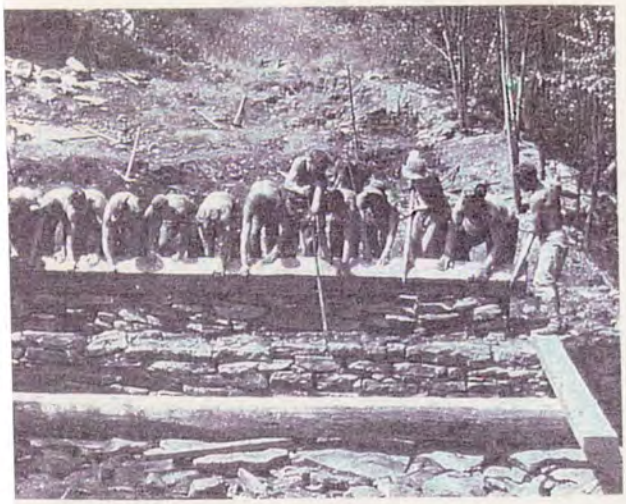
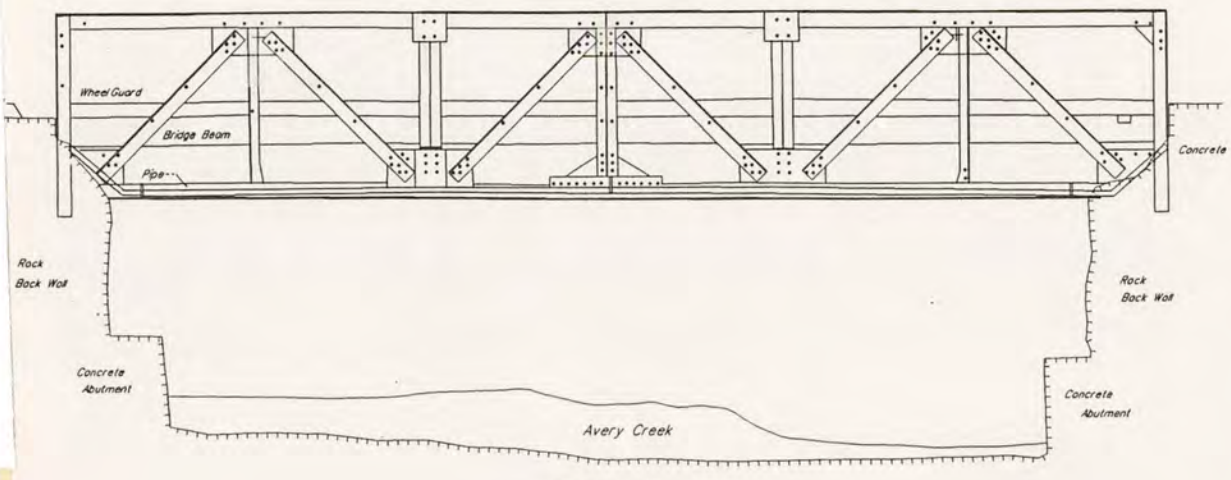


NATIONAL REGISTER OF HISTORIC PLACES DETERMINATION OF ELIGIBILITY FOR THE AVERY CREEK & ENGLISH CHAPEL WARREN PONY METAL TRUSS BRIDGES

AH RANGER DISTRICT
AH NATIONAL FOREST
NSYLVANIA COUNTY,
TH CAROLINA

National Forests in North Carolina Asheville, NC **August 1999**



Side Elevation

Avery Creek & English Chapel Warren Pony Metal Truss Bridges
Transylvania County · *National Register of Historic Places Determination of Eligibility*

National Register of Historic Places Determination of Eligibility for the Avery Creek and English Chapel Warren Pony Metal Truss Bridges

Pisgah Ranger District, Pisgah National Forest
Transylvania County, North Carolina

August 1999

A. Scott Ashcraft

Rodney J. Snedeker

National Forests in North Carolina
Asheville, NC

ACKNOWLEDGMENTS

Due to the elusive nature of the bridges' vintage and builders, the completion of this document required the assistance of many individuals and organizations, and the authors wish to recognize their contributions. The initial search began with our Brevard College intern, Rosemary Rierson, searching all of Transylvania County sources (newspapers, historical societies) and eventualiy the internet for information. We extend our sincere appreciation to Rosemary for unearthing many unknown and long lost pieces of our history. In addition, Mr. Michael Cegelis, Senior Vice President (and archivist) of the American Bridge Company in Pittsburgh, PA, has graciously fielded numerous phone requests for information and searched many volumes of old records. Mr. Cegelis went to great lengths on our behalf and provided very valuable data, and we extend a most grateful "Thank You".

An urgent request to colleagues for bridge and/or Civilian Conservation Corps evaluations among U.S. Forest Service Region 8 archeologists resulted in the arrival of several pertinent documents most helpful in generating cohesive contexts and evaluations. We appreciate the immediate response by John Ippollito (NFsTX), Rhonda Kimbrough (NFsFL), and Cecil Ison (Daniel Boone NF) to our request for information. We cannot thank enough, Sonny Cudabec, USFS Region 8, for completing the photographic documentation for the bridges with such short notice. In addition, we thank Mr. Scott Schumate, Blue Ridge Cultural Resources, Boone, NC, for providing reference materials.

In generating the historic context, we wish to recognize Mr. Clay Griffith (NC Division of Archives and History) and Ms. Debra Kraybill Bevin for permission to generously quote their extensive transportation and bridge context documentation. We also thank Clay, Ms. Renee Gledhill -Early, and Mr. Steve Claggett (NCDCR) for general guidance and assistance with this evaluation.

Of great importance were the contributions of local informants who provided invaluable first-hand accounts of their experiences. Their accounts of everyday life lends vibrance to otherwise ordinary documentation, and allows for a fuller understanding of the whole of local history. Sincere appreciation and gratitude is extended to Ms. Vera West Cansler, Mr. W.R. Boggs, Mr. L.W. Hollingsworth, Mr. Vessie McCall, and Mr. Clarence Goodson. In addition, Mr. Michael G. Domonkos and Ms. Betty Sherill are thanked for their assistance.

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Finally, we would like to mention our appreciation to the N.C. Department of Transportation, Bridge Relocation and Reuse Program, and specifically Ms. Mary Pope Furr, for her guidance and administration of the logistics involved to ensure the future public use of the truss spans.

Cover Photos:
Top: CCC enrollees building a bridge at Mineral Springs, PA 1935. National Archives 35-6-4343
Center: Avery Creek Bridge No. 2 1999 NFsNC
Bottom: Avery Creek Bridge No. 2 Planview drawn from stereoscopic image 1999 USFS

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INTRODUCTION

In 1970 the National Forests in North Carolina began detailed bridge inspections on five "select" metal truss bridges that crossed Avery Creek and the Davidson River (Figure 1) (Plate 1). Located in the Pisgah National Forest, Pisgah Ranger District in Transylvania County, North Carolina, four of the bridges crossed Avery Creek along Forest Highway 477 and one crosses the Davidson River along Forest Road 474 accessing the English Chapel church (Figures 2 & 3). The Avery Creek Bridges were constructed between 1935 and 1936, and the English Chapel bridge was constructed in 1936. Subsidiaries of the American Bridge Company of Pittsburgh, Pennsylvania built the steel trusses and the Civilian Conservation Corps (CCC) built the stone abutments and performed the final implementation of the trusses. The structural integrity of these historic bridges has become a safety concern consistent with most early 20th century bridges that do not meet the demands brought about by today's vehicular traffic. These early bridges are too narrow and structurally unsuited to withstand increased automotive traffic flow and heavier loads characteristic of todays traffic. This area is a popular recreation area drawing thousands of visitors per year to access a day-use area, a group camp area, horseback riding stables, roadside camping spots and many fishing and hiking access points.

Since the 1978 bridge inspections, the National Forests in North Carolina (NFsNC) has chosen to retain the structures through a maintenance and repair program to ensure adequate structural integrity (Appendix 1). Avery Creek bridge No. 3 was deemed unsafe in 1988 and subsequently replaced with a low-water concrete bridge. By 1998 the structural integrity of the remaining bridges had become suspect despite routine maintenance, and the bridges were targeted for replacement. Through a synthesis of inspection data, John L. Zirkle, U.S.F.S. Regional Bridge Engineer, described several deficiencies inherent in the design of these bridges. As described, the truss member geometry does not permit water to properly drain off and the trapped water along with soil and other debris accelerates the rusting process. With respect to vehicular traffic, the structures have deteriorated beyond the rehabilitation stage and new bridges were recommended to provide the public with safe access.

Faced with the imminent replacement of these bridges, the Forest Service role as a resource management agency is to provide the public with safe bridges, and to protect and enhance its historically significant properties. Following guidelines set forth in Section 106 of the National Historic Preservation Act, the Forest Service evaluates historic structures with respect to criteria outlined in the National Register of Historic Places (NRHP). Many of our nations historic bridges have been included on the NRHP, including many located in North Carolina. The goal of this document is to provide historic context relative to the Avery Creek and Davidson River truss bridges, and to evaluate these with reference to a Determination of Eligibility. Bridge significance has been justified using Criteria A & C (NRHP), and subsequent documentation conforms to 36 CFR 63 Determination of Eligibility requirements.

Four bridges have been evaluated for NRHP eligibility in this document including bridges 1, 2 and 4 crossing Avery Creek along Forest Highway 477 (Bridge 3 was removed in 1988), and the English Chapel bridge crossing the Davidson River (adjacent to U.S. Highway 276) along Forest Road 474 (Figure 4). The bridges are herein known as Avery Creek Bridges 1, 2, and 4, and the English Chapel Bridge. The three Avery Creek Bridges are scheduled for removal, the English

Thompson - Gordon - Shook
Engineers, Incorporated

JOB NO. PISGAH RANGER DIST. BR # 477-01.7
SHEET 1 OF 1
CALCULATED BY T.L. SHOTWELL DATE 4-2-81
CHECKED BY L.G. Fletcher DATE 4-2-81
DOWNSTREAM PROFILE

