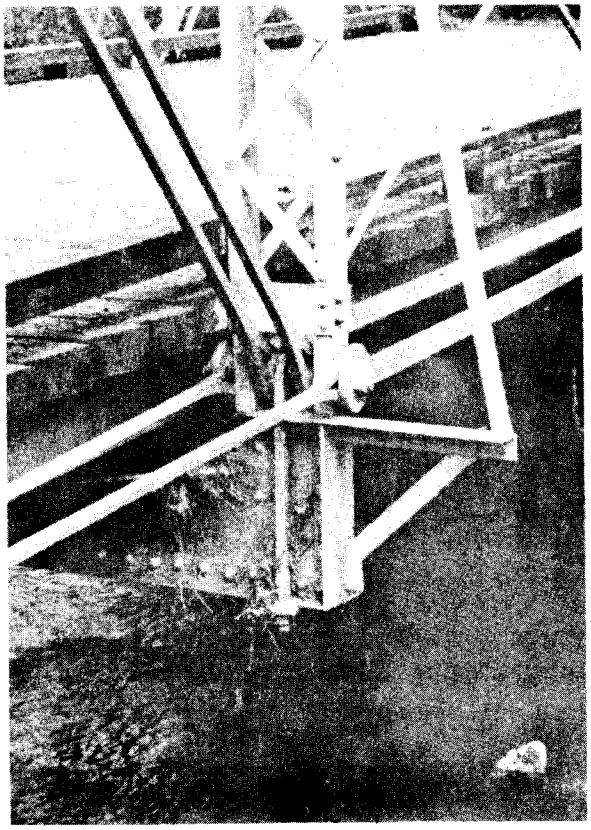


Figure 9. A pin connection at a truss panel point, the junction of an intermediate post, a top or bottom chord member and several diagonals. (Rockbridge County; see form/photo number 08-81-15.)

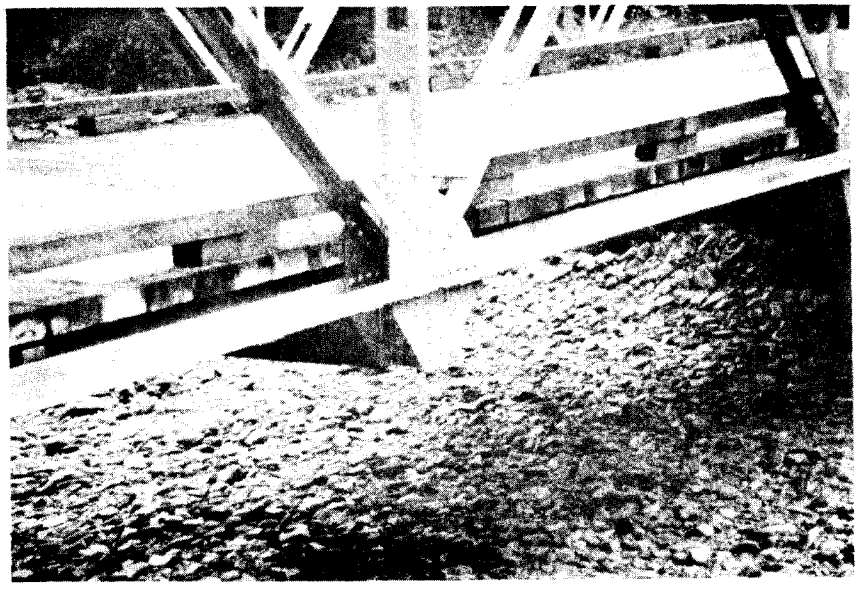


Figure 10. A rigid connection featuring a gusset plate to which are riveted the intersecting chord members, post angles, and the several diagonals. (Rockingham County; see form/photo number 08-82-3.)

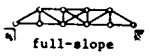
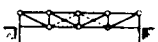
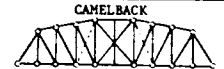
that included a variety of materials, e.g., wood, cast iron, wrought iron or steel; however, once steel became economically competitive and available, combination type truss bridges quickly became obsolete. Since no trusses inventoried in the Staunton District have a documented date earlier than 1890, it is reasonable to assume that steel would have been used exclusively for structural members in all of these trusses.

Of the 144 truss spans,[2] (79 through trusses, 65 low trusses) in the Staunton Construction District (see Tables 1 and 2), 99 of them are Pratt trusses and 100 have pin connections.[3] Of the 42 riveted connected trusses (all types), the majority date after 1910, which would reflect the trend away from using pin connections (see Table 3). Interestingly enough, no low Pratt, half-hip trusses (Figure 12) have riveted connections, which strongly suggests that this is an early form for the low Pratt truss. There are six bedstead/truss leg spans, a rather unusual truss type which did not utilize the inclined end posts/batter braces (Figure 13) preferred by Waddell. The truss leg bridge presents a curious form whose vertical end posts extend into the foundations, thereby incorporating them as part of the supporting substructure. This use as load-bearing substructural elements suggests that the intent was to avoid the expense of load-bearing masonry abutments; however, there would still be the need for some type of retaining wall to hold the embankment in place up to the edge of the bridge. Of the five truss leg bridges found in the District, abutments are present and, in most cases, appear to be original to the sites. This fixed end condition also alters the structural concept and results in a different distribution of stresses reflected in the sizing or depth of the panel members. Instead of being simple floating spans, the fixed end posts become cantilevered members capable of carrying moments at the supports. These bedstead trusses are all low Pratt or triangular configurations, none of which carry date plates. The average length for the existing low/pony trusses (all configurations) is 64 feet (19.5 meters) ranging from 39 feet (11.9 meters) to 87.5 feet (26.7 meters), well under the 65 feet (19.8 m) to 90 feet (27.4 m) range suggested by Waddell; through truss spans (excluding Camelback trusses) had an average length of 103.1 feet (33.8 meters) ranging from 82.5 feet (25.1 meters) to 139 feet (42.3 meters); while lengths for the District's camelback trusses averaged 159 feet (48.5 meters), ranging from 140 feet (42.7 meters) to 185 feet (56.4 meters). Though there are no spectacular spans of or greater than 200 feet (ca. 60 meters) in the District, Camelback trusses were used for spans of the greatest length.

Figure 11. A Low Triangular/Warren-type truss span featuring rigid connection details. (Augusta County; see form/photo number 08-07-4.)

Figure 12. A Low Pratt, half-hip truss whose end posts/batter braces do not bisect a full panel. (Rockingham County; see form/photo number 08-82-18.)

Table 2. Bridge Companies and Truss Types in the Staunton District.

TRUSS TYPE / BRIDGE COMPANY	LOW (Pony)					
	PRATT  half-hip	PRATT  full-slope	TRIANGULAR 	TRUSS LEG/BEDSTEAD 	CAMELBACK  Pratt	CAMELBACK  Modified
ATLANTIC BRIDGE COMPANY Roanoke, Va.						
BRACKETT BRIDGE COMPANY Cincinnati, O.	1 - ND	1 - 1898			2 - 1899 1 - ND	
CANTON BRIDGE COMPANY Canton, Ohio.	3 - ND *1 - ND					
CHAMPION BRIDGE COMPANY Wilmington, Ohio.	5 - ND *1 - ND	*1 - ND	6 - ND	1 - ND *2 - ND	1 - 1899 1 - 1915	1 - 1904
FARRIS BRIDGE COMPANY Pittsburgh, Pa.		2 - 1909				
GROTON BRIDGE & MANUFACTURING COMPANY Groton, N. Y.						
NELSON & BUCHANAN Engineers & Contractors Chambersburg, Pa.						
PHOENIX BRIDGE COMPANY Phoenixville, Pa.						
PITTSBURGH BRIDGE COMPANY Pittsburgh, Pa.						
ROANOKE BRIDGE COMPANY Roanoke, Va.		6 - 1910			1 - 1908 1 - 1910 1 - 1912 1 - 1913	
ROANOKE IRON & BRIDGE WORKS Roanoke, Va.		1 - 1917	1 - 1922 1 - 1931 1 - 1923 1 - 1924 2 - 1927 1 - 1928			
VARIETY IRON WORKS Cleveland, Ohio.	1 - ND					
VIRGINIA BRIDGE & IRON COMPANY Roanoke, Va.		2 - 1914 1 - 1915 3 - ND *3 - ND				1 - 1916
VIRGINIA BRIDGE & IRON COMPANY of TENNESSEE Roanoke, Va.		2 - 1917				
VIRGINIA STATE HIGHWAY COMMISSION Richmond, Va.		1 - 1921				
WALKER BROTHERS, Contractors Charlestown, W.Va.		1 - ND				
WEST VIRGINIA BRIDGE WORKS Wheeling, W. Va.		1 - ND				
WROUGHT IRON BRIDGE COMPANY Canton, Ohio.	2 - 1898 *1 - ND					
UNKNOWN	2 - ND	2 - ND 1 - ND (modified)	1 - ca. 1910	3 - ND	1 - ND	
TOTAL	17	28	14	6	10	2

THROUGH (High)

ND - no date.
* - stylistic attribution.

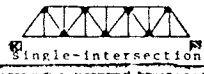
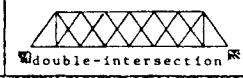
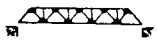
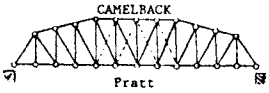
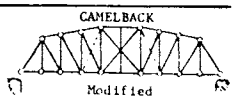
PENNSYLVANIA  Petit.	PRATT  single-intersection	TRIANGULAR  Single-intersection	TRIANGULAR  double-intersection	WHIPPLE  double-intersection	TOTAL
		3 - 1923			3
	2 - ND				7
	*1 - 1905 2 - 1906 3 - 1908 1 - ND *1 - ND				12
	1 - 1900 4 - 1907 1 - 1914	1 - 1923			26
					2
	2 - 1890 1 - 1896				3
	3 - 1896				3
	*1 - ND				1
	2 - 1887				2
	2 - 1910 1 - 1913				13
	3 - 1916 2 - 1925 1 - 1929				15
					1
	1 - 1913 3 - 1916 2 - ND				16
					2
		1 - 1922			2
					1
					1
	1 - 1890 3 - 1898 1 - ND			1 - 1898	9
2 - ND	10 - ND	1 - ND	3 - 1903		26
2	55	6	3	1	144

Table 3. Bridge Dates, Connection Details and Truss Types in the Staunton District.

TRUSS TYPE	LOW (Pony)					
	PRATT  half-hip	PRATT  full-slope	TRIANGULAR 	TRUSS LEG/BEDSTEAD 	CAMELBACK  Pratt	CAMELBACK  Modified
TRUSS DATES						
Known: 1870-1910: 47 1911-1932: 36	2 - 1898	1 - 1898 2 - 1909 6 - 1910 2 - 1914 1 - 1915 4 - 1917 1 - 1921	1 - 1922 1 - 1923 1 - 1924 2 - 1927 1 - 1928 1 - 1931 1 - ca. 1910		3 - 1899 1 - 1908 1 - 1910 1 - 1912 1 - 1913 1 - 1915	1 - 1904 1 - 1916
	2	17	8		8	2
Unknown	15	11	6	6	2	
CONNECTION DETAILS						
Rigid having riveted gusset plates:		15	14	3	1	
Pin having loop welded eyebars:	16	12		3	7	
Pin having die forged eyebars:					2	
Pin having both type eyebars:	1				2	
Other:		1				

THROUGH (High)

ND - no date.
* - stylistic attribution.

PENNSYLVANIA  Petit	PRATT  single-intersection	TRIANGULAR  single-intersection	TRIANGULAR  double-intersection	WHIPPLE  double-intersection	TOTAL
	3 - 1890 4 - 1896 2 - 1897 3 - 1898 1 - 1900 1 - 1905 2 - 1906 4 - 1907 3 - 1908 2 - 1910 2 - 1913 1 - 1914 6 - 1916 2 - 1925 1 - 1929 37	1 - 1922 4 - 1923 5	3 - 1903 3	1 - 1898 1	83
2	18				61
	3	5	3		44
2	35			1	76
	4	1			7
	13				16
					1

In absolute terms, there are no trusses in the Staunton District whose design or construction would represent a unique contribution in the development of truss technology. Several factors may help to account for this. Any early bridges which could have been "patented truss" designs probably fell victim to the Civil War campaigns in the Shenandoah Valley, as well as the ravages of natural disasters; the major road and railroad development appears not to have occurred until about 1880; and finally, the sites and crossings encountered by the bridge builders required neither specially designed nor innovative structural solutions. Considering that the longest low/pony truss spanned only 87.5 feet (26.7 meters), that the longest through/high truss spanned 139 feet (42.3 meters) and that only 47 of the 144 trusses are part of multi-span bridges, the utilization of standard designs extracted from bridge company files or catalogues would seem quite reasonable. Nonetheless, it should not be concluded that there are no truss bridges deserving of interest in the Staunton District. A number of the inventoried trusses can be classified as rare survivors or uncommon truss forms of the period. There is one remaining Whipple type truss dating from 1898 and built by the Wrought Iron Bridge Company, Canton, Ohio (Figure 14). Two Pennsylvania/Petit trusses exist as part of a four-span through truss bridge. Their date of construction has not been determined; however, they may originally have been located in Warren County on Route 340 where it crosses the South Fork of the Shenandoah River (Figure 15). An unusual pin-connected Warren-type/triangular through truss bridge was formerly a railroad bridge (Figure 16). An unusually light membered three-span quadrangular truss over the South Fork of the Shenandoah River may have been built in 1903 but this date has not yet been documented (Figure 17). There is an 1890 two-span, through Pratt truss bridge built by the Groton Bridge & Manufacturing Company, Groton, New York, for the Goshen Land & Improvement Company of Goshen, Virginia. It is built on a 30° skew and still carries its original decorative iron work (Figure 18). A single span through Pratt truss in Covington, Virginia, is the only example of a bridge designed and build by the Phoenix Bridge Company, Phoenixville, Pennsylvania, in the Staunton District. It utilizes their patented Phoenix column for all its compression members (Figure 19). There are five low truss leg/bedstead truss bridges in the District, only one of which can be definitely attributed to a particular bridge company (Figure 20). A single span, low Pratt, half-hip truss bridge survives as the only one by the Variety Iron Works, Cleveland, Ohio, in the District (Figure 21). The most unusual truss in the District is a short-span low truss made out of railroad rails and bent rods. It is unclassifiable as to type (Figure 22). A readily available means for differentiating between wrought iron and steel could help in making some conclusions about the early use of steel or the survival of wrought iron for structural purpose. (See Appendix 1 for detailed forms on each of the above mentioned trusses as well as others of special note.)

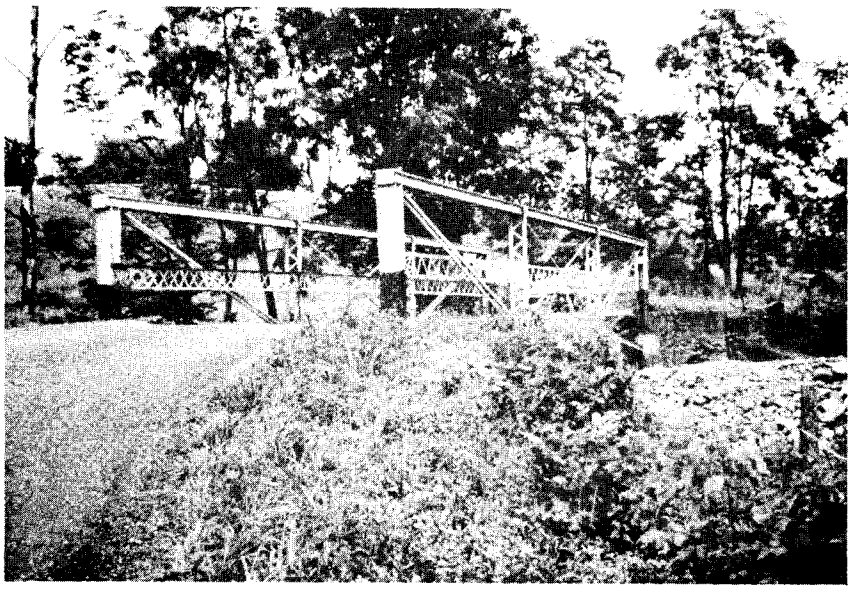


Figure 13. A typical low Bedstead/Truss Leg truss configuration with vertical end posts. (Augusta County; see form/photo number 08-07-15.)

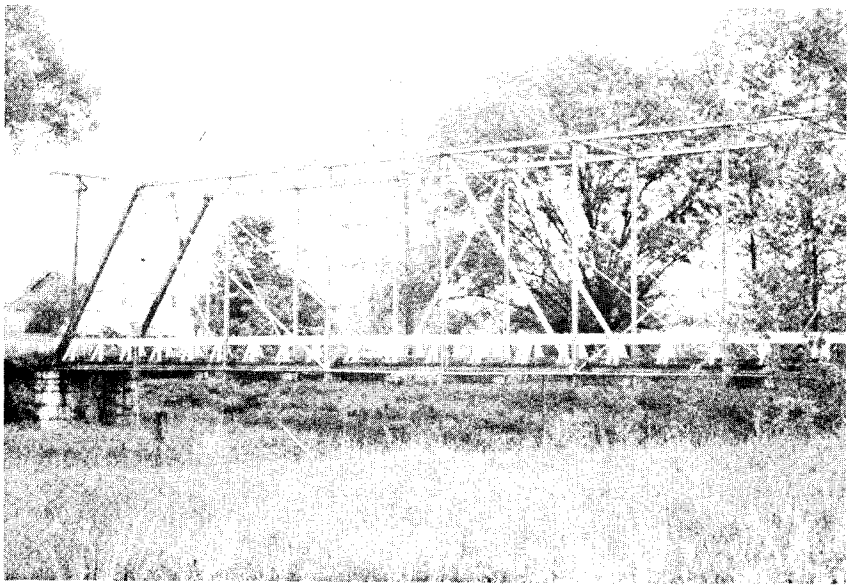


Figure 14. Whipple-type truss, Rockingham County; built by the Wrought Iron Bridge Company, Canton, Ohio, in 1898. (See form/photo number 08-81-35.)

