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

III. The Culpeper 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

December 1975

VHTRC 76-R11

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. This local responsibility resulted in a rich variety of bridge designs built by an equally diverse group of bridge companies. The following report on the 12 counties comprising the Culpeper Construction District discusses that diversity found in just one of the popular nineteenth century bridge forms — the metal truss bridge.

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In accordance with the Virginia Highway & Transportation Research Council's study of the history and development of road and bridge building technology in Virginia, a photographic survey of the extant metal truss bridges was begun in 1973 to record and document those structures that were designed or built prior to 1932. Additional research dealing with developments in truss design during the nineteenth century has also been undertaken in order to evaluate each truss in terms of the structural technology of the period.

The Culpeper District was the second highway construction district (Figure 1) surveyed in the project. Three counties (Fairfax, Loudoun, Prince William) in the district are becoming increasingly urbanized as a result of their proximity to metropolitan Washington. With increasing population, the county secondary roads are coming under increasing use and constant travel. These pressures provide continuous maintenance problems along with ample reason for improvement projects for all roads, and invariably make the older single lane bridges and unsurfaced roads especially vulnerable to replacement. It was therefore deemed necessary to record the remaining trusses in this district before more were lost on a somewhat rigid schedule of replacement. The survey of the district revealed some surprising contrasts in both road and bridge types. This circumstance is clearly a reflection of the demographic contrasts found among the 12 counties that comprise the district. From Fairfax County in the northern section adjacent to the District of Columbia, to Fluvanna County in the southern part which borders the James River, the population varies from 1,112.5 people per square mile to 26.4 people per square mile.(1) Traffic conditions and road requirements for an area whose population makes up 35%-40% of the 3.0 million people in the metropolitan Washington area are markedly different from those for a county whose population is largely dispersed on individually owned farms averaging 205 acres.(2) Whereas limited-access expressways carrying 4 and 6 lanes of heavy commuter traffic serve one area, unpaved, single-lane roads adequately meet the traffic requirements of the other. The medium span steel beam or reinforced concrete deck-girder bridges carrying the many ramps and overpasses of the high speed expressways stand in marked contrast to the single-lane wooden deck steel beam or metal truss bridges surviving from another era and continuing to carry occasional traffic at lower speeds.

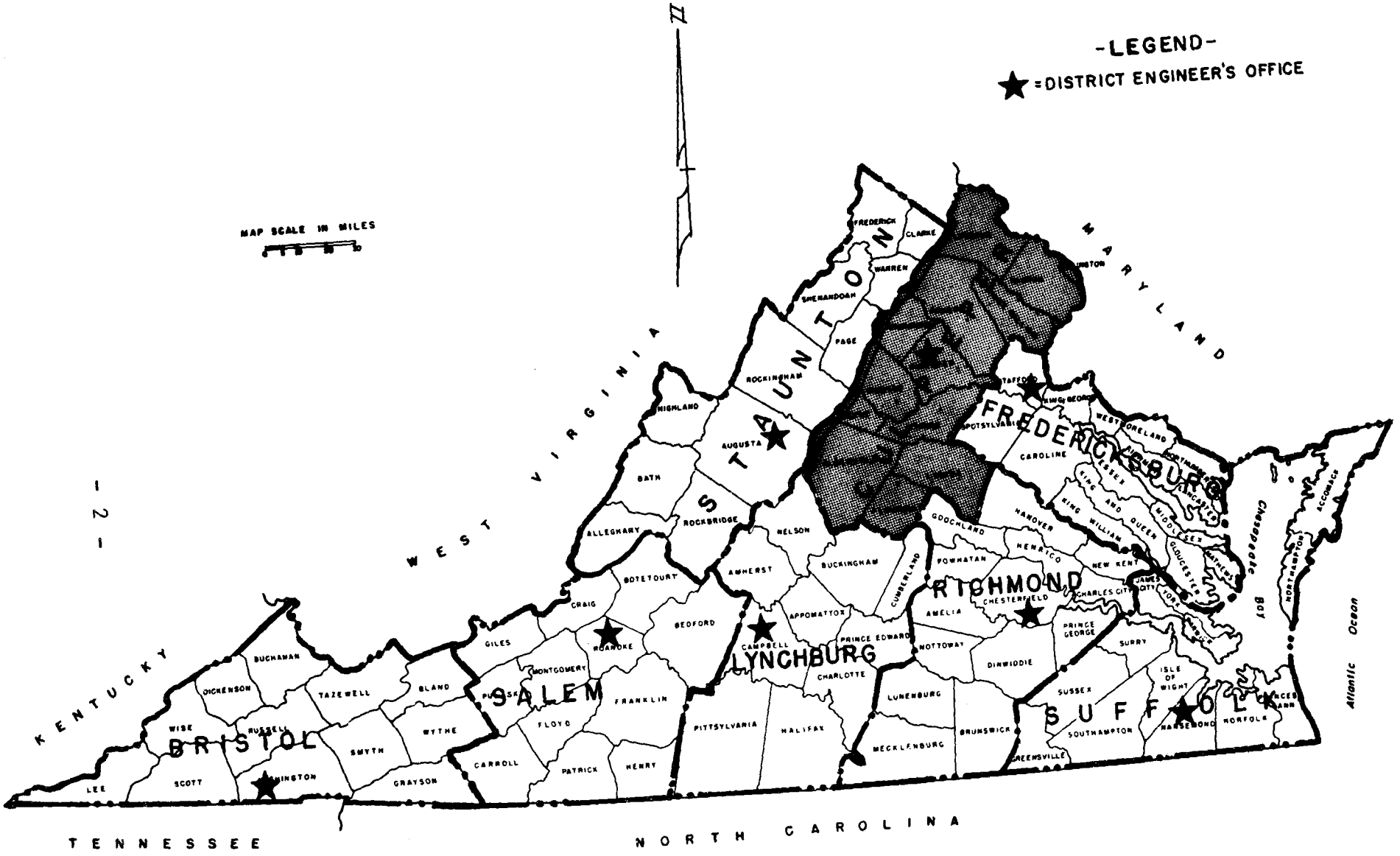

Figure 1. Culpeper Construction District map outline.

The 4 northern counties — Fairfax, Fauquier, Loudoun and Prince William — have 27 of the 75* total truss spans found in the district. Forty-one of the trusses are located in 3 counties -- Albemarle, Culpeper and Prince William (Table 1). The relatively large number of trusses in both Albemarle and Culpeper Counties is an understandable condition considering their predominant rural character; however, the survival of 12 truss spans in Prince William County, with a population density of 313.8 people per square mile[1] and increasing, seems a most unusual circumstance. This is of particular interest when it is realized that 2 of the oldest intact trusses in the district are located in Prince William County. The older of these (Figure 2) is a through/high Pratt truss built in 1882 by the Keystone Bridge Company, Pittsburgh, Pennsylvania, to carry a county road over the tracks of the present-day Southern Railroad the other (Figure 3) is a 1900 low/pony Pratt truss built by Walker Brothers, Charlestown, West Virginia. Though this latter truss is not of any great length nor structurally significant, it does have a uniquely positioned bridge plate.

The Culpeper District is crisscrossed by several primary roads (both state and national), including Routes 6, 15, 29, 33, 211, and 522, which were newly developed or upgraded during the late 1920's, probably as a result of the Federal Highway Act of 1921,[3] which imposed some order and standardization on highway development. Such projects involved widening and resurfacing the roadways and resulted in the construction of a number of 2-lane single and double span truss bridges designed to accommodate increasing vehicular traffic (Figure 4). Even though most of these bridges were designed prior to 1932, the cutoff date of the survey project, they are only of moderate interest since they present truss technology in its most rationalized and calculated context (Figure 5). Their massive structural character, with heavy members and fully riveted construction, puts them well beyond the small rather delicate, if not naive, trusses built by the numerous and prolific nineteenth century bridge companies.

Fifty-two of the 75 inventoried trusses are low/pony spans of rather uninspired design; 14 of these were designed and built between 1924 and 1932 and exhibit all the characteristics of rationalized structural technology (see Figures 4 and 5). With the presence of an 1879 through/high Pratt truss, the contrast in structural iron and steel design is particularly evident.

Any general observations or conclusions that can be made about the trusses surveyed in the Culpeper District must be in terms of their deviation from or conformity to developments in truss technology at the time of their construction. A similar analytic process was applied to the trusses in the Staunton District and seemed to yield satisfactory results. By 1900, mass production of standard structural steel shapes by a limited number of manufacturers assured a less than individual quality to truss designs, irrespective of which particular bridge company designed and fabricated a bridge. This standardization of parts was accompanied by the persistence of a few proven and consistently reliable truss types -- the Whipple, the Warren, and the Pratt[4] --

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* This includes 1 through/high truss maintained on a private road belonging to Woodberry Forest School in Culpeper and Orange Counties.

Table 1. Truss Types in the Culpeper District

TRUSS TYPE / COUNTY	LOW (Pony)					
	PRATT half-hip	PRATT full-slope	TRIANGULAR	TRUSS LEG/BEDSTEAD	CAMELBACK Pratt	CAMELBACK Modified
ALBEMARLE COUNTY	1 - 1920 1 - 1924	1 - 1907 1 - 1928 1 - 1915 1 - 1943 1 - 1917 1 - ND 1 - 1924	1 - ND			
CULPEPER COUNTY		5 - 1898	2 - 1930		1 - ND	
FAIRFAX COUNTY	1 - ND	1 - 1922	1 (mod) - ND 1 - ND			
FAUQUIER COUNTY		1 - 1910 1 - 1956 1 - ND				
FLUVANNA COUNTY		2 - ND	1 - 1930		1 - 1931 2 - ND	
GREENE COUNTY			1 - 1928			
LOUDOUN COUNTY		1 - 189[?] 1 - 1930 1 - ND	1 (mod) - ND 1 - ND			
LOUSIA COUNTY		1 - 1916 3 - ND	1 - 1926			
MADISON COUNTY			1 - 1916 1 - 1929			
ORANGE COUNTY					1 - 1905	
PRINCE WILLIAM COUNTY	1 - ND	2 - 1900 1 - 1930 2 - ND	1 - 1925 1 - 1927 1 - ND		1 - 1930	
RAPPAHANNOCK COUNTY		1 - 1909 1 - ND	1 - 1928			
TOTAL	4	32	16		6	

THROUGH (High)

ND - no date.
* - stylistic attribution.

PENNSYLVANIA Petit	PRATT single-intersection	TRIANGULAR single-intersection	TRIANGULAR double-intersection	WHIPPLE double-intersection	TOTAL
	1 - 1909 2 - 1924 1 - 1943 2 - ND				16
	1 - 1879 1 - 1901 1 - 1916	2 - 1930			13
					4
	1 - 1882 1 - 1925				5
					6
					1
	1 - ND				6
					5
					2
	1 - 1908				2
	1 - 1882 1 - ND				12
					3
	15	2			75

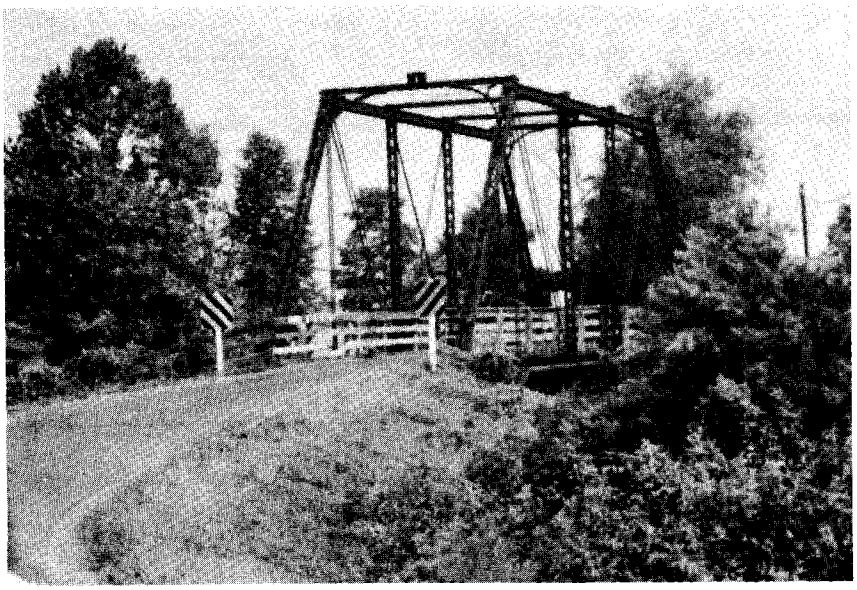


Figure 2. Single-span through/high Pratt truss built by the Keystone Bridge Company, Pittsburgh, Pennsylvania, in 1882. (Prince William County, see form/photo number 07-76-11.)