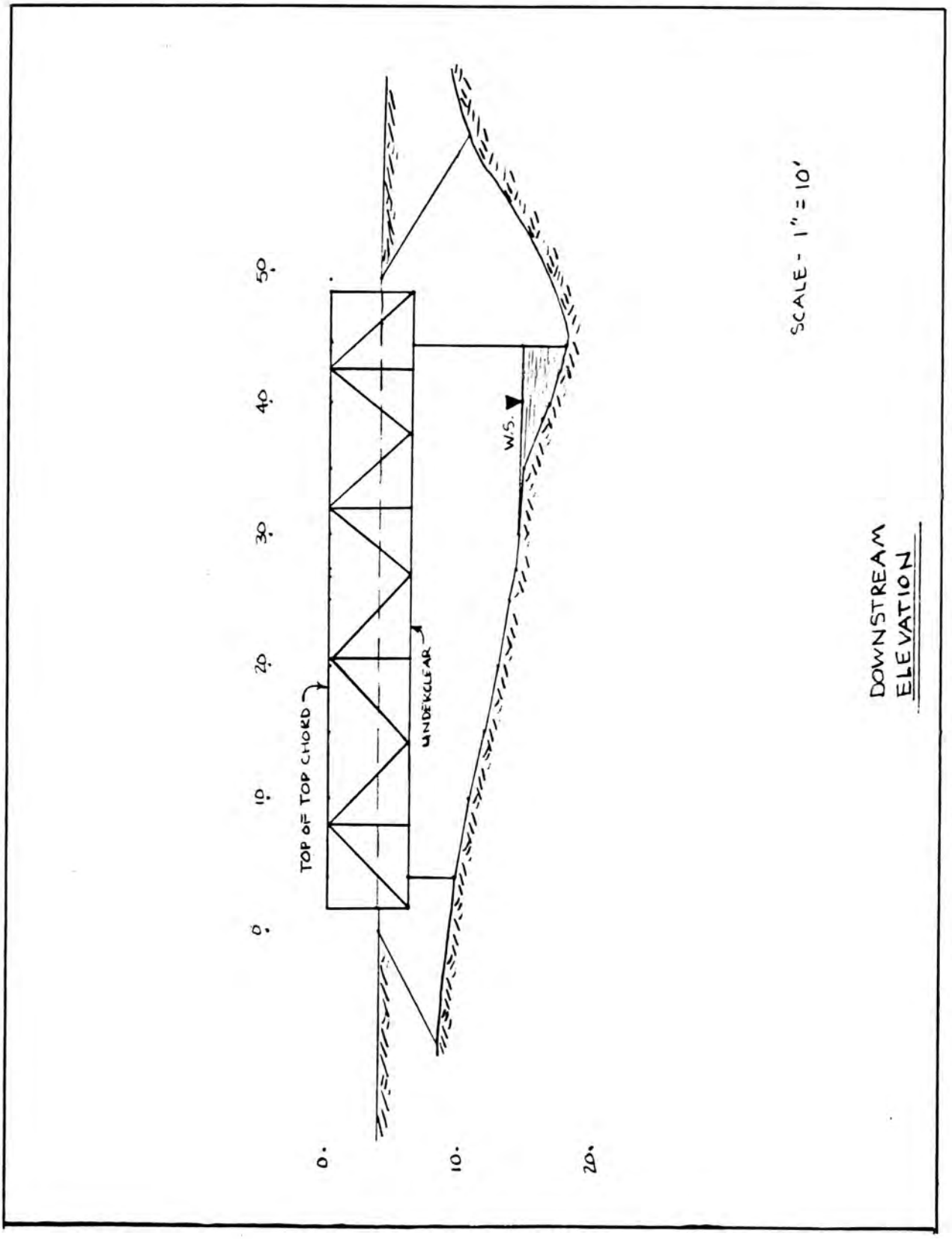


Figure 1: Bridge Inspection Truss Diagram

Plate 1: Avery Creek metal truss bridge

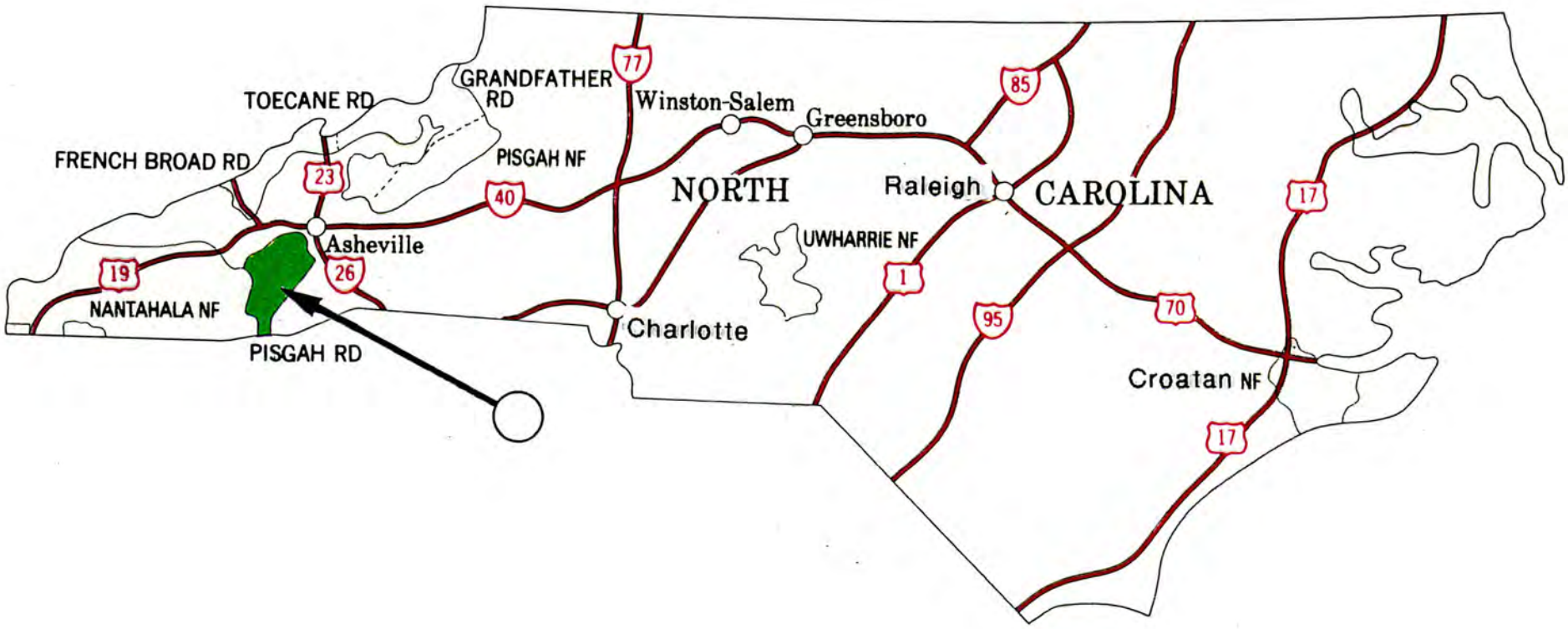


Figure 2: Location of the proposed bridge replacements

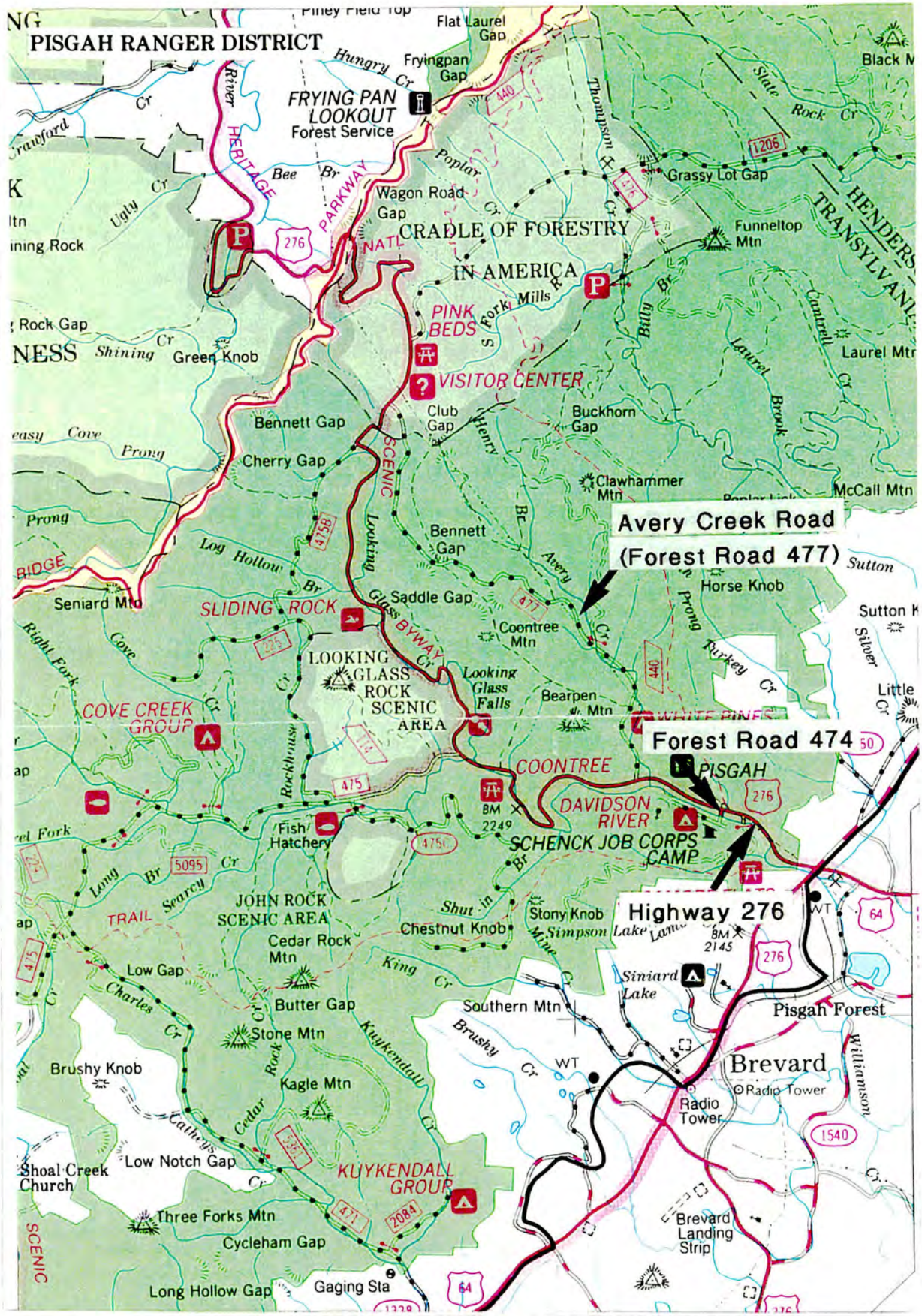


Figure 3: Location of the proposed project area showing affected roads

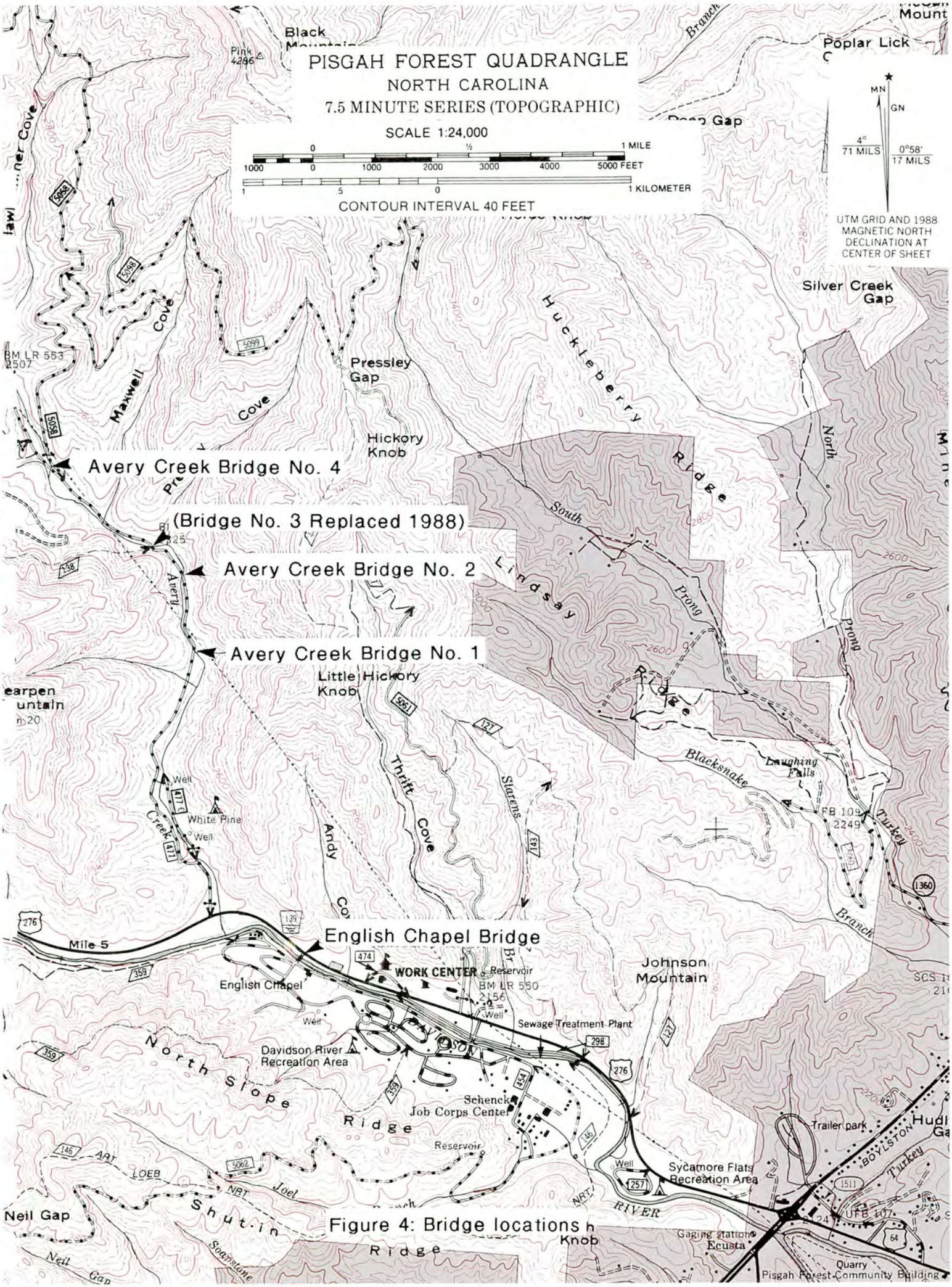


Figure 4: Bridge locations

Chapel bridge is to remain as an example of an early twentieth century CCC constructed and installed bridge. The bridges are all the same type of Warren pony steel truss and possess similar stone abutments. All of the bridges were constructed between 1935 and 1936 by the Civilian Conservation Corps. The bridges are within a two mile radius of each other. Given the homogeneity of bridge type and decking, abutment type, construction date and proximity to one another, the bridges have been evaluated as a structure group with respect to the NRHP criteria. However, individual bridge characteristics are discussed, contrasted and evaluated within the structure group.

Since their acquisition and placement in the 1930's, these bridges have been owned by the United States Forest Service, U.S. Department of Agriculture. The National Forests in North Carolina, Pisgah Ranger District has been responsible for the maintenance of the bridges. The Avery Creek bridges are located at mile markers 0.9, 1.2 and 1.7 along Forest Highway 477 (see Figure 4). The road makes a loop from U.S. 276 near the Pisgah Ranger Station office back to US 276 just south of the Cradle of Forestry Visitor's Center (see Figure 3). The English Chapel Bridge is located at milepost 0 along Forest Road 474 just after its departure from U.S. Highway 276. The intersections of the Forest Roads 477 and 474 with U.S. 276 are less than a mile apart (see Figure 4).

Pursuant to National Environmental Policy Act requirements, the NFsNC generated an initial project proposal for the Avery Creek bridge replacements and distributed this for public review and comment. Considering all natural and historic resources involved, the NFsNC is attempting to limit the relative impacts wherever possible. Below listed are the proposed actions for the bridge replacements as described in the public record on February 17, 1999 (Rowe and Buncick).

The proposed method for bridge replacement will require no disturbance in the stream and very little ground disturbance on the stream bank. Replacing the bridges requires the following:

1. The steel bridge will be lifted out, leaving the existing abutments in place;
2. New concrete abutments will be located back from the existing abutments, up the bank and slightly above the high water mark. New abutments will be concrete, poured on the site;
3. Road alignment will remain the same at bridges 1 and 4 and will be changed a few feet at bridge three;
4. The new bridges will be prefabricated concrete beams, brought to the site by truck; and
5. Avery Creek Road will be closed to through traffic for up to 7 months (Nov. 1999 - May 2000), however, either end may be open up to the point where a bridge is being replaced.

These roads receive large volumes of recreational traffic every year and need to be improved to safely accommodate our forest users.

Recognizing the historic significance of the pony truss spans themselves, the NFsNC in coordination with the North Carolina Department of Transportation - Division of Highways (Bridge Relocation and Reuse Program) will ensure the preservation of the truss spans. The trusses will be donated and relocated for future public use. This action is described in more detail in the Mitigation of Effects section of this document.

HISTORIC CONTEXT

The scope of this historic context requires the consideration of four related histories pertinent to the Avery Creek and English Chapel Bridges. These are a North Carolina transportation context, bridge engineering context, Forest Service lands transportation context, and a Civilian Conservation Corps context. Historic contexts for transportation and bridge type (engineering) on state roads have been thoroughly developed for North Carolina via two inventory and evaluation documents generated through the Federal Highway Administration (FHWA), North Carolina Department of Transportation (NCDOT), and the North Carolina State Historic Preservation Office (NCSHPO).

In 1979, consultant George Fore formulated a historic context for the 259 metal truss bridges located on state-owned roadways. Borrowing from a rating system developed by the Virginia Highway and Transportation Research Council (Deibler 1975), Fore evaluated the merits of each bridge for NRHP eligibility. Of the 259 state bridges surveyed and evaluated, 35 were determined eligible for listing in the NRHP. In 1995 the FHWA, NCDOT, and NCSHPO, in coordination with the Keeper of the National Register, pursued a re-evaluation of the remaining metal truss bridges in North Carolina. Authored by Clay Griffith (NCDOT) and Debra Kraybill Bevin (NCSHPO), the study created additional historic metal truss bridge context, revised the evaluation system for these bridges, and determined the eligibility of the bridges. The transportation and metal truss bridge contexts for state roads for this document is drawn entirely from the above mentioned sources.

The function of Forest Service transportation networks contrasts somewhat from the North Carolina public roads works. Although many roads were designed for public vehicle use, most roads were designed or maintained for access to manage and extract natural resources. In addition, the historic (prior to government acquisition) pursuit of resources in the mountains of Western North Carolina produced a very unique transportation system for the removal of timber and minerals. Given the nature of Forest Service landuse and transportation needs, additional context for these lands has been generated to describe the whole of North Carolina's transportation past.