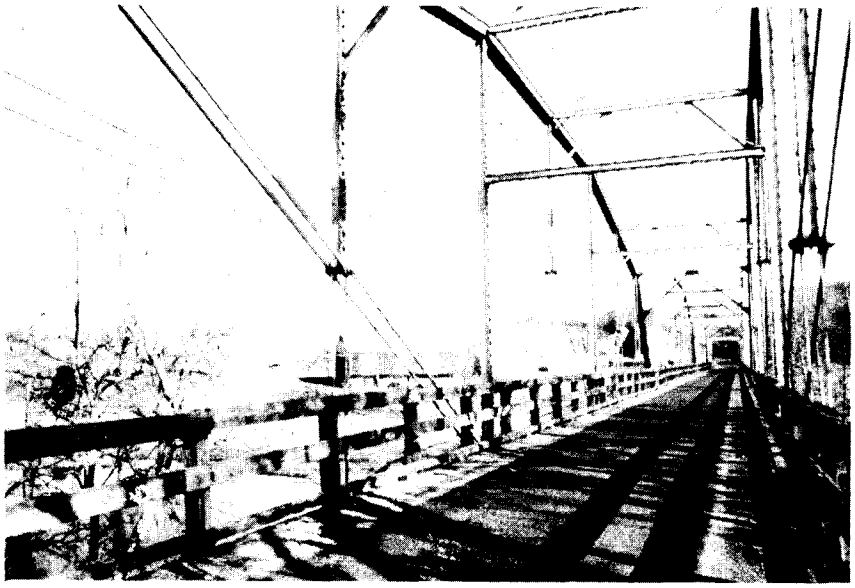


Figure 15. Two Pennsylvania/Petit trusses in Shenandoah County. Builder and date unknown. (See form/photo number 08-85-1.)

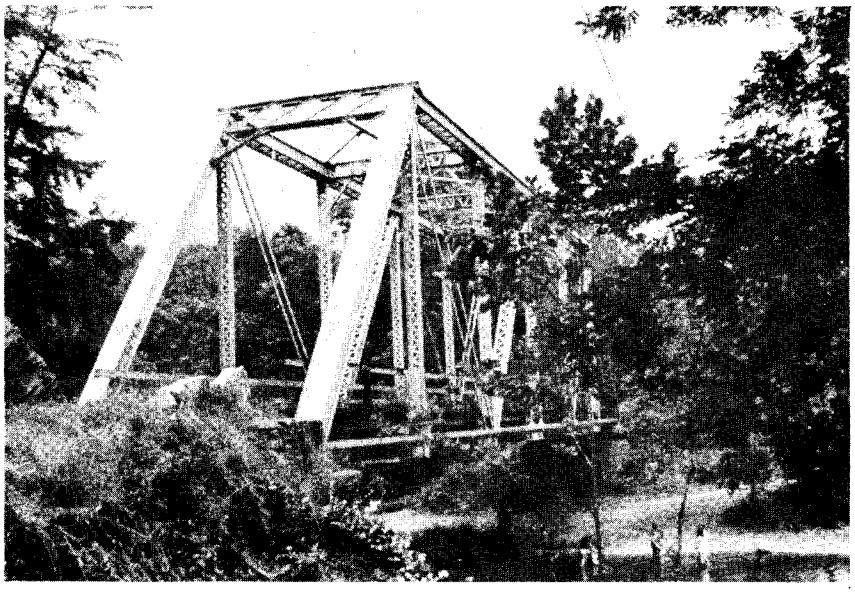


Figure 16. Single span triangular/Warren-type truss in Augusta County with pin connections. Builder and date unknown. (See form/photo number 08-07-30.)

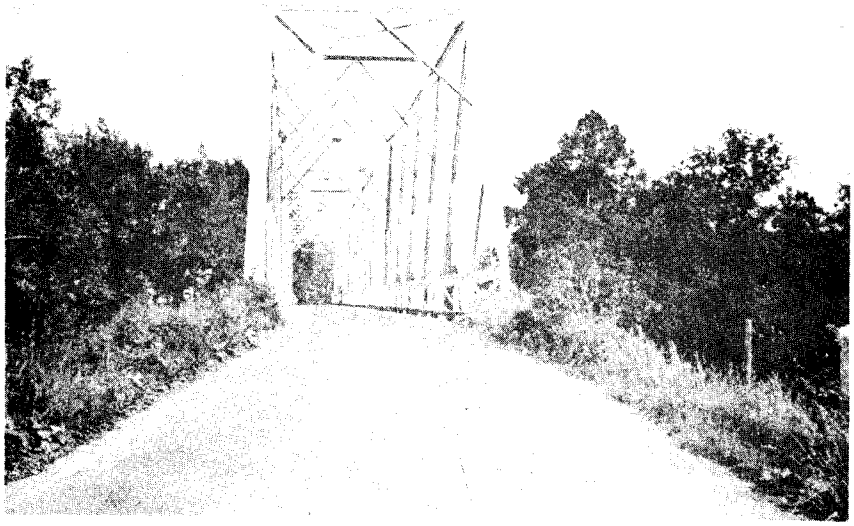


Figure 17. Three-span quadrangular truss bridge in Rockingham County and possibly constructed in 1903; builder unknown. (See form/photo number 08-82-36.)

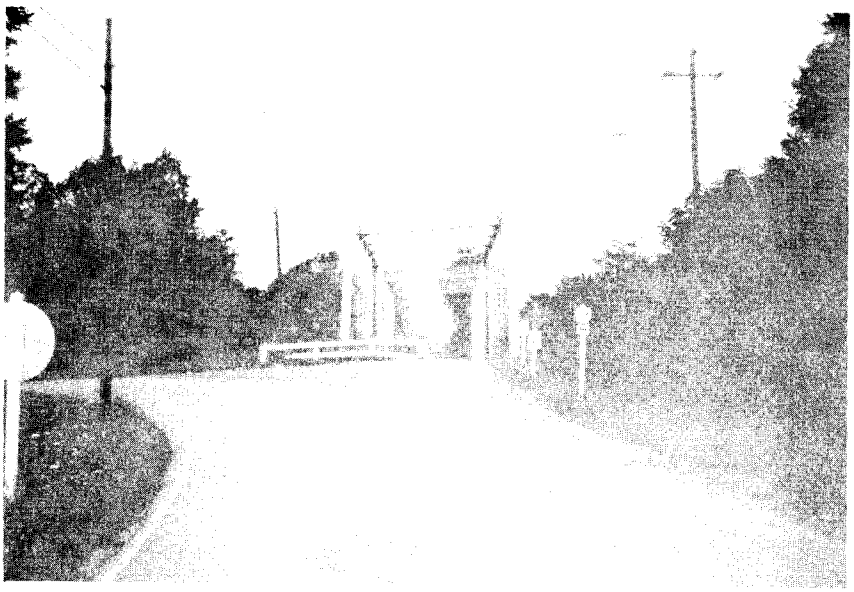


Figure 18. Two-span Pratt truss bridge in Rockbridge County having 30° skew; built by the Groton Bridge & Manufacturing Company, Groton, New York, in 1890. (See form/photo number 08-81-6.)

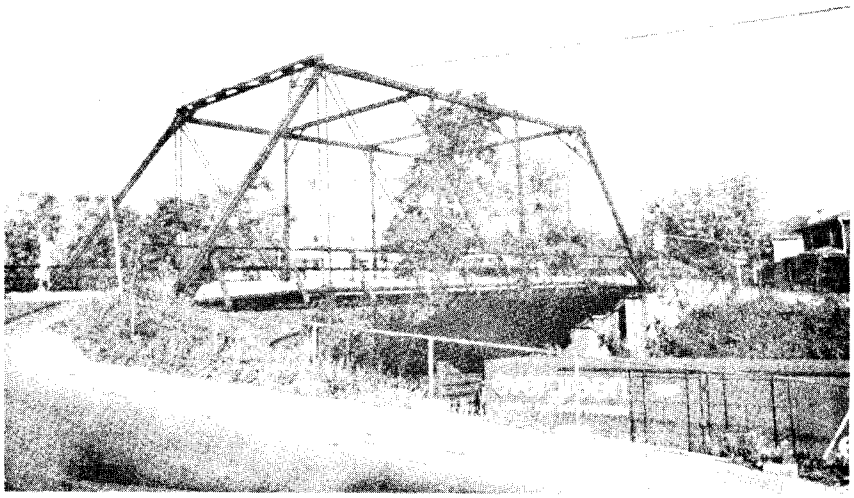


Figure 19. Single-span Pratt truss bridge in Covington, Virginia; built by the Phoenix Bridge Company; the date is unknown. (See form/photo number 08-81-7.)

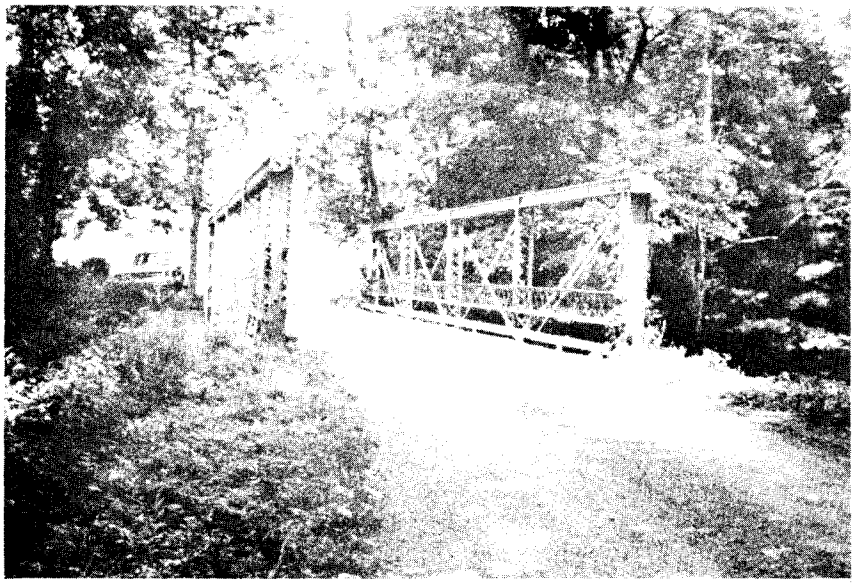


Figure 20. One of five bedstead/truss leg bridges built in the Staunton Construction District; dates unknown. (See form/photo number 08-07-13.)

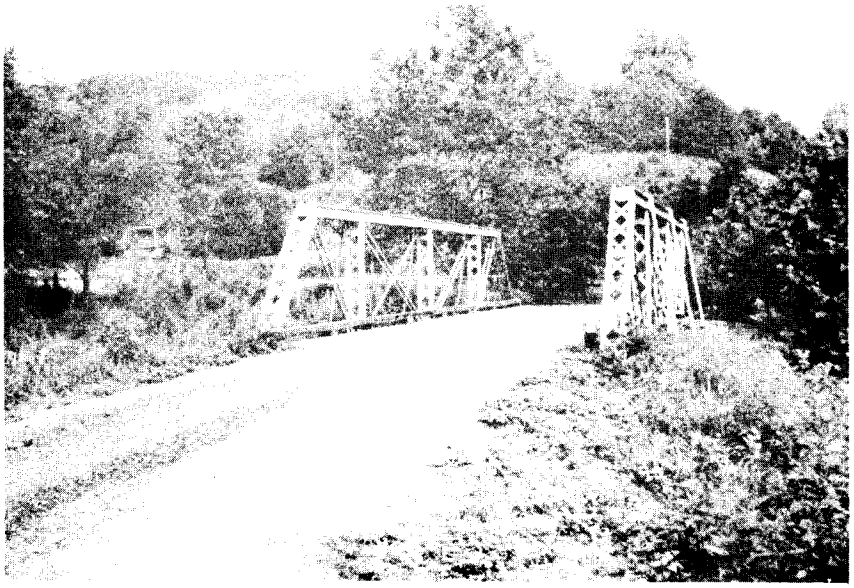


Figure 21. Single-span, low Pratt, half-hip truss bridge in Rockbridge County; built by Variety Iron Works, Cleveland, Ohio; date unknown. (See form/photo number 08-81-15.)

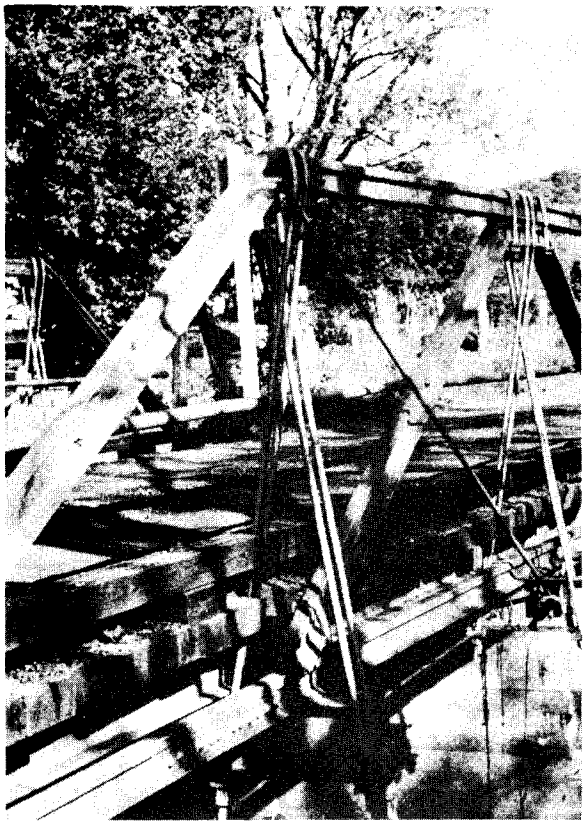


Figure 22. Single-span low truss bridge of unidentifiable configuration in Highland County; builder and date unknown. (See form/photo number 08-45-6.)

There are only 26 truss spans out of the 144 which cannot be attributed to any of the 18 bridge companies known to have erected truss bridges in the District between 1880 and 1932,[4] i.e., before the State Highway Commission assumed jurisdiction over all Virginia roads (see Table 2). The major portion of the trusses (99) were built by the following six companies:

Champion Bridge Company, Wilmington, Ohio	26
Roanoke Bridge Company/Roanoke Iron & Bridge Company, Roanoke, Va.	27
Virginia Bridge & Iron Company, Roanoke, Va.	18
Canton Bridge Company, Canton, Ohio	12
Wrought Iron Bridge Company, Canton, Ohio	9
Brackett Bridge Company, Cincinnati, Ohio	7
	99

Nineteen of the remaining 45 truss spans are evenly distributed among 12 other companies, contractors or engineers. Inasmuch as the individual counties had the responsibility for all secondary road construction and maintenance within their respective boundaries until 1932, it is understandable that a variety of bridge companies are represented and that some worked exclusively in one county. It would have been most unusual for any of the county governments to have had an engineer or the shop facilities to design or construct one of these rather intricate structures.

No county record research has yet been undertaken to determine the specific procedure followed for getting these company designed truss bridges built; however, from several other sources[5] a general understanding of the practice is apparent. The county officials, having decided where and when a bridge was needed, either as a replacement structure or a result from new construction, would draw up a notice of a "bridge-letting" and post it publically or mail it to potential bidders, as well as publish it in newspapers or engineering journals likely to be read by bridge builders.[6] (Figure 23.) The extent of the published specifications could vary significantly from being a highly detailed listing of dimensions, materials, loads (live and dead), flooring and

NOTICE
TO BRIDGE CONTRACTORS !

PROPOSALS will be received until the 16th day of April next, by the undersigned commissioners on the part of the counties of Orange and Culpeper, in the state of Virginia, for the Masonry and Construction of a **Wrought Iron Bridge,** about 167 feet span, across the Rapidan River, at Raccoon Ford.

The masonry required consists of two abutments, first-class rubble work of 20 feet face, with wings 20 feet and 8 feet thick, and to be founded on solid hard pan, or rock, below, and raised 15 feet above level of water when running over the entire length of the mill dam, to be laid of Syenite or solid hard stone in cement to water level, and with lime mortar above, and the bridge to be of ENTIRE WROUGHT IRON, floor excepted, which is to be of White Oak Plank, two and a-half inches thick, laid diagonally across, and with roadway twelve feet wide, the whole not to cost over FIVE THOUSAND DOLLARS, as limited by orders of the court.

Bids for entire work, or separately, for masonry and bridge, will be received, said proposals to be sent to office of the Clerk of the County Court of Culpeper County, in Culpeper, and are subject to the confirmation of the courts of the counties of Orange and Culpeper, and if any be accepted, and contract made, the work to be paid for out of the levies for the year 1883.

For any further information address Culpeper Commissioners at Raccoon Ford, Culpeper county, or Orange Commissioners at Rapidan Station, Culpeper county.

J. J. HALSEY,
H. T. HOLLADAY,
JAMES S. WILLIS,
Commissioners for Orange County.

W. S. STRINGFELLOW,
JNO. Z. HOLLADAY,
J. M. SCOTT,
Commissioners for Culpeper County.

Raccoon Ford, Va., March 21, 1883.

"TIMES" PRINT—CULPEPER.