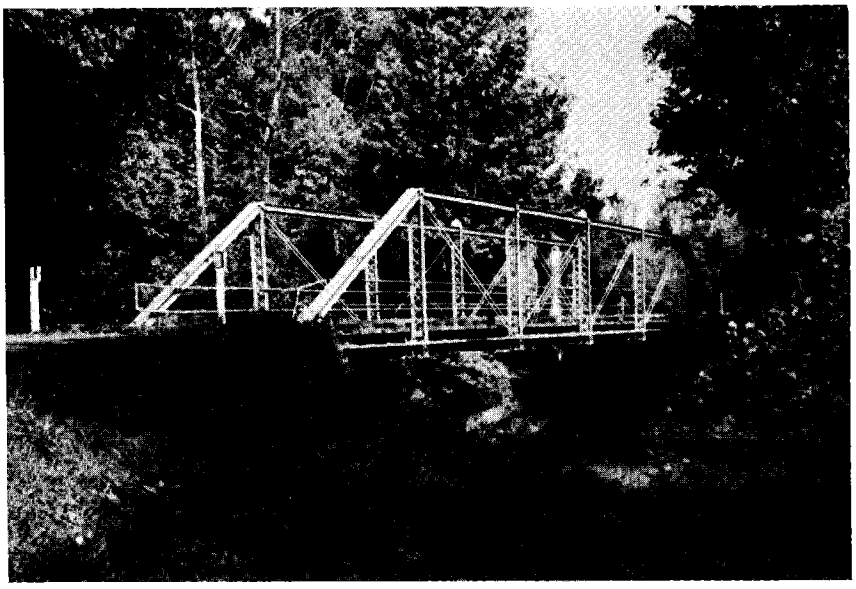


Figure 3. Single-span low/pony Pratt truss, full slope, built by Walker Brothers, Contractors, Charlestown, West Virginia, in 1900. (Prince William County, see form/photo number 07-76-4.)

with the last two persisting well into the twentieth century in new construction. This trend was seen as early as 1884 by James A. L. Wadell, the internationally renowned bridge engineer of the late nineteenth century, when he observed that 90% of all highway bridges built after the Civil War were either Pratt or Whipple types.(5) The 57 Pratt type trusses in the Culpeper District comprise 76% of all the extant trusses, a figure which would certainly substantiate Waddell's observation on the preferability of that type. The one known example of a Whipple type truss in the district succumbed to the ravages of Hurricane Agnes in 1972, when it was irreparably damaged. The 209-foot span and carried vehicular traffic over the Occoquan River since 1878. The other 18 truss spans in the district are Warren/triangular types, 12 of which were built between 1916 and 1932; the remaining 6 carry no date information.

Waddell also maintained that certain design features were preferable to others and that truss type was a function of span length.(6) For example, he considered inclined end posts/batter braces (Figure 6) to be structurally superior to vertical ones; lacing bars (Figure 7) better than latticing (Figure 8); and pin connections (Figure 9) preferable to riveted ones. Pin connections were used almost exclusively until the early decades of the twentieth century, when riveted connections became commonplace in truss bridge design. All of these preferred features predominate in the trusses of the Culpeper District. Only 1 of the 18 Warren/triangular trusses does not have riveted gusset plate connections; no trusses have vertical end posts; and only 2 trusses utilize latticing on structural members.

Figure 4. Five-span, two-lane bridge with a 90-foot low/pony triangular truss built by Bethlehem Fabricators, Inc., Bethlehem, Pennsylvania, according to plans and specifications prepared by the Virginia State Highway Commission in 1927. (Fairfax/Prince William County line; see form/photo number 07-76-1.)

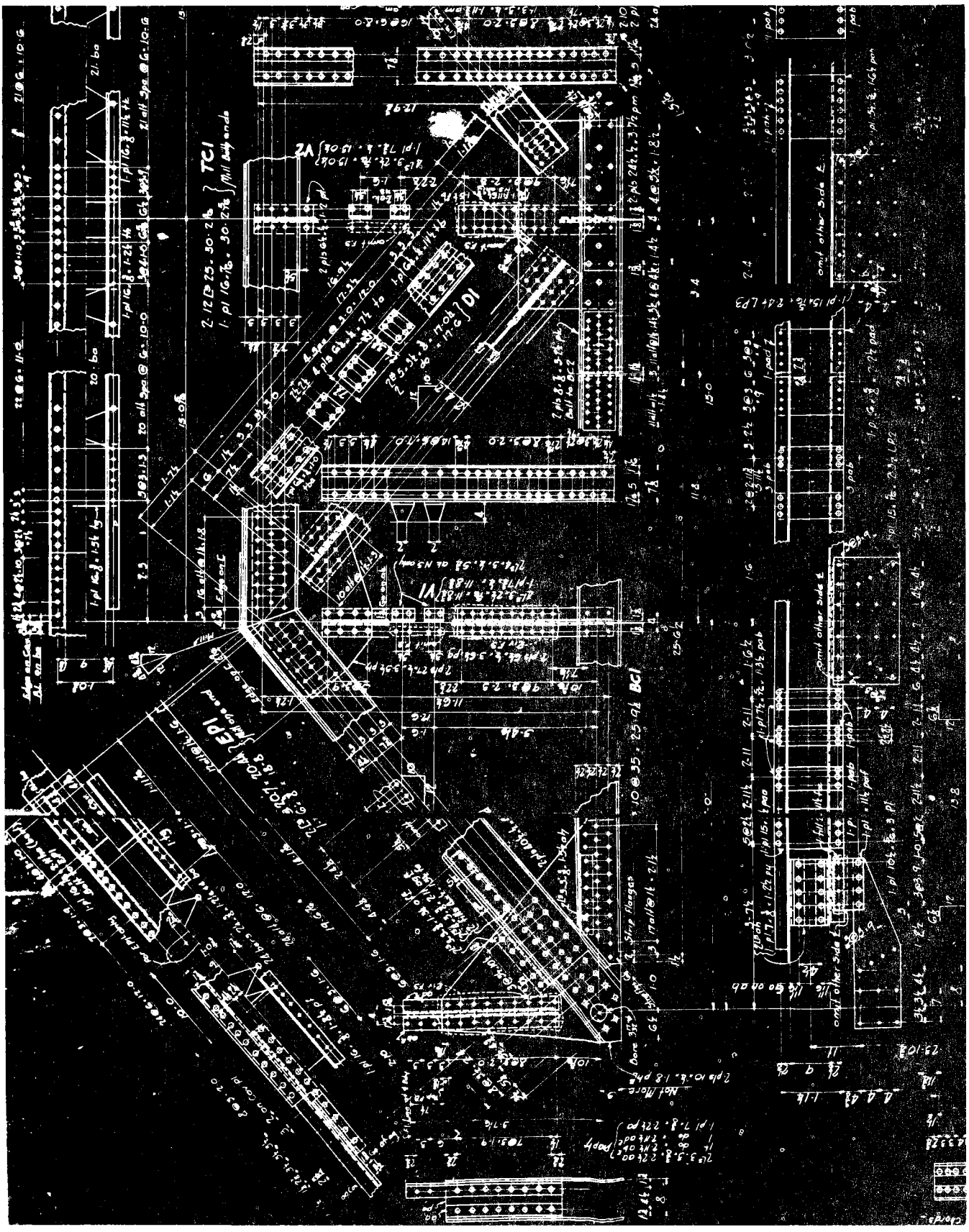


Figure 5. Detail from original plan of above truss as prepared by the design section of the Virginia State Highway Commission.

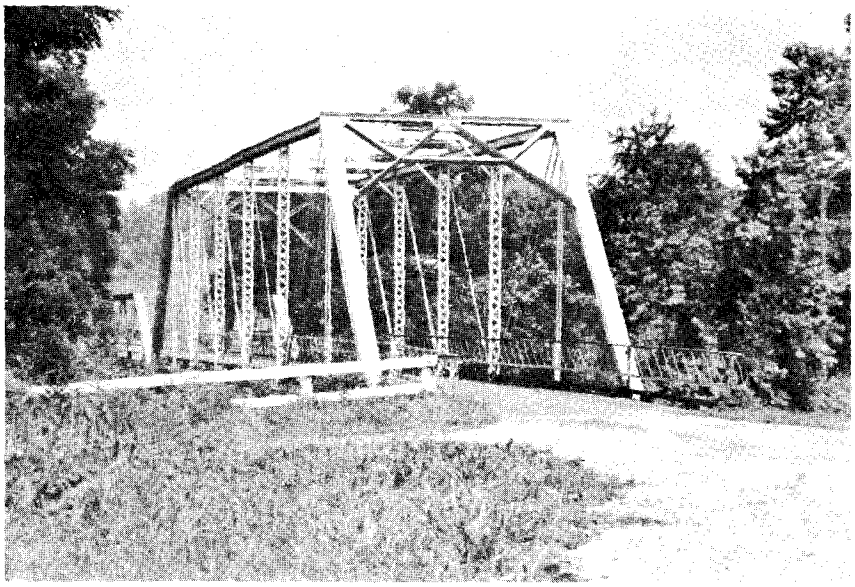


Figure 6. Inclined end post-batter brace, the configuration preferred by J. A. L. Waddell. (Albemarle County, form/photo number 07-02-3.)

Figure 7. Posts and diagonals comprised of lacing bars. (Prince William County, form/photo number 07-76-3.)

Figure 8. Latticing used on posts. (Rappahannock County, form/photo number 07-78-3.)

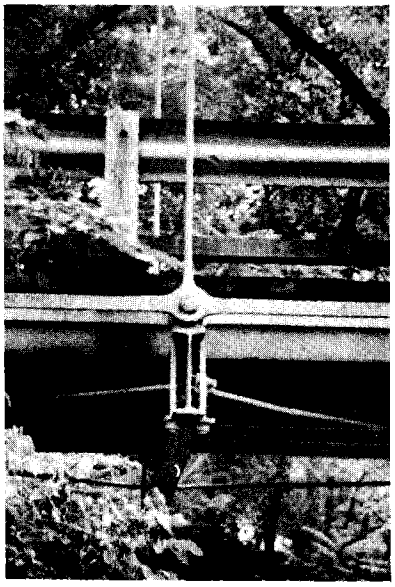


Figure 9. A pin connection used at the junction of bottom chord eye bars and the hip vertical. Note die-forged eye bars. (Loudoun County, form/photo number 07-53-6.)

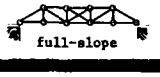
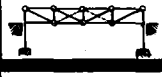
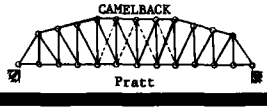
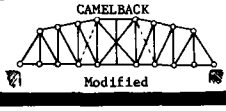
Waddell also formulated the following scale that related span length to truss type:

Spans	Recommended Truss
65 feet 90 feet	Pin connected low/pony truss
90 feet 200 feet	Pin connected through/high truss
200 feet	Pin connected through/high truss with polygonal top chords

Generally speaking then, the longer the span the deeper the truss and the greater the chance of its having a polygonal top chord. The inverse is likewise true — the shorter the span, the shallower the truss and the less likelihood of having a polygonal top chord. The average length of all the low/pony trusses in the Culpeper District is 69.2 feet; the through/high trusses with straight top chords averaged 105.2 feet; while the Camelback trusses, i.e., those with polygonal top chords, averaged 150 feet in length. These figures do not precisely coincide with Waddell's ; but they do conform to the theory that the shortest spans used low/pony trusses, that the longest utilized through/high trusses with polygonal top chords, and that those through/high trusses of intermediate length need have only horizontal top chords.

If the truss bridges in the Culpeper District that are carryovers from the nineteenth century can be taken as representative of the types built and structural features used, then Waddell's pronouncements were generally used by the contemporary truss designers and builders as authoritative guidelines. The majority of trusses are Pratt configurations and are pin connected (see Tables 2 and 3). Similar observations on truss designs of the nineteenth century were made by other engineers. Theodore Cooper, writing in 1889 on American railroad bridges,[7] commented on the persistent use of single intersection webbing systems, e.g., the type found in Pratt and Warren/triangular trusses rather than the more complex but less efficient double intersection types used in the Whipple, Fink, and Bollman trusses. During the 1890's, developments in truss design for highway bridges showed a gradual shift to structural standardization and simplification along with the use of heavier, more massive members and riveted connections. These developments were interrelated and were more the result of practical rather than theoretical considerations. Since economics have always been an important part of any construction project, speed and ease of erection are of prime consideration. This fact was recognized very early in truss technology and largely accounts for the development and exploitation of the pin-connected truss form. Because hand-driven field rivets were regarded as structurally inferior and far more expensive to apply, the American engineering profession was slow to adopt them for general use.[8] Once a bridge site had been prepared, the pin-connected truss could be erected rather quickly. This meant that the extensive falsework required during construction did not have to remain in place for very long, which reduced the probability of its being washed away by unpredictable flooding, a natural phenomenon far more common in America than in Europe. The pin connection was also preferred because of its structural clarity, which resulted from its unambiguous distribution of stresses. This was a condition not found with the riveted (rigid) connection; however, the pin-connected truss was not without its drawbacks. It was a less rigid structure

Table 2. Bridge Companies and Truss Types in the Culpeper 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, Virginia		1 - 1922				
BETHLEHEM STEEL FABRICATORS Bethlehem, Pa.			1 - 1927			
BRACKETT BRIDGE COMPANY Cincinnati, Ohio					1 - 1905	
CHAMPION BRIDGE COMPANY Wilmington, Ohio	1 - 1920 1 - 1924 1 - ND	1 - 1924 1 - ND				
COLUMBIA BRIDGE WORKS Dayton, Ohio						
HORSEHEADS BRIDGE COMPANY Horseheads, N. Y.		5 - 1898				
KEYSTONE BRIDGE COMPANY Pittsbrugh, Pa.						
KING IRON BRIDGE MANUFACTURING COMPANY Cleveland, Ohio						
ROANOKE BRIDGE COMPANY Roanoke, Virginia		1 - 1910				
ROANOKE IRON & BRIDGE WORKS Roanoke, Virginia		1 - 1930	1 - 1925 3 - 1930 1 - 1926 1 - 1928 1 - 1929		1 - 1930	
VARIETY IRON WORKS COMPANY Cleveland, Ohio						
VIRGINIA BRIDGE & IRON COMPANY Roanoke, Virginia		1 - 1909 1 - 1915 1 - 1916	1 - 1916		1 - 1931 1 - ND	
VIRGINIA DEPT. of HIGHWAYS Richmond, Virginia		1 - 1943				
VIRGINIA STATE HIGHWAY COMMISSION Richmond, Virginia			1 - 1928			
WALKER BROTHERS, CONTRACTORS Charlestown, W. Va.		1 - 1900				
WEST VIRGINIA BRIDGE WORKS Charlestown, W. Va.		1 - 189[?]				
YORK BRIDGE COMPANY York, Pennsylvania						
UNKNOWN	1 - ND	1 - 1900 1 - 1930 1 - 1907 1 - 1956 1 - 1917 10 - ND 1 - 1928	4 - ND 2 (mod) - ND		2 - ND	
TOTAL	4	32	16		6	

THROUGH (High)

ND - no date.
* - stylistic attribution.