The history of the New Deal era Civilian Conservation Corps and its accomplishments has had a considerable and lasting effect on Western North Carolina. Large scale projects like the construction of the Blue Ridge Parkway, widespread planting of forests, and the construction of numerous recreational areas were an investment in which Western North Carolina still reaps the aesthetic, social and economic benefits. The U.S. Forest Service specifically benefitted from the massive road and bridge construction, forest planting and maintenance, and watershed restoration CCC projects. Various local and non-local sources were available for the generation of this context.

TRANSPORTATION CONTEXT

North Carolina's State Highways
(Griffith and Bevin 1995)

The natural transportation systems of North Carolina handicapped the state's early economic development and served to influence the prevalent modes of transportation and the physical development of the state's major routes and facilities. The importance of the "Good Roads Movement" in North Carolina in the 1920's results in part from the insufficient and inadequate transportation systems of the previous two centuries.

Despite the state's extensive coast line, North Carolina suffered economically in the eighteenth and early-nineteenth centuries due to the dangerous coastal waters and lack of good harbors. Only one of North Carolina's principle rivers flows directly into the Atlantic Ocean while the others empty into the shallow Albemarle and Pamlico Sounds or waterways outside the state. The barrier islands and sounds along the coast complicated navigation and provided "few good outlets for ocean commerce" (Lefler and Albert 1954). An adequate natural system of inland waterways in the coastal plain, however, provided the primary routs of trade and travel throughout the colony. These navigable waterways and the area's rich soil attracted the earliest settlers to northeastern North Carolina. As the coastal areas became more densely populated and settlers had to move further away from navigable watercourses, particularly into the Piedmont, the pleas for road development began in earnest.

The earliest colonial roads were little more than Indian trails or trading paths where tree branches had been cut away to allow a rider on horseback to pass without being struck, but these trails evolved into the primary routs of travel in the eighteenth century. The act of 1764, one of many eighteenth century road laws, authorized the county courts to order "the laying out of roads," establish ferries, designate the location of bridges, and clear navigable rivers and creeks. The courts could delegate "Overseers of the Highways and Roads" to enlist "all male taxables, ages sixteen to thirty, to work the roads a certain number of days each year." Under this system public roads were laid out and cleared of trees and obstructions to a width of twenty feet (Lefler and Newsome 1956). If the road laws had been enforced, the state might have developed a satisfactory network of good roads in its infancy.

In the eighteenth century, bridges were uncommon in areas of North Carolina where water travel was prevalent, but as settlement extended gradually inland, ferries and bridges were needed to cross the deeper and swifter creeks and rivers. In their absence, travelers risked either fording the waterway or taking a circuitous route. As a crossing became more heavily traveled, a ferry might have been established to reduce the risk of fording the creek or river and to make a profit for some enterprising individual. Many ferries were eventually replaced with bridges built by the county to allow for the unrestricted movement of traffic at the crossing. The Act of 1764 stipulated that bridges over small streams were to be constructed of wood "at least fourteen feet long, laid across the road, well secured, and covered with earth." Bridges over larger creeks and streams were to be "at least twelve feet wide, made of sawed plank at least two inches thick, with strong posts, rails, and beams, all well fastened together" (Lefler and Newsome 1956).

Archibald D. Murphy and the Reverend Joseph Caldwell were early proponents of an improved transportation network within the state to establish economic independence from North Carolina's neighboring states and help curtail the statewide problem of emigration. Murphy introduced a proposal to the General Assembly in 1815 that called for the improvement of existing waterways, clearing of river channels, connecting principal waterways by canals, building good roads and turnpikes, and developing strategic centers of trade and distribution. Although Murphy's plan initially met with statewide support, emphasis on regional projects and sectionalism led to ineffective appropriation of the internal improvement funds (Ashe 1906).

The introduction of the locomotive engine and the operation of two "experimental railroads" in North Carolina aroused interest among the state's leaders and citizens concerning this new mode of transportation. In November 1833, the General Assembly chartered ten railroad companies to be constructed with private funds including the Wilmington and Weldon (originally chartered as the Wilmington and Raleigh) and the Raleigh and Gaston, both completed in 1840. The most important of the early railroad companies, however, proved to be the state-operated North Carolina Railroad (NCRR). chartered in 1849 an completed in 1856, because it not only linked the growing industrial cities of the state along its route but also demonstrated the willingness to the state's leaders to consider public funds for transportation projects. In the decade preceding the Civil War, North Carolina's railroads showed their potential to spur economic growth, but the war effort left the state's railroads in poor condition. By the mid-1870's, construction and consolidation of rail lines in North Carolina began a new era of prosperity.

In addition to railroads, North Carolina's leaders pursued the construction of plank roads as an antidote to the state's poor transportation systems. The General Assembly chartered numerous private companies to build plank roads many radiating from Fayetteville, with the state subscribing up to three-fifths of the stock. Within ten years, however, most of the plank roads were in need of extensive repairs, and consequently abandoned, since the roads had not been profitable.

Although the railroads improved North Carolina's economic condition significantly, agitation for good roads resumed in the last quarter of the nineteenth century. The Mecklenburg Road Law, passed in 1879, provided for roads funded through taxation and implemented by the old labor system. This legislation was enacted as a general law but, in reality, only applied to a few counties. Most progressive counties, however, had adopted similar tax-based road building programs by the end of the century. Rural Free Delivery mail service, instituted by the federal government in 1896, generated additional interest in good roads. Ultimately, North Carolina's desire for an extensive and dependable highway system achieved broad-based acceptance in the early twentieth century with the introduction and widespread availability of automobiles. The number of registered automobiles in North Carolina rose sharply from 2,400 in 1910 to 150,000 in 1921. By 1929, nearly 500,000 vehicles were registered in the state (Lefler and Newsome 1989).

The "Good Roads" era of highway building in North Carolina can be said to have begun under Governor Locke Craig (1913-1917). In 1915, the Legislature created the State Highway Commission (SHC) and appropriated $10,000 for the construction of highways, in anticipation of the Federal Aid Road Act passed in 1916. The work of the SHC was carried out by four departments - bridges, testing, plans and estimates, and construction - under the supervision of the State Highway Engineer. State lawmakers passed new legislation in 1917 allowing the SHC to

receive funds from automobile registration with the stipulation that 70 percent of the revenues were to be expended on the county from which they were collected.

A far-reaching, but ultimately flawed, piece of legislation enacted in 1919 "symbolized the beginning of real highway work" in North Carolina (Waynick 1952). The SHC was charged with constructing all roads on the state highway system, assisting the counties with highway work, and allocating Federal Aid funds. The 1919 act created the State Highway Fund and gave priority for highway projects to counties that provided one-fourth of the construction costs, to the disadvantage of poorer counties. The main fault of the legislation was that the responsibility of maintenance was left to the counties.

Acknowledgment of the inadequate system of maintenance and the need for even more and better roads led to the beginning of the Good Roads campaign. In 1921, the Doughton-Connor-Bowie Act was passed, empowering the state to assume control of a network of approximately 5,500 miles of hard surfaced roads in North Carolina. The proposal called for linking the state's 100 county seats, principal towns, state parks, principal state institutions, and the highways of adjoining states (*N.C. Highway Bulletin,* vol. 2, no. 2 1921). To pay for this new responsibility, the state imposed a fuel tax of one cent per gallon, established a series of vehicle license and registration fees, and, most significantly, approved a $50 million bond issue. In the years of Governor Cameron Morrison's term (1921-1925) additional highway bonds were approved, bringing the total to $115 million for the period from 1921 to 1927. During this period of highway building, North Carolina became known as "the Good Roads State" (Harrington 1989).

The Bridge Department of the SHC was responsible for the design and construction of bridges on the State Highway System and for providing assistance to the counties. William L. Craven headed the Bridge Department from the late-1910s until 1949. Craven brought nearly 15 years of experience working with bridge companies in Pennsylvania, Virginia, and North Carolina when he began with the SHC. Mr. O.F. Yount, Superintendent of Bridge Construction in the early 1920s, spent a number of years with the Virgina Bridge and Iron Company of Roanoke, Virginia, prior to beginning work with the SHC. Both men not only possessed considerable knowledge in the design of metal truss bridges, but also played important roles as reinforced concrete came to be the preferred material for bridges on the state highway system beginning in the early 1920's (Craven 1922, Yount 1920).

By the time the 1930's arrived and the Depression took hold, the counties clearly could not maintain the network of secondary roads, much less improve them. The legislature voted in 1931 to assume responsibility for county roads, which placed the state in charge of the entire secondary road system. On this single action, the state took over 40,000 miles of roads and 15,000 bridges (Hardin 1966). The highway fund was diverted to other state programs during the Depression, but by 1935, highway building resumed in earnest as revenues began to rise. Since World War II, North Carolina has continued to extend and improve its highway system to serve all citizens of the state.

BRIDGE CONTEXT

(Griffith and Bevin 1995)

The most common bridge type constructed in late-nineteenth and early twentieth century North Carolina was the metal truss. It was the successor to the covered wooden truss bridge, of which only two survive in the entire state - Pisgah Community Bridge in Randolph County and Bunker Hill Bridge in Catawba County. By contrast, 100 metal truss bridges are still in service on the road system. North Carolina's remaining metal truss bridges exemplify more than fifty years of rapid refinement in the fields of bridge engineering and design.

A truss is a rigid framework of interconnecting members designed to resist compression, a force that presses together, and tension, a force that stretches apart. In a truss, long top and bottom beams, called chords, are connected by panels of shorter structural members, often arranged in triangles. Paired trusses that are joined by a deck and rest on abutments at each end form a truss bridge. The trusses distribute stresses and transfer loads to the abutments, enabling the bridge to support its own weight, as well as live loads generated by vehicular traffic.

Simple wooden trusses have been used since ancient times to span bodies of water or other obstacles to travel. The earliest truss bridges were constructed of heavy wooden timbers and were covered to provide protection from the weather. Wood was ultimately an impractical material for truss bridges, however. While it acts well in compression, wood is less flexible in tension and is susceptible to weather and fire. Iron, first and then wrought, began to replace some of the wooden members in truss bridges beginning in the 1840's. Iron was mass-produced, inexpensive, strong, and fire resistant. Most importantly, iron's elastic properties allowed it to function equally well in compression and tension. Once the Bessemer process for converting iron to steel made structural steel widely available in the 1880's, steel in turn superseded iron as the preferred material for truss bridges.

A truss is identified by its configuration to tension and compression members. Throughout the nineteenth century, engineers, architects, and builders designed and patented a series of truss configurations to be used for bridges. J.A.L. Waddell, in his 1916 textbook on bridge engineering, likened the evolution of truss design to "survival of the fittest," with only the simplest and most efficient configurations enduring into the twentieth century and gaining widespread use (Waddell 1916).

The earliest of the truss patents was awarded in 1806 to carpenter Theodore Burr, who combined a wooden arch for strength with a wooden truss for rigidity. Architect Ithiel Town followed in 1920 with a wooden lattice truss composed of closely spaced diagonal timbers. In 1840, designer William Howe was the first of many to specify the use of iron members in combination with heavy wooden timbers. Complicated geometric configurations designed by railroad bridge engineers Wendel Bollman and Albert Fink specified all metal parts, but these were expensive to construct and lacked the rigidity that was essential to good truss design.

Surviving metal truss bridges in North Carolina date from 1891 to the 1930s and are representative of the last stage of truss design evolution, in which a few patented configurations and standard variants were widely used. All of the state's surviving metal truss bridges are variants of either Pratt or Warren truss. These two trusses were versatile, durable, and inexpensive to fabricate and erect. Though designed for a combination of wood and iron members, they were easily adapted to all-steel construction. Caleb and Thomas Pratt, father and

son, patented a simple truss design in 1844 that used vertical wooden compression members and diagonal iron tension rods. Variants of the Pratt truss found in North Carolina include the Pratt half-hip, the Parker, the Camelback, and the Petit. Patented in 1848 by British engineers James Warren and Willoughby Monzani, the basic Warren truss consists of diagonals alternately acting in tension and compression. All of the surviving Warren truss bridges in North Carolina conform to the basic Warren design, and many incorporate vertical members as stiffeners. Several variants of the basic Warren configuration such as the Warren Polygonal Chord and the Warren Lattice Truss were once found in the state but these bridges have been demolished.

Truss bridges are further characterized by the relationship of the roadway to the trusses that support it. Through and pony truss bridges carry the roadway level with the bottom chords of the truss while deck truss bridges carry the roadway level with the top chords. Through truss bridges are differentiated from pony truss bridges by their use of lateral bracing between the top chords. Because pony trusses are generally lower, they do not require overhead bracing and are suited for spanning relatively short distances. Through and deck trusses are capable of longer spans, while multiple trusses were used to span the greatest distances.

One final distinguishing feature of metal truss bridges is the method used to connect the members. In most nineteenth-century truss bridges, structural members were joined by placing a large pin through a hole at the joint. Pin-connected trusses could be easily and quickly assembled on-site using unskilled labor. Pinned joints could loosen with use, however, causing increased vibration. An alternative method of construction called for riveting the members to a gusset plate at each joint. Although the riveted trusses had to be assembled in the factory, making them more complicated to transport to the site and erect, they provided greater strength and rigidity and were favored for heavier-duty bridges. Improvements in pneumatic field riveting in the 1890s meant that riveting no longer had to be done in the factory, and riveted connections became more commonplace.

Prior to the establishment of the state highway system in 1921, counties owned public roads and were responsible for erecting and maintaining bridges. County officials could order standard bridges directly from mail order catalogs or traveling salesman representing one of the numerous regional bridge manufacturers. After the creation of the State Highway Commission (SHC) in 1915, state engineers were available to advise counties on bridge design. An item in the *North Carolina Highway Bulletin* from 1920 counseled county officials to "employ a competent engineer to determine the size of waterway required and the type of structure best suited to the location and, after a careful survey is made, have him draw up plans for the bridge. These plans should be submitted to the Bridge Department of the State Highway Commission for checking and approval by engineers thoroughly familiar with this work" (*N.C. Highway Bulletin* vol. 1, no. 3 1920).

A state road system was established for primary routes in 1921 and was expanded to include all secondary roads in 1931. The SHC's Bridge Department took over responsibility for bridge design and construction on state-owned roads. An example of a bridge constructed during this period is the Neuse River Bridge at Goldsboro (no longer extant), which carried the Goldsboro-Wilmington Highway, "an artery of the State Highway System." The bridge was designed "in its entirely by Mr. Wm L. Craven, Bridge Engineer of the State Highway Commission, and plans drawn up in the Bridge Department under his direction" (*N.C. Highway Bulletin*, vol. 2, no. 10 1921). Documentary plaques credit the SHC with bridge design on a few of the surviving

bridges, but many of those after 1921 and all bridges after 1931 can be assumed to represent the work of the Bridge Department engineers.