Figure 23. A "bridge letting" notice put out in 1883 by the Board of Supervisors of Culpeper and Orange Counties.

abutment requirements, to a relatively simple notice whose purpose was more a search for and discussion of what type bridge would be the best solution for the crossing.(7) Obviously, the previous experience and background of the local officials, along with their access to professional advice, would have determined the nature of a particular "bridge-letting". Waddell placed little faith in the ability of the typical local government official to select the best bridge design from among the competitive bidders.(8) Even the most general comprehension of the variables in truss technology, e.g., number of panels vs. truss depth vs. span length vs. total weight vs. pin size vs. floor beam depth and weight, should indicate the formidable technological knowledge required in truss design. Most county officials were really at the mercy of the bridge companies and their representatives on whose integrity they were forced to rely. The bridge companies would respond to the "bridge-letting" notices either by sending bids and specifications along with their design for the commissioners to examine or by having a company representative appear before the local officials to explain their proposals. The exact procedure ultimately would depend on the preferences and policies of the individual counties.

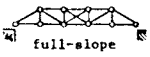
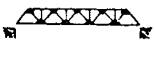
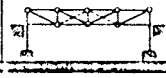
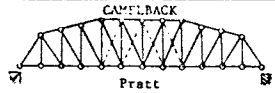
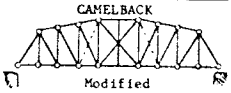
It is not decisively clear at this time if all "bridge-lettings" were based on the competitive bidding system. Public policy would certainly have dictated adhering to this system; however, on a local level there may have been factors of convenience or familiarity, as suggested by a high concentration of truss bridges erected by one company in a particular county. For example, 21 of the 35 extant trusses in Augusta County were built by the Champion Bridge Company of Wilmington, Ohio, whereas 11 of Allegheny County's 16 extant trusses came from firms located in Roanoke, Virginia, just as did 12 of Rockbridge County's 18 truss spans (see Tables 4 through 13).The proximity of both Allegheny and Rockbridge Counties to Roanoke may be part of the explanation. There is also the possibility that these bridge companies were more than just passive participants who responded to "bridge-letting" notices. Some companies had regional offices with district sales personnel whose task it was to represent their particular firms to the appropriate officials when construction projects were under consideration. After 1904 Edward J. Rose of the Champion Bridge Company was one of these traveling bridge salesmen whose territory included Virginia.(9) Apparently his efforts were not wasted.

After a county had contracted with a particular company, the immediate task of erecting the bridge was the responsibility of the erection foreman, another company employee who was something of an itinerant himself, traveling from one bridge project to the

next, hiring and training local labor for each job as well as securing needed supplied, e.g., timber for falsework and masonry and mortar for abutments.(10) Some of these materials might easily have been taken right from the site — sand and gravel from the stream bed and rock and timber from the surrounding locale.(11) If everything went according to plan, this preliminary work was completed by the time the tools, equipment and truss components arrived at the nearest freight depot. However, the rapidity of the work depended on a number of other variables as well: weather, the site's location and accessibility, the water depth, the span length, and the truss type itself. Pin-connected trusses lent themselves to greater ease of erection than rigidly connected ones, because in the former virtually all riveting was machine driven in the company's shop. Just as a truss is built up from component parts, i.e., posts, chord sections, eye bars, and rods, so, too, are these members fabricated from standardized steel or wrought iron shapes, e.g., channels, angles, bars and plates. At the bridge company's fabrication shop, these basic shapes were machine sized, cut, drilled, punched and riveted into the various truss components, which in turn were put together at the site simply by slipping pins in at the various panel points. Field riveting was kept to a minimum.

When the job was completed, the erection crew was disbanded and the foreman moved on to the next project in his territory or returned to the company's home or regional shop. In a case like Augusta County with one company (Champion Bridge) building 21 trusses in a 15-year period, several within a year of each other, there would have developed a pool of trained laborers from which these companies could have drawn. A rather appropriate tribute to these men's efforts and an equally fitting testimony to the effectiveness of truss technology rests in the fact that there are more than 140 truss spans in use in the Staunton Construction District in 1975. Unfortunately, their future is neither definite nor secure.

Table 4. Bridge Companies and Truss Types in Allegheny County.

TRUSS TYPE / ALLEGHENY COUNTY	LOW (Pony)					
	PRATT  half-hip	PRATT  full-slope	TRIANGULAR 	TRUSS LEG/BEDSTEAD 	CAMELBACK  Pratt	CAMELBACK  Modified
NELSON & BUCHANAN, Engineers & Contractors Chambersburg, Pa.						
PHOENIX BRIDGE COMPANY Phoenisville, Pa.						
ROANOKE BRIDGE COMPANY Roanoke, Va.		3 - 1910			1 - 1910 1 - 1913	
VIRGINIA BRIDGE & IRON COMPANY Roanoke, Va.						
UNKNOWN						
TOTAL		3			2	

THROUGH (High)

ND - no date.
* - stylistic attribution.

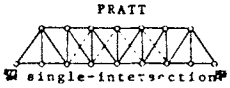
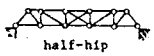
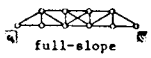
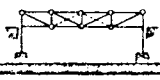
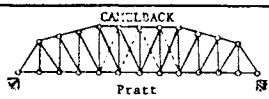
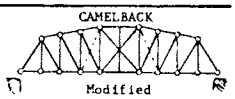
PENNSYLVANIA  Petit	PRATT  single-intersection	TRIANGULAR  single-intersection	TRIANGULAR  double-intersection	WHIPPLE  double-intersection	TOTAL
	3 - 1896				3
	1 - ND				1
	2 - 1910				7
	2 - 1916 2 - ND				4
	1 - ND				1
	11				16

Table 5. Bridge Companies and Truss Types in Augusta County.

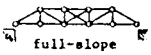
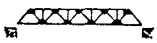
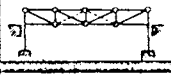
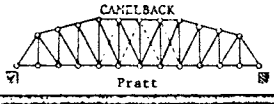
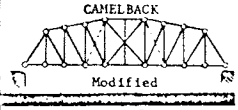
TRUSS TYPE / AUGUSTA COUNTY	LOW (Pony)					
	PRATT  half-hip	PRATT  full-slope	TRIANGULAR 	TRUSS LEG/BEDSTEAD 	CAMELBACK  Pratt	CAMELBACK  Modified
BRACKETT BRIDGE COMPANY Cincinnati, Ohio	1 - ND	1 - 1898			2 - 1899 1 - ND	
CHAMPION BRIDGE COMPANY Wilmington, Ohio	4 - ND *1 - ND		4 - ND	*2 - ND 1 - ND	1 - 1899 1 - 1915	1 - 1904
GROTON BRIDGE & MFG. COMPANY Groton, N. Y.						
PITTSBURGH BRIDGE COMPANY Pittsburgh, Pa.						
VIRGINIA BRIDGE & IRON COMPANY Roanoke, Va.		2 - 1914				
WROUGHT IRON BRIDGE COMPANY Canton, Ohio						
UNKNOWN						
TOTAL	6	3	4	3	5	1

THROUGH (High)

ND - no date.
* - stylistic attribution.

PENNSYLVANIA  Petit	PRATT  single-intersection	TRIANGULAR  Single-intersection	TRIANGULAR  Double-intersection	WHIPPLE  Double-intersection	TOTAL
	2 - ND				7
	1 - 1900 4 - 1907 1 - 1914				21
	1 - 1896				1
	2 - 1897				2
					2
	1 - 1890				1
		1 - ND			1
	12	1			35

Table 6. Bridge Companies and Truss Types in Bath County.

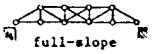
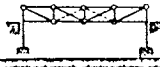
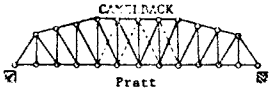
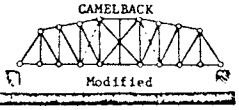
TRUSS TYPE / BATH COUNTY	LOW (Pony)					
	PRATT  half-hip	PRATT  full-slope	TRIANGULAR 	TRUSS LEG/BEDSTEAD 	CAMELBACK  Pratt	CAMELBACK  Modified
CHAMPION BRIDGE COMPANY Wilmington, Ohio.						
FARRIS BRIDGE COMPANY Pittsburgh, Pa.		1 - 1909				
ROANAKE BRIDGE COMPANY Roanoke, Va.		2 - 1910				
VIRGINIA STATE HIGHWAY COMMISSION Richmond, Va.		1 - 1921				
UNKNOWN	1 - ND	1 - ND				
TOTAL	1	5				

THROUGH (High)

ND - no date.
* - stylistic attribution.

PENNSYLVANIA  Petit	PRATT  single-intersection	TRIANGULAR  Single-intersection	TRIANGULAR  double-intersection	WHIPPLE  double-intersection	TOTAL
		1 - 1923			1
					1
					2
		1 - 1922			2
	1 - ND				3
	1	2			9

Table 7. Bridge Companies and Truss Types in Frederick County.

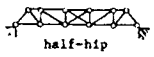
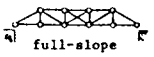
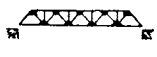
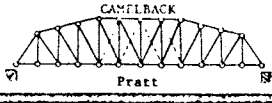
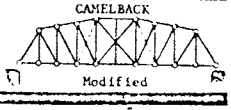
TRUSS TYPE / FREDERICK COUNTY	LOW (Pony)					
	PRATT  half-hip	PRATT  full-slope	TRIANGULAR 	TRUSS LEG/BEDSTEAD 	CAMELBACK  Pratt	CAMELBACK  Modified
ROANOKE IRON & BRIDGE WORKS Roanoke, Va.		1 - 1917				
UNKNOWN				1 - ND		
TOTAL		1		1		

THROUGH (High)

ND - no date.
* - stylistic attribution.

PENNSYLVANIA	PRATT	TRIANGULAR	TRIANGULAR	WHIPPLE	TOTAL
Petit	single-intersection	single-intersection	double-intersection	double-intersection	
					1
					1
					2

Table 8. Bridge Companies and Truss Types in Highland County.

TRUSS TYPE / HIGHLAND COUNTY	LOW (Pony)					
	PRATT  half-hip	PRATT  full-slope	TRIANGULAR 	TRUSS LEG/BEDSTEAD 	CAMELBACK  Pratt	CAMELBACK  Modified
VIRGINIA BRIDGE & IRON COMPANY Roanoke, Va.		1 - 1917				
WEST VIRGINIA BRIDGE WORKS Wheeling, W. Va.		1 - ND				
UNKNOWN		1 - ND (modified)				
TOTAL		3				

THROUGH (High)

ND - no date.
* - stylistic attribution.

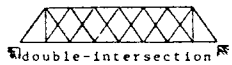
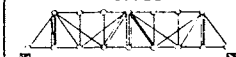
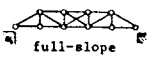
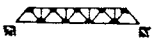
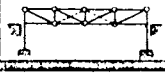
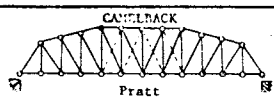
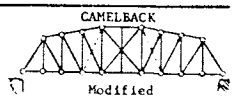
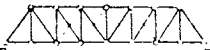
PENNSYLVANIA  Petit	PRATT  single-intersection	TRIANGULAR  single-intersection	TRIANGULAR  double-intersection	WHIPPLE  double-intersection	TOTAL
	1 - 1916				2
					1
	2 - ND				3
	3				6

Table 9. Bridge Companies and Truss Types in Page County.

TRUSS TYPE / PAGE COUNTY	LOW (Pony)					
	PRATT  half-hip	PRATT  full-slope	TRIANGULAR 	TRUSS LEG/BEDSTEAD 	CAMELBACK  Pratt	CAMELBACK  Modified
CANTON BRIDGE COMPANY Canton, Ohio.						
UNKNOWN	1 - ND					
TOTAL	1					

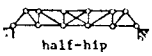
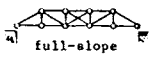
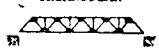
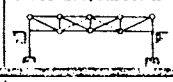
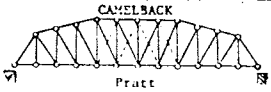
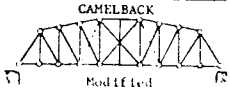
THROUGH (High)

ND - no date.
* - stylistic attribution.

PENNSYLVANIA  Petit	PRATT  single-intersection	TRIANGULAR  Single-intersection	TRIANGULAR  double-intersection	WHIPPLE  double-intersection	TOTAL
	1 - 1908				1
					1
	1				2

3264

Table 10. Bridge Companies and Truss Types in Rockbridge County.

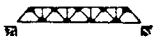
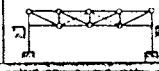
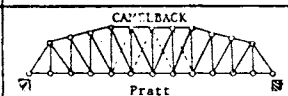
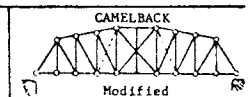
TRUSS TYPE / ROCKBRIDGE COUNTY	LOW (Pony)					
	PRATT  half-hip	PRATT  full-slope	TRIANGULAR 	TRUSS LEG/BEDSTEAD 	CAMELBACK  Pratt	CAMELBACK  Modified
GROTON BRIDGE & MFG. COMPANY Groton, N. Y.						
ROANOKE BRIDGE COMPANY Roanoke, Va.					1 - 1908 1 - 1912	
ROANOKE IRON & BRIDGE WORKS Roanoke, Va.			1 - 1922 1 - 1923 1 - 1924 2 - 1927 1 - 1931			
VARIETY IRON WORKS Cleveland, Ohio.	1 - ND					
VIRGINIA BRIDGE & IRON COMPANY of TENNESSEE Roanoke, Va.		2 - 1917				
VIRGINIA STATE HIGHWAY COMMISSION Richmond, Va.						
UNKNOWN		1 - ND	1 - ca. 1910			
TOTAL	1	3	7		2	

THROUGH (High)

ND - no date.
* - stylistic attribution.

PENNSYLVANIA  Petit	PRATT  single-intersection	TRIANGULAR  single-intersection	TRIANGULAR  double-intersection	WHIPPLE  double-intersection	TOTAL
	2 - 1890				2
	1 - 1913				3
					6
					1
					2
	1 - 1916				1
	1 - ND				3
	5				18

Table 11. Bridge Companies and Truss Types in Rockingham County.

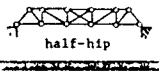
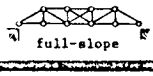
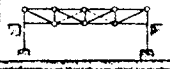
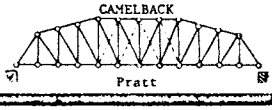
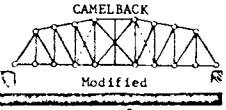
TRUSS TYPE / ROCKINGHAM COUNTY	LOW (Pony)					
	PRATT half-hip 	PRATT full-slope 	TRIANGULAR 	TRUSS LEG/BEDSTEAD 	CAMELBACK Pratt 	CAMELBACK Modified 
CANTON BRIDGE COMPANY Canton, Ohio.	3 - ND *1 - ND					
CHAMPION BRIDGE COMPANY Wilmington, Ohio	1 - ND	*1 - ND	2 - ND			
FARRIS BRIDGE COMPANY Pittsburgh, Pa.		1 - 1909				
ROANOKE IRON & BRIDGE WORKS Roanoke, Va.			1 - 1928			
VIRGINIA BRIDGE & IRON COMPANY Roanoke, Va.		1 - 1915 *3 - ND 2 - ND				
WALKER BROTHERS, Contractors Charlestown, W. Va.		1 - ND				
WROUGHT IRON BRIDGE COMPANY Canton, Ohio.	2 - 1898 *1 - ND					
UNKNOWN						
TOTAL	8	9	3			

THROUGH (High)

ND - no date.
* - stylistic attribution.

PENNSYLVANIA Petit	PRATT single-intersection	TRIANGULAR single-intersection	TRIANGULAR double-intersection	WHIPPLE double-intersection	TOTAL
	*1 - 1905 *1 - ND 2 - 1906 2 - 1908 1 - ND				11
					4
					1
	2 - 1916 2 - 1925 1 - 1929				6
	1 - 1913				7
					1
	1 - ND			1 - 1898	5
	3 - ND		3 - 1903		6
	17		3	1	41

Table 12. Bridge Companies and Truss Types in Shenandoah County.

TRUSS TYPE / SHENANDOAH COUNTY	LOW (Pony)					
	PRATT  half-hip	PRATT  full-slope	TRIANGULAR 	TRUSS LEG/BEDSTEAD 	CAMELBACK  Pratt	CAMELBACK  Modified
ATLANTIC BRIDGE COMPANY Roanoke, Va.						
VIRGINIA BRIDGE & IRON COMPANY Roanoke, Va.						1 - 1916
WROUGHT IRON BRIDGE COMPANY Canton, Ohio.						
UNKNOWN				2 - ND		1 - ND
TOTAL				2		2

THROUGH (High)

ND - no date.
* - stylistic attribution.

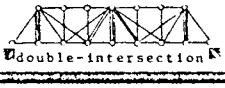
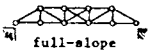
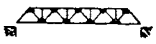
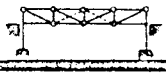
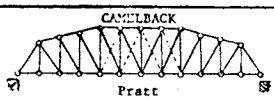
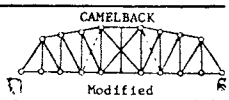
PENNSYLVANIA  Petit	PRATT  single-intersection	TRIANGULAR  single-intersection	TRIANGULAR  double-intersection	WHIPPLE  double-intersection	TOTAL
		3 - 1923			3
					1
	3 - 1898				3
2 - ND	2 - ND				6
2	5	3			14

Table 13. Bridge Companies and Truss Types in Warren County.

TRUSS TYPE / WARREN COUNTY	LOW (Pony)					
	PRATT  half-hip	PRATT  full-slope	TRIANGULAR 	TRUSS LEG/BEDSTEAD 	CAMELBACK  Pratt	CAMELBACK  Modified
ROANOKE BRIDGE COMPANY Roanoke, Va.		1 - 1910				
		1				

THROUGH (High)

ND - no date.
* - stylistic attribution.