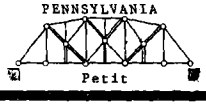
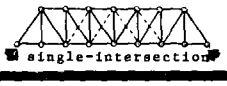
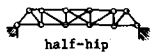
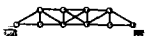
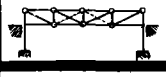
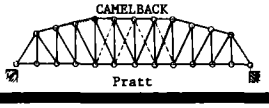
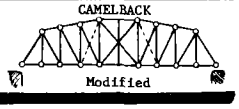
PENNSYLVANIA  Petit	PRATT  single-intersection	TRIANGULAR  single-intersection	TRIANGULAR  double-intersection	WHIPPLE  double-intersection	TOTAL
	1 - 1925				2
					1
					1
					5
	1 - 1882				1
					5
	1 - 1882				1
	1 - 1879				1
	1 - 1908				2
	2 - 1924	2 - 1930			13
	1 - ND				1
	1 - ND				7
	1 - 1943				2
					1
					1
					1
	1 - 1909				1
	1 - 1916 3 - ND				29
	15	2			75

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

TRUSS TYPE	LOW (Pony)					
	PRATT half-hip 	PRATT full-slope 	TRIANGULAR 	TRUSS LEG/BEDSTEAD 	CAMELBACK Pratt 	CAMELBACK Modified 
TRUSS DATES						
Known:						
1870-1910: 17	1 - 1920 1 - 1924	1 - 189[?] 5 - 1898 2 - 1900 1 - 1907 1 - 1909 1 - 1910 1 - 1915 1 - 1916 1 - 1917 1 - 1922 1 - 1924 1 - 1928 2 - 1930 1 - 1943 1 - 1956	1 - 1916 1 - 1925 1 - 1926 1 - 1927 2 - 1928 1 - 1929 3 - 1930		1 - 1905 1 - 1930 1 - 1931	
1911-1932: 31						
	2	21	10		3	
Unknown:	2	11	6		3	
CONNECTION DETAILS						
Rigid having riveted gusset plates:	1	8	15		2	
Pin having loop welded eyebars:	3	21			4	
Pin having die forged eyebars:		1				
Pin having both type eyebars:		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
	1 - 1879 2 - 1882 1 - 1908 1 - 1909 1 - 1916 2 - 1924 1 - 1925 1 - 1943	2 - 1930			
	10	2			48
	5				27
	1	2			29
	9				37
	3				4
	2				4
					1

and therefore required more complex webbing systems for greater stability, which in turn required a greater number of parts and pieces. Pin-connected trusses were generally lighter than riveted ones tended to be and thus carried lighter loads.

The problem was to combine the advantages of a riveted structure (rigidity and strength) with a pin-connected one (expeditious construction). The dilemma was resolved with the development of portable pneumatic riveters. Field riveting could now compete with shop/machine riveting for strength and reliability and with pin connections with respect to speed of erection. The invention certainly occurred at a specific time but its implementation was much more gradual. Older trusses would have continued in use and older technology would have persisted among the smaller bridge companies. Innovations would have appeared first in the very long spans that required individual designs and for which the advantages to be gained from recent developments would have been greatest. Small spans were rather commonplace and routinely designed since they had been constructed many times previously. This transitional period, with riveted connections and pin connections enjoying an equivalent status, stretched from about 1890 to 1915. In this 25-year period, the maximum recommended length for riveted truss spans increased from 100 feet in 1890 to 350 feet in 1915.[9]

It must also be kept in mind that higher strength alloy steels were under development and being tested during the early part of the twentieth century. Their role in the ever increasing span lengths cannot be discounted. Nickel steel was found to be as durable as carbon steel and over 50% stronger;[10] however, it was not used in bridge work until 1903, when it was employed in New York City's Blackwell's Island Bridge (Queensboro Bridge) for its eye bar.

In the Culpeper District it is unlikely that the remaining truss bridges would exhibit any of the experimental features of innovative technology which would be found on a structure as formidable as the Queensboro Bridge. No crossing in the district would have required any such technology. This is not to say that a lack of innovative technology renders any of the extant trusses unworthy of special attention or void of any historical significance. Age, builder/designer, site integrity, or single example are all factors which can individually contribute to a bridge's historical integrity and consequently increase its merit. For example, Pratt trusses are a very common configuration for through/high truss bridges; however, in the 12-county area comprising the district there is only one surviving multi-span through truss bridge. It is a two-span, through/high Pratt truss bridge in Albemarle County (Figure 10). Thus in a given area it is a single surviving example. The district's most unusual multi-span truss bridge is a five-span low Pratt half-hip structure built in 1898 by the Horseheads Bridge Company of Horseheads, New York (Figure 11, form). It is the only example of a bridge built by this company in the district and may be the only such example in the state. The most significant truss bridge surveyed in the district is a single-span through Pratt truss built by the King Iron & Bridge Manufacturing Company, Cleveland, Ohio (Figure 12). Its 1879 date plate makes it the oldest dated truss in northern Virginia and further suggests that it is a wrought iron structure. Its merit is enhanced by its being located on its original site though the stone masonry parapet approach walls indicate that its predecessor was covered wooden truss. Two separate through/high truss bridges built in 1882 also remain in the district. The Keystone Bridge Company, Pittsburgh, Pennsylvania, built one of them for a predecessor

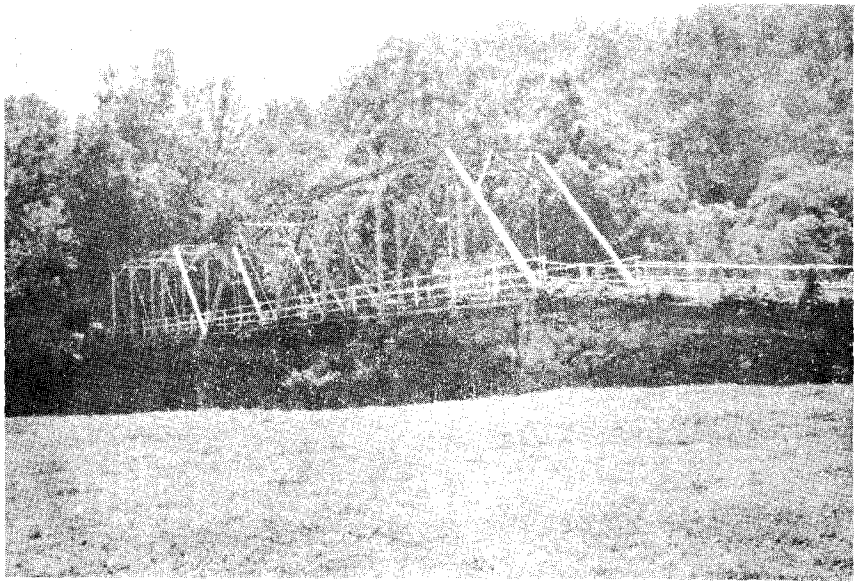


Figure 10. The District's last remaining two-span through/high Pratt truss bridge in Albemarle County built by the Roanoke Iron & Bridge Works, Roanoke, Virginia, 1924. (See form/photo number 07-02-1.)

Figure 11. Five-span, low/pony Pratt truss, full-slope bridge built by the Horseheads Bridge Company, Horseheads, New York, in 1898. (Culpeper-Fauquier County line, see form/photo number 07-23-2.)

of the Southern Railroad to carry a county road over its tracks (see Figure 2). It remains, remarkably enough, on its original site. The other span is what remains of a three-span, through/high Pratt truss bridge built by the Columbia Bridge Company, Dayton, Ohio, that originally crossed the Rappahannock River at Madison Mills on the Orange-Culpeper County line (Figure 13). This bridge was replaced in the mid-1930's by a wider, heavier structure; however, rather than abandon the three older spans, each was used as an individual bridge at a separate location.* Regrettably, the one remaining truss was denuded of its once elegant and decorative ironwork when it was moved to its present location on Route 645 crossing the Rappahannock River between Fauquier and Rappahannock Counties.

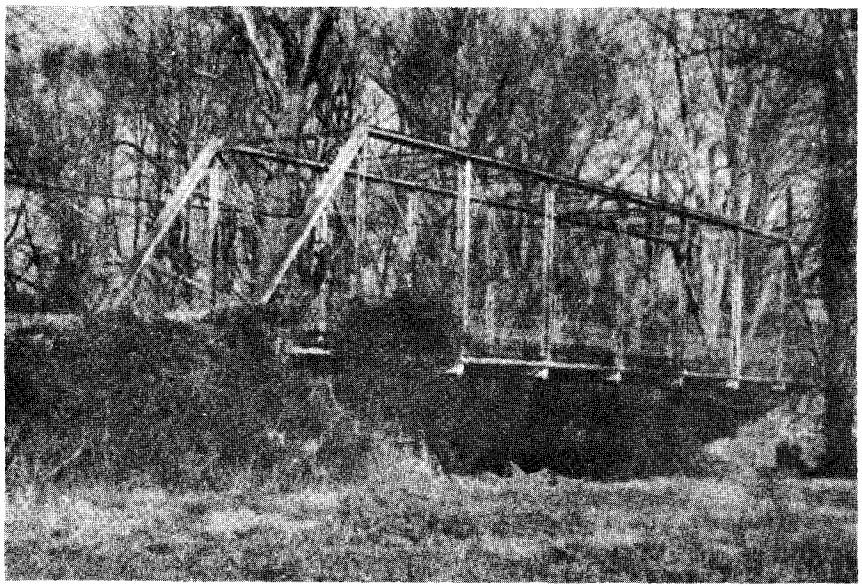


Figure 12. Single-span, through/high Pratt truss built by the King Iron Bridge & Manufacturing Company, Cleveland, Ohio, in 1879. (Culpeper-Fauquier County, see form/photo number 07-23-7.)

The Variety Iron Works of Cleveland, Ohio, is responsible for the design and construction of the longest single-span through/high Pratt truss (157 feet) in the district (Figure 14). During this period, it was more usual for spans of this length to have utilized polygonal top chords. The majority of such trusses thus far inventoried throughout the state span between 100 and 125 feet. As one might expect, this truss has also been moved from its original location on Route 7, Loudoun County.

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* One was moved to Page County, Route 645 (since replaced); another to the Caroline-Hanover County line, Route 603 (since replaced); and the third to the Green-Hanover County line, Route 230 (since replaced). One of these was again moved to the last remaining span's present location.

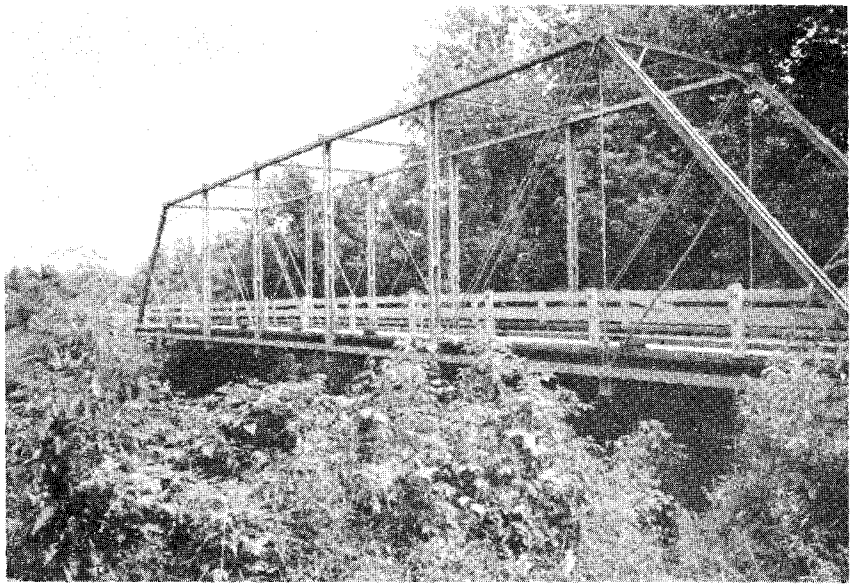


Figure 13. Single-span, through/high Pratt truss built by the Columbia Bridge Works, Dayton, Ohio, in 1882. (Fauquier-Rappahannock County, see form/photo number 07-30-5.)