Whether designed by a professional engineer or ordered from a catalog, all metal truss bridges were fabricated by companies specializing in iron and steel work. In the nineteenth century, these companies often combined a foundry for producing the iron components with a contractor specializing in bridge construction. Once steel became the preferred truss material, most bridge companies focused on fabrication, relying on large steel mills to produced the increasingly standardized parts.

Prolific bridge companies in Roanoke, Virginia, and other urban industrial centers fabricated many of the state's surviving metal truss bridges. Roanoke firms that built bridges in North Carolina include the Roanoke Iron & Bridge Works, Virginia Bridge & Iron Company, Camden Iron Works, and American Bridge Company. A handful of North Carolina's metal truss bridges were fabricated in-state by branch offices of firms based elsewhere, like the Atlantic Bridge Company of Roanoke, which had a branch office in Charlotte, and the Owego Bridge Company of Owego, New York, which operated a regional office in Greensboro. Of the surviving bridges, only Surry #164 was fabricated by a North Carolina based firm - Greensboro's Carolina Steel and Iron Company. A few North Carolina bridges were fabricated outside of the south east, including Haywood #79, the state's oldest surviving metal truss bridge, which was fabricated by the internationally-known Phoenix Bridge Company of Phoenixville, Pennsylvania.

Although the SHC continued to design metal truss bridges into the 1930s, reinforced concrete increasingly became the material of choice for new bridges, especially on heavily-traveled roads. An item in the *North Carolina Highway Bulletin* from 1921 advocated the use of reinforced concrete bridges because "structures of this type require no painting, have no wood floors to replace, and as they grow older the strength increases" (*N.C. Highway Bulletin*, vol. 2, no. 5 1921). In some cases when metal truss bridges were replaced with reinforced concrete structures, the truss bridges were relocated to less heavily-traveled crossings for continued service. Truss bridges were well-suited to relocation because of their easy disassembly and transport. For example, several Parker truss spans from the Roanoke Rapids Bridge in Halifax and Northampton Counties were moved in 1965 to replace two bridges in Polk County over the Green River and one bridge in Jackson County over the Tuckaseigee River. The exact number, however, of truss bridges that has been relocated is not known for certain, but it is likely that many of North Carolina's truss bridges have served transportation purposes at more than one location. Relocating metal truss bridges remains one option for preserving these resources into the next century.

U.S. FOREST SERVICE TRANSPORTATION CONTEXT

The transportation history of Forest lands in Western North Carolina is characterized by two separate periods defined by the Government acquisition of private lands. This acquisition of private lands resulted in a substantial redirection of transportation scope. The early 20th century conservation, forestry, and watershed restoration movement in the U.S. was partly inspired by the destructive landuse history in the once majestic Western North Carolina forests. The mountainous terrain was substantially damaged by a combination of natural and cultural factors prior to Forest Service ownership. Since acquisition, Forest Service management has produced a relatively stable physical environment.

Western North Carolina is part of the larger Appalachian social and economic region characterized by rough mountainous topography. The mountains have acted as a physical barrier that affected cultural, social, and economic development and interaction with surrounding areas. The first EuroAmerican settlers entered the relatively remote area in the late eighteenth century. Land grants to Revolutionary War veterans provided an additional incentive for settlement, as did the Cherokee removal treaty of 1835. Most of these early settlers were small-scale farmers, with settlement density generally low, and restricted to river and major creek floodplains (Harmon and Snedeker 1987). Travel was always difficult in the Western North Carolina mountains. Prior to the coming of the railroads in the late nineteenth century, travel was either by foot, horse, or boat.

The heart of the transportation and communication system in the mountains was a network of trails and dirt roads connecting each community with the larger villages and towns, and in turn with the nearest marketing centers of the low country. The earliest white settlers found the mountain landscape already interlaced by big-game and Indian trails, and they quickly turned these ancient paths into minor roads. Continued use gradually widened the narrow roadways, which usually ran along the banks of creeks and rivers, and frequently crossed the watercourse as they wound toward the headwaters of another stream. Such roads were usually steep and often muddy and impassable in the winter and spring, but they served the limited needs of early settlers (Eller 1979).

The area was sparsely populated until the years following the Civil War, when Western North Carolina was linked to the east by improved roads and completion of the railroad (Harmon and Snedeker 1987). The improvements in transportation, however, did not affect most mountain rural areas until the twentieth century. Thus, while technological change and industrial growth change expanded transportation facilities in other areas of the nation, there matured in Appalachia a traditional transportation network which primarily met local needs (Eller 1979). It was the large-scale pursuit of the vast virgin forests that initiated major changes within western North Carolina's transportation system.

Early lumbering in the area began around 1880 and was relatively selective with what was cut. Railroads were not yet in use for logging in remote areas. Logging was initially limited to areas along rivers and creeks, but when these areas were clearcut and depleted, operations moved into the higher, more remote sections of the forest (Harmon and Snedeker 1987). To get these giant trees out of the interior forests before railroads, tram roads of thick hardwood planks were laid across heavy stringers. This provided footing for draft animals to pull wagons. Later, wooden rails were added, and logs were loaded on trucks with iron wheels, still pulled by animals

(Bolgiano 1998). Oxen were the primary beasts of burden and they often were led down the path of least resistance, thus creating a temporary "skid road".

The introduction of industrial scale logging into western North Carolina brought the funding for widespread use of the railroad. Between 1890 and 1920, the "lumber barons" purchased and cut over huge tracts of mountain timberland, devastating the region's forests in one of the most frenzied timber booms in American history. This boom was facilitated primarily with the use of locomotives for large-scale removal of logs. The Western North Carolina Railroad arrived in Asheville, North Carolina on October 3, 1880 (Eller 1979). The line was soon extended west of Asheville and connected with other regional railroads, and Western North Carolina was opened up for railway logging.

Many lumber companies entered into western North Carolina, and many new companies were created during the logging boom period. Thousands of miles of narrow-gauge railroads were cut into the mountain sides of western North Carolina extending up the highest peaks the Appalachians have to offer. The area now know as the Pisgah Ranger District was initially logged by the Scottish Brothers from 1886 to 1891. The Vanderbilts acquired most of this area (69,0000 acres) in 1890 from the State of North Carolina. The Vanderbilts sponsored further logging under the management of Gifford Pinchot and Dr. Carl Schenck until the time of Forest Service acquisition between 1916 and 1921 (Harmon and Snedeker 1987). Nearby areas outside of the Vanderbilt acquisition were extensively logged by the Silversteen Brothers of Balsam Grove, North Carolina.

George Vanderbilt hired Pinchot and Schenck because they practiced a new, and controversial form of conservation forestry. Pinchot, followed by Schenck, initially utilized the existing transportation system of roads and trails to perform this mission. Most existing roads at the time served remote communities and individual farmsteads and were at times impassable. Vanderbilt, however, did finance the construction of some new roads and the maintenance of others. The Carr Lumber Company began logging on the tract in 1912 and provided the financing for the construction of narrow-gauge railroads. These rails were used by compact and powerful locomotives that could access and remove loads of timber from areas once considered remote.

In 1912, under financial duress, George Vanderbilt sold the timber rights on the Pisgah tract to the Carr Lumber Company. This contract provided for a twenty-year period where the Carr Lumber Company had sole logging rights on most of the tract. The contract also stipulated that Carr maintain many of the roads and trails on the tract:

> The approximate length of each of the roads and each of the trails which the contract with Mr. Carr provides he must keep cleared from brush or debris resulting from his logging operations... (F.S. acquisition files, 1913).

Edith S. Vanderbilt, widow of the recently deceased George Vanderbilt, sold 86,700 acres to the Federal Government between 1916 and 1921 (Tract PV-1). These lands were some of the first acquired under the Weeks Act and formed the bulk of lands initiating the Pisgah National Forest. The U.S. Forest Service, with great reluctance, was obligated to honor the original contract between Vanderbilt and Louis Carr (F.S. acquisition files). Unlike Pinchot and Schenck, Carr practiced a relatively harsh form of logging with little consideration for regeneration and watershed concerns (Forest acquisition files). Logging for Carr was a venture of profit and the

investments in the railroad line, roads, and trails were enough to ensure basic usability. Carr constructed and operated the rail lines along the Davidson River and up Avery Creek (Figure 5).

In the mid 1930s the Carr contract expired on the Pisgah tract and the Forest Service inherited a transportation system that required extensive work. Where the public had access, extensive repairs and modernizing was required. On more remote roads, trails, and logging trails, the Forest Service utilized, repaired and maintained many of them for future land management and public use. Like most lumber companies, Carr disassembled the railroads for salvage or reuse leaving behind graded railroad beds. Many of these were adopted for road and trail use. Of less permanence however, were the many bridges the loggers had built to remove timber. Most of these bridges were designed for temporary use and had fallen into disrepair over the years. In addition, many of the stream and river crossings were simple fords which would require bridge construction.

Avery Creek and Davidson River Roads

The Avery Creek road historically accessed the Pink Beds area from the Davidson River communities. Winding up Avery Creek between Coontree and Clawhammer Mountains, this road passed through Bennett Gap and back down into and through the Pink Beds, then meandered back down the mountain into the Mills River area. This road was the main access and through-way for numerous families in the Avery Creek cove and Pink Beds communities. The origin of the road may date back to trails created and used by American Indians that were hundreds or thousands of years old. Early settlers adopted at least segments of American Indian or game trails extending through this drainage basin.

The Davidson River Road historically paralleled the Davidson River from its intersection with Highway 280 at Pisgah Forest and followed the river to its headwaters in the Gloucester area. Its historic location followed a different route than today with large segments located on the opposite (south) side of the river (Figure 6). When the river floodplains were occupied and heavily farmed in the early twentieth century, the road ran along the southwest banks accessing the many established farmsteads. After the road enters Gloucester Gap, it intersects with three other roads which follow along ridgelines and drainage systems. Like the Avery Creek Road, travel along established routes next to the Davidson River originated with American Indians.

Both the Avery Creek and Davidson River roads are shown on early historic maps dating back to the turn of the century (Figure 5). During the early 20th century, the area was relatively densely populated as evidenced by structures mapped on a 1906 Pisgah topographic quadrangle (see Figure 6). Twenty-nine structures are mapped adjacent to the Davidson River Road between Highway 280 and Gloucester Gap, and thirteen structures were mapped adjacent to Avery Creek Road between its intersection with Davidson River road and Bennett Gap (see Figure 6). Occupation of the Avery Creek area peaked during the 1920s with approximately 75 house structures located here (Cansler pers com). In 1906 the historic Davidson River Road crossed up-river relative to the English Chapel Bridge location. Although these roads served as major access roads to the area, they often became very rough or impassable during wet months (Cansler pers com).
As part of the timber contract with Vanderbilt, Carr was required to maintain sections of both the Avery Creek and Davidson River Roads. Forest Service acquisition files show that Carr was responsible for maintaining approximately seven miles of "Bennett Gap Road" (known today as Avery Creek Road) and approximately seven miles of the Davidson River Road. The Bennett Gap

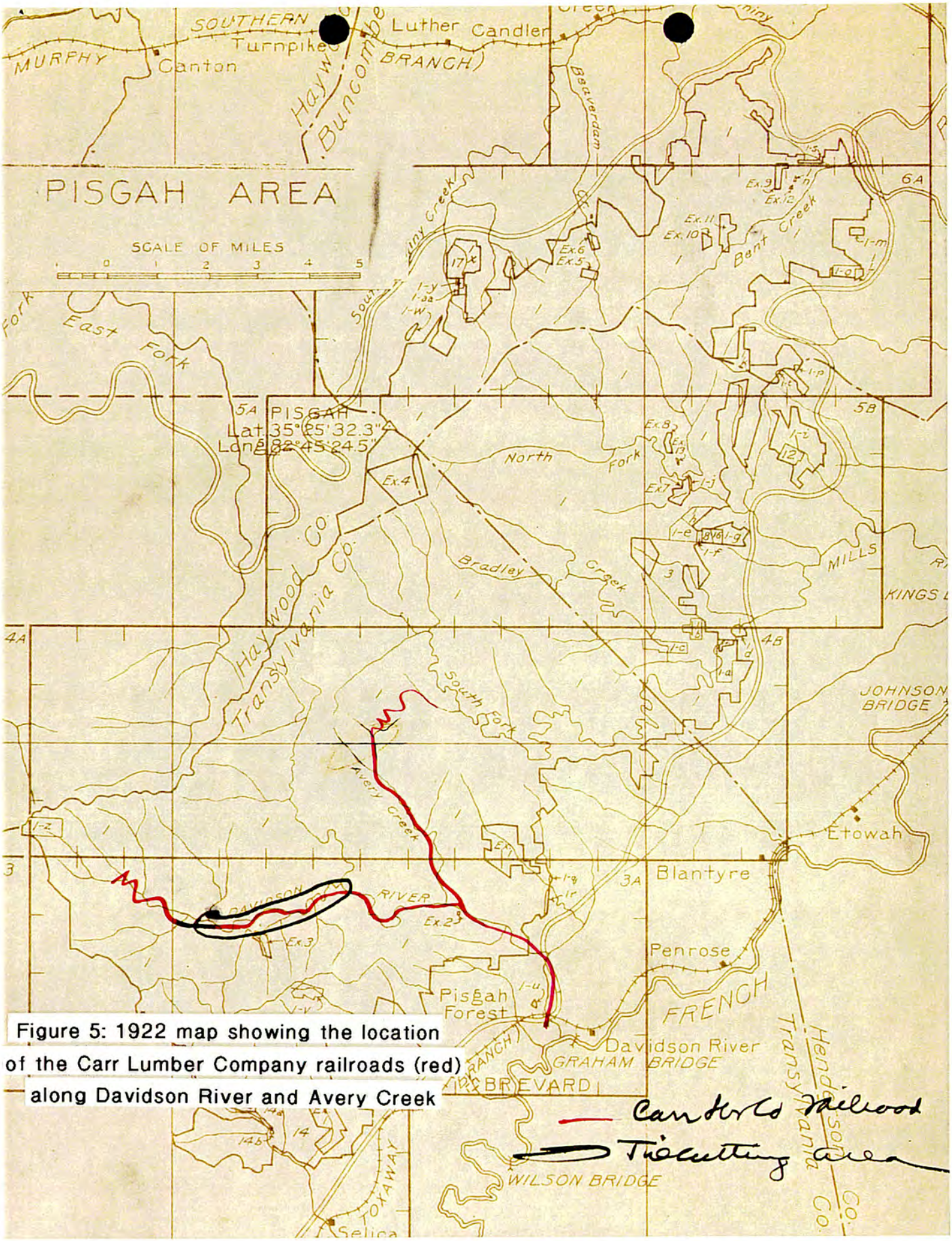


Figure 5: 1922 map showing the location of the Carr Lumber Company railroads (red) along Davidson River and Avery Creek