PENNSYLVANIA  Petit	PRATT  single-intersection	TRIANGULAR  single-intersection	TRIANGULAR  double-intersection	WHIPPLE  double-intersection	TOTAL
					1
					1

NOTES

1. James A. L. Waddell, The Designing of Ordinary Iron Highway Bridges, New York, John Wiley & Sons, Inc., 1891 (fifth edition), pp. ix-x.

2. The figures used in this paper represent the number of individual truss spans rather than truss bridges; for example, in a four-span bridge each truss span is counted separately. This was done because a number of multi-span truss bridges are made up of trusses which once formed individual bridges but were dismantled, stored and later reused as one span of another multi-span bridge and because some of the multi-span bridges have only one truss usually relocated to the site. To classify this latter condition as a multi-span truss bridge would be misleading.

3. One through/high triangular truss span has pin connections — so far a unique occurrence.

4. The lower limit, 1880, is an arbitrary cut-off date, though a two-span through/high Pratt truss bridge is considered to have been built in 1887 by the Pittsburgh Bridge Company. If this date proves to be correct, this would be the Staunton District's oldest truss.

5. See David H. Miars, A Century of Bridges, Wilmington (Ohio), 1972, pp. 23-25; and Waddell, op. cit., pp. 157-171.

6. Waddell, op. cit., p. 157.

7. Ibid.

8. Ibid., pp. 157-161.

9. Miars, op. cit., p. 26.

10. Ibid., p. 24.

11. Ibid.

3274

APPENDIX

METAL TRUSS BRIDGES IN THE STAUNTON DISTRICT OF SPECIAL INTEREST

Photo Numbers: Ø8-85-1:

A	M
B	N
C	O
D	P
E	Q
F	R
G	S
H	T
J	U
K	V
L	W

TRUSS BRIDGE SURVEY AND INVENTORY FORM

Geographic Information

State: Virginia
Va. Dept. of Highways District: *Staunton*; No. *Ø8*.
County: *Shenandoah*; No. *85*.
~~City~~/Town: *Edinburg*.
~~Street~~/Road: *State route #675*.
River/~~Stream/Railroad~~ (crossing): *NF Shenandoah River*.
UTM/KGS Coordinates: *126998*.

Historical Information

Formal designation: ____.
Local designation: *6Ø5Ø (District Structure No.)*.
Designer: ____.
Builder: ____.
Date: ____; basis for: ____.
Original owner: ____; use: *vehicular bridge*.
Present owner: *Virginia Dept. of Highways*; use: *vehicular bridge*.

Historical or Technological Significance

__X__ Unique/Unusual in its time: *This is the only example of a Pennsylvania truss in the District.*

_____ Rare survivor though of standard design: ____.

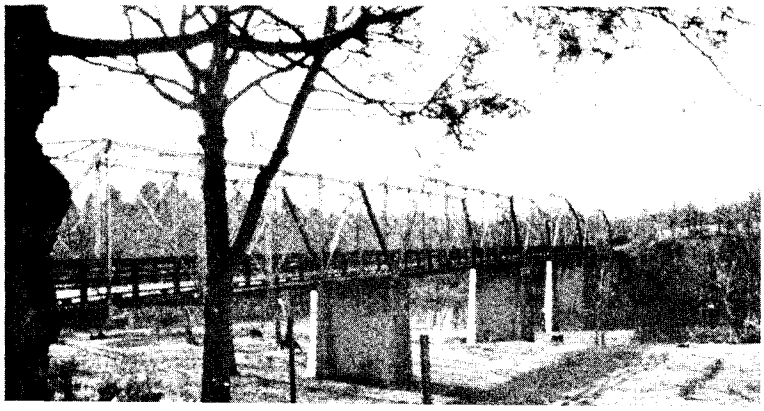
_____ Typical example of its time and a common survivor: ____.

_____ Other Remarks/Explanation: *Sub-diagonals run from intersection of the diagonals to midpoints of each of the bottom chords and top chords as well. Bolts on top chords at panel points indicate that trusses were relocated to this crossing. Since the trussesare different, the suggestion is that they came from two different bridges. A two-span Pennsylvania truss bridge was located near Front Royal until the 1930's when it was partially washed out by flooding.*

Nature/Degree of any destructive threats: ____.

Reference materials and contemporary photos/illustrations with their respective locations:
Waddell, J. A. L., Bridge Engineering, 1916.
1968 Truss Span Survey, Staunton Construction District.
Old photo file, Virginia Highway and Transportation Research Council.

Recorder: *DAN DEIBLER*.
Date: *7 December 1973*.
Affiliation: *Research Council, Concrete Section.*



A-2 3278

Design Information

Compass orientation of axis: *E/W*.

No. of spans: *five(5)*; length; overall: *588'*.
Span types:
(1) *truss (Penna.)*; length: *160' 6"*.
(2) *truss (Penna.)*; length: *159' 7"*.
(3) *truss (Pratt)*; length: *126' 7"*.
(4) *truss (Pratt)*; length: *100' 9"*.
(5) *steel beam*; length: *41' 2"*.
(6) _____; length: _____.

No. of lanes: *one (1)*; width: *17' 1"* c to c.

Architectural or decorative features:

Simple wood railings. Pennsylvania trusses have lateral struts with knee braces made of channels and lacing bars. Posts are made of the same members.

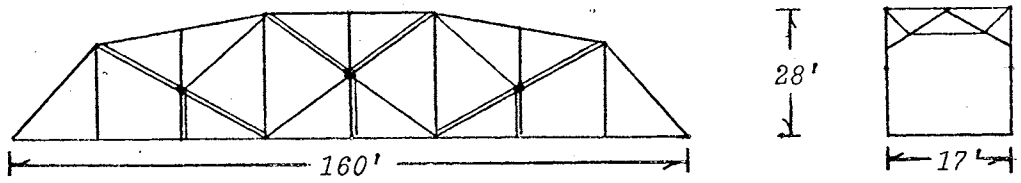
Structural Information

Substructure:
Material: *concrete*.
Foundations: _____.
Piers: *concrete*.
Abutments: _____.
Wings: _____.
Seats: *concrete*.

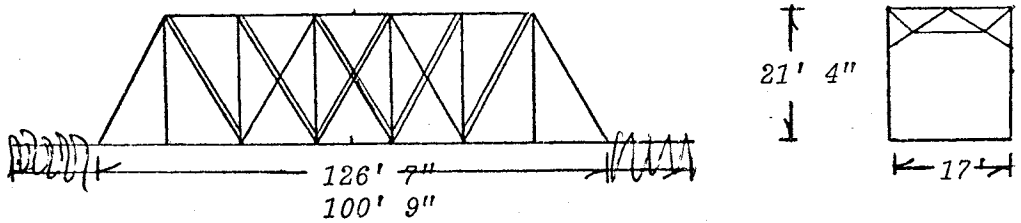
Superstructure:
Material: *steel* sources *C.R.M. Co. (probably for Chester Rolling Mills, Thurlow, Penna.) Cambria (Pratt trusses only.*
Characteristics, details and members:
Connections: *X* pin.
_____ rigid.
Top Chords *2 up-right channels connected w/cover plates and lacing bars*.
End Posts: *2 vertical channels connected w/cover plates and lacing bars*.
Bottom chords: *double rectilinear eye bars, die-forged; Pratt trusses have 2 angles*.
Posts: *2 vertical channels connected w/lacing bars paralleling roadway(Pa. trusses)*.
Diagonals: *single and double loop-welded diagonals*.
Counters: *single rectilinear eyebars, loop-welded connected w/stay plates for end panel chords.*

Truss Configuration

Main span type: *PENNSYLVANIA/PETIT, modified* Through/~~Pony/Deck~~, ~~Skew~~



Secondary span type: *PRATT* Through/~~Pony/Deck~~, ~~Skew~~



The 4th truss is a standard Pratt truss but of 6 panels instead of 7 and has double rectilinear counters.

Photo Numbers: Ø8-Ø3-1

A
B
C
D
E
F
G
H
I
J
K

3329

TRUSS BRIDGE SURVEY AND INVENTORY FORM

Geographic Information

State: Virginia
Va. Dept. of Highways District: Staunton ; No. Ø8 .
County: Allegheny ; No. Ø3 .
City/Town: .
~~Street~~/Road: State route #633 .
River/~~Stream/Railroad~~ (crossing): Cowpasture River .
UTM/KGS Coordinates: Ø93833 .

Historical Information

Formal designation: #1746 (Structure Tabulation No.) .
Local designation: #6Ø64 (District Structure No.) .
Designer: .
Builder: Nelson & Buchanan, Engineers & Contractors, Chambersburg, Penna .
Date: 1896 ; basis for: name/date plate .
Original owner: ; use: vehicular bridge .
Present owner: Virginia Dept. of Highways ; use: vehicular bridge .

Historical or Technological Significance

____ Unique/Unusual in its time: .

__X__ Rare survivor though of standard design: One of the few multi-span thru truss bridges in the District and the only one built by this company .

____ Typical example of its time and a common survivor: .

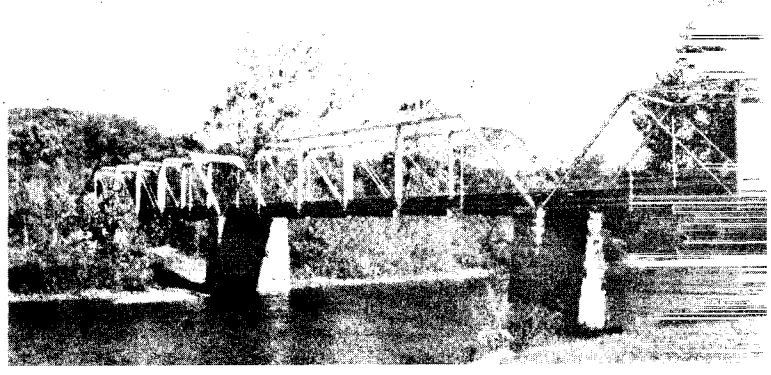
____ Other Remarks/Explanation: Following county officials are listed on the bridge date plate: Supervisors--E.M. NETTLETON
C.M. McELWEL
H.P. CARSON
Clerk--J.J. HOBBS
Engineer--WILLIAM P. MARSHALL .

Nature/Degree of any destructive threats: Bridge is scheduled for replacement under 1975-76 fundings. .

Reference materials and contemporary photos/illustrations with their respective locations:

1968 Truss Span Survey, Staunton Construction District.
PLANS, 23 March 1948, concerned with remodeling floor system.

Recorder: DAN DEIBLER .
Date: 16 October 1973 .
Affiliation: Research Council, Concrete Section .



A-4 3280

Design Information

Compass orientation of axis: *NE/SW*.

No. of spans: *3 (three)* length; overall: *315' 3"*.
Span types:
(1) *truss (Pratt)*; length: *103' 10"*.
(2) *truss "*; length: *103' 10"*.
(3) *truss "*; length: *103' 10"*.
(4) _____; length: _____.
(5) _____; length: _____.
(6) _____; length: _____.

No. of lanes: *one (1)*; width: *15'* c to c.

Architectural or decorative features:

The delicate latticing on the portals of of each span is the most interesting feature of this bridge. The lateral struts are comprised of angles and lacing bars.

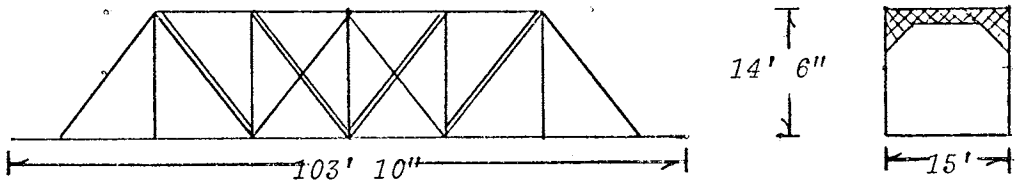
Structural Information

Substructure:
Material: *limestone*.
Foundations: .
Piers: *coursed ashlar masonry*.
Abutments: *coursed ashlar masonry*.
Wings: .
Seats: .

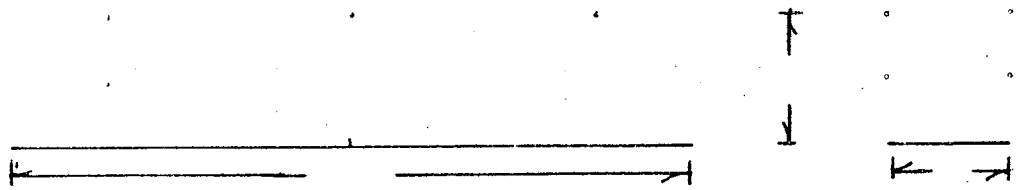
Superstructure:
Material: *steel* sources *Carnegie*.
Characteristics, details and members:
Connections: *X* pin.
_____ rigid.
Top Chords *2 up-right channels connected w/cover plates and stay plates*.
End Posts: *2 vertical channels connected w/cover plates and stay plates*.
Bottom chords: *double rectilinear eye bars, die forged*.
Posts: *2 vertical channels connected w/lacing bars forming a hollow column*.
Diagonals: *double rectilinear tie rods, loop welded*.
Counters: *single rectilinear tie rods, loop welded*.

Truss Configuration

Main span type: *PRATT* Through/~~Pony/Deck~~, ~~Skew~~



Secondary span type: _____ Through/Pony/Deck, Skew



A-5

Photo Numbers: *Ø8-82-36*

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3381

TRUSS BRIDGE SURVEY AND INVENTORY FORM

Geographic Information

State: Virginia
Va. Dept. of Highways District: *Staunton*; No. *Ø8*.
County: *Rockingham*; No. *82*.
~~City~~/Town: *east of Lynnwood*.
~~Street~~/Road: *State route #659*.
River/~~Stream/Railroad~~ (crossing): *SF Shenandoah River*.
UTM/KGS Coordinates: *#951427*.

Historical Information

Formal designation: *#1493 (Structure Tabulation No.)*.
Local designation: *#6057 (District Structure No.)*.
Designer: _____.
Builder: _____.
Date: *1903*; basis for: *date written in pier footing*.
Original owner: _____; use: *vehicular bridge*.
Present owner: *Virginia Dept. of Highways*; use: *vehicular bridge*.

Historical or Technological Significance

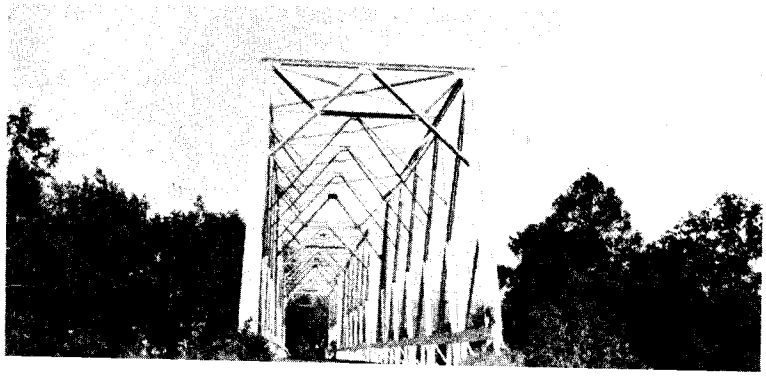
X Unique/Unusual in its time: *This is the only double-action/intersection (quadrangular truss system in the Staunton District.*.
_____ Rare survivor though of standard design: _____.
_____ Typical example of its time and a common survivor: _____.
_____ Other Remarks/Explanation: *District files suggest that this bridge may have been built about 1910 an possibly moved in 1932.*

Nature/Degree of any destructive threats: _____.

Reference materials and contemporary photos/illustrations with their respective locations:

1968 Truss Span Survey, Staunton Construction District.
F.A.S., Bridge Safety Inspection file.

Recorder: *DAN DEIBLER*.
Date: *5 June 1973*.
Affiliation: *Research Council, Concrete Section*.



A-6

Design Information

Compass orientation of axis: *NW/SE*.

No. of spans: *three (3)* length; overall: *341' 9"*.
Span types:
(1) *truss (Quadrangular)* length: *100' 9"*.
(2) *truss "* ; length: *120' 4"*.
(3) *truss "* ; length: *120' 8"*.
(4) _____ ; length: _____.
(5) _____ ; length: _____.
(6) _____ ; length: _____.

No. of lanes: *one (1)*; width: *12' 9"* c to c.

Architectural or decorative features:

Simple wood side railings. Exceptionally thin members characterize the trusses as weak and flimsy rather than light and delicate. Tall attenuated character is exaggerated by narrow roadway.

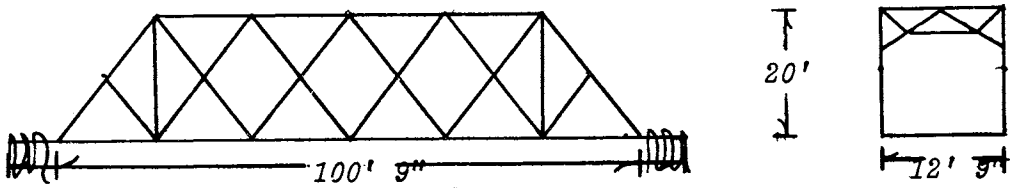
Structural Information

Substructure:
Material: *concrete and stone masonry*.
Foundations: _____.
Piers: *paired steel columns filled with concrete*.
Abutments: *concrete and masonry*.
Wings: *concrete and masonry*.
Seats: *concrete*.