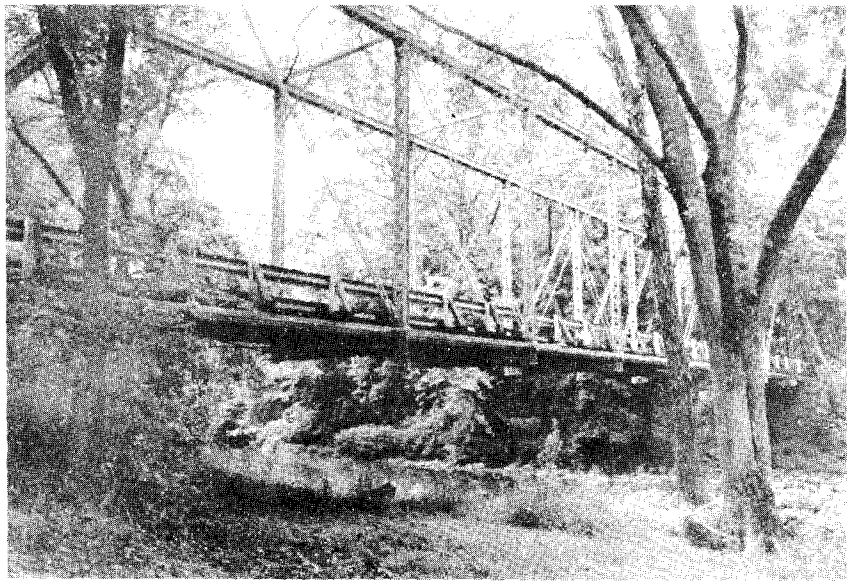


Figure 14. Single-span, through/high Pratt truss of unusual length built by the Variety Iron Works Company, Cleveland, Ohio; date unknown. (Loudoun County, see form/photo number 07-53-6.)

The only trusses exhibiting any unusual configurations are three single-span low/pony trusses. Each appears to be something of an impromptu design of the local or county bridge maintenance crew rather than being well engineered structures. One of these bridges (Figure 15) is a straightforward low Pratt truss except for the treatment of the end post/top chord junction. It is a clearly unconventional solution. The other two bridges are variations on the triangular truss system. One has subdivided center panels (Figure 16); the other has both pin and rigid connections (Figure 17). The remaining truss configurations conform fairly well to the structure laid down by J. A. L. Waddell, the author of the definitive text on truss design in 1916 (see above).

Forty-seven of 75 trusses in the district are Pratt-type (both low and through trusses); 46 of these trusses have pin connections. The inverse of this is true for 18 triangular trusses — only 1 of these does not have riveted connections. Eleven of these date after 1925, which indicates the more recent alliance of the truss form and the connection detail. Riveted connections became the more usual solution for triangular/Warren type trusses whereas Pratt and Whipple types were pin connected. The exceptions (1 triangular, 9 Pratt) demonstrate that the structural requirement is not inviolable. Prior to the 1890's, it was not uncommon to find trusses that incorporated a variety of material, e.g., wood, cast or wrought iron, or steel; however, with the possible exception of 4 truss spans (form nos. Ø7-53-6, Ø7-23-7, Ø7-76-11, Ø7-3Ø-5), all the extant trusses in the district are solely of steel.

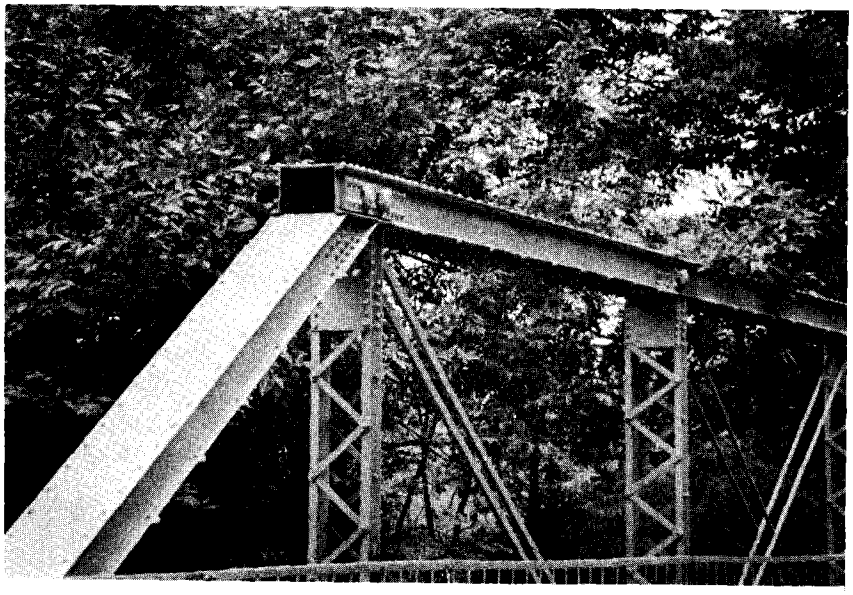


Figure 15. Single-span, low/pony Pratt truss, full-slope with unusual butt end at top chord/end post panel point; builder and date unknown. (Loudoun County, see form/photo number 07-53-1.)

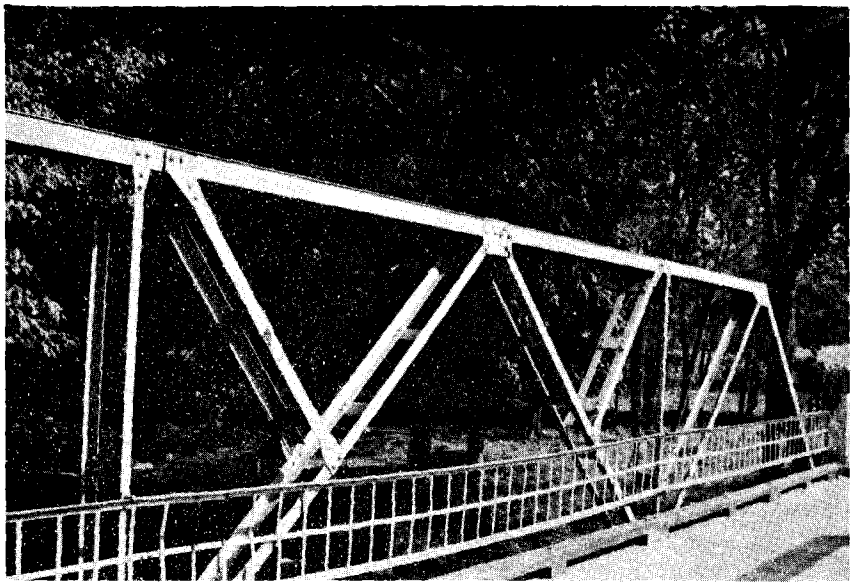


Figure 16. Single-span, low/pony triangular truss having an unusual subdivided center panel; builder and date unknown. (Loudoun County, see form/ photo number 07-53-5.)

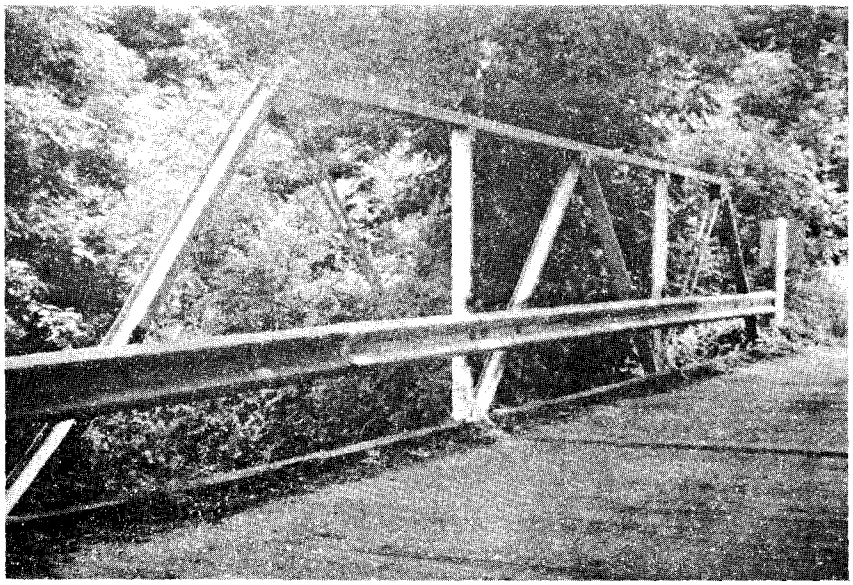


Figure 17. Single-span, low/pony triangular truss having both pin and rigid connections; builder and date unknown. (Fairfax County, see form/ photo number 07-29-3.)

Twenty-nine of the 75 trusses cannot be attributed to any of the 16 companies or agencies that designed or built any truss bridges in the district between 1875 and 1932. Thirty of the trusses were built by the following 4 companies:

Roanoke Iron & Bridge Works, Roanoke, Virginia	13
Virginia Bridge & Iron Company, Roanoke, Virginia	7
Champion Bridge Company, Wilmington, Ohio	5
Horseheads Bridge Company, Horseheads, New York	5
	30

The remaining 16 trusses are distributed among 13 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 companies or firms are represented and that some worked exclusively in one county. (See Tables 4 through 15.) It would have been most unusual for any of the county governments to have had a trained or otherwise qualified bridge/structural engineer or the facilities to design or construct one of these rather intricate structures.

No county record research has been undertaken to determine the specific procedure followed for getting these company designed truss bridges built; however, from several other sources, 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 resulting from new construction, notices of a "bridge-letting" would then have been drawn up and posted publicly or mailed to potential bidders, as well as being published in newspapers or engineering journals likely to be read by bridge builders[11] (Figure 18). The extent of the published specifications could vary significantly from being a highly detailed listing of dimensions, materials, loads, flooring, and abutment requirements, to a relatively simple notice whose purpose was a search for and discussion of what type bridge would be the best solution for the crossing.[12] The exact nature of a particular "bridge-letting" would have been determined by the previous experience and background of the local officials, along with their access to professional advice. Waddell placed little faith in the ability of the typical local government official to select the best bridge design from among those offered by the participating bidders.[13] Even the most elementary comprehension of the variables in truss design, 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 or 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.

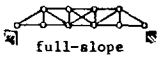
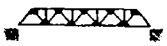
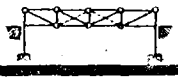
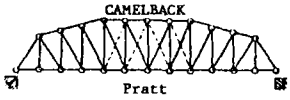
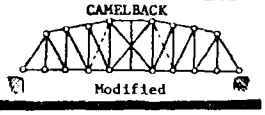
It is not decisively clear at this time if all "bridge-lettings" were based on the competitive bidding system. Public policy would certainly have dictated adhering to this system; however, on a local level there may have been factors or convenience to a particular bridge fabricator or familiarity with a particular company. The Culpeper

District does not have an overwhelming number of truss bridges by a particular company in any one of its counties, a situation quite different from that found in the Staunton District.[14] There is also the possibility that those bridge companies who responded to "bridge-letting" notices were more than just passive participants. It was not unusual for these companies to have regional offices with district sales personnel whose task it was to represent them to the appropriate officials when construction projects were under consideration.

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 supplies, e.g., timber for falsework and masonry and mortar for abutments.[15] 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.[16] If work went according to plan, these preliminaries were 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: weather conditions, site location and accessibility, water depth, number of spans and their length, and the truss type itself. As previously mentioned, 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 fabrication shop, these basic shapes were machine sized, cut, drilled, punched and riveted into the various truss components, which in turn were but 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 forman moved on to the next project in his territory or returned to the company's home or regional shop. In an area where a number of truss bridges were built over a period of years, it is only reasonable to assume that a pool of skilled laborers would have developed. A rather appropriate tribute to the efforts of these men and the effectiveness of truss technology rests in the fact that among the 75 extant bridges, 3 were built before 1885 and remain in use on the secondary roads of the Culpeper District.

Table 4. Bridge Companies and Truss Types in Albemarle County

TRUSS TYPE / ALBEMARLE COUNTY	LOW (Pony)					
	PRATT  half-hip	PRATT  full-slope	TRIANGULAR 	TRUSS LEG/BEDSTEAD 	CAMELBACK  Pratt	CAMELBACK  Modified
CHAMPION BRIDGE COMPANY Wilmington, O.	1 - 1920 1 - 1924	1 - 1924 1 - ND				
ROANOKE IRON & BRIDGE WORKS ROANOKE, Va.						
VIRGINIA BRIDGE & IRON COMPANY Roanoke, Va.		1 - 1915				
VIRGINIA DEPT. of HIGHWAYS Richmond, Va.		1 - 1943				
YORK BRIDGE COMPANY York, Pa.						
UNKNOWN		1 - 1907 1 - 1917 1 - 1928	1 - ND			
TOTAL	2	7	1			

THROUGH (High)

ND - no date.
* - stylistic attribution.

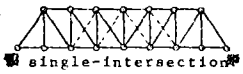
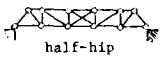
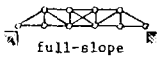
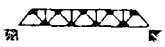
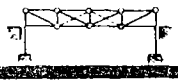
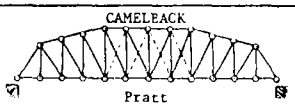
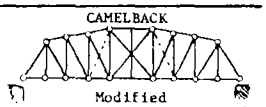
PENNSYLVANIA  Petit	PRATT  single-intersection	TRIANGULAR  single-intersection	TRIANGULAR  double-intersection	WHIPPLE  double-intersection	TOTAL
					4
	2 - 1924				2
					1
	1 - 1943				2
	1 - 1909				1
	2 - ND				6
	6				16

Table 5. Bridge Companies and Truss Types in Culpeper County

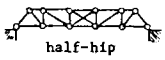
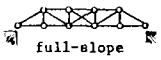
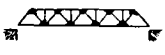
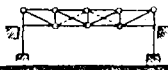
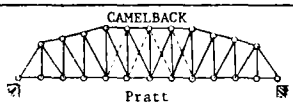
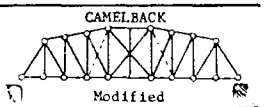
TRUSS TYPE / CULPEPER COUNTY	LOW (Pony)					
	PRATT  half-hip	PRATT  full-slope	TRIANGULAR 	TRUSS LEG/BEDSTEAD 	CAMELBACK  Pratt	CAMELBACK  Modified
HORSEHEADS BRIDGE COMPANY Horseheads, N.Y.		5 - 1898				
KING IRON BRIDGE & MANUFACTURING COMPANY Cleveland, Ohio						
ROANOKE IRON & BRIDGE WORKS Roanoke, Va.			2 - 1930			
VIRGINIA BRIDGE & IRON COMPANY Roanoke, Va.					1 - ND	
VIRGINIA STATE HIGHWAY COMMISSION Roanoke, Va.						
UNKNOWN						
		5	2		1	

THROUGH (High)

ND - no date.
* - stylistic attribution.