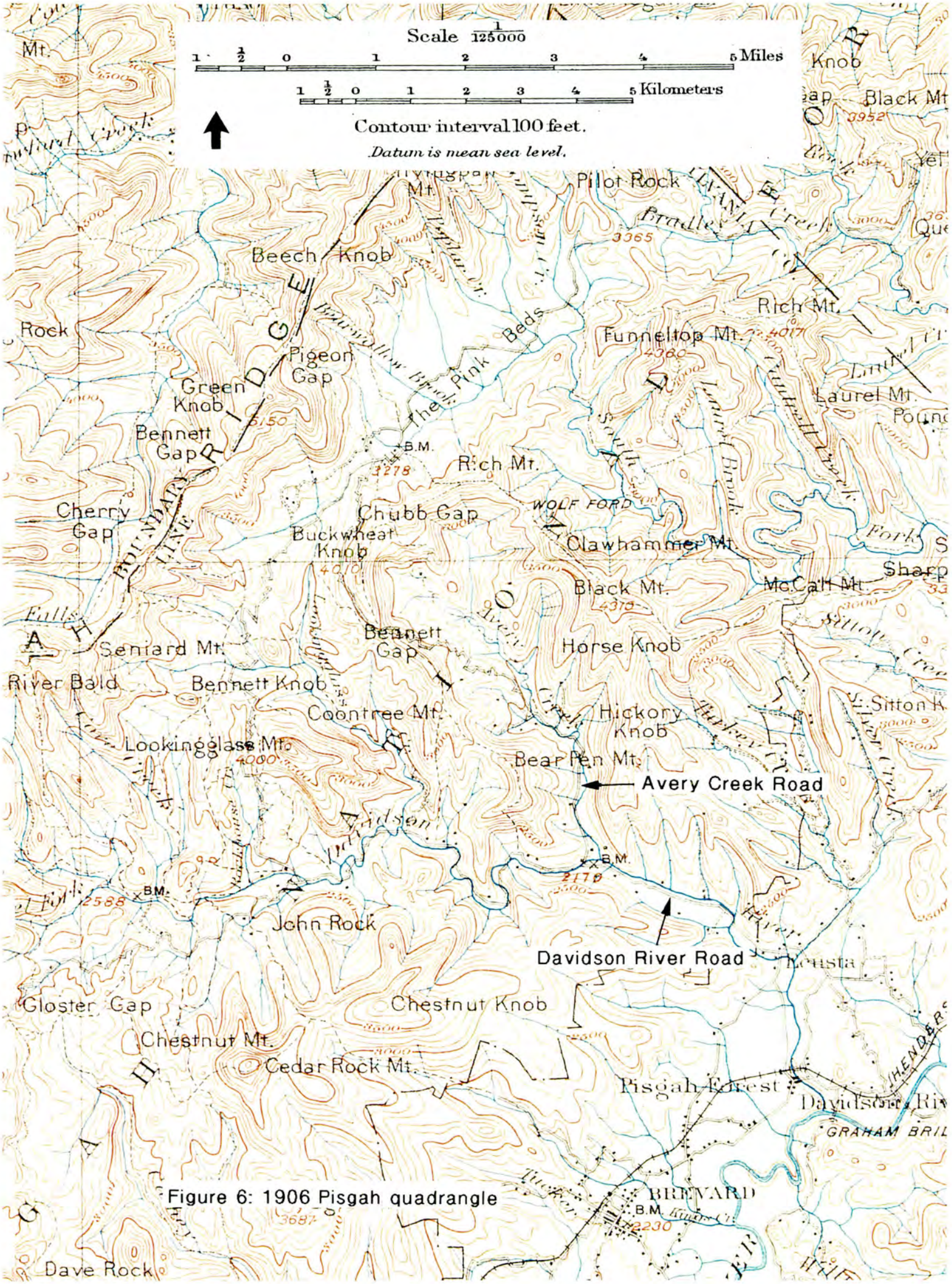


Figure 6: 1906 Pisgah quadrangle

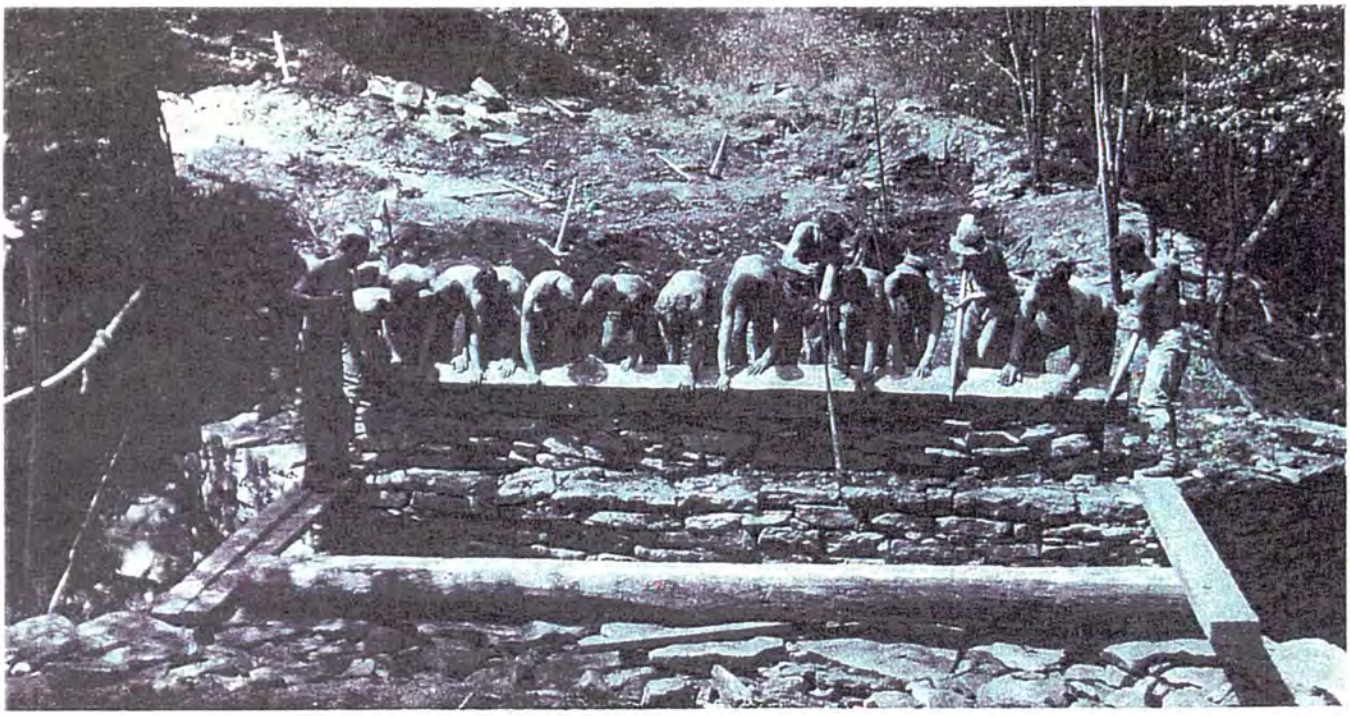
Road was maintained by Carr up to Bennett Gap. The section extending into the Pink Beds was maintained by Vanderbilt (until 1916) and was described as the "road known as the Old Avery Creek Road from the Pink Beds through Chubb Gap down Avery Creek to Bennett Gap Road." Carr also operated a rail line up Avery Creek for logging purposes (see Figure 5). Prior to Forest ownership, the road passage over Avery Creek probably varied between simple log and plank bridges and simple fords. To maintain grade, Carr built log trestle bridges over Avery Creek. These log and plank structures required consistent repair and were intermittently damaged or destroyed by the extreme flash flooding of the time.

CIVILIAN CONSERVATION CORPS (CCC)

The Civilian Conservation Corps (CCC) was authorized by the Emergency Conservation Work Act, ratified on March 31, 1933 (E. G. Throop 1981). First established as the Emergency Conservation Works on April 5, 1933, the CCC, was one of many programs implemented to alleviate the plight of the poor and unemployed. Nearly three million men, most between the ages of eighteen and twenty-five, did much to improve and preserve America's forests, parks, and agricultural lands (Rawick 1957; Salmond 1976).

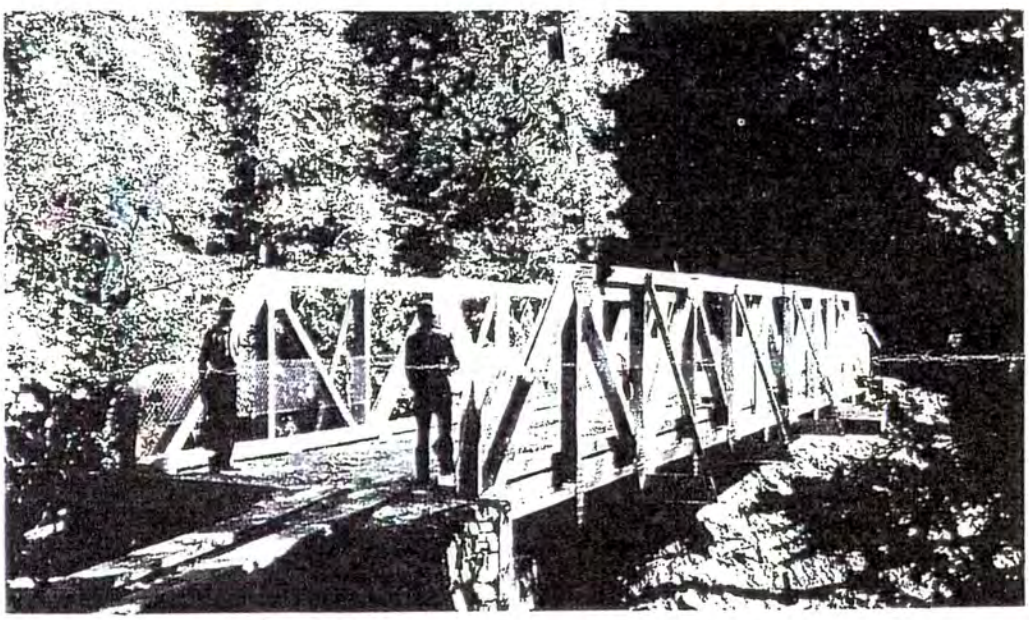
The New Deal Era, proclaimed by President Franklin Delano Rossevelt with his election in 1932, is one in which the American government radically reversed the policies of previous administrations. Laissez-faire policies toward business and industry, and an absence of government administration on the behalf of the "common man", characterized the years of the industrial Revolution from the late 1880's to the stock market crash of 1929. The programs of the New Deal implementing citizen protection spanned the years 1933 to 1942 nationally. In his presidential acceptance speech, Roosevelt proposed the Civilian Conservation Corps. This idea dated at least as far back as 1915, when conservationist George Maxwell proposed that a national corps of young men be formed for reforestation, conservation, flood and fire control. The coordination of this effort included the Department of Labor, which recruited men: the War Department which used the U. S. Army for supplying and direction of the camps; the Office of Education which provided for educational programs; the Department of the Interior and the Department of Agriculture for the supervision of projects (Wise 1994).

Landscape designs developed for recreation sites constructed by the CCC have their roots in the works of Andrew Jackson Downing, Frederick Law Olmstead, Frank Waugh and many others. The sites represent an exploration of design in harmony with the natural environment. Period buildings represent a hybrid of influences from vernacular architecture to the Shingle and Arts and Crafts styles, most commonly referred to as Rustic style. The materials used in the construction of the sites and buildings were indigenous stone, timber and earth. These materials, true to the design intent of the architects and landscape architects, allow the man-made forms to blend with the natural environment. The craftsmanship of the resources is distinctive to Civilian Conservation Corps work and federal public projects of the 1930's (Plate 2). The works of the CCC are of simple, primitive methods of construction. The materials, rough laid stone, heavy timber and log construction are those of vernacular American architecture, but their use is more varied. In CCC construction, log and timber joinery is exaggerated, stonework has playful insets or is exaggeratedly massive. Timelessness, serenity and complete integration with their surroundings, give Civilian Conservation Corps projects a presence not commonly found in the United States (Wise 1994).



CCC enrollees building a bridge at Mineral Springs, PA, 1935. National Archives 35-6-4343)

Plate 2



Coffee Creek, Shasta National Forest, 1930. (This is a steel Warren truss bridge having a main span of 75 feet. The Construction Engineer was John H. Lawrence. This bridge is the first bridge that "Ham" Pyles worked on 38 years ago. He was employed as a laborer at $3.50 per day.)

-after The History of Engineering in the Forest Service

Plate 3

The United States Department of Agriculture had the vast majority of the CCC camps under its jurisdiction from the beginning of the Emergency Conservation Work. As of June 30, 1935, the department had 1,231 camps, 517 of which were on National Forests. The average number of camps operated in North Carolina was 45, 17 of which were on National Forests. Statewide work accomplishments included trees planted for gully erosion and reforestation projects, check dams, and bridges (Plate 3). The number of bridges constructed was 1,502. This total included all types of bridges (P. Merrill 1981). Nationwide, 46,854 bridges of various kinds were built (D. Jackson 1994)

The Weeks Law of March 1, 1911 authorized the purchase of private lands in the East by the Federal government for the purpose of protecting navigable waterways and reestablishing forests for future generations. Many years of forest exploitation and overuse had decimated the county's forested lands and resources. Resulting floods, fires and erosion were commonplace. The National Forest Reservation Commission designated 7 purchase units in 1911, including the Pisgah Unit in North Carolina (USDA 1983). The first parcel of land purchased under the Weeks Law was the 8,100 acres known as the Curtis Creek Tract in McDowell County, west of Marion, NC. This land is part of the Grandfather Ranger District of the Pisgah National Forest, the first National Forest established in the East. The Pisgah Ranger District, near Brevard, includes the Avery Creek and Davidson River watersheds. Avery Creek is crossed by 3 historic metal truss bridges, a fourth was replaced in 1984. Davidson River is crossed by the English Chapel metal truss bridge. These bridges were constructed during the years 1935 - 1936. During this time the Civilian Conservation Corps was most active in western North Carolina.