Superstructure:
Material: *steel* sources _____.
Characteristics, details and members:
Connections: _____ pin.
X rigid.
Top Chords *paired back-to-back riveted angles*.
End Posts: *paired back-to-back riveted angles*.
Bottom chords: *paired back-to-back riveted angles*.
Posts: _____.
Diagonals: *paired back-to-back riveted angles*.
Counters: *paired back-to-back riveted angles*.

Truss Configuration

Main span type: *QUADRANGULAR (double intersection/action)* Through/~~Pony/Deck~~, ~~Thru~~



Secondary span type: _____ Through/~~Pony/Deck~~, ~~Thru~~

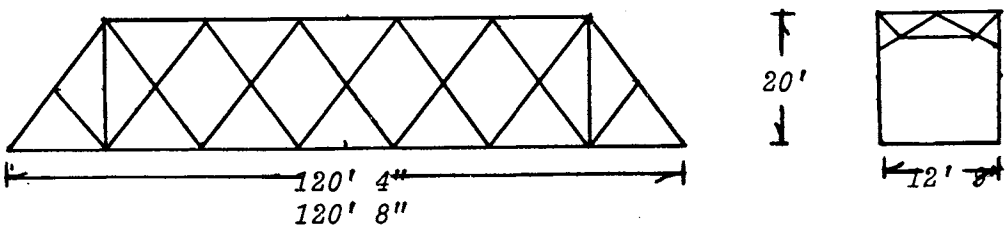


Photo Numbers: Ø8-81-6:

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TRUSS BRIDGE SURVEY AND INVENTORY FORM

Geographic Information

State: Virginia
Va. Dept. of Highways District: Staunton ; No. Ø1 .
County: Rockbridge ; No. 81 .
[redacted]/Town: Goshen .
[redacted]/Road: state route #746 .
River/[redacted] (crossing): Calfpasture River .
UTM/KGS Coordinates: #322Ø5Ø .

Historical Information

Formal designation: #1416 (Structure Tabulation No.) .
Local designation: #6145 (District Structure No.) .
Designer: Groton Bridge & Manufacturing Company, Groton, New York .
Builder: Groton Bridge & Manufacturing Company, Groton, New York .
Date: 1890 ; basis for: bridge/date plate .
Original owner: Goshen Land & Improvement Co. ; use: .
Present owner: Virginia Dept. of Highways ; use: vehicular bridge .

Historical or Technological Significance

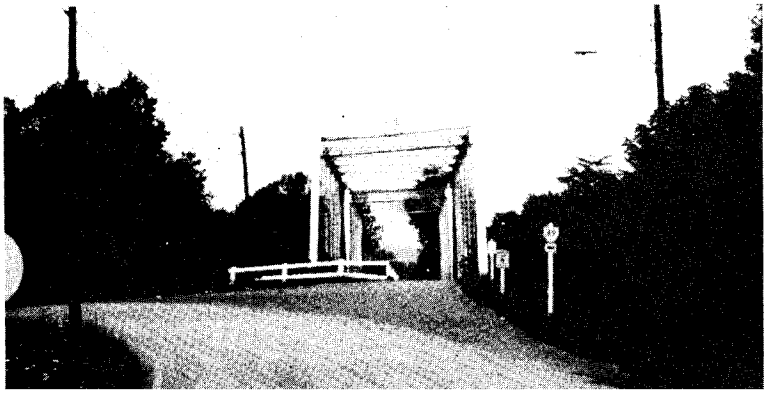
X Unique/Unusual in its time: This is the only bridge of this size, age & character (30° skew) built by this company in this District.
___ Rare survivor though of standard design:
___ Typical example of its time and a common survivor:
___ Other Remarks/Explanation: The following inscription is on the back side of the bridge plate: GOSHEN LAND & IMP CO.
Col. R. P. Chew, President D. C. Humphries, Engineer
J. Fred Effinger, Vice President
C. L. Cooke, Secretary & Treasurer
C. P. Ehrman, General Manager

Nature/Degree of any destructive threats:

Reference materials and contemporary photos/illustrations with their respective locations:

1968 Truss Span Survey, Staunton Construction District.

Recorder: DAN DEIBLER .
Date: 15 August 1973 .
Affiliation: Research Council, Concrete Section .



Design Information

Compass orientation of axis: *NE/SW*.

No. of spans: *two (2)*; length; overall: *260' 8"*.
Span types:
(1) *truss*; length: *138' 10"*.
(2) *truss*; length: *120' 10"*.
(3) ; length: .
(4) ; length: .
(5) ; length: .
(6) ; length: .

No. of lanes: *two (2)*; width: *25' 2"* c to c.

Architectural or decorative features:

Portal has ornate cresting sign & end post finials as well as a latticed portal strut. Lateral struts & sway struts are closely spaced with lacing bar sway braces. For all this delightful detailing the bridge has a simple 2-pipe railing. Floor planks are laid diagonally.

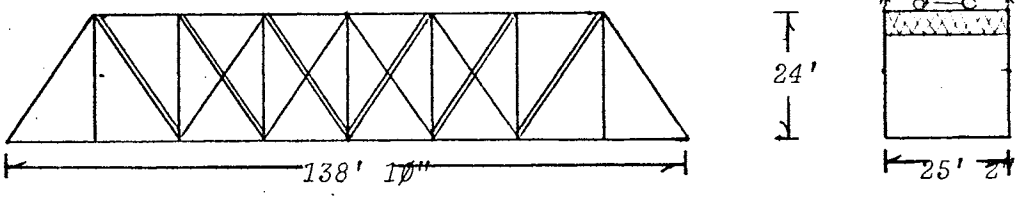
Structural Information

Substructure:
Material: *limestone*.
Foundations: .
Piers: *coursed, tooled ashlar masonry; large limestone blocks*.
Abutments: *coursed, tooled ashlar masonry*.
Wings: *coursed tooled ashlar masonry*.
Seats: *large limestone blocks*.

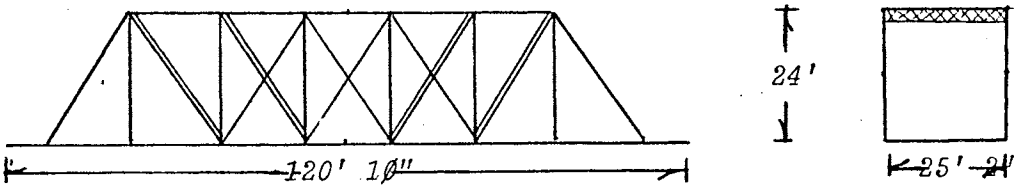
Superstructure:
Material: *steel (poss. wrought iron)* sources *Carnegie*.
Characteristics, details and members:
Connections: *X* pin.
rigid.
Top Chords *2 up-right channels connected w/cover plates & lacing bars*.
End Posts: *2 up-right channels connected w/cover plates & lacing bars*.
Bottom chords: *double rectilinear eye bars, die forged*.
Posts: *2 vertical channels connected w/latticing*.
Diagonals: *double rectilinear eye bars, die forged*.
Counters: *single cylindrical eye bars, loop welded*.

Truss Configuration

Main span type: *PRATT, 30° skew* Through/[redacted], Skew



Secondary span type: *PRATT, 30° skew* Through/[redacted], Skew



A-9

Photo Numbers: 08-82-20

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3285

TRUSS BRIDGE SURVEY AND INVENTORY FORM

Geographic Information

State: Virginia
Va. Dept. of Highways District: STAUNTON ; No. 08 .
County: Rockingham ; No. 82 .
~~City~~/Town: Mt. Crawford .
~~Street~~/Road: State route #727 .
River/~~Stream/Railroad~~ (crossing): North River .
UTM/KGS Coordinates: #794469 .

Historical Information

Formal designation: .
Local designation: #6251 (District Structure No.) .
Designer: .
Builder: Roanoke Bridge & Iron Company, Roanoke, Virginia .
Date: 1916 ; basis for: Plans, dated 10 March 1916 .
Original owner: Warm Springs Turnpike ; use: vehicular bridge .
Present owner: Virginia Dept. of Highways ; use: vehicular bridge .

Historical or Technological Significance

____ Unique/Unusual in its time: .

____ Rare survivor though of standard design: .

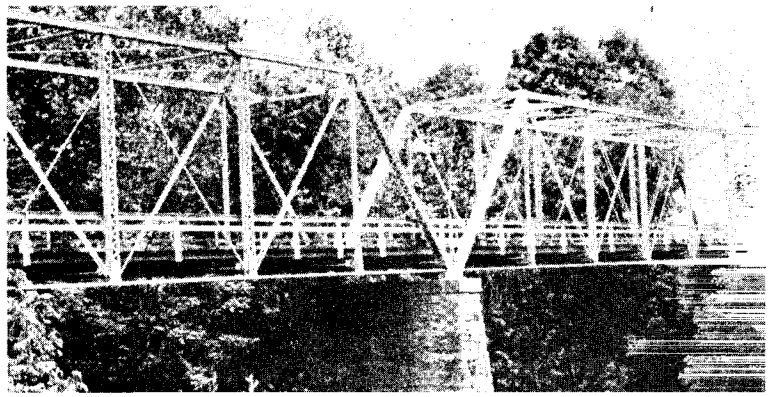
__X__ Typical example of its time and a common survivor: This bridge has no unusual features.

____ Other Remarks/Explanation: The two trusses which make up this two-span bridge were moved to this site in 1961 from two different locations--one from Page County and one from nearby Bridgewater in Rockingham County.

Nature/Degree of any destructive threats: .

Reference materials and contemporary photos/illustrations with their respective locations:

1968 Truss Sapn Survey, Staunton Construction District.
FAS, Bridge Safety Inspection File.



Recorder: DAN DEIBLER .
Date: 5 June 1973 .
Affiliation: Research Council, Concrete Section .

Design Information

Compass orientation of axis: *NE/SW* .

No. of spans: *two(2)* ; length; overall: *218' 8"* .

Span types:

(1) *truss (Pratt)* ; length: *122' 2"* .
(2) *truss " * ; length: *82' 6"* .
(3) _____ ; length: _____ .
(4) _____ ; length: _____ .
(5) _____ ; length: _____ .
(6) _____ ; length: _____ .

No. of lanes: *one(1)* ; width: *17' 4"* c to c.

Architectural or decorative features:

Simple channel side railings.

Structural Information

Substructure:

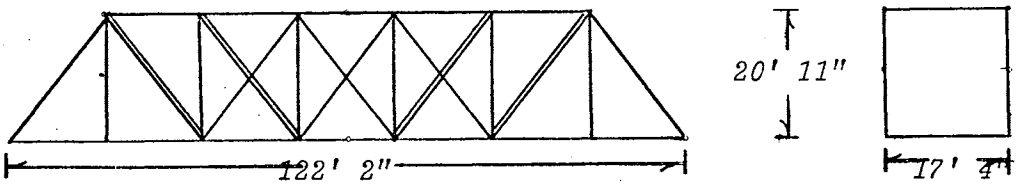
Material: *limestone, concrete* .
Foundations: _____ .
Piers: *random tooled coursed ashlar limestone masonry* .
Abutments: *random tooled coursed ashlar masonry* .
Wings: *random tooled soursed ashlar limestone masonry* .
Seats: *concrete--new* .

Superstructure:

Material: *steel* sources *Carnegie, Bethlehem* .
Characteristics, details and members:
Connections: *X* pin.
_____ rigid.
Top Chords *2 up-right channels connected w/comer plates and lacing bars* .
End Posts: *2 vertical channels connected w/cover plates and lacing bars* .
Bottom chords: *double rectilinear eye bars, die forged* .
Posts: *2 vertical channels connected w/lacing bars paralleling the roadway* .
Diagonals: *double rectilinear eye bars, die forged* .
Counters: *single rectilear eye bars, die forged* .

Truss Configuration

Main span type: *PRATT* Through/~~Pony/Deck~~, ~~Skew~~



Secondary span type: *PRATT* Through/~~Pony/Deck~~, ~~Skew~~

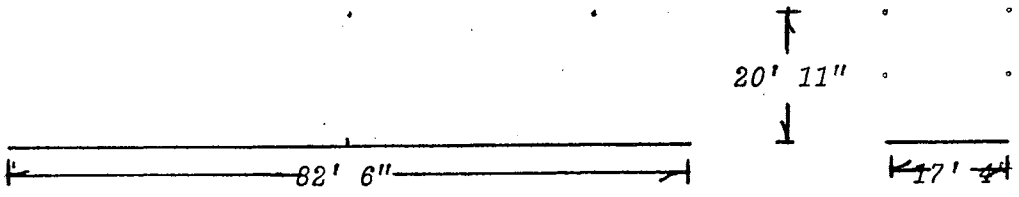


Photo Numbers:

3787

TRUSS BRIDGE SURVEY AND INVENTORY FORM

Geographic Information

State: Virginia
Va. Dept. of Highways District: *Staunton*; No. *Ø8*.
County: *Rockingham*; No. *82*.
City/Town: *Mt. Crawford*.
Street/Road: *State route #727*.
River/Stream/Railroad (crossing): *North River*.
UTM/KGS Coordinates: *#794469*.

Historical Information

Formal designation: _____.
Local designation: _____.
Designer: _____.
Builder: _____.
Date: _____; basis for: _____.
Original owner: *probably Page County*; use: *vehicular bridge*.
Present owner: *Virginia Dept. of Highways*; use: *vehicular bridge*.

Historical or Technological Significance

_____ Unique/Unusual in its time: _____.

_____ Rare survivor though of standard design: _____.

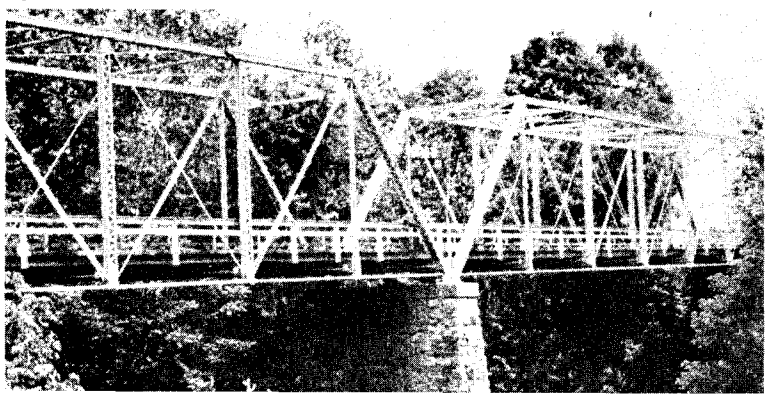
__X__ Typical example of its time and a common survivor: _____.

_____ Other Remarks/Explanation: *The shorter truss was formerly located in Page county on route #340 where it crossed the NF Shenandoah River. End posts bears evidence of an escutcheon shapped name plate*

Nature/Degree of any destructive threats: _____.

Reference materials and contemporary photos/illustrations with their respective locations:

Recorder: _____.
Date: _____.
Affiliation: _____.



A-12 3268

Design Information

Compass orientation of axis: *NE/SW*.

Architectural or decorative features:

No. of spans: *two(2)*; length; overall: *210' 8"*.

Span types:

(1) *truss (Pratt)*; length: *122' 2"*.
(2) *truss "*; length: *82' 6"*.
(3) _____; length: _____.
(4) _____; length: _____.
(5) _____; length: _____.
(6) _____; length: _____.

No. of lanes: *one (1)*; width: *17'4"* c to c.

Structural Information

Substructure:

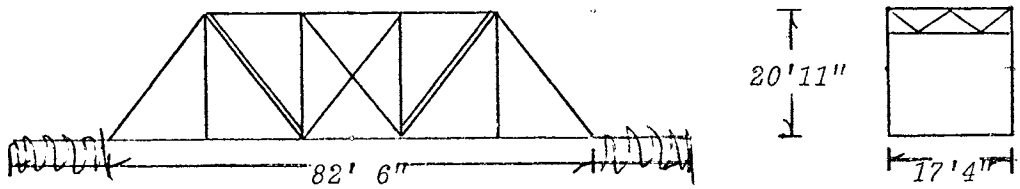
Material: _____.
Foundations: _____.
Piers: _____.
Abutments: _____.
Wings: _____.
Seats: _____.

Superstructure:

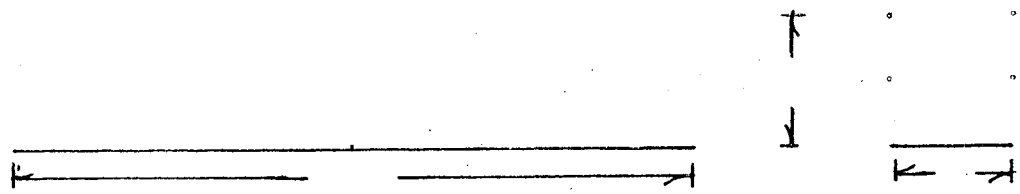
Material: *steel* sources _____.
Characteristics, details and members:
Connections: _____ pin.
X rigid.
Top Chords *2 up-right channels connected w/cover plates and lacing bars*.
End Posts: *2 vertical channels connected w/cover plates and lacing bars*.
Bottom chords: _____.
Posts: *2 vertical channels connected w/lacing bars*.
Diagonals: *double rectilinear eye bars*.
Counters: *single rectilinear eye bars*.

Truss Configuration

Main span type: *PRATT* Through/~~Pony/Deck, Skew~~



Secondary span type: _____ Through/Pony/Deck, Skew



A-13

Photo Numbers: *Ø8-Ø7-16*

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3789

TRUSS BRIDGE SURVEY AND INVENTORY FORM

Geographic Information

State: Virginia
Va. Dept. of Highways District: *Staunton* ; No. *Ø8* .
County: *Augusta* ; No. *Ø7* .
City/Town: .
~~Street~~/Road: *State route #632* .
River/~~Crossing/Intersection~~ (crossing): *South River* .
UTM/KGS Coordinates: *#799126* .