PENNSYLVANIA Petit	PRATT single-intersection	TRIANGULAR single-intersection	TRIANGULAR double-intersection	WHIPPLE double-intersection	TOTAL
					5
	1 - 1879				1
		2 - 1930			4
	1 - 1901				2
	1 - 1916				1
	3	2			13

Table 6. Bridge Companies and Truss Types in Fairfax County

TRUSS TYPE / FAIRFAX COUNTY	LOW (Pony)					
	PRATT  half-hip	PRATT  full-slope	TRIANGULAR 	TRUSS LEG/BEDSTEAD 	CAMELBACK  Pratt	CAMELBACK  Modified
ATLANTIC BRIDGE COMPANY Roanoke, Va.		1 - 1922				
UNKNOWN	1 - ND		1 - ND 1 (mod) - ND			
TOTAL	1	1	2			

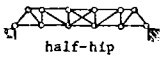
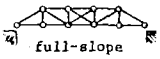
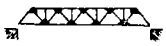
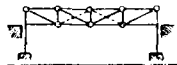
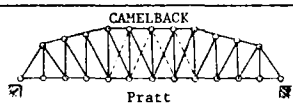
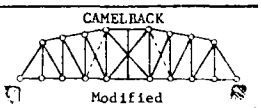
THROUGH (High)

ND - no date.
* - stylistic attribution.

PENNSYLVANIA Petit	PRATT single-intersection	TRIANGULAR single-intersection	TRIANGULAR double-intersection	WHIPPLE double-intersection	TOTAL
					1
					3
					4

B494

Table 7. Bridge Companies and Truss Types in Fauquier County

TRUSS TYPE / FAUQUIER COUNTY	LOW (Pony)					
	PRATT  half-hip	PRATT  full-slope	TRIANGULAR 	TRUSS LEG/BEDSTEAD 	CAMELBACK  Pratt	CAMELBACK  Modified
ATLANTIC BRIDGE COMPANY Roanoke, Va.						
COLUMBIA BRIDGE WORKS Dayton, Ohio						
ROANOKE BRIDGE COMPANY Roanoke, Va.		1 - 1910				
VIRGINIA BRIDGE & IRON COMPANY Roanoke, Va.						
UNKNOWN		1 - 1956 1 - ND				
TOTAL		3				

THROUGH (High)

ND - no date.
* - stylistic attribution.

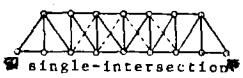
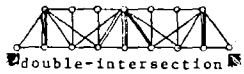
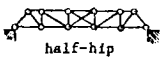
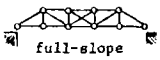
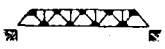
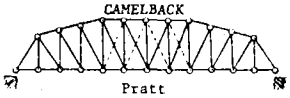
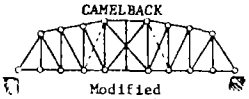
PENNSYLVANIA  Petit	PRATT  single-intersection	TRIANGULAR  single-intersection	TRIANGULAR  double-intersection	WHIPPLE  double-intersection	TOTAL
	1 - 1925				1
	1 - 1882				1
					1
					2
	2				5

Table 8. Bridge Companies and Truss Types in Fluvanna County

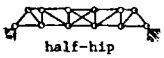
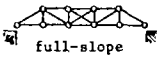
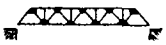
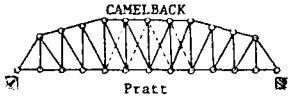
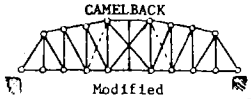
TRUSS TYPE / FLUVANNA COUNTY	LOW (Pony)					
	PRATT  half-hip	PRATT  full-slope	TRIANGULAR 	TRUSS LEG/BEDSTEAD 	CAMELBACK  Pratt	CAMELBACK  Modified
ROANOKE IRON & BRIDGE WORKS Roanoke, Va.			1 - 1930			
VIRGINIA BRIDGE & IRON COMPANY Roanoke, Va.					1 - 1931	
VIRGINIA STATE HIGHWAY COMMISSION Richmond, Va.						
UNKNOWN		2 - ND			2 - ND	
TOTAL		2	1		3	

THROUGH (High)

ND - no date.
* - stylistic attribution.

PENNSYLVANIA Petit	PRATT single-intersection	TRIANGULAR single-intersection	TRIANGULAR double-intersection	WHIPPLE double-intersection	TOTAL
					1
					1
					4
					6

Table 9. Bridge Companies and Truss Types in Greene County

GREENE COUNTY / TRUSS TYPE	LOW (Pony)					
	PRATT  half-hip	PRATT  full-slope	TRIANGULAR 	TRUSS LEG/BEDSTEAD 	CAMELBACK  Pratt	CAMELBACK  Modified
VIRGINIA STATE HIGHWAY COMMISSION Richmond, Va.			1 - 1928			
TOTAL			1			

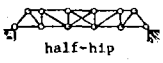
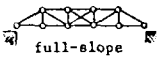
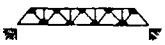
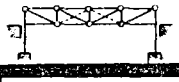
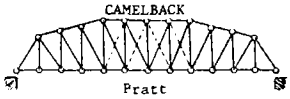
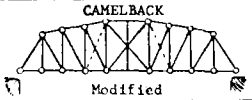
THROUGH (High)

ND - no date.
* - stylistic attribution.

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

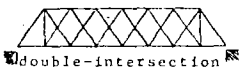
1990

Table 10. Bridge Companies and Truss Types in Loudoun County

TRUSS TYPE / LOUDOUN COUNTY	LOW (Pony)					
	PRATT  half-hip	PRATT  full-slope	TRIANGULAR 	TRUSS LEG/BEDSTEAD 	CAMELBACK  Pratt	CAMELBACK  Modified
VARIETY IRON WORKS COMPANY Cleveland, Ohio						
WEST VIRGINIA BRIDGE WORKS Charlestown, West Virginia.		1 - 189[?]				
UNKNOWN		1 - 1930 1 - ND	1 - ND 1 (mod) - ND			
TOTAL		3	2			

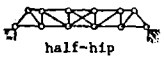
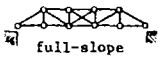
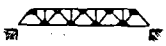
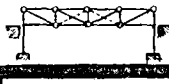
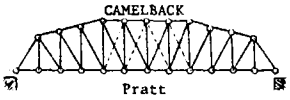
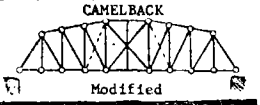
THROUGH (High)

ND - no date.
* - stylistic attribution.

PENNSYLVANIA  Petit	PRATT  single-intersection	TRIANGULAR  Single-intersection	TRIANGULAR  double-intersection	WHIPPLE  double-intersection	TOTAL
	1 - ND				1
					1
					4
	1				6

1968

Table 11. Bridge Companies and Truss Types in Louisa County

TRUSS TYPE / LOUISA COUNTY	LOW (Pony)					
	PRATT  half-hip	PRATT  full-slope	TRIANGULAR 	TRUSS LEG/BEDSTEAD 	CAMELBACK  Pratt	CAMELBACK  Modified
ROANOKE IRON & BRIDGE WORKS Roanoke, Va.			1 - 1926			
VIRGINIA BRIDGE & IRON COMPANY Roanoke, Va.		1 - 1926.				
VIRGINIA STATE HIGHWAY COMMISSION Richmond, Va.						
UNKNOWN		3 - ND				
TOTAL		4	1			

THROUGH (High)

ND - no date.
* - stylistic attribution.

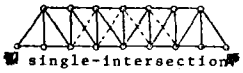
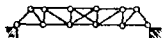
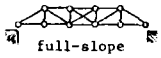
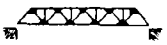
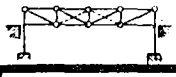
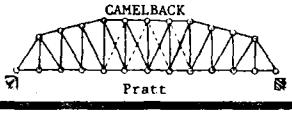
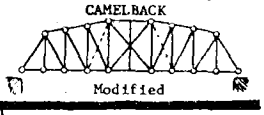
PENNSYLVANIA  Petit	PRATT  single-intersection	TRIANGULAR  single-intersection	TRIANGULAR  double-intersection	WHIPPLE  double-intersection	TOTAL
					1
					1
					3
					5

Table 12. Bridge Companies and Truss Types in Madison County

TRUSS TYPE / MADISON COUNTY	LOW (Pony)					
	PRATT  half-hip	PRATT  full-slope	TRIANGULAR 	TRUSS LEG/BEDSTEAD 	CAMELBACK  Pratt	CAMELBACK  Modified
ROANOKE IRON & BRIDGE COMPANY Roanoke, Va.			1 - 1929			
VIRGINIA BRIDGE & IRON COMPANY Roanoke, Va.			1 - 1916			
VIRGINIA STATE HIGHWAY COMMISSION Richmond, Va.						
TOTAL			2			

THROUGH (High)

ND - no date.
* - stylistic attribution.

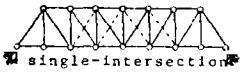
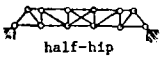
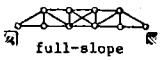
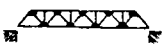
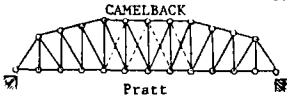
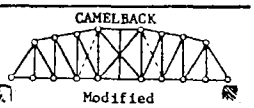
PENNSYLVANIA  Petit	PRATT  single-intersection	TRIANGULAR  Single-intersection	TRIANGULAR  double-intersection	WHIPPLE  double-intersection	TOTAL
					1
					1
					2

Table 13. Bridge Companies and Truss Types in Orange County

TRUSS TYPE / ORANGE COUNTY	LOW (Pony)					
	PRATT  half-hip	PRATT  full-slope	TRIANGULAR 	TRUSS LEG/BEDSTEAD 	CAMELBACK  Pratt	CAMELBACK  Modified
BRACKETT BRIDGE COMPANY Cincinnati, Ohi					1 - 1905	
ROANOKE BRIDGE COMPANY Roanoke, Va.						
TOTAL					1	

THROUGH (High)

ND - no date.
* - stylistic attribution.

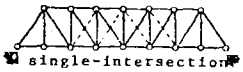
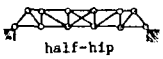
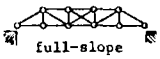
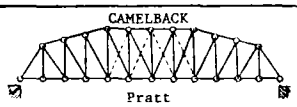
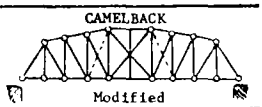
PENNSYLVANIA  Petit	PRATT  single-intersection	TRIANGULAR  single-intersection	TRIANGULAR  double-intersection	WHIPPLE  double-intersection	TOTAL
					1
	1 - 1908				1
	1				2

Table 14. Bridge Companies and Truss Types in Prince William County

TRUSS TYPE / PRINCE WILLIAM COUNTY	LOW (Pony)					
	PRATT  half-hip	PRATT  full-slope	TRIANGULAR 	TRUSS LEG/BEDSTEAD 	CAMELBACK  Pratt	CAMELBACK  Modified
BETHLEHEM FABRICATORS, INC Bethlehem, Pa.			1 - 1927			
CHAMPION BRIDGE COMPANY Wilmington, O.	1 - ND					
KEYSTONE BRIDGE COMPANY Pittsburgh, Pa.						
ROANOKE IRON & BRIDGE WORKS, IN Roanoke, Va.		1 - 1930	1 - 1925		1 - 1930	
VIRGINIA STATE HIGHWAY COMMISSION Richmond, Va.						
WALKER BROTHERS CONTRACTORS Charlestown, West Virginia		1 - 1900				
UNKNOWN		1 - 1900 2 - ND	1 - ND			
TOTAL	1	5	3		1	

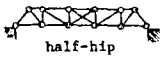
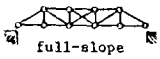
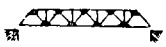
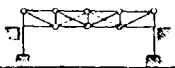
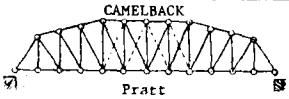
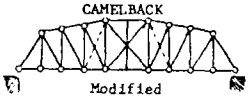
THROUGH (High)

ND - no date.
* - stylistic attribution.

PENNSYLVANIA Petit	PRATT single-intersection	TRIANGULAR single-intersection	TRIANGULAR double-intersection	WHIPPLE double-intersection	TOTAL
					1
					1
	1 - 1882				1
					3
					1
	1 - ND				5
	2				12

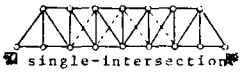
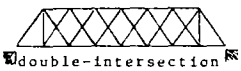
1910

Table 15. Bridge Companies and Truss Types in Rappahannock County

TRUSS TYPE / RAPPAHANNOCK COUNTY	LOW (Pony)					
	PRATT  half-hip	PRATT  full-slope	TRIANGULAR 	TRUSS LEG/BEDSTEAD 	CAMELBACK  Pratt	CAMELBACK  Modified
ROANOKE IRON & BRIDGE WORKS Roanoke, Va.			1 - 1928			
VIRGINIA BRIDGE & IRON COMPANY Roanoke, Va.		1 - 1909				
UNKNOWN		1 - ND				
TOTAL		2	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
					1
					3

1012

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 18. A "bridge letting" notice put out in 1883 by the Boards of Supervisors of Culpeper and Orange Counties.