In 1933 there were 14 CCC camps on the National Forests in North Carolina. One of these camps, F-11, was actually in Tellico Plains, Tennessee, but administered by the National Forests in North Carolina. Of the 13 camps in North Carolina (1933), 9 were on the Pisgah National Forest and 3 were on the Nantahala National Forest:

Camp No.	Company No.	Camp Name	Location (Post Office)	Date Occupied
			Pisgah National Forest	
NC F-1	**402**	**John Rock**	**Pisgah Forest, Transylvania Co.**	**May 19, 1933**
NC F-2	404	Mills River/Yellow Gap	Hendersonville, Henderson Co.	May 19, 1933
NC F-3	406	Jim Stanton	Old Fort, McDowell County	May 25, 1933
NC F-4	401	McCloskey	Marion, McDowell County	May 20, 1933
NC F-5	403 JW*	Mortimer	Mortimer, Caldwell County	May 20, 1933
NC F-6	412	Globe	Lenoir, Caldwell County	May 30, 1933
NC F-7	407 JW*	Alex Jones	Hot Springs, Madison County	May 27, 1933
NC F-8	409	Big Ivy	Barnardsville, Buncombe Co.	May 30, 1933
NC F-14	**428**	**Gloucester/Balsam Grove**	**Balsam Grove, Transylvania Co.**	**June 22, 1933**
			Nantahala National Forest	
NC F-9	405	Nawokada	Franklin, Macon County	June 7, 1933
NC F-10	408 JW*	Winnfield Scott	Aquone, Macon County	May 28, 1933
NC F-12	425 C*	Nathaniel Greene	Rainbow Springs, Clay County	June 28, 1933
NC F-13	435	Bob Reynolds	Topton, Cherokee County	June 27, 1933

* JW denotes "Junior White" camp
C denotes "Colored" camp

As work progressed and successes mounted, new CCC camps were established and camps were often reoccupied to complete new projects. Sidecamps were often established closer to project locations than the base camps. Some camps, moveable buildings and tent camps as well as permanent camps were utilized, and Companies were often relocated to different locations throughout the state as well as the region, then administered by different agencies.

A total of 25 CCC camps were established on the National Forests in North Carolina. In addition to those camps established in 1933 the following camps were located on the Forests.

Camp No.	Company No.	Camp Name	Location (Post Office)	Date Occupied
NC F-15	296	Patterson	New Bern, Craven County	Dec. 16, 1940
(reoccupied)	4471 JC*	Patterson	New Bern, Craven County	June 10, 1941
NC F-17	2401 VW*	Albert R. Ives	Troy, Montgomery County	Dec. 19, 1934
NC F-19	455	Horse Cove	Highlands, Macon County	Oct. 6, 1935
NC F-20	3445 JW*	Cowee	Franklin, Macon County	April 22, 1935
NC F-21	5424 C*	Gillette	Maysville, Jones County	Sept. 3, 1935
NC F-22	3402	Bent Creek/Rocky Cove	Asheville, Buncombe County	----1935----
NC F-23	3446 JW*	Coweeta	Otto, Macon County	May 20, 1935
NC F-24	3447 JW*	Santeetlah	Robbinsville, Graham County	July 7, 1938
NC F-25	3455 JW*	Sunburst	Canton, Haywood County	----1935----
NC F-27	401 JW*	Joseph McDowell	Marion, McDowell County	Dec. 17, 1937
NC F-28	**428 JW***	**John Rock**	**Brevard, Transylvania Co.**	**May 22, 1938**
(Reoccupation of Camp NC F-1)				
NC F-29	2450 VW*	----------	Murphy, Cherokee County	Sept. 29, 1939

* JC denotes "Junior Colored" camp
VW denotes "Veteran White" camp
C denotes "Colored" camp

Five Civilian Conservation Corps camps were located on the Pisgah Ranger District of the Pisgah National Forest. These include Camp John Rock (F-1), Camp Mills River/Yellow Gap (F-2), Camp Gloucester (F-14), Camp Bent Creek/Rocky Cove (F-22), and Camp F-28 (John Rock reoccupied).

The Avery Creek and English Chapel bridges were constructed between 1935 and 1936. The CCC Camps F-1, F-28 and F-14 were in closest proximity to the bridge locations and occupied during that time (Figure 7). Figure 8, Camp Inspection Report, shows camp occupation date. Camp F-28 was one of the last CCC camps in operation on the Forest, closing in 1941. Only one CCC camp, Coweeta (F-23) was in operation in 1942, the last on the National Forests in North Carolina.

The Balsam Grove (F-14) Camp Report for the week ending June 6, 1934 shows "5 bridges" under "Work Projects" (Figure 9). The November 10, 1938 Camp Inspection Report (Form 11, Revised 3-22-38) for Camp John Rock (F-28) states work projects "emphasized the improvement of existing structures which included bridges."

The Avery Creek and English Chapel bridges have abutments and footings that are typical of Civilian Conservation Corps stonework (see Plate 2). The truss bridges are typical and contemporary with bridges constructed nationwide by the CCC under the direction of the US Army. These bridges were World War I army surplus bridges, bought from the American Bridge Company or one of their subsidiaries (Cegelis pers com).

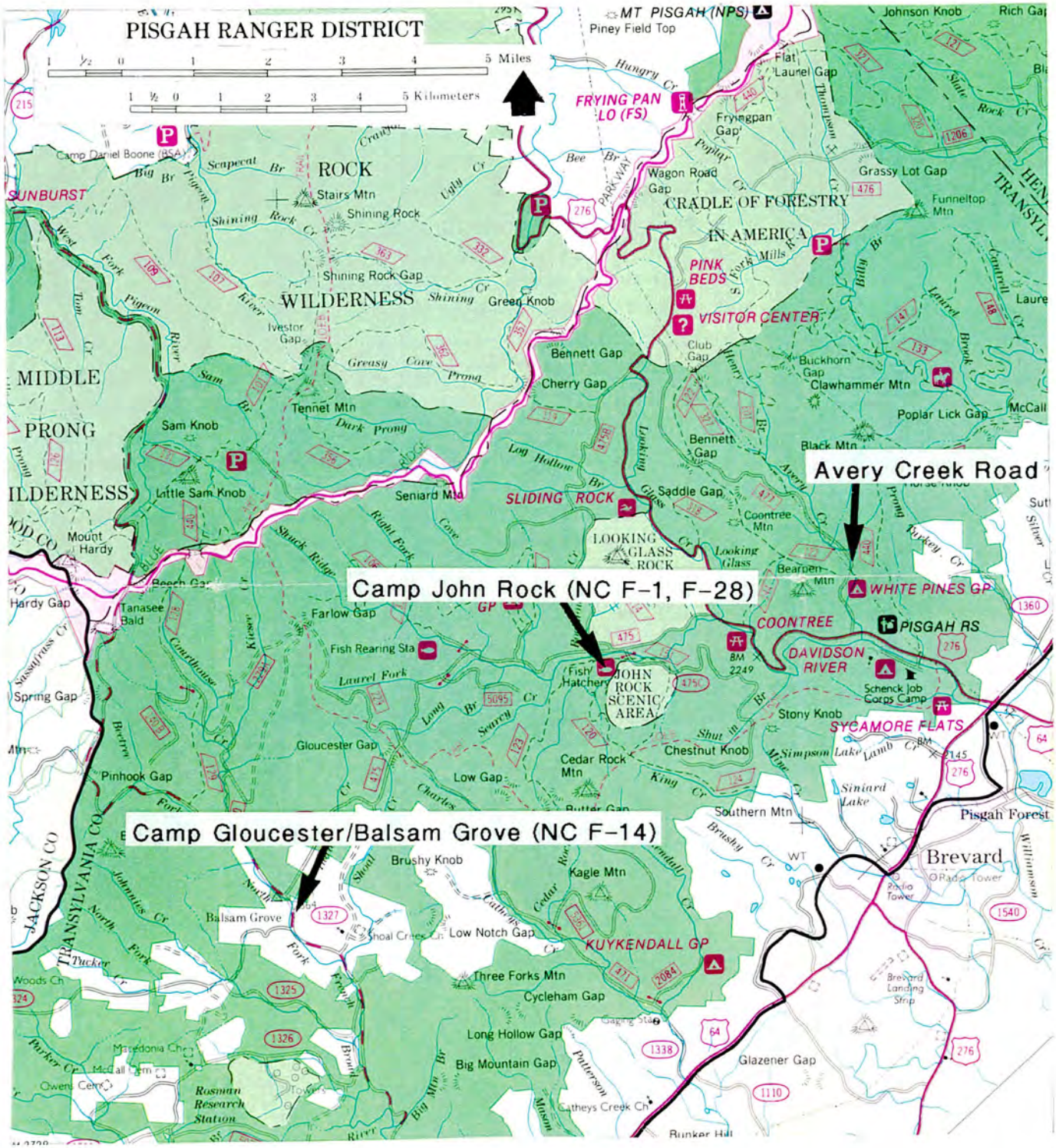


Figure 7: Location of CCC camps

EMERGENCY CONSERVATION WORK
OFFICE OF THE DIRECTOR
WASHINGTON, D. C.

9-NW-600

CAMP REPORT Week ending 6/26/34

Camp No. NC F-1 Camp Name Camp John Rock State North Carolina

Camp Location Transylvania Brevard Pisgah Forest, N.C.
County, nearest town or city, and Post Office Address

Size of Work Project 9 miles roadside clearing
10 miles truck trail construction
3 miles of stream improvement

Colored or White Camp White

Name of Camp Commander Glenn D. Grimke, Capt. Inf-Res.

Name of Work Project Supervisor R. B. Hardin

Number of Commissioned Officers at Camp 3

Number of Regular Army men assigned to Camp None

Number of men actually on forest work 140 Average for month

Number of men permanently detailed to camp work 31, including understudies

Number of men enrolled locally in vicinity of Camp 16 Local experienced

Number employed in Forestry Supervision (not enrolled men) ~~87~~ 7

Type of Camp: (Underline particular one) National Forests, National Parks and Monuments, National Military Parks and Monuments, Public Land Office, State Parks, State Owned Lands, Migratory Bird Refuges.

Nature of work being done Trail construction, clearing, stream improvement

Number of men in camp when first established

Number of men in camp week ending 185

Number of elopements 6

Number dishonorably discharged 5

Number honorably discharged 14

State enrolled from North Carolina

Date this camp was occupied May 19, 1933

(over)

Figure 8: CCC Camp John Rock, Camp Report – 6/26/34

SECOND INSPECTION

Inv 600

EMERGENCY CONSERVATION WORK
OFFICE OF THE DIRECTOR
WASHINGTON, D. C.

JUL 1934

CAMP REPORT Week ending 6/26/34

Camp No. NC F-14 Camp Name Balsam Grove Camp State North Carolina

Camp Location Transylvania Brevard, N.C. Balsam Grove, N.C.
County, nearest town or city, and Post Office Address

Size of Work Project 12 miles truck trails; 2 miles roadside clearing 5 bridges

Colored or White Camp White

Name of Camp Commander ~~Bernard O'Neill~~ Bernard O'Neill, 1st Lt. Inf-Res.

Name of Work Project Supervisor R. H. Morrow

Number of Commissioned Officers at Camp 2

Number of Regular Army men assigned to Camp None

Number of men actually on forest work 108

Number of men permanently detailed to camp work 23 plus 1 educational asst. 2 vehicle drivers 3 understudies

Number of men enrolled locally in vicinity of Camp 37

Number employed in Forestry Supervision (not enrolled men) 6

Type of Camp: (Underline particular one) National Forests, National Parks and Monuments, National Military ~~Parks and Monuments~~, Public Land Office, State Parks, State Owned Lands, Migratory Bird Refuges.

Nature of work being done Truck trail construction & surfacing

Number of men in camp when first established

Number of men in camp week ending 155

Number of elopements 2

Number dishonorably discharged 3

Number honorably discharged 12

State enrolled from North Carolina, Georgia (4)

Date this camp was occupied June 22.1933

Figure 9: CCC Balsam Grove Camp, Camp Report - 6/26/34

Only one other similar truss bridge remains on the National Forest in North Carolina. It is over the Chatooga River on Bullpen Road (#1178) in Jackson County, on the Highlands Ranger District. It was probably built by the CCC enrollees at Horse Cove Camp, NC F-19.

BRIDGE VINTAGE AND BUILDERS

Initial research into the origin of the Avery Creek and English Chapel bridges began with a search of the engineering bridge inspection reports. A single document (dated 1982) from these reports listed dates of 1935 and 1936 with no reference to the source of these dates. The only other reference to these bridges states "the trusses for the Avery Creek bridges are 'military' trusses" (Forest Inspection Reports). An extensive search of the Forest acquisition records provided general historic data for the roads which cross the bridges, yet no specific information for the bridges themselves. Thus began an exhaustive search of all known data sources.

There are four separate entities that could have been responsible for the construction of these bridges. In chronological order, these are George Vanderbilt between the years of 1900 and 1912, the Carr Lumber Company (1913 - 1932), the U.S. Forest Service (1916 - 1936), or the CCC (in cooperation with the U.S. Forest Service and U.S. Army) between 1933 and 1941. Numerous sources of historic information were searched for records concerning the bridges with few results. The queried sources are listed below.

1. Forest inspection reports
2. Forest acquisition files and collected references
3. Regional Forest Service records
4. Transylvania County Library
5. Transylvania Co. Historical Society
6. Transylvania Co. records
7. Transylvania Times publication
8. Biltmore Estate records
9. Forest History Society
10. American Bridge Company
11. National Archives
12. National Records Center
13. National Park Service HABS/HAER Database

No additional information specific to construction dates and builders for the bridges was recovered from the above listed 13 sources. Of great importance, however, was information provided by local informants. Interviews with local informants, present and retired FS employees as well as local CCC enrollees provided crucial information about the bridges and local history. Information provided by these informants was at times conflicting, none the less important. To resolve the matter, it required a combination of the above mentioned sources with an on-site study of bridge characteristics, and a chronological sequencing of physical evidence. The compilation of all available information invokes the conclusion that the bridges are a product of the New Deal ERA Civilian Conservation Corps. Specifically, they were most likely built by the John Rock CCC camp (F-1 and F-28) during its tenure (1933 - 1941). By road, Camp John Rock was no further than 6 miles from any of the discussed bridges (Figure 10).