Historical Information

Formal designation: *#Ø788 (Structure Tabulation No.)* .
Local designation: *#6Ø49 (District Structure No.)* .
Designer: *Pittsburgh Bridge Company, Pittsburgh, Pennsylvania* .
Builder: *Pittsburgh Bridge Company, Pittsburgh, Pennsylvania* .
Date: *1887* ; basis for: *1968 Truss Span Survey* .
Original owner: *Augusta County* ; use: *vehicular bridge* .
Present owner: *Virginia Dept. of Highways* ; use: *vehicular bridge* .

Historical or Technological Significance

_____ Unique/Unusual in its time: _____ .

_X_ Rare survivor though of standard design: *This bridge may be the oldest truss bridge in the district though the date plate is no longer extant. Rusting in* .

_____ Typical example of its time and a common survivor: _____ .

_____ Other Remarks/Explanation: *th center of the latticed portal struts suggests that a rectangular plate/plaque once was affixed to it. If, indeed, the above date is accurate, this truss may be of wrought iron.* .

Nature/Degree of any destructive threats: *The general deteriorating condition may make this bridge a prime candidate for replacement.* .

Reference materials and contemporary photos/illustrations with their respective locations:

1968 Truss Span Survey, Staunton Construction District.

Recorder: *DAN DEIBLER* .
Date: *19 June 1973* .
Affiliation: *Research Council, Concrete Section* .

A-14

Design Information

Compass orientation of axis: *E/W*.

No. of spans: *two(2)*; length; overall: *166' 11"*.
Span types:
(1) *truss (Pratt)*; length: *82' 6"*.
(2) *truss "*; length: *80'*.
(3) _____; length: _____.
(4) _____; length: _____.
(5) _____; length: _____.
(6) _____; length: _____.

No. of lanes: *one(1)*; width: *12' 7"* c to c.

Architectural or decorative features:

Simple 2-pipe railing.
Latticed portal struts give the bridge a rather delicate appearance.

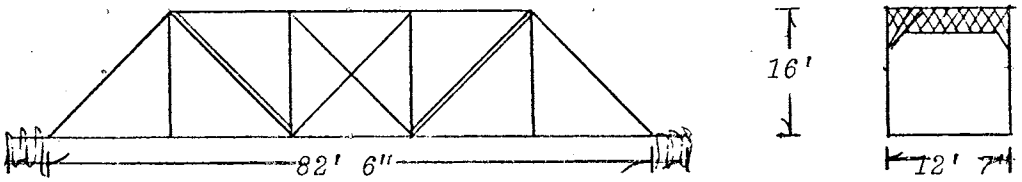
Structural Information

Substructure:
Material: *concrete*.
Foundations: _____.
Piers: *concrete*.
Abutments: *concrete*.
Wings: *concrete*.
Seats: *concrete*.

Superstructure:
Material: *possibly wrought iron* sources *Carnegie*.
Characteristics, details and members:
Connections: *X* pin.
_____ rigid.
Top Chords *2 up-right channels connected w/cover plates and lacing bars*.
End Posts: *2 vertical channels connected w/cover plates and lacing bars*.
Bottom chords: *double rectilinear eye bars, die-forge, center panel; others loop-welded*
Posts: *2 vertical channels connected w/lacing bars*.
Diagonals: *double rectilinear eye bars, loop welded*.
Counters: *single rectilinear eye bars, loop welded*.

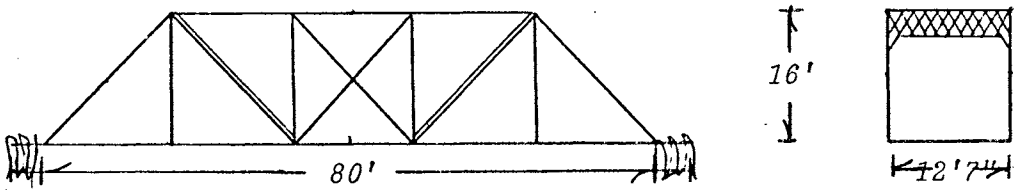
Truss Configuration

Main span type: *PRATT* Through/~~Pony/Deck, Skew~~



3 panels @ 16' each; 2 panels @ 17'3"each.

Secondary span type: *PRATT* Through/~~Pony/Deck, Skew~~



5 panels @ 16' each.

A-15
Photo Numbers: Ø8- 81-4

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3291

TRUSS BRIDGE SURVEY AND INVENTORY FORM

Geographic Information

State: Virginia
Va. Dept. of Highways District: Staunton ; No. Ø8 .
County: Rockbridge ; No. _____ .
City/~~Town~~: East Lexington .
~~Street~~/Road: State route #631 .
River/~~Stream/Railroad~~ (crossing): Maury River .
UTM/KGS Coordinates: #363859 .

Historical Information

Formal designation: J.H.C. MANN BRIDGE .
Local designation: #6Ø75 (District Structure No.) .
Designer: _____ .
Builder: Roanoke Bridge Company, Roanoke, Virginia .
Date: 1912 ; basis for: bridge/date plate .
Original owner: _____ ; use: vehicular bridge .
Present owner: Virginia Dept. of Highways ; use: vehicular bridge .

Historical or Technological Significance

_____ Unique/Unusual in its time: _____ .

X Rare survivor though of standard design: This is an unusually long truss span (180') for this date (1912) and is the District's second longest span. .

_____ Typical example of its time and a common survivor: _____ .

_____ Other Remarks/Explanation: this bridge was dedicated as the J.H.C. MANN BRIDGE in 1967; however, it had been relocated to this site some years prior to that. The combination of span length, distance off the water, high coursed ashlar masonry abutments and impressive setting make it one of the most attractive truss spans in the Staunton District. .

Nature/Degree of any destructive threats: The bridge has been scheduled for replacement in 1974. .

Reference materials and contemporary photos/illustrations with their respective locations:

1968 Truss Span Survey, Staunton Construction District.
FAS. Bridge Safety Inspection File.

Recorder: DAN DEIBLER .
Date: 22 August 1973 .
Affiliation: Research Council, Concrete Section .

Design Information

Compass orientation of axis: *N/S*.

No. of spans: *one(1)*; length; overall: *184'*.
Span types:
(1) *truss(Camelback)*; length: *180'*.
(2) _____; length: _____.
(3) _____; length: _____.
(4) _____; length: _____.
(5) _____; length: _____.
(6) _____; length: _____.

No. of lanes: *one(1)*; width: *15'1"* c to c.

Architectural or decorative features:

Latticed side railings.
Lateral & sway struts are simple angles not connected w/sway bracing.
Span is impressively situated and rather high off the water.

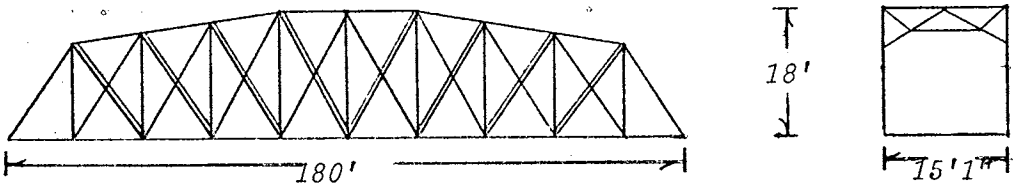
Structural Information

Substructure:
Material: *limestone; concrete*.
Foundations: _____.
Piers: _____.
Abutments: *coursed ashlar limestone masonry; S abutment has be reinforced with concrete.*
Wings: *coursed ashlar limestone masonry, quite large blocks*.
Seats: *one concrete, one stone*.

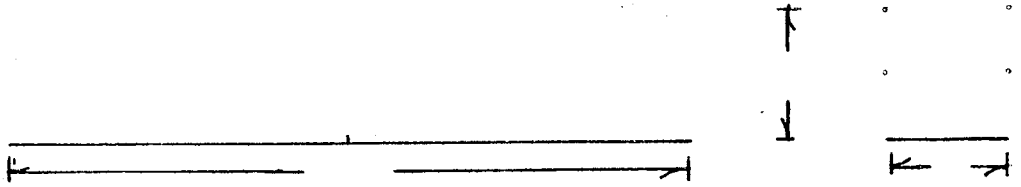
Superstructure:
Material: *steel* scources *Cambria*.
Characteristics, details and members:
Connections: *X* pin.
_____ rigid.
Top Chords *2 up-right channels connected w/cover plates and stay plates*.
End Posts: *2 vertical channels connected w/cover plates and stay plates*.
Bottom chords: *double rectilinear eye bars, loop welded*.
Posts: *2 vertical channels connected w/lacing bars*.
Diagonals: *double rectilinear eye bars, loop welded*.
Counters: *single rectilinear eye bars, loop welded.*.

Truss Configuration

Main span type: *PRATT (Camelback)* Through/~~Pony~~/~~Deck~~, ~~Skew~~



10 panels @ 18' each.
Secondary span type: _____ Through/Pony/Deck, Skew



A-17

Photo Numbers: Ø8-Ø7-3Ø

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3233

TRUSS BRIDGE SURVEY AND INVENTORY FORM

Geographic Information

State: Virginia
Va. Dept. of Highways District: *Staunton*; No. *Ø8*.
County: *Augusta*; No. *Ø7*.
~~City~~/Town: *Stokesville*.
~~Street~~/Road: *State route #730*.
River/~~Stream/Railroad~~ (crossing): *North River*.
UTM/KGS Coordinates: *#616466*.

Historical Information

Formal designation: *#Ø8Ø5 (Structure Tabulation No.)*.
Local designation: *#6117 (District Structure No.)*.
Designer:
Builder:
Date: ; basis for:
Original owner: *Chesapeake & Western Railroad*; use: *railroad bridge*.
Present owner: *Virginia Dept of Highways*; use: *vehicular bridge*.

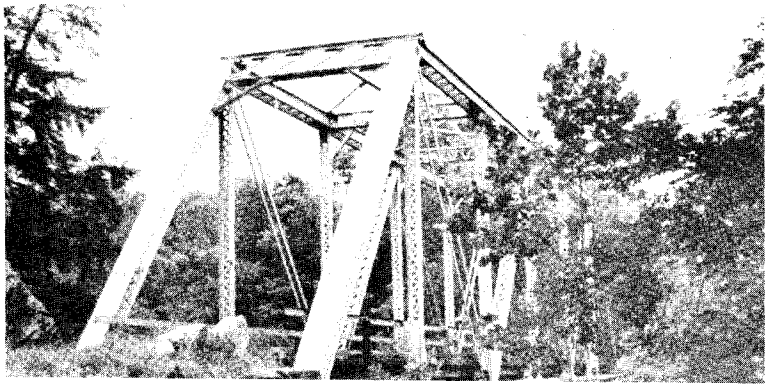
Historical or Technological Significance

X Unique/Unusual in its time: *This is the only Warren type truss seen which has pin connected joints.*
___ Rare survivor though of standard design:
___ Typical example of its time and a common survivor:
___ Other Remarks/Explanation: *This span was originally used by a spur line of the Chesapeake & Western Railroad to carry logs out of the mountains. It is also a very heavily membered bridge.*

Nature/Degree of any destructive threats:

Reference materials and contemporary photos/illustrations with their respective locations:
1968 Truss Span Survey, Staunton Construction District.
FAS, Bridge Safety Inspection File.

Recorder: *DAN DEIBLER*.
Date: *9 July 1973*.
Affiliation: *Research Council, Concrete Section*.



A-18 [illegible]

Design Information

Compass orientation of axis: *NW/SE*.

No. of spans: *one (1)*; length; overall: *136'*.
Span types:
(1) *truss(Warren)*; length: *130'*.
(2) _____; length: _____.
(3) _____; length: _____.
(4) _____; length: _____.
(5) _____; length: _____.
(6) _____; length: _____.

No. of lanes: *one (1)*; width: *15' 9"* c to c.

Architectural or decorative features:

Side railings are made from simple angles.
Very heavily membered truss.

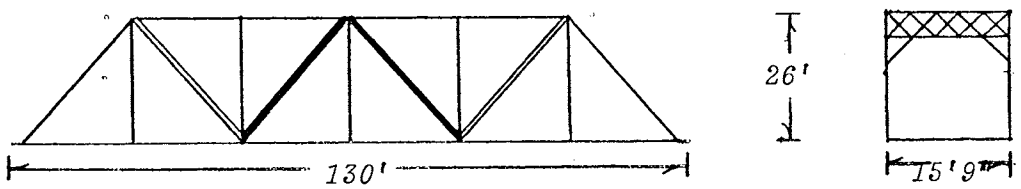
Structural Information

Substructure:
Material: *limestone; concrete*.
Foundations: *solid rock*.
Piers: _____.
Abutments: *concrete*.
Wings: *rubble masonry*.
Seats: *concrete*.

Superstructure:
Material: *steel* sources _____.
Characteristics, details and members:
Connections: *X* pin.
_____ rigid.
Top Chords *2 up-right channels connected w/lacing bars on top and under side*.
End Posts: *2 vertical channels connected w/cover plates and lacing bars*.
Bottom chords: *couble rectilinear eye bars, die forged*.
Posts: *double back-to-back angles connected w/lacing bars*.
Diagonals: *double rectilinear eye bars, die forged*.
Counters: *2 up-right channels connected by lacing bars top & under sides*.

Truss Configuration

Main span type: *WARREN* Through/~~Pony~~/~~Deck~~, ~~Skew~~



6 panels @ 21'8" each.
Secondary span type: _____ Through/Pony/Deck, Skew

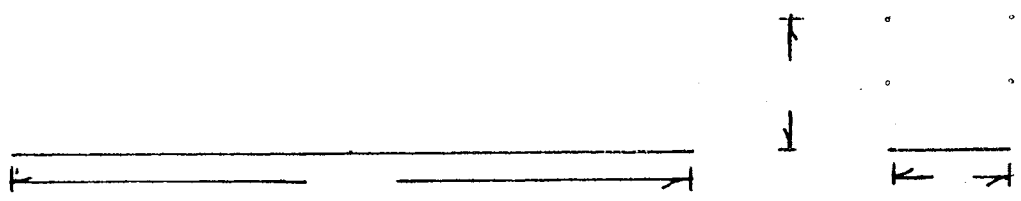


Photo Numbers: Ø8-82-35

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3285

TRUSS BRIDGE SURVEY AND INVENTORY FORM

Geographic Information

State: Virginia
Va. Dept. of Highways District: Staunton ; No. Ø8 .
County: Rockingham ; No. 82 .
~~City~~/Town: Broadway .
~~Street~~/Road: State route #1421 .
~~River~~/Stream/~~Railroad~~ (crossing): Daphna Creek .
UTM/KGS Coordinates: #912752 .

Historical Information

Formal designation: #1868 (Structure Tabulation No.) .
Local designation: #6154 (District Structure No.) .
Designer: .
Builder: Wrought Iron Bridge Company, Canton, Ohio .
Date: 1898 ; basis for: bridge/date plate .
Original owner: ; use: vehicular bridge .
Present owner: Virginia Dept. of Highways ; use: vehicular bridge .

Historical or Technological Significance

___ Unique/Unusual in its time: .

X Rare survivor though of standard design: This is the only double-intersection Whipple type truss in the Staunton Construction District .

___ Typical example of its time and a common survivor: .

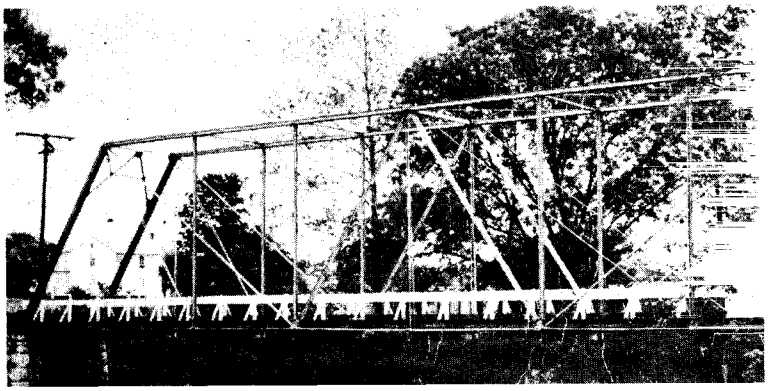
___ Other Remarks/Explanation: The configuration is not specifically of a Whipple patented truss .

Nature/Degree of any destructive threats: .

Reference materials and contemporary photos/illustrations with their respective locations:

1968 Truss Span Survey, Staunton Construction District.

Recorder: DAN DEIBLER .
Date: 5 June 1973 .
Affiliation: Research Council, Concrete Section .



3296

Design Information

Compass orientation of axis: *E/W*.

No. of spans: *one(1)*; length; overall: *134'*.

Span types:

(1) *truss(Whipple)*; length: *133' 4"*.
(2) ______; length: ______.
(3) ______; length: ______.
(4) ______; length: ______.
(5) ______; length: ______.
(6) ______; length: ______.

No. of lanes: *one(1)*; width: *13'1"* c to c.

Architectural or decorative features:

Bridge has simple wooden side railings. The truss is very tall (24') in relation to its width (13') giving a narrow, attenuated appearance.

Structural Information

Substructure:

Material: *limestone*.
Foundations: ______.
Piers: ______.
Abutments: *broken/random-tooled ashlar masonry, coursed*.
Wings: *broken/random tooled ashlar masonry, coursed*.
Seats: *limestone*.

Superstructure:

Material: *steel* sources ______.