NOTES

1. Figures based on county population and land area statistics of the 1970 U. S. Census, "Population and Area of Counties, Cities and Incorporated Towns", Commonwealth of Virginia, September 1971.

2. "United States Census of Agriculture", U. S. Department of Agriculture, 1974.

3. Carl W. Condit, American Building Art, New York, Oxford University Press, 1961, p. 276.

4. These terms are applied generically, i.e., based on geometric profile not on a specific patent.

5. James A. L. Waddell, The Designing of Ordinary Iron Highway Bridges, New York, John Wiley & Sons, Inc., 1891 (fifth edition), p. iv.

6. Ibid., pp. ix-x.

7. Theodore Cooper, "American Railroad Bridges", Transactions, American Society of Civil Engineers, July 1889, 21:8.

8. J. A. L. Waddell, Bridge Engineering, John Wiley & Sons, Inc., New York, 1916, I:747.

9. Ibid.

10. Ibid., pp. 58-9.

11. J. A. L. Waddell, Iron Highway Bridges, p. 157.

12. Ibid.

13. Ibid., pp. 157-161.

14. Dan G. Deibler, The Staunton Construction District, 2, 1975, VHTRC 75-R53.

15. David H. Miars, A Century of Bridges, Wilmington (Ohio), 1972, p. 24.

16. Ibid.

1914

APPENDIX

METAL TRUSS BRIDGES IN THE CULPEPER DISTRICT

OF SPECIAL INTEREST

R-358

1987

Photo Numbers:
07-53-6

12336-15: 17-21
12336-16: 0-6

TRUSS BRIDGE SURVEY AND INVENTORY FORM

Geographic Information

State: Virginia
Va. Dept. of Highways District: *Culpeper* ; No. *07* .
County: *Loudoun* ; No. _____ .
[redacted]/Town: *N. of Waterford* .
[redacted]/Road: *State Route #673* .
[redacted]/Stream/[redacted] (crossing): *N.F. Catoctin Creek* .
UTM/KGS Coordinates: _____ .

Historical Information

Formal designation: *#1866 (Structure Tabulation No.)* .
Local designation: *#6051 (District Structure No.)* .
Designer: *Variety Iron Works Company, Cleveland, Ohio* .
Builder: *Variety Iron Works Company, Cleveland, Ohio* .
Date: _____ ; basis for: *Bridge plate, no date* .
Original owner: _____ ; use: *Vehicular bridge* .
Present owner: *Va. Dept. of Highways & Transp.* ; use: *Vehicular bridge* .

Historical or Technological Significance

_____ Unique/Unusual in its time: _____ .

X Rare survivor though of standard design: *Only truss bridge by Variety Iron Works in the District and only 2 have so far been inventoried in the state* .

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

_____ Other Remarks/Explanation: *Bridge plate missing on one end (a recent loss) and half broken on the other. Separate plaque with county officials:*
Bridge Committee: George E. Eamich, Chairman
E. G. Caufman N. B. Peacock
F. M. Carter P. W. Carter
Thos. R. Smith Alfred Stanton, Engineer .

[redacted]: *John G. Lewis indicates that this bridge was moved in 1930s from Route #7 where it crossed Goose Creek east of Leesburg. Bolts at panel points confirm a relocation.* .

Reference materials and contemporary photos/illustrations with their respective locations:
Culpeper District bridge files.
John G. Lewis, letter, 338-4330, written to Neil FitzSimons.

Recorder: *DAN DEIBLER* .
Date: *1 May 1974* .
Affiliation: *Research Council, Concrete Section* .

1998

Design Information

Compass orientation of axis: *E/W*.

No. of spans: *1*; **length; overall:** *160'*.
Span types:
(1) *Truss*; **length:** *157'1-1/2"*.
(2) _____; **length:** _____.
(3) _____; **length:** _____.
(4) _____; **length:** _____.
(5) _____; **length:** _____.
(6) _____; **length:** _____.

No. of lanes: *1*; **width:** *13'10"* **c to c.**

Architectural or decorative features:

Guardrails used for side railings. Truss has tall, narrow proportions.

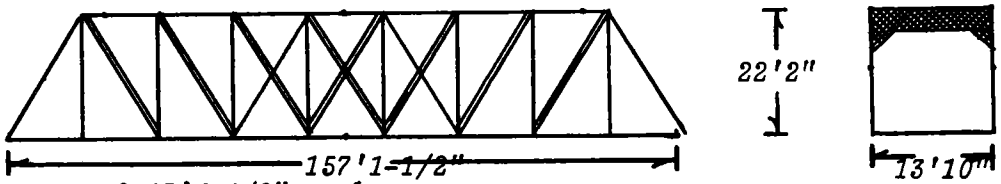
Structural Information

Substructure:
Material: *Sandstone; concrete*.
Foundations: _____.
Piers: _____.
Abutments: *Uncoursed, uncut masonry*.
Wings: *Rubble*.
Seats: *Concrete*.

Superstructure:
Material: *Wrought iron (poss.)* **sources** _____.
Characteristics, details and members:
Connections: *X* **pin.**
_____ **rigid.**
Top Chords *2 upright channels connected with cover plates and stay plates*.
End Posts: *2 upright channels connected with cover plates and stay plates*.
Bottom chords: *Double rectilinear eye bars, die forged; center panel has 4 eye bars*.
Posts: *2 vertical channels connected with lacing bars*.
Diagonals: *Double rectilinear eye bars, die forged*.
Counters: *Single cylindrical eye bars, loop welded*.

Truss Configuration

Main span type: *Pratt* **Through/**[redacted]



9 spans @ 17'5-1/2" each

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

Photo Numbers:
07-02-1
A
B
C

12336-7: 13-21

TRUSS BRIDGE SURVEY AND INVENTORY FORM

Geographic Information

State: Virginia
Va. Dept. of Highways District: *Culpeper* ; No. *07* .
County: *Albemarle* ; No. *07* .
[redacted]/Town: *Decca* .
[redacted]/Road: *State Route #678* .
River/[redacted]/[redacted] (crossing): *Mechum River* .
UTM/KGS Coordinates: _____ .

Historical Information

Formal designation: *#0935 (Structure Tabulation No.)* .
Local designation: *#6068 (District Structure No.)* .
Designer: _____ .
Builder: *Roanoke Iron & Bridge Works, Roanoke, Virginia* .
Date: *1924* ; basis for: *Bridge/date plate* .
Original owner: _____ ; use: *Vehicular bridge* .
Present owner: *Va. Dept. of Highways & Transp.* ; use: *Vehicular bridge* .

Historical or Technological Significance

_____ Unique/Unusual in its time: _____ .

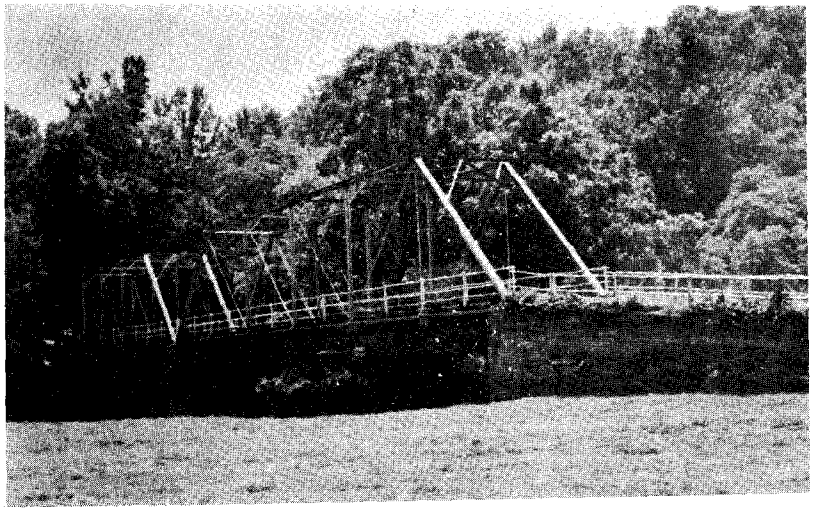
X Rare survivor though of standard design: *Only 2-span through truss bridge in Culpeper District.* .

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

_____ Other Remarks/Explanation: *Bolts at top chord panel points suggest that these trusses have been relocated to this site.* .

Nature/Degree of any destructive threats: _____ .

Reference materials and contemporary photos/illustrations with their respective locations:
Culpeper District bridge files.



Recorder: *DAN DEIBLER* .
Date: *8 July 1974* .
Affiliation: *Research Council, Concrete Section* .

Design Information

Compass orientation of axis: *N/S*.

No. of spans: *2*; length; overall: *209'6"*.
Span types:
(1) *Truss*; length: *103'*.
(2) *Truss*; length: *103'*.
(3) _____; length: _____.
(4) _____; length: _____.
(5) _____; length: _____.
(6) _____; length: _____.

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

Architectural or decorative features:

Simple 2-pipe railings. Lateral struts are back-to-back angles with sway braces (brackets).

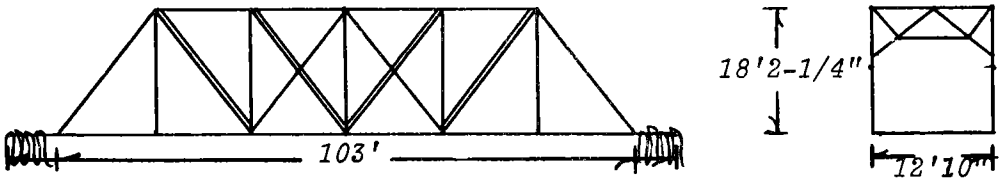
Structural Information

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

Superstructure:
Material: *Steel* sources *B. S. Co., Cambria, U.S.A.*.
Characteristics, details and members:
Connections: *X* pin.
_____ rigid.
Top Chords *2 upright channels connected with cover plates and lacing bars.*.
End Posts: *2 upright channels connected with cover plates and lacing bars.*.
Bottom chords: *Double rectilinear eye bars, loop welded.*.
Posts: *2 vertical channels connected with lacing bars.*.
Diagonals: *Double rectilinear eye bars, loop welded*.
Counters: *Single rectilinear tie rods, loop welded.*.

Truss Configuration

Main span type: *Pratt* Through/[redacted]



Secondary span type: *Pratt* Through/[redacted]

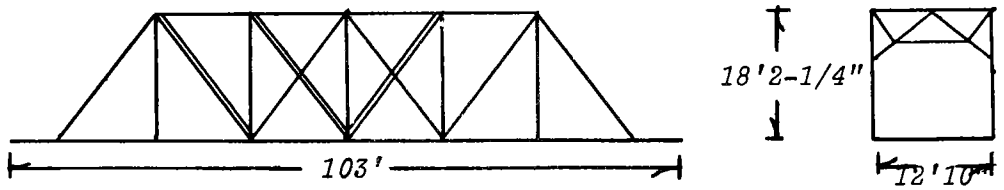


Photo Numbers:

07-23-7

A
B
C
D
E

12366-12: 17-20
12366-13: 1-9
12366-15: 13-16

TRUSS BRIDGE SURVEY AND INVENTORY FORM

Geographic Information

State: Virginia
Va. Dept. of Highways District: *Culpeper* ; No. *07* .
County: *Culpeper/(Fauquier)* ; No. *23/(30)*
[redacted]/Town: *Fauquier White Sulphur Springs* .
[redacted]/Road: *State Route #802* .
River/[redacted] (crossing): *Rappahannock River* .
UTM/KGS Coordinates: _____ .

Historical Information

Formal designation: _____ .
Local designation: *#6911 (District Structure No.)* .
Designer: *King Iron Bridge & Manufacturing Company, Cleveland, Ohio* .
Builder: *King Iron Bridge & Manufacturing Company, Cleveland, Ohio* .
Date: *1879* ; basis for: *Bridge/date plate* .
Original owner: _____ ; use: *Vehicular bridge* .
Present owner: *Va. Dept. of Highways & Transp.* ; use: *Vehicular bridge* .

Historical or Technological Significance

_____ Unique/Unusual in its time: _____ .

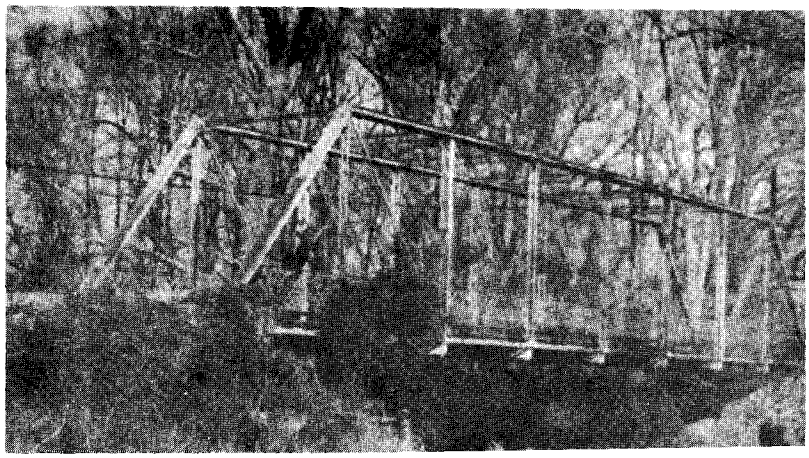
X Rare survivor though of standard design: *May be the oldest truss in the District, if not one of oldest in the State.* .