The four local informants interviewed for this study are Mrs. Vera West Cansler (age 90), Mr. W.R. Boggs (age 94), Mr. L.W. Hollingsworth (age 83), and Mr. Vessie McCall (age 83). In addition, Mr. Charles Goodson (age 64) provided much historical information concerning the area. The four interviewed informants all provided details of their memories of the area in general, and some with specifics of the bridges. Regarding the bridges, there was contrasting information provided by the informants. Mrs. Cansler and Mr. Hollingsworth recalled (these) bridges as being constructed in the

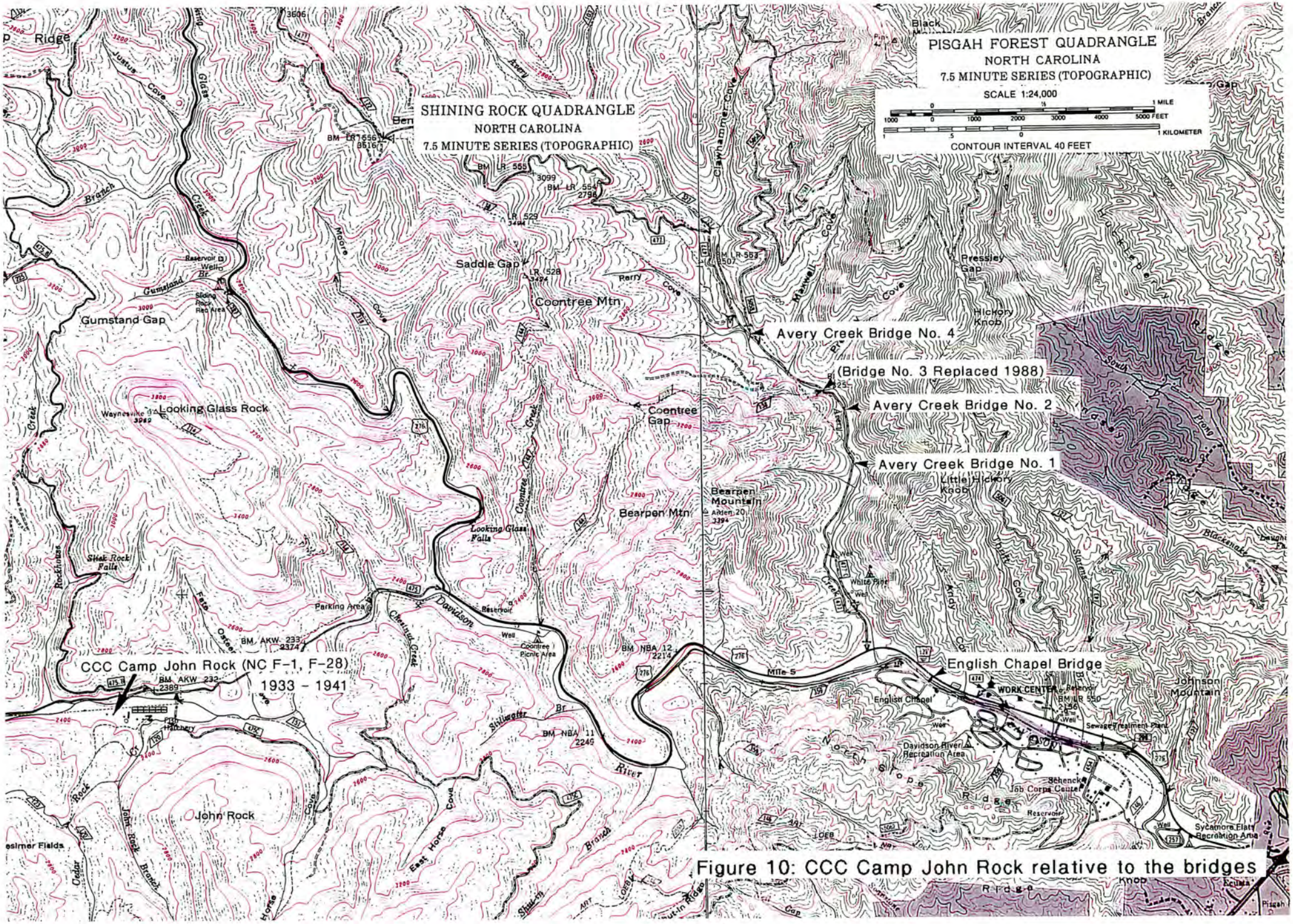


Figure 10: CCC Camp John Rock relative to the bridges

1920s, and Mr. Boggs and Mr. McCall recall the bridges as being a product of the CCC camps Regardless, the detail provided was pivotal in assigning age to the bridges.

An on-site inspection of bridge characteristics, construction features, and a chronological sequencing of physical evidence also provided insight into the origin of the bridges. The bridges were erected on stone abutments typical of the CCC design elements as outlined by the CCC "Brick and Stone Work" guidance manual (1937). The English Chapel and Avery Creek bridges were all single lane trusses on secondary roads.

An inspection of the physical setting of the English Chapel Bridge in relation to the old railroad bed revealed obvious chronological separation between the two. The Carr Lumber Company's contract to log in the area ceased in the mid 1930s, and Carr subsequently removed the rails and most of the cross-ties on his way out. This Davidson River area was the last removed as it was the access to Carr's saw mill in the near by town of Pisgah Forest (Paxon and Guest via Carr 1985). The construction features of the English Chapel Bridge indicate it was constructed after the removal of the railroad. Carr's railroad bed was directly adjacent to the south bank of the Davidson River (see Figure 5). The English Chapel bridge was constructed approximately 6 feet above existing ground level and earth ramps were constructed up to the truss grade level. The earth ramp on the south bank entrance extends directly over the railroad bed, burying it beneath several feet of soil. Therefore, the indicated sequence of events establishes the construction of the English Chapel Bridge sometime after the removal of the railroad in the early 1930s. In addition, the north bank bridge ramp was constructed upward to access Highway 276. The location for this highway was not identified and built until the mid 1930s.

Two personal accounts from informants also indicate the bridges were a 1930s construction. Along with the Davidson River railroad, the Avery Creek line was also one of the last removed (Forest acquisition records). Mrs. Vera West Cansler recalled that the Avery Creek road and bridges were constructed directly on much of what was Carr's railroad grade, as was a common practice of the time. This would indicate the bridges bare a mid 1930s construction date. Also of great importance was Mr. W.R. Boggs account of the arrival of these bridges in a reply to a Transylvania Times newspaper information request (1999):

> I did not see them erected, but I knew when they were delivered to the sites where they were later erected. They were built for the U.S. Army during World War I for use in Europe where they were needed as the countries were occupied. They were considered surplus munitions, and were used by such agencies as the CCC during the early days of the "Great Depression." They replaced older and obsolete structures, such as they have become. They were not built in place, the sections were actually built in steel mills somewhere else, and assembled on site. I was in the CCC camp at John Rock, at the time, and witnessed the occurrences I am speaking of.

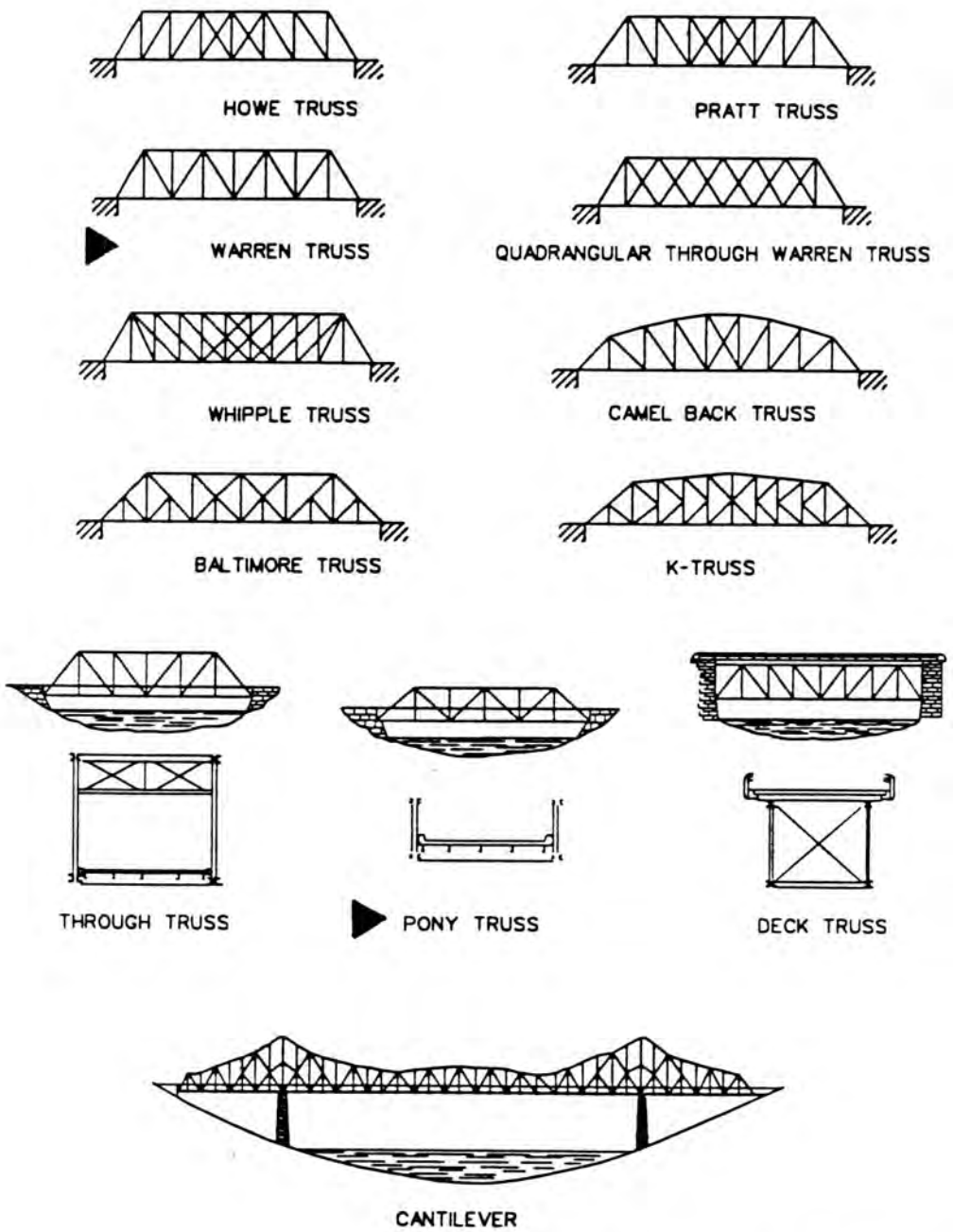
In a later phone conversation, Mr. Boggs revealed that he witnessed the arrival of the bridges to their respective sites, but left shortly there after to work on a dam project in Tennessee. We he returned two years later, the bridges were in place. Mr. Boggs stated that the bridges were most likely constructed by the John Rock CCC camp (1999).

George Vanderbilt and the Carr Lumber Company have been systematically eliminated as possible constructors of the bridges. The 1935 - 1936 dates listed in the Forest Service bridge inspection reports have been substantiated by the combination of information sources cited, local informants, and physical evidence. In addition, the mention of military trusses in the Forest records was in reference to post World War I surplused bridges. The U.S. Army coordinated the CCC program providing logistical convenience to access of surplus munitions such as metal truss bridges. In addition, the surplusing and relocation of these bridges explains why there is no evidence in the American Bridge Company records (Cegelis pers com) of a direct sale and transport to the Forest Service or U.S. Army in the Pisgah National Forest. They were a product of the vast American war effort during the first World War.

BRIDGE DESCRIPTIONS

Design elements characteristic of North Carolina's metal truss bridges derive from five basic truss design types. These are the Pratt, Parker, Camelback, Petit, and Warren truss designs. The Avery Creek and English Chapel Bridges are of the Warren Pony Truss design (Figure 11). Warren Pony trusses are among the most numerous types in North Carolina. The Warren truss is a simple, straightforward design with diagonal members alternately acting in tension and compression. Many of the Warren Pony trusses in North Carolina include vertical members which stiffen the entire structure (Griffith and Bevin, In prep). A geometronic drawing was produced from a stereoscopic photograph (Cudabec 1999) of the Avery Creek Bridge 2, and this procedure generates precise, scaled renditions of bridge detail. Figure 12 exhibits side and end view detail of truss characteristics with Bridge 2, and with exception of length, represents standard truss geometry in profile.

The Avery Creek Bridges can be located in relation to their mile-marker distance from Davidson River Road - U.S. Highway 276. These bridges are the Avery Creek 1, 2 and 4 bridges. All span a single crossing of Avery Creek along Forest Highway 477. The English Chapel Bridge is on an infrequently used Forest Road (474) and crosses the Davidson River to access the English Chapel. The English Chapel Bridge is described as being located at mile marker 0 on 474, just after its departure from the U.S. Highway 276 (see Figure 4).



After ***Bridge Inspection, Maintenance, and Repair***, 1994.