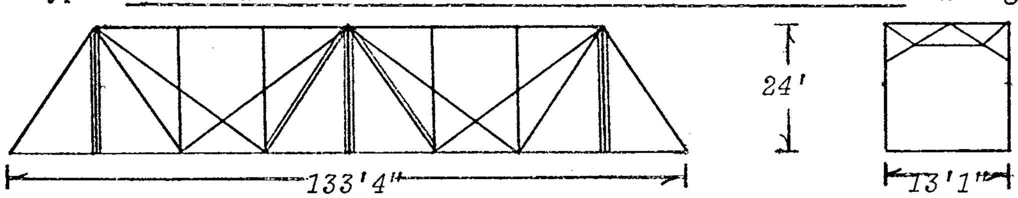
Characteristics, details and members:

Connections: *X* pin.
______ rigid.

Top Chords *2 up-right channels connected w/cover plates and lacing bars*.
End Posts: *2 vertical channels connected w/cover plates and lacing bars*.
Bottom chords: *double rectilinear eye bars, loop welded*.
Posts: *paired back-to-back angles connected w/lacing bars & triple rectilinear eye bars*.
Diagonals: *single rectilinear eye bars, loop welded*.
Counters: *2 channels connected w/stay plates & single rectilinear eye bars, loop welded.*

Truss Configuration

Main span type: *WHIPPLE* Through/~~Pony/Deck, Skew~~



Secondary span type: ______ Through/Pony/Deck, Skew

A-21

Photo Numbers: Ø8-Ø3-7

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TRUSS BRIDGE SURVEY AND INVENTORY FORM

Geographic Information

State: Virginia
Va. Dept. of Highways District: Staunton ; No. Ø8 .
County: Allegheny ; No. Ø3 .
City/~~Town~~: Covington .
Street/~~Road~~: Hawthorne Street .
~~River/Stream~~/Railroad (crossing): C & O Railroad tracks
UTM/KGS Coordinates: #889815 .

Historical Information

Formal designation: .
Local designation: McCurdy-Hawthorne Street Bridge .
Designer: .
Builder: Phoenix Iron Company, Philadelphia, Pennsylvania .
Date: ; basis for: .
Original owner: ; use: vehicular bridge .
Present owner: ; use: vehicular bridge .

Historical or Technological Significance

___ Unique/Unusual in its time: .

X Rare survivor though of standard design: The ownership of this bridge is in question--whether the city of Covington or the C & O Railroad .

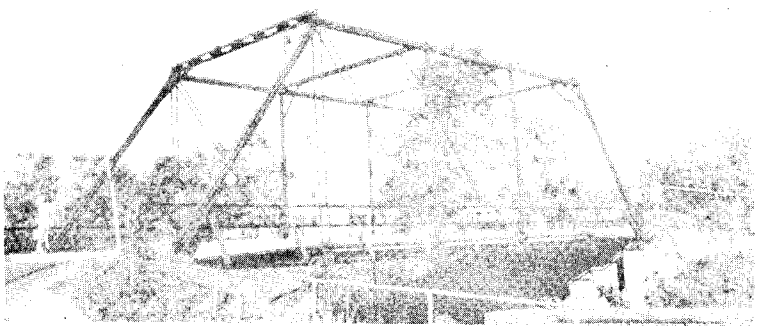
___ Typical example of its time and a common survivor: .

___ Other Remarks/Explanation: This truss has no identifying bridge plate but it does have the patented four section Phoenix column.

Nature/Degree of any destructive threats: Neglect may be this trusses biggest enemy. Is in dire need of cleaning and painting .

Reference materials and contemporary photos/illustrations with their respective locations:

Recorder: DAN DEIBLER .
Date: 16 October 1973 .
Affiliation: Research Council, Concrete Section .



Design Information

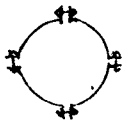
Compass orientation of axis: *E/W*.

No. of spans: *one(1)*; length; overall: _____.
Span types:
(1) *truss(Pratt)*; length: _____.
(2) _____; length: _____.
(3) _____; length: _____.
(4) _____; length: _____.
(5) _____; length: _____.
(6) _____; length: _____.

No. of lanes: *two(2)*; width: _____ c to c.

Architectural or decorative features:

Portal struts have angle bracing with stablizing inner triangles. There is one external sidewalk on the north side. The latticed handrailing is the only decorative feature.



section through a Phoenix column.

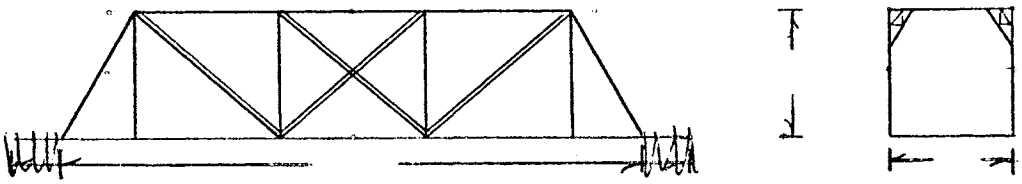
Structural Information

Substructure:
Material: *concrete*.
Foundations: _____.
Piers: _____.
Abutments: *concrete*.
Wings: *concrete*.
Seats: *concrete*.

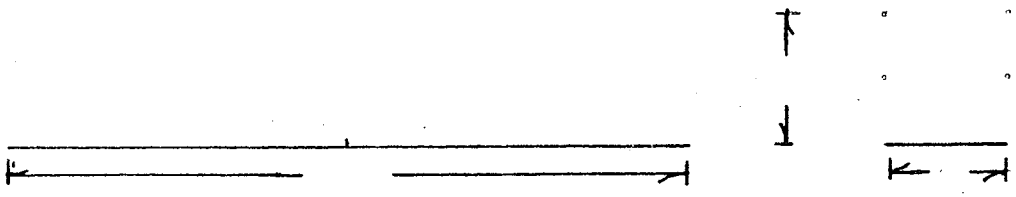
Superstructure:
Material: *steel* sources *Phoenix*.
Characteristics, details and members:
Connections: *X* pin.
_____ rigid.
Top Chords *4-section Phoenix column (see above diagram)*.
End Posts: *4-section Phoenix column*.
Bottom chords: *double square eye bars, die forged*.
Posts: *4-section Phoenix column*.
Diagonals: *double square eye bars, die forged*.
Counters: *double cylindrical eye bars, die forged*.

Truss Configuration

Main span type: *PRATT* Through/~~Pony/Deck~~, ~~Skew~~



Secondary span type: _____ Through/Pony/Deck, Skew



A-23

Photo Numbers: Ø8-Ø7--11

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3289

TRUSS BRIDGE SURVEY AND INVENTORY FORM

Geographic Information

State: Virginia
Va. Dept. of Highways District: *Staunton* ; No. *Ø8* .
County: *Augusta* ; No. *Ø7* .
City/Town: .
~~Street~~/Road: *State route #664* .
River/~~Stream/Railroad~~ (crossing): *South River* .
UTM/KGS Coordinates: *#8Ø6128* .

Historical Information

Formal designation: *#1653 (Structure Tabulation No.)* .
Local designation: *#6Ø71 (District Structure No.)* .
Designer: *Virginia State Highway Commission, Richmond, Virginia* .
Builder: *Virginia Bridge & Iron Company, Roanoke, Virginia* .
Date: *1914* ; basis for: *bridge/date plate* .
Original owner: *Virginia State Highway Commission*; use: *vehicular bridge* .
Present owner: *Virginia Dept. of Highways* ; use: *vehicular bridge* .

Historical or Technological Significance

_____ Unique/Unusual in its time: .

_____ Rare survivor though of standard design: .

X Typical example of its time and a common survivor: *This is the earliest dated truss designed by the State Highway Commission in the Staunton District* .

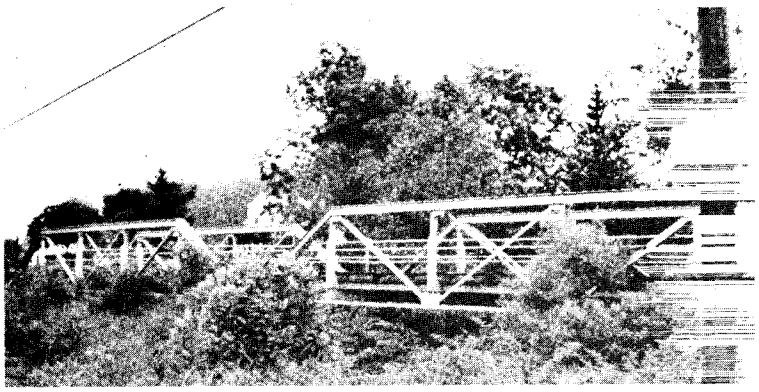
_____ Other Remarks/Explanation: *Though there are no bolts on these trusses at any panel points to suggest its having been moved, the heavy character of the trusses would indicate its once having served a major/primary road. It is also too early (1914) for the State Highway Commission to have designed and constructed a bridge on a secondary road* .

Nature/Degree of any destructive threats: .

Reference materials and contemporary photos/illustrations with their respective locations:

1968 Truss Span Survey, Staunton Construction District.
FAS, Bridge Safety Inspection File.

Recorder: *DAN DEIBLER* .
Date: *19 June 1973* .
Affiliation: *Research Council, Concrete Section* .



A-24 3[illegible]9

Design Information

Compass orientation of axis: *N/S*.

No. of spans: *two(2)*; length; overall: *166' 11"*.
Span types:
(1) *truss (Pratt)*; length: *80' 3"*.
(2) *truss (Pratt)*; length: *80' 3"*.
(3) _____; length: _____.
(4) _____; length: _____.
(5) _____; length: _____.
(6) _____; length: _____.

No. of lanes: *one(1)*; width: *17'4"* c to c.

Architectural or decorative features:

Side railings are simple pipe members. Heavily membered trusses.

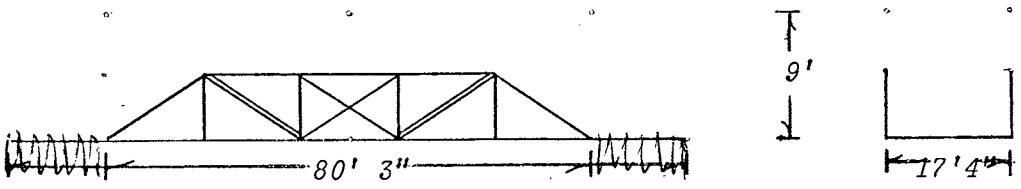
Structural Information

Substructure:
Material: *concrete*.
Foundations: _____.
Piers: *concrete*.
Abutments: *concrete*.
Wings: *concrete*.
Seats: *concrete*.

Superstructure:
Material: *steel* sources _____.
Characteristics, details and members:
Connections: _____ pin.
X rigid.
Top Chords *2 up-right channels connected w/lacing bars on both top & undersides*.
End Posts: *2 vertical channels connected w/lacing bars on both top & undersides*.
Bottom chords: *2 angles connected w/stay plates, continuous*.
Posts: *2 angles connectedw/continuous plate & having an external fin-like projection*.
Diagonals: *2 angles connected w/stay plates*.
Counters: *single crossed angles*.

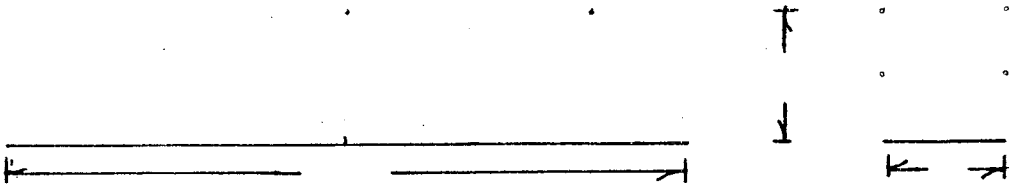
Truss Configuration

Main span type: *PRATT (Full slope)* ~~Through~~/Pony/~~Deck~~, ~~Skew~~



4 panels @ 16' each; 1 panel @ 16'3".

Secondary span type: *same as above* Through/Pony/Deck, Skew



A-25

Photo Numbers: Ø8-82-2

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3301

TRUSS BRIDGE SURVEY AND INVENTORY FORM

Geographic Information

State: Virginia
Va. Dept. of Highways District: *Staunton* ; No. *Ø8* .
County: *Rockingham* ; No. *82* .
~~City~~/Town: *Spring Creek* .
~~Street~~/Road: *State route #748* .
~~River~~/Stream/~~Railroad~~ (crossing): *Spring Creek* .
UTM/KGS Coordinates: *#727518* .

Historical Information

Formal designation: *#Ø585(Structure Tabulation No.)* .
Local designation: *#6095 (District Structure No.)* .
Designer: *Champion Bridge Company, Wilmington, Ohio* .
Builder: *Champion Bridge Company, Wilmington, Ohio* .
Date: _____ ; basis for: _____ .
Original owner: _____ ; use: *vehicular bridge* .
Present owner: *Virginia Dept. of Highways* ; use: *vehicular bridge* .

Historical or Technological Significance

X Unique/Unusual in its time: *This is the only truss in the District whose members are all made from "I" beams and channels.* .
_____ Rare survivor though of standard design: _____ .
_____ Typical example of its time and a common survivor: _____ .
_____ Other Remarks/Explanation: *The configuration of this triangular truss is standard but the use of the structural members is certainly unusual.*

Nature/Degree of any destructive threats: _____ .

Reference materials and contemporary photos/illustrations with their respective locations:

1968 Truss Span Survey, Staunton Construction District.
FAS, Bridge Safety Inspection File.

Recorder: *DAN DEIBLER* .
Date: *19 June 1973* .
Affiliation: *Research Council, Concrete Section* .

A-26382

Design Information

Compass orientation of axis: *E/W*.

Architectural or decorative features:

Simple 2-angle side railing.

No. of spans: *one(1)*; length; overall: *55' 6"*.
Span types:
(1) *truss(Triangular)*; length: *55' 10 1/2"*.
(2) _____; length: _____.
(3) _____; length: _____.
(4) _____; length: _____.
(5) _____; length: _____.
(6) _____; length: _____.

No. of lanes: *one(1)*; width: *13'* c to c.

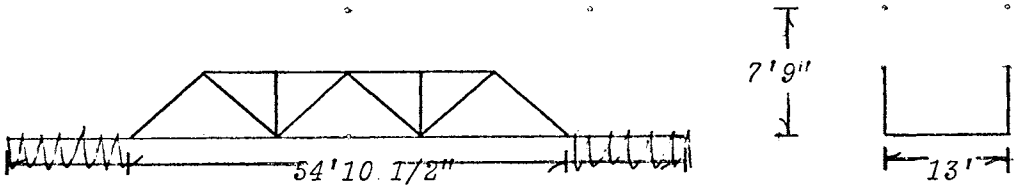
Structural Information

Substructure:
Material: *concrete*.
Foundations: _____.
Piers: _____.
Abutments: *concrete*.
Wings: *concrete*.
Seats: *concrete*.

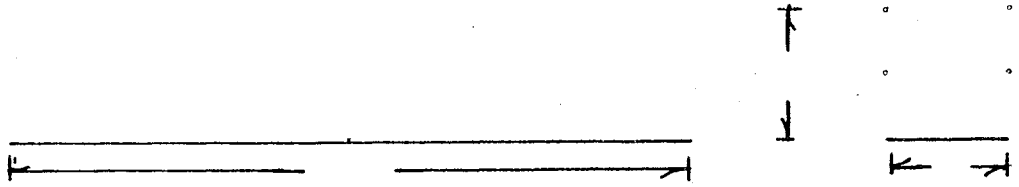
Superstructure:
Material: *steel* sources _____.
Characteristics, details and members:
Connections: _____ pin.
X rigid.
Top Chords *single "I" beams, continuous*.
End Posts: *single "I" beams, continuous*.
Bottom chords: *wide channels, single'*.
Posts: *wide channels, single w/external bracing*.
Diagonals: *wide channels, single*.
Counters: *wide channels, single*.

Truss Configuration

Main span type: *TRIANGULAR (with verticals)* ~~Through~~/Pony/~~Deck, Skew~~



3 panels @ 18' 3 1/2"
Secondary span type: _____ Through/Pony/Deck, Skew



A-27

Photo Numbers: Ø8-81-15

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3383

TRUSS BRIDGE SURVEY AND INVENTORY FORM

Geographic Information

State: Virginia
Va. Dept. of Highways District: *Staunton*; No. *Ø8*.
County: *Rockbridge*; No. *81*.
City/Town: _____.
~~Street~~/Road: *State route #683*.
~~River~~/Stream/~~Railroad~~ (crossing): *Broad Creek*.
UTM/KGS Coordinates: *#295737*.

Historical Information

Formal designation: *#972*.
Local designation: *#6160 (District Structure No.)*.
Designer: *Variety Iron Works, Bridge Builders, Cleveland, Ohio*.
Builder: _____.
Date: _____; basis for: *no date is included on bridge plate*.
Original owner: _____; use: *vehicular bridge*.
Present owner: *Virginia Dept. of Highways*; use: *vehicular bridge*.

Historical or Technological Significance

____ Unique/Unusual in its time: _____.

__X__ Rare survivor though of standard design: *This is the only truss span in the District built by Variety Iron Works*.

____ Typical example of its time and a common survivor: _____.

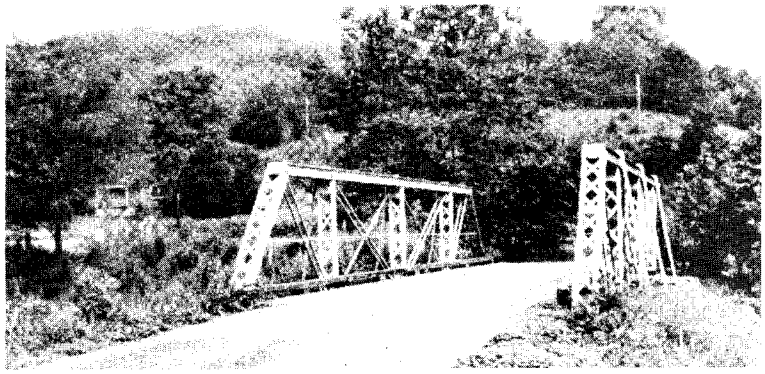
____ Other Remarks/Explanation: *The District bridge files state that the bridge was built by state forces; however, this must pertain to when the truss was re-erected as evidenced by bolts at the panel points. External bracing at posts was apparently added when the span was re-erected.*

Nature/Degree of any destructive threats: _____.