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

_____ Other Remarks/Explanation: *There is nothing to suggest that trusses have ever been moved so that it may easily be this truss bridges original site. Stone approach parapet walls suggest it may have been the site of a covered bridge prior to the truss.* .

Nature/Degree of any destructive threats: *Under imminent threat of replacement. Bids have been let.* .

Reference materials and contemporary photos/illustrations with their respective locations:
Culpeper District bridge files.



Recorder: *DAN DEIBLER* .
Date: *16 July 1974* .
Affiliation: *Research Council, Concrete Section* .

1058

Design Information

Compass orientation of axis: *NE/SW*.

No. of spans: *1*; **length; overall:** *106'*.

Span types:

(1) *Truss*; **length:** *102'8"*.
(2) _____; **length:** _____.
(3) _____; **length:** _____.
(4) _____; **length:** _____.
(5) _____; **length:** _____.
(6) _____; **length:** _____.

No. of lanes: *1*; **width:** *14'* **c to c.**

Architectural or decorative features:

Has closely spaced delicate latticed side railings.
Lateral struts and sway struts are closely spaced "T" shapes connected with lacing bar sway braces.
* *Four symmetrically disposed intermediate posts are made up of 2 vertica channels connected with lacing bars.*

Structural Information

Substructure:

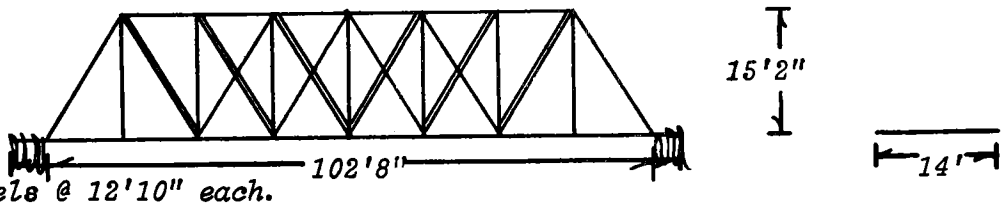
Material: *Limestone*.
Foundations: _____.
Piers: _____.
Abutments: *Uncoursed, random ashlar*.
Wings: *Uncoursed, random ashlar*.
Seats: *Limestone*.

Superstructure:

Material: *Probably wrought iron* **sources** _____.
Characteristics, details and members:
Connections: *X* **pin.**
_____ **rigid.**
Top Chords *2 upright channels connected with cover plates and stay plates.*.
End Posts: *2 upright channels connected with cover plates and stay plates*.
Bottom chords: *Double rectilinear eye bars, die forged.*.
* **Posts:** *2 "T" shapes connected with latticing.*.
Diagonals: *Double rectilinear eye bars, die forged*.
Counters: *Single cylindrical tie rods, die forged.*.

Truss Configuration

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



8 panels @ 12'10" each.

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

1023

Photo Numbers:

07-23-2

A F
B
C
D
E

12336-11: 15-21
12336-12: 0-7

TRUSS BRIDGE SURVEY AND INVENTORY FORM

Geographic Information

State: Virginia
Va. Dept. of Highways District: *Culpeper* ; No. *07* .
County: *Culpeper/(Fauquier)* ; No. *23/(30)*
[redacted]/Town: *Kellys Ford* .
[redacted]/Road: *State Route #620* .
River/[redacted] (crossing): *Rappahannock River* .
UTM/KGS Coordinates: _____ .

Historical Information

Formal designation: *#0984 (Structure Tabulation No.)* .
Local designation: *#6908 (District Structure No.)* .
Designer: *Horseheads Bridge Company, Horseheads, New York* .
Builder: *Horseheads Bridge Company, Horseheads, New York* .
Date: *1898* ; basis for: *Bridge/date plate* .
Original owner: _____ ; use: *Vehicular bridge* .
Present owner: *Va. Dept. of Highways & Transp.* ; use: *Vehicular bridge* .

Historical or Technological Significance

_____ Unique/Unusual in its time: _____ .

X Rare survivor though of standard design: *Only bridge by Horseheads Bridge Company in the Staunton and Culpeper Districts.* .

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

_____ Other Remarks/Explanation: *This is one of the longest pony/low trusses remaining in Virginia.*
A. G. WILLIS, Commissioner & Superintendent of Construction, Culpeper Co.
JOHN R. SPILMAN, Commissioner & Superintendent of Construction, Fauquier Co.
1936 - Center span and one to south of center washed out and rebuilt. .

Nature/Degree of any destructive threats: _____ .

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

Culpeper District Bridge Office
PLAN LXVIII-5, 8 June 1937

PLAN LXVIII, remodeling of 15 March 1943
Old photo files, VHTRC

The 1937 plans state that 2 spans were washed out, center and first to south of center. The 1943 plans deal with replacement of another span.

Recorder: *DAN DEIBLER* .
Date: *16 July 1974* .
Affiliation: *Research Council, Concrete Section* .

10[illegible]

Design Information

Compass orientation of axis: *E/W*.

No. of spans: *6*; **length; overall:** *433'*.
Span types:
(1) *Steel beam*; **length:** *18'*.
(2) *Truss*; **length:** *82'4"*.
(3) *Truss*; **length:** *83'6"*.
(4) *Truss*; **length:** *83'6"*.
(5) *Truss*; **length:** *82'4"*.
(6) *Truss*; **length:** *82'8"*.

No. of lanes: *1*; **width:** *13'2"* **c to c.**

Architectural or decorative features:
Simple 2-channel railing and 2-cable railing -- repaired spans.
Lower portion of piers are cyclopean masonry while upper portion of piers is concrete.

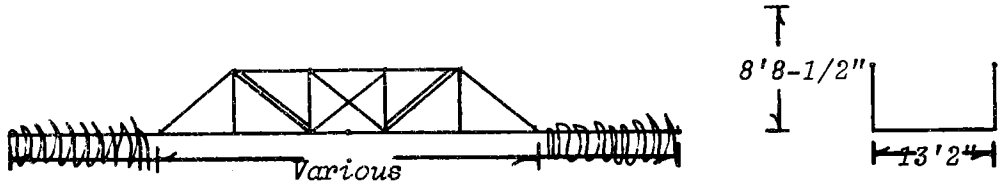
Structural Information

Substructure:
Material: *Concrete and sandstone masonry.*
Foundations:
Piers: *Concrete and cyclopean sandstone masonry*
Abutments: *Concrete; south abutment is randomly coursed broken ashlar*
Wings: *Concrete; south abutment is randomly coursed broken ashlar.*
Seats: *Concrete; south abutment seat has masonry blocks.*

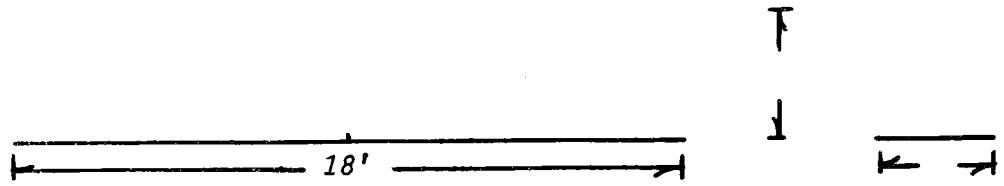
Superstructure:
Material: *Steel* **sources** *Carnegie; Pencoyd*
Characteristics, details and members:
Connections: *X* **pin.** *One truss (not span) has lacing bars on its top chords.*
_____ **rigid.**
Top Chords *2 upright channels connected with cover plates and stay plates.*
End Posts: *2 upright channels connected with cover plates and stay plates.*
Bottom chords: *Double rectilinear eye bars, loop welded.*
Posts: *2 angles connected with lacing bars.*
Diagonals: *Double rectilinear eye bars, loop welded.*
Counters: *Single cylindrical tie rods, loop welded.*

Truss Configuration

Main span type: *Low Pratt, full slope* [redacted]/Pony/[redacted]



Secondary span type: *Steel beam* [redacted]/Deck, [redacted]



TRUSS BRIDGE SURVEY AND INVENTORY FORM

Photo Numbers:
07-53-2
A
B
C
D

12336-16: 14-20

Geographic Information

State: Virginia
Va. Dept. of Highways District: *Culpeper* ; No. *07* .
County: *Loudoun* ; No. *53* .
[redacted]/Town: *Hillsboro* .
[redacted]/Road: *State Route 812* .
[redacted]/Stream/[redacted] (crossing): *N.F. Catoctin Creek* .
UTM/KGS Coordinates: _____ .

Historical Information

Formal designation: *#1864 (Structure Tabulation No.)* .
Local designation: *#6062 (District Structure No.)* .
Designer: *West Virginia Bridge Works, Charlestown, West Virginia* .
Builder: *West Virginia Bridge Works, Charlestown, West Virginia* .
Date: *189[?]* ; basis for: *Name/date plate* .
Original owner: _____ ; use: *Vehicular bridge* .
Present owner: *Va. Dept. of Highways & Transp.* ; 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: *No evidence to suggest the trusses have ever been relocated. Final digit never put on date plate.*
Bridge plaque: A. B. PEACOCK)
J. J. GRIM)- Commissioners listed on plaque.
W. D. THOMPSON)

Nature/Degree of any destructive threats: _____

Reference materials and contemporary photos/illustrations with their respective locations:
Culpeper District bridge files.

Recorder: *DAN DEIBLER* .
Date: *24 July 1974* .
Affiliation: *Research Council, Concrete Section* .

Design Information

Compass orientation of axis: *NE/SW*.

No. of spans: *1*; length; overall: *72'6"*.
Span types:
(1) *Truss*; length: *71'1-3/4"*.
(2) _____; length: _____.
(3) _____; length: _____.
(4) _____; length: _____.
(5) _____; length: _____.
(6) _____; length: _____.

No. of lanes: *1*; width: *12'11"* c to c.

Architectural or decorative features:

Wire mesh used for side railings.

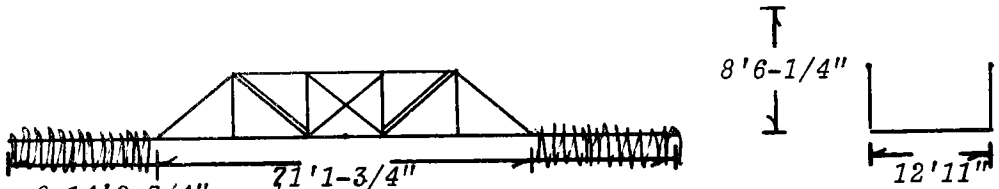
Structural Information

Substructure:
Material: *Limestone*.
Foundations: _____.
Piers: _____.
Abutments: *Uncut, random masonry*.
Wings: *Rubble masonry*.
Seats: *Stone*.

Superstructure:
Material: *Steel* sources _____.
Characteristics, details and members:
Connections: *X* pin.
_____ rigid.
Top Chords *2 upright channels connected with cover plates and stay plates.*.
End Posts: *2 upright channels connected with cover plates.*.
Bottom chords: *Double rectilinear eye bars, loop welded.*.
Posts: *Paired back-to-back angles connected with lacing bars.*.
Diagonals: *Double rectilinear eye bars, loop welded.*.
Counters: *Single cylindrical tie rods, loop welded.*.

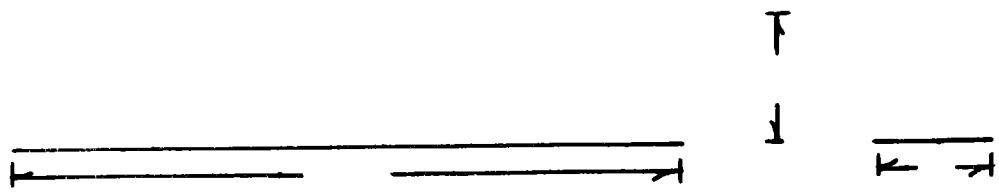
Truss Configuration

Main span type: *Pratt, full slope* [redacted]/Pony/[redacted]



5 panels @ 14'2-3/4" each

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



TRUSS BRIDGE SURVEY AND INVENTORY FORM

Photo Numbers:

07-30-5

A F
B G
C H
D I
E J

12336-17: 19-21
12336-18: 1-11

Geographic Information

State: Virginia
Va. Dept. of Highways District: *Culpeper* ; No. *07* .
County: *Fauquier/(Rappahannock)* ; No. *30/(78)*
City/Town: .
[redacted]/Road: *State Route #645* .
River/[redacted] (crossing): *Rappahannock River* .
UTM/KGS Coordinates: .

Historical Information

Formal designation: *#1366 (Structure Tabulation No.)* .
Local designation: *#6903 (District Structure No.)* .
Designer: *Columbia Bridge Works, Dayton, Ohio* .
Builder: *Columbia Bridge Works, Dayton, Ohio* .
Date: *1882* ; basis for: *Bridge/date plate* .
Original owner: *Orange/Madison Counties* ; use: *Vehicular bridge* .
Present owner: *Va. Dept. of Highways & Transp.* ; use: *Vehicular bridge* .