Figure 11: Truss types

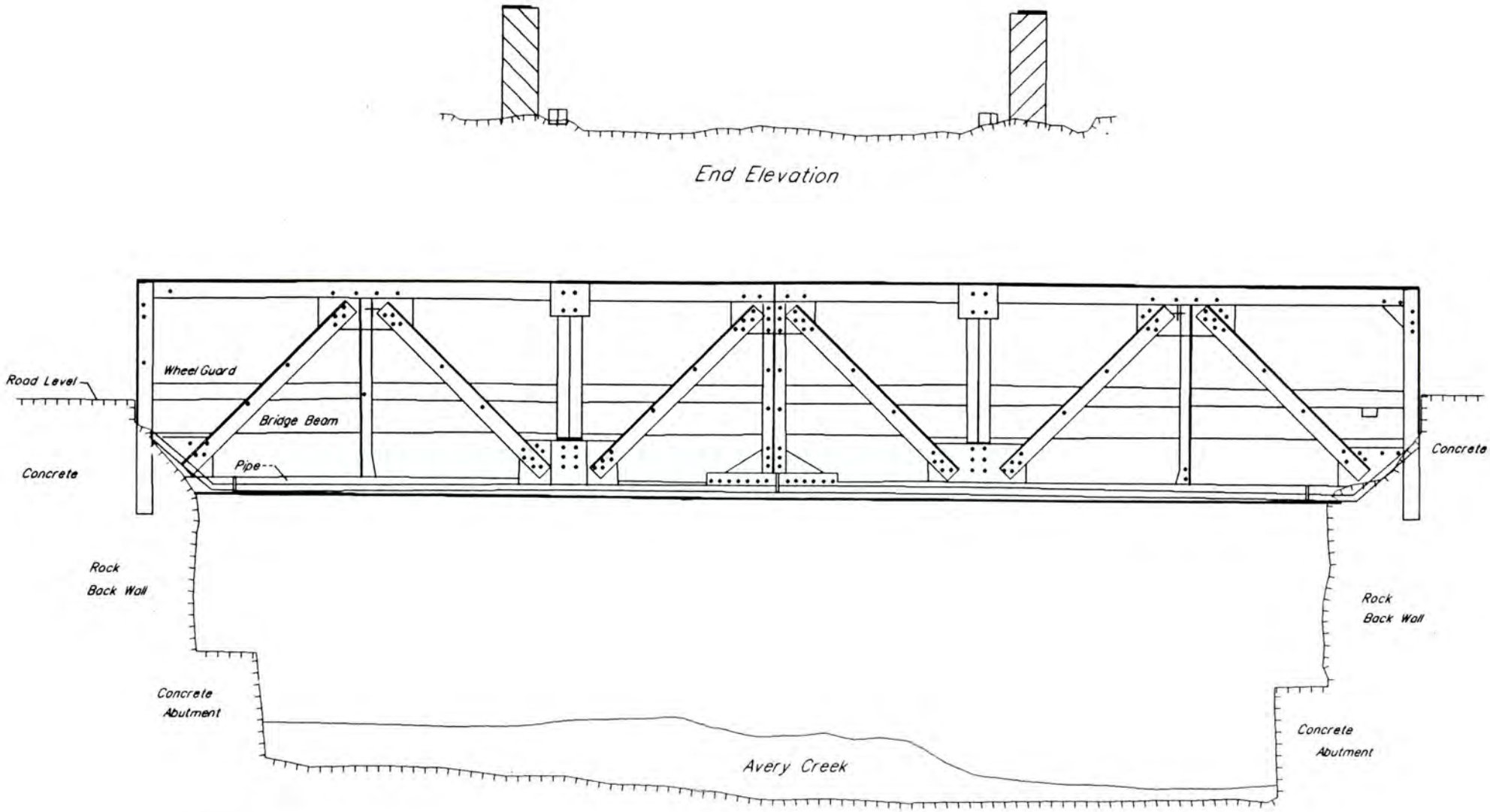


Figure 12: Avery Creek Bridge No. 2

Avery Creek Bridge No. 1

Located at mile marker 0.9 on Forest Highway 477 (see Figure 4), Avery Creek Bridge No. 1 (1935) is a one lane, single span, steel Warren Pony truss bridge. Bridge decking consists of treated timber planks covered with an asphalt overlay, which is also covered with some dirt and gravel (Plate 4). The truss structure is 50 ft. in length and spans 43 ft. between abutment walls. The total truss structure width is 14 ft., with a 12 ft. out to out and a 11 ft. curb to curb width. Curbs are constructed with six inch squared treated lumber and are bolted to the decking.

The truss is constructed with *Pencoyd USA* steel beams that are bound together with steel pins. This Warren pony truss was constructed with vertical truss beams in addition to the standard diagonals for added strength (See Figure 10). The entire truss is painted gray, yet the paint has flaked off in many areas resulting is rust and rust stains. The extreme end verticals have black and yellow reflective plates attached as a visual aid for night traffic (see Plate 4) .

The abutment walls are constructed with quarried stone and are bound with mortar. They are configured with a face wall horizontal with the stream, and flanking wing-walls extending out at approximately 50% angles. The abutments are capped with a poured concrete slab 18 inches thick and the truss rests directly upon these (Plate 5). The maximum vertical height of the abutment walls above water is 6.7 ft. Abutment masonry style is described as "random coursed" where "the stones are leveled off at specified heights to an approximately horizontal surface. These courses are not necessarily of the same height throughout but may rise by steps" (Brick and Stone Work 1937). The bond and joints (stacking) style is described as an asymmetrical "Flemish bond" (Brick and Stone Work 1937) (Figure 13).

The original abutment walls extend to ground level and below to buried footings. The footings may be either poured concrete or stone. In the 1981 Forest Service inspection report, B.L. Roach documented the abutment condition as "poor". Describing both cracking in the walls, and undermining by the stream, Roach recommended "both abutment walls need repair." In response to the recommendations, the Forest Service added support walls of poured concrete along the base of the abutments (Plate 6). The concrete support additions were constructed in 1984.

The Avery Creek Road consists of a earth and gravel foundation, and is periodically regraveled and regraded. The truss bridge is single lane (11ft curb to curb) and is relatively small compared to modern dump trucks and timber removal trucks. The bridge bears numerous scars where these wide trucks have scraped the sides while passing through.

Plate 4: Avery Creek Bridge No. 1. View SW

Plate 5: Bridge No. 1 stone abutment. View S

CLASSES OF MASONRY

RUBBLE

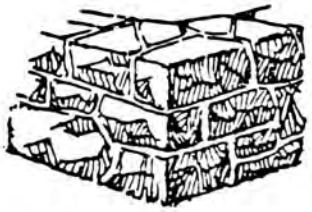


Fig. 1

In uncoursed rubble masonry as shown in Fig. 1, the stones are laid without any attempt to form regular courses.

Fig. 2

In coursed rubble masonry as shown in Fig. 2, the stones are leveled off at specified heights to an approximately horizontal surface. These courses are not necessarily of the same height throughout but may rise by steps. In this case the work is said to be random coursed.

After *Bridge and Stone Work*, 1937.

BONDS AND JOINTS

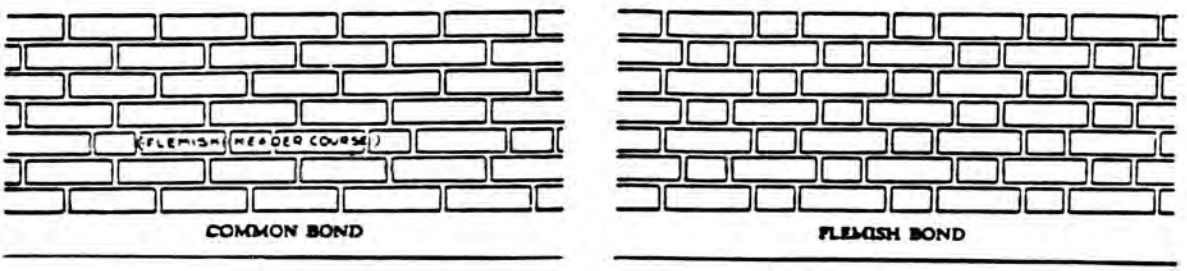


Figure 13: Types of CCC masonry

Plate 6: Bridge No. 1 stone abutment showing concrete support wall addition. View SW

Avery Creek Bridge No. 2

Located at mile marker 1.2 on Forest Highway 477 (see Figure 4), Avery Creek Bridge No. 2 (1936) is also a one lane, single span, steel Warren Pony truss bridge. Bridge decking consists of treated timber planks covered with 1.5 inch asphalt overlay, which is also covered with some dirt and gravel (Plate 7). The truss structure is 38 ft. in length and spans 31 ft. between abutment walls. At 38 ft., Bridge No. 2 is the shortest within the study group (Plate 8). The total truss structure width is 14 ft., with a 12 ft. out to out and a 11 ft. curb to curb width. Curbs are constructed with six inch squared treated lumber and are bolted to the decking.

Bridge No. 2 possesses the same engineering characteristics as Bridge No. 1. Constructed with *Pencoyd USA* steel beams, it also possess both vertical and diagonal truss beams (see Figure 10). The entire truss is painted gray, and also experiences varying degrees of rust. The extreme end verticals have black and yellow reflective plates attached as a visual aid for night traffic.. The bridge bears numerous scars where wide trucks have scraped the sides while passing through.

Abutment walls are constructed with stone masonry characterized by random setting with an asymmetrical Flemish bond joint stacking (Brick and Stone Work 1937) (Figure 13). They are configured with a face wall roughly horizontal with the stream, and flanking wing-walls extending out at approximately 50% angles (Plate 9). The abutments are capped with a poured concrete slab 18 inches thick and the truss rests directly upon these. Vertical height of the abutments above water level is 6.8 ft.

The base of the abutment walls are buffered by a low poured concrete support wall to prevent some of the severe undercutting by Avery Creek (Plate 10). These support wall were constructed in 1984. Inspection photos taken in 1981 show that the face wall had experienced severe damage. The wall was completely undercut by Avery Creek and numerous original stones had been washed down stream. Approximately 15 % of the face wall was lost prior to the construction of the support walls.

The Avery Creek Road consists of a earth and gravel foundation, and is periodically regraveled and regraded. The truss bridge is single lane (11ft curb to curb) and is relatively small compared to modern dump trucks and timber removal trucks. The bridge bears numerous scars where these wide trucks have scraped the sides while passing through.

Plate 7: Avery Creek Bridge No. 2. View E.

Plate 8: Avery Creek Bridge No. 2. View N.

Plate 9: Bridge No. 2, abutment wall. View W.

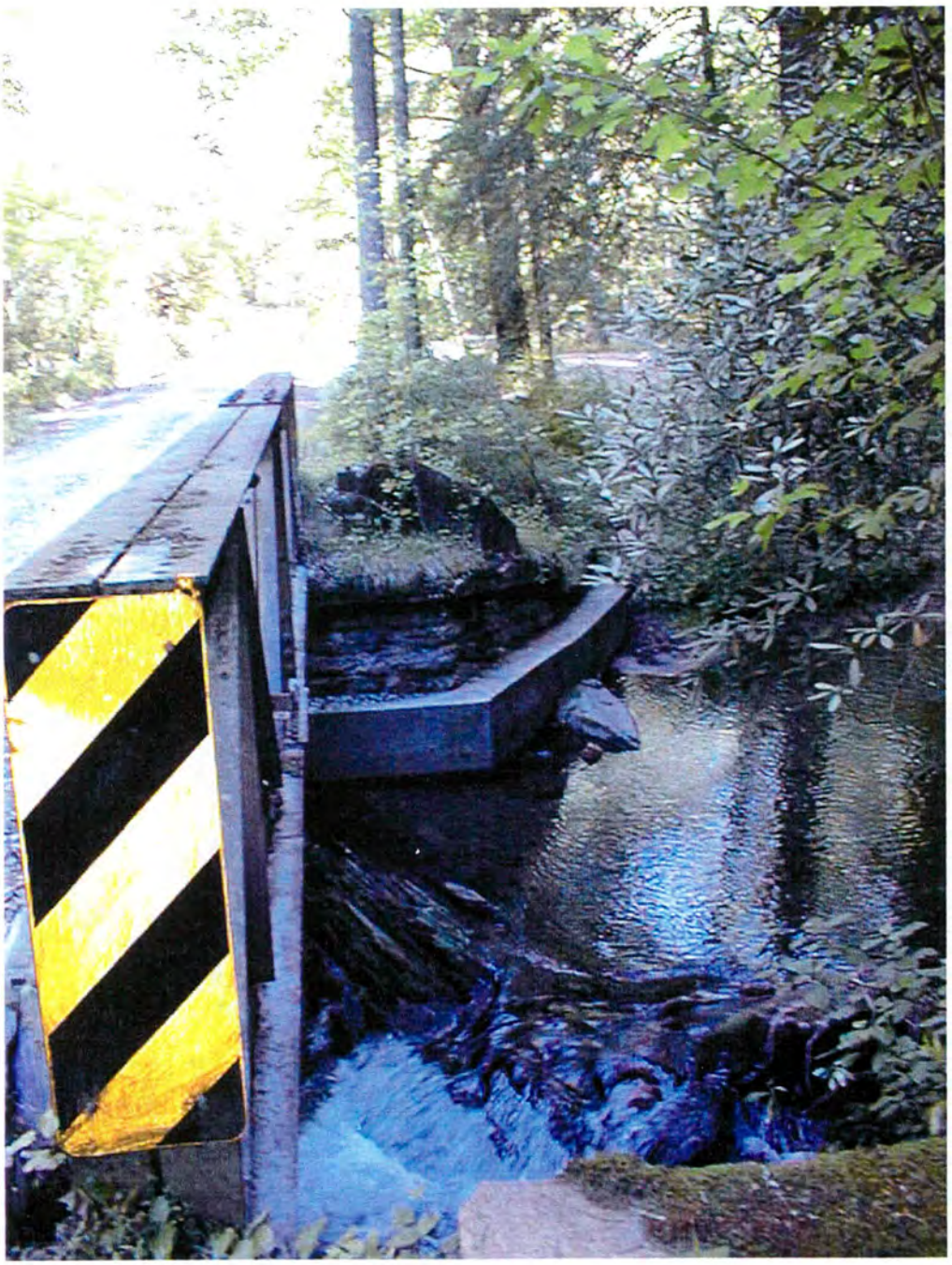


Plate10: Bridge No. 2, abutment showing concrete support wall. View W.

Avery Creek Bridge No. 4

Located at mile marker 1.7 on Forest Highway 477 (see Figure 4), Avery Creek Bridge No. 4 (1936) is a one lane, single span, steel Warren Pony truss bridge. Bridge decking consists of treated timber planks covered with an 1.5 inch asphalt overlay, itself covered with some dirt and gravel (Plate 11). Truss structure length is 50 ft. in length and spans 44 ft. between abutment walls (Plate 12). The total truss structure width is 14 ft., with a 11.8 ft. out to out and a 10.9 ft. curb to curb width. Curbs are constructed with six inch squared treated lumber and are bolted to the decking.

The truss is constructed with *Pencoyd USA* steel beams that are bound together with steel pins. This Warren pony truss was constructed with vertical truss beams in addition to the standard diagonals for added strength (Figure 12). The entire truss is painted gray, yet the paint has flaked off in many areas resulting is rust and rust stains. The extreme end verticals have black and yellow reflective plates attached as a visual aid for night traffic.

Abutment walls are constructed with stone masonry characterized by random coursed setting with an asymmetrical Flemish bond joint stacking (Brick and Stone Work 1937) (see Figure 11). They are configured with a face wall roughly horizontal with the stream, and flanking wing-walls extending out at approximately 50% angles (Plate 13). The abutments are capped with a poured concrete slab 18 inches thick and the truss rests directly upon these. Maximum vertical height of the abutments above water level is 8.5 ft. Unlike bridges No. 1 and No. 2, the original concrete footing on the south abutment wall extended above ground/water. In 1981, inspection photos show that this footing was severely undercut by Avery Creek (Roach), and was subsequently capped with poured concrete support walls during the 1984 abutment repairs (Plate 14).

The Avery Creek Road consists of a earth and gravel foundation, and is periodically regraveled and regraded. The truss bridge is single lane (11ft curb to curb) and is relatively small compared to modern dump trucks and timber removal trucks. The bridge bears numerous scars where these wide trucks have scraped the sides while passing through.

Plate 11: Avery Creek Bridge No. 4. View S.

Plate 12: Avery Creek Bridge No. 4. View E.

Plate 13: Bridge No. 4, abutment wall. View E.

Plate 14: Bridge No. 4, abutment showing concrete support wall. View SW

English Chapel Bridge

Although it suffers from some of the same structural degradation as the Avery Creek bridges, the English Chapel bridge (1935) is not scheduled for removal. Its location on Forest Road 474 (mile marker 0.0) experiences