Reference materials and contemporary photos/illustrations with their respective locations:

1968 Truss Span Survey, Staunton Construction District.

Recorder: *DAN DEIBLER*.
Date: *16 August 1973*.
Affiliation: *Research Council, Concrete Section*.



Design Information

Compass orientation of axis: *N/S*.

No. of spans: *one(1)*; length; overall: *55'*.
Span types:
(1) *truss (Pratt)*; length: *53'*.
(2) _____; length: _____.
(3) _____; length: _____.
(4) _____; length: _____.
(5) _____; length: _____.
(6) _____; length: _____.

No. of lanes: *one(1)*; width: *15'* c to c.

Architectural or decorative features:

Side railing is a single metal rod running through the trusses.

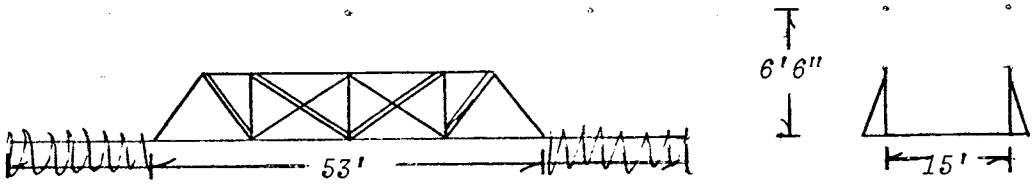
Structural Information

Substructure:
Material: *concrete*.
Foundations: _____.
Piers: _____.
Abutments: *concrete*.
Wings: *concrete*.
Seats: *concrete*.

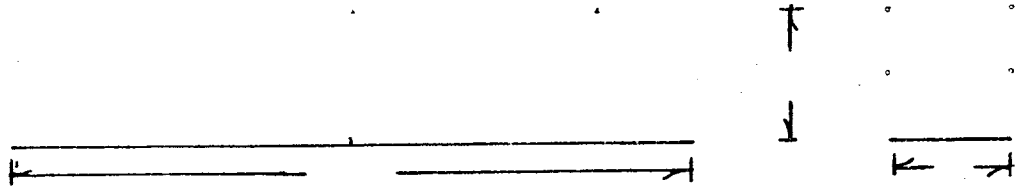
Superstructure:
Material: *steel* sources *Jones & Laughlins*.
Characteristics, details and members:
Connections: *X* pin.
_____ rigid.
Top Chords *2 up-right channels connected w/cover plates & stay plates*.
End Posts: *2 vertical channels connected w/lacing bars top & bottom sides*.
Bottom chords: *double rectilinear eye bars; center 2 panels are heavier die forged*.
Posts: *2 vertical channels connected w/lacing bars w/external sway bracing*.
Diagonals: *double rectilinear eye bars, loop welded*.
Counters: *single rectilinear eye bars, loop welded*.

Truss Configuration

Main span type: *PRATT (Half-hip)* ~~Through~~/Pony/~~Deck~~, ~~Skew~~



Secondary span type: _____ Through/Pony/Deck, Skew



A-29
Photo Numbers: Ø8-82-13

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3305

TRUSS BRIDGE SURVEY AND INVENTORY FORM

Geographic Information

State: Virginia
Va. Dept. of Highways District: *Staunton*; No. *Ø8*.
County: *Rockingham*; No. *82*.
City/Town: _____.
~~Street~~/Road: *State route #671*.
~~River~~/Stream/~~Railroad~~ (crossing): *Mill Creek*.
UTM/KGS Coordinates: *#9Ø8428*.

Historical Information

Formal designation: *#1495 (Structure Tabulation No.)*.
Local designation: *#6054 (District Structure No.)*.
Designer: *Wrought Iron Bridge Company, Builders, Canton, Ohio*.
Builder: *Wrought Iron Bridge Company, Builders, Canton, Ohio*.
Date: *1898*; basis for: *bridge/date plate*.
Original owner: _____; use: *vehicular bridge*.
Present owner: *Virginia Dept. of Highways*; use: *vehicular bridge*.

Historical or Technological Significance

_____ Unique/Unusual in its time: _____.

_____ Rare survivor though of standard design: _____.

X Typical example of its time and a common survivor: *This is one of the few pony trusses which carries a bridge/date plate.*

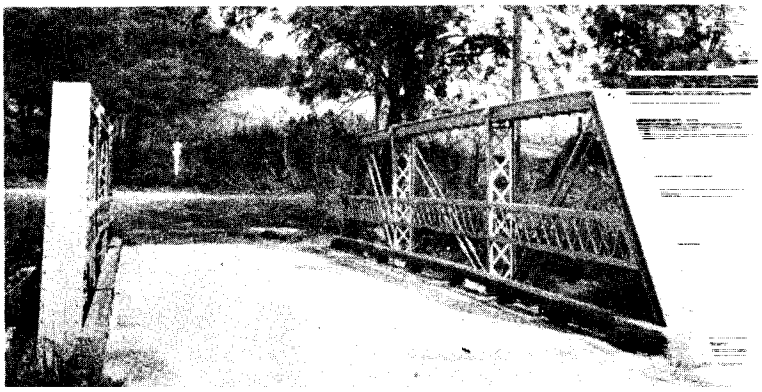
_____ Other Remarks/Explanation: *This truss span has probably been moved to this site.*

Nature/Degree of any destructive threats: _____.

Reference materials and contemporary photos/illustrations with their respective locations:

1968 Truss Span Survey, Staunton Construction District.

Recorder: *DAN DEIBLER*.
Date: *5 June 1973*.
Affiliation: *Research Council, Concrete Section*.



A-30

Design Information

Compass orientation of axis: *NW/SE*.

No. of spans: *one(1)*; length; overall: *47'*.
Span types:
(1) *truss(Pony)*; length: *47'*.
(2) _____; length: _____.
(3) _____; length: _____.
(4) _____; length: _____.
(5) _____; length: _____.
(6) _____; length: _____.

No. of lanes: *one(1)*; width: *12'9"* c to c.

Architectural or decorative features:

Bridge has latticed side railings and an escutcheon-shaped name/date plate.

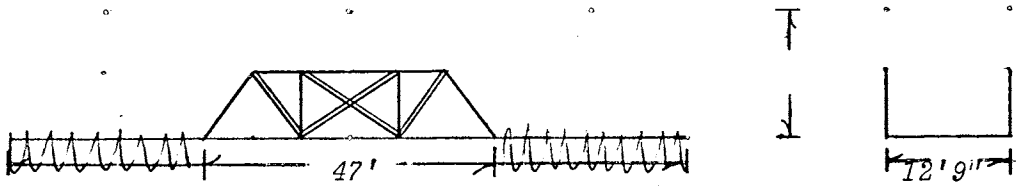
Structural Information

Substructure:
Material: *concrete*.
Foundations: _____.
Piers: _____.
Abutments: *concrete*.
Wings: *concrete*.
Seats: *concrete*.

Superstructure:
Material: *steel* sources _____.
Characteristics, details and members:
Connections: *X* pin.
_____ rigid.
Top Chords *2 narrow up-right channels connected w/cover plates & lacing bars*.
End Posts: *2 narrow vertical channels connected w/cover plates & lacing bars*.
Bottom chords: *double rectilinear eye bars, loop welded*.
Posts: *paired back-to-back angles connected w/latticing*.
Diagonals: *double rectlinear eye bars, loop welded*.
Counters: *double rectilinear eye bars, loop welded*.

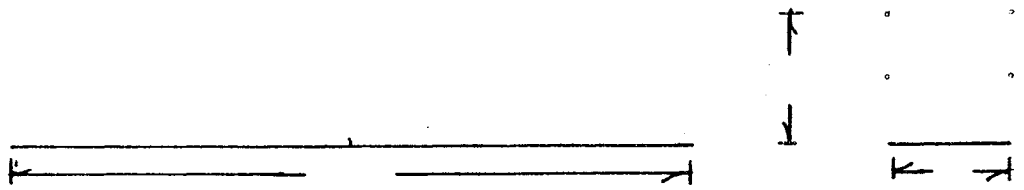
Truss Configuration

Main span type: *PRATT (Half-hip)* ~~Through~~/Pony/~~Deck, Skew~~



3 panels @ 15'8" each.

Secondary span type: _____ Through/Pony/Deck, Skew



A-31

Photo Numbers: Ø8-Ø7-15

A
B
C
D

3307

TRUSS BRIDGE SURVEY AND INVENTORY FORM

Geographic Information

State: Virginia
Va. Dept. of Highways District: Staunton ; No. Ø8 .
County: Augusta ; No. Ø7 .
City/Town: .
~~Street~~/Road: State route #720 .
~~River~~/Stream/~~Railroad~~ (crossing): Buffalo Branch .
UTM/KGS Coordinates: #58Ø294 .

Historical Information

Formal designation: #802 .
Local designation: #6110 (District Structure No.) .
Designer: Champion Bridge Company, Wilmington, Ohio .
Builder: Champion Bridge Company, Wilmington, Ohio .
Date: ; basis for: the bridge plate does not include a date .
Original owner: ; use: vehicular bridge .
Present owner: Virginia Dept. of Highways ; use: vehicular bridge .

Historical or Technological Significance

X Unique/Unusual in its time: There are only five other examples of these truss leg type bridges in the District .

Rare survivor though of standard design: .

Typical example of its time and a common survivor: .

Other Remarks/Explanation: Bridge should be compared to #Ø8-Ø7-13, 14; however, this is the lowest & shortese such truss of the type. The stay plate detailing differs from the the above examples though it is the same as all other stay plates observed. It is simply riveted to the flanges of each channel. .

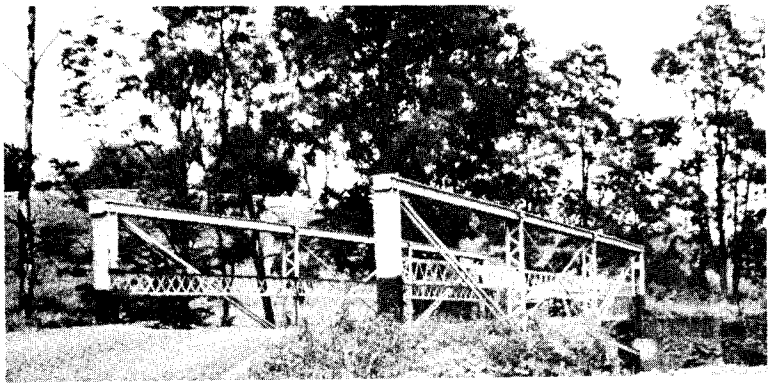
County Commissioners:
J. H. ROHRE
R. E. TRIMBLE
J.H. BAYLOR

Nature/Degree of any destructive threats: This span is scheduled for replacement in 1974-1975. .

Reference materials and contemporary photos/illustrations with their respective locations:

1968 Truss Span Survey, Staunton Construction District.
FAS, Bridge Safety Inspection File.

Recorder: DAN DEIBLER .
Date: 5 July 1973 .
Affiliation: Research Council, Concrete Section .



3308

Design Information

Compass orientation of axis: *N/S*.

No. of spans: *one(1)*; length; overall: *52' 4"*.
Span types:
(1) *truss (Bedstead)*; length: *51'*.
(2) _____; length: _____.
(3) _____; length: _____.
(4) _____; length: _____.
(5) _____; length: _____.
(6) _____; length: _____.

No. of lanes: *one(1)*; width: *12'10"* c to c.

Architectural or decorative features:

Bridge has one latticed handrail and one with lacing bars.

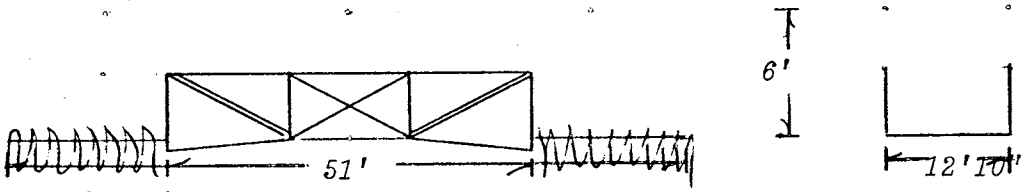
Structural Information

Substructure:
Material: *concrete*.
Foundations: _____.
Piers: _____.
Abutments: *concrete*.
Wings: *concrete*.
Seats: *concrete*.

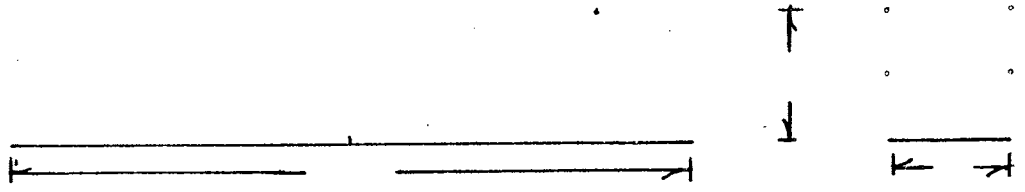
Superstructure:
Material: *steel* sources *Cambria*.
Characteristics, details and members:
Connections: *X* pin.
_____ rigid.
Top Chords *2 up-right channels connected w/cover plates & stay plates*.
End Posts: *2 vertical channels connected w/cover plates & stay plates*.
Bottom chords: *end panels have "I" beams embedded in abutments; center panel has**.
Posts: *paired back-to-back angles connected w/lacing bars*.
Diagonals: *double rectilinear eye bars, loop welded*.
Counters: *single cylindrical eye bars, loop welded*.
**double rectilinear eye bars, loop welded.*

Truss Configuration

Main span type: *PRATT (Truss leg/bedstead)* ~~Through~~/Pony/~~Deck~~, ~~Skew~~



3 panels @ 17' each.
Secondary span type: _____ Through/Pony/Deck, Skew



A-33

Photo Numbers: Ø8-45-6

A
B
C
D
E

3389

TRUSS BRIDGE SURVEY AND INVENTORY FORM

Geographic Information

State: Virginia
Va. Dept. of Highways District: Staunton ; No. Ø8 .
County: Highland ; No. 45 .
[redacted]/Town: McDowell .
[redacted]/Road: State route #645 .
[redacted]/Stream/[redacted] (crossing): Crab Run .
UTM/KGS Coordinates: #319438 .

Historical Information

Formal designation: .
Local designation: #6Ø43 .
Designer: West Virginia Bridge Works, Wheeling, West Virginia .
Builder: West Virginia Bridge Works, Wheeling, West Virginia .
Date: poss. 1896 ; basis for: 1968 Truss Span Survey form .
Original owner: ; use: vehicular bridge .
Present owner: Virginia Dept. of Highways ; use: vehicular bridge .

Historical or Technological Significance

X Unique/[redacted] in its time: The chords of this truss are formed from railroad rails. .

____ Rare survivor though of standard design: .

____ Typical example of its time and a common survivor: .

____ Other Remarks/Explanation: The District survey form (see above) states that the trusses were made in 1896; however, this is the date stamped on the rails rather than from an applied plate. There is evidence to suggest that a bridge plate was on the truss but no longer. The same form also states that the compresstion members are used trolly rails. Structurally the truss is evaluated as being indeterminent. .

Nature/Degree of any destructive threats: .

Reference materials and contemporary photos/illustrations with their respective locations:

1968 Truss Span Survey, Staunton Construction District.

Recorder: DAN DEIBLER .
Date: 19 October 1973 .
Affiliation: Research Council, Concrete Section .

A-34

Design Information

Compass orientation of axis: *N/S*.

No. of spans: *one(1)*; length; overall: *39'*.
Span types:
(1) *truss(Pony)*; length: *39'*.
(2) _____; length: _____.
(3) _____; length: _____.
(4) _____; length: _____.
(5) _____; length: _____.
(6) _____; length: _____.

No. of lanes: *one(1)*; width: *12'6"* c to c.

Architectural or decorative features:

Simple pipe railing.
This is also the District's shortest truss span.

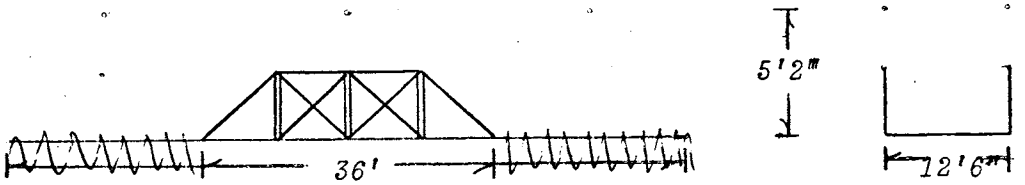
Structural Information

Substructure:
Material: *limestone; concrete*.
Foundations: _____.
Piers: _____.
Abutments: *cyclopean masonry refaced with concrete*.
Wings: *cyclopean masonry refaced with concrete*.
Seats: *concrete*.

Superstructure:
Material: *steel rails* sources *Cambria, 1896*.
Characteristics, details and members:
Connections: _____ pin.
_____ rigid.
Top Chords *bent railroad rails, continuous*.
End Posts: *bent railroad rails, continuous*.
Bottom chords: *railroad rails*.
Posts: *looped tie rods*.
Diagonals: *looped tie rods*.
Counters: *bent railroad rails*.

Truss Configuration

Main span type: *UNIDENTIFIED (Full slope)* ~~Through~~/Pony/~~Deck~~, ~~Skew~~



4 panels @ 9' each.
Secondary span type: _____ Through/Pony/Deck, Skew