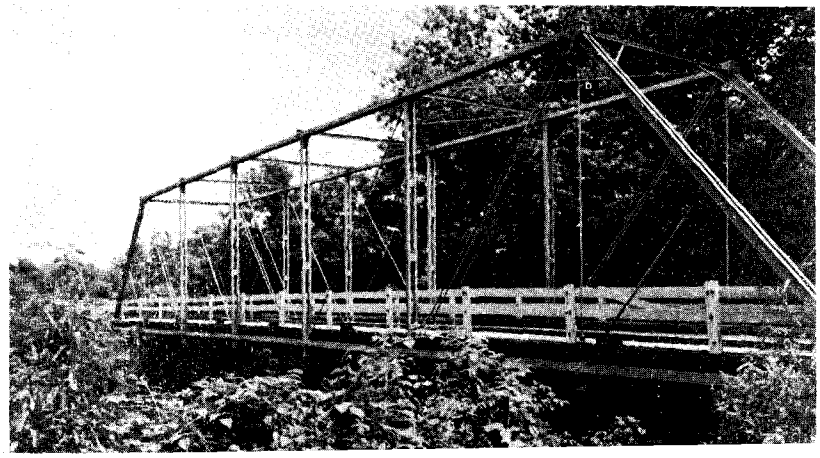
Historical or Technological Significance

X ~~Unique~~/Unusual in its time: *Has unusual structural details and is probably wrought iron.*
_____ Rare survivor though of standard design:
_____ Typical example of its time and a common survivor:
_____ Other Remarks/Explanation: *This bridge is one span of a three-span truss bridge originally located at Madison Mills on the Madison-Orange County border crossing the Rapidan. One span had been relocated to Page County, Route #654 over the Hawks Bill Creek but since replaced. Eye bars may be wrought iron; remaining structural members may be steel.*

Nature/Degree of any destructive threats:

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

Culpeper District bridge files.
Old photo files, VHTRC



Recorder: *DAN DEIBLER* .
Date: *29 July 1974* .
Affiliation: *Research Council, Concrete Section* .

Design Information

Compass orientation of axis: *NE/SW*.

No. of spans: *8*; length; overall: *280'9"*.

Span types:

(1) *Truss*; length: *98'*.
(2) *Steel beam*; length: *29'4"*.
(3) *Steel beam*; length: *29'4"*.
(4) *Steel beam*; length: *29'4"*.
(5) *Steel beam*; length: *29'4"*.
(6) *Steel beam*; length: *29'4"*.
(7) *Steel beam*; length *29'4"*
(8) *Steel beam*; length *29'4"*

Architectural or decorative features:
Wooden side railings

No. of lanes: *1*; width: *12'11"* c to c.

Structural Information

Substructure:

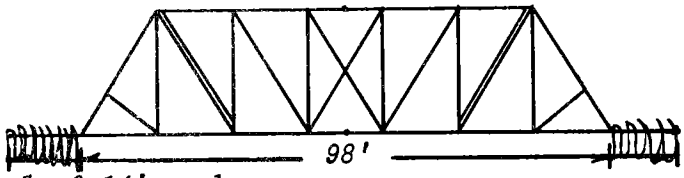
Material: *Concrete*.
Foundations: .
Piers: *Concrete*.
Abutments: *Concrete*.
Wings: *Concrete*.
Seats: *Concrete*.

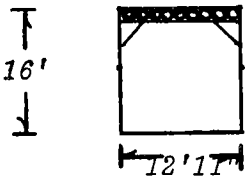
Superstructure:

Material: *Wrought iron (by date only)* sources .
Characteristics, details and members:
Connections: *X* pin.
rigid.
Top Chords *Single horizontal eye beams*.
End Posts: *Triple riveted eye beams*.
Bottom chords: *Double, very thin rectilinear eye bars, die forged*.
Posts: *2 vertical channels connected with a block-like member.*.
Diagonals: *Single and double cylindrical eye bars, die forged*.
Counters: *Single and cylindrical eye bars, die forged.*.

Truss Configuration

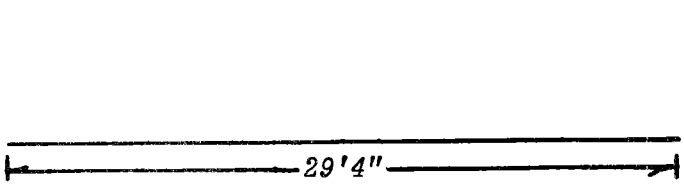
Main span type: *Pratt* Through/[redacted]

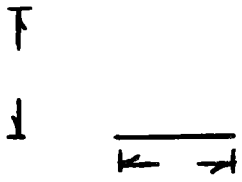




7 panels @ 14' each

Secondary span type: *Steem beam* [redacted]/Deck, [redacted]





TRUSS BRIDGE SURVEY AND INVENTORY FORM

Photo Numbers:

07-76-11

A
B
C
D
E

12336-21: 14-21

Geographic Information

State: Virginia
Va. Dept. of Highways District: *Culpeper* ; No. *07* .
County: *Prince William* ; No. *76* .
[redacted]/Town: *Nokesville* .
[redacted]/Road: *State Route #646, Aden Road* .
[redacted]/Railroad (crossing): *Southern R.R.* .
UTM/KGS Coordinates: _____ .

Historical Information

Formal designation: *#2066 (Structure Tabulation No.)* .
Local designation: *#6023 (District Structure No.)* .
Designer: *Keystone Bridge Company, Pittsburgh, Pennsylvania* .
Builder: *Keystone Bridge Company, Pittsburgh, Pennsylvania* .
Date: *1882* ; basis for: *Bridge/date plate* .
Original owner: *Southern Railroad* ; use: *Vehicular bridge* .
Present owner: *Southern Railroad* ; use: *Vehicular bridge* .

Historical or Technological Significance

_____ Unique/Unusual in its time: _____ .

X Rare survivor though of standard design: *Only truss bridge surveyed to date built by this company.* .

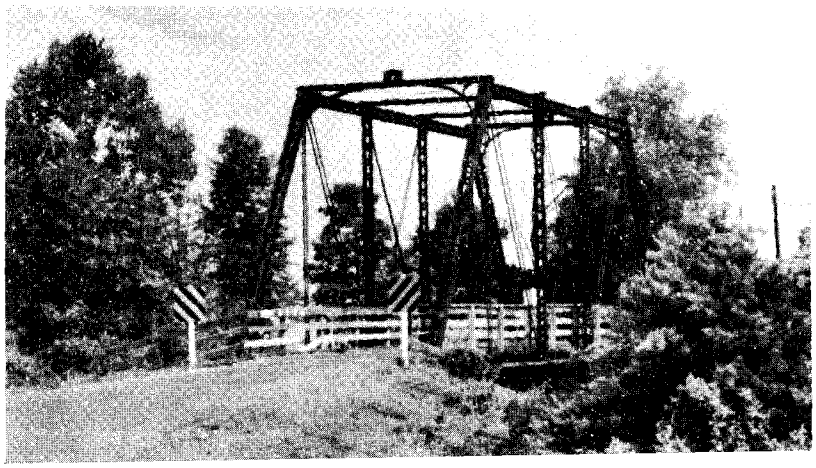
_____ Typical example of its time and a common survivor: _____ .

_____ Other Remarks/Explanation: *The date of this truss would place it in the age of wrought iron truss design.* .

Nature/Degree of any destructive threats: _____ .

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

Culpeper District bridge files



Recorder: *DAN DEIBLER* .
Date: *1 August 1974* .
Affiliation: *Research Council, Concrete Section* .

Design Information

Compass orientation of axis: *NE/SW*.

No. of spans: *1*; length; overall: *78'*.
Span types:
(1) *Truss*; length: *73'11-1/2"*.
(2) _____; length: _____.
(3) _____; length: _____.
(4) _____; length: _____.
(5) _____; length: _____.
(6) _____; length: _____.

No. of lanes: *1*; width: *16'2"* c to c.

Architectural or decorative features:
Wooden railing

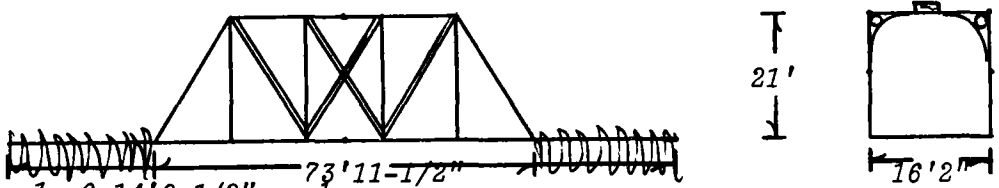
Structural Information

Substructure:
Material: *Concrete & timber*.
Foundations: _____.
Piers: _____.
Abutments: *Concrete*.
Wings: *Concrete*.
Seats: *Timber*.

Superstructure:
Material: *Wrought iron* sources _____.
Characteristics, details and members:
Connections: *X* pin.
_____ rigid.
Top Chords *2 upright channels connected with lacing bars top and bottom.*.
End Posts: *2 upright channels connected with lacing bars top and bottom*.
Bottom chords: *Double rectilinear eye bars, die forged*.
Posts: *2 vertical channels connected with lacing bars.*.
Diagonals: *Double rectilinear eye bars, die forged*.
Counters: *Double rectilinear tie rods, die forged*.

Truss Configuration

Main span type: *Pratt* Through/[redacted]



5 panels @ 14'9-1/2" each

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

Photo Numbers:
07-76-4
A
B
C

12366-R-25: 1-12

TRUSS BRIDGE SURVEY AND INVENTORY FORM

Geographic Information

State: Virginia
Va. Dept. of Highways District: *Culpeper*; No. *07*.
County: *Prince William*; No. *76*.
City/Town: _____.
[redacted]/Road: *Route #611*.
[redacted]/Stream/[redacted] (crossing): *Cedar Run*.
UTM/KGS Coordinates: _____.

Historical Information

Formal designation: *#2056 (Structure Tabulation No.)*.
Local designation: *#6047 (District Structure No.)*.
Designer: *Walker Brothers, Contractors, Charlestown, West Virginia*.
Builder: *Walker Brothers, Contractors, Charlestown, West Virginia*.
Date: *1900*; basis for: *Bridge/date plate*.
Original owner: _____; use: *Vehicular bridge*.
Present owner: *Va. Dept. of Highways & Transp.*; use: *Vehicular bridge*.

Historical or Technological Significance

_____ Unique/Unusual in its time: _____.

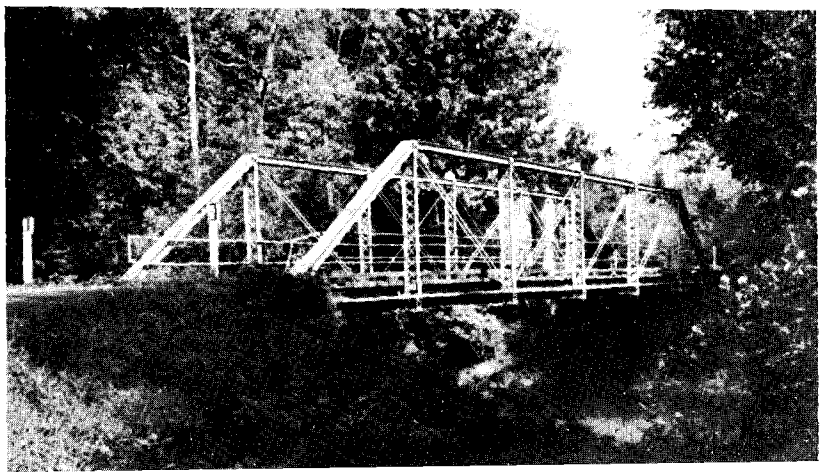
X Rare survivor though of standard design: *One of two bridges definitely attributed to Walker Brothers, Contractors.*

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

_____ Other Remarks/Explanation: *The other example of their work is a small pony truss bridge in Rockingham County, on Route #817 over Turner Run (see Form 08-82-9). Since there are no bolts at panel points on this truss, it is very likely that this is the original site for this truss. Date plate is positioned at the center of the top chord facing the roadway.*

Nature/Degree of any destructive threats: _____.

Reference materials and contemporary photos/illustrations with their respective locations:
Culpeper District bridge files.



Recorder: *DAN DEIBLER*.
Date: *3 October 1974*.
Affiliation: *Research Council, Concrete Section*.

1032

Design Information

Compass orientation of axis: *NE/SW*.

No. of spans: *1*; length; overall: *89'6"*.
Span types:
(1) *Truss*; length: *87'*.
(2) _____; length: _____.
(3) _____; length: _____.
(4) _____; length: _____.
(5) _____; length: _____.
(6) _____; length: _____.

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

Architectural or decorative features:

Simple 2-pipe railing.
Rather tall proportions.

Truss has a very unusual bridge plate mounted on top of the top chord.

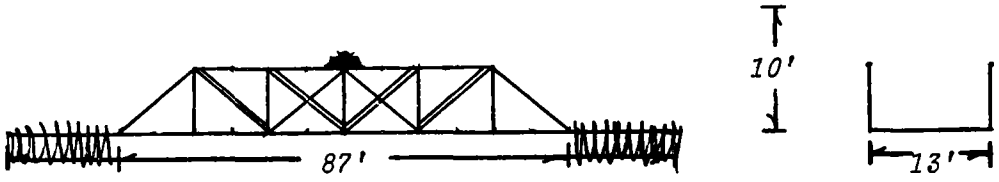
Structural Information

Substructure:
Material: *Sandstone masonry*.
Foundations: _____.
Piers: _____.
Abutments: *Coursed, randomly sized ashlar.*.
Wings: *Coursed randomly sized ashlar.*.
Seats: *Coursed randomly sized ashlar.*.

Superstructure:
Material: *Steel* sources *Jones & Laughlin*.
Characteristics, details and members:
Connections: *X* pin.
_____ rigid.
Top Chords *2 upright channels connected with cover plates and stay plates.*.
End Posts: *2 upright channels connected with cover plates and stay plates.*.
Bottom chords: *Double rectilinear eye bars, die forged.*.
Posts: *Paired back-to-back angles connected with latticing.*.
Diagonals: *Double rectilinear eye bars, loop welded.*.
Counters: *Single cylindrical tie rods, loop welded.*.

Truss Configuration

Main span type: *Pratt, full slope* [redacted]/Pony/[redacted]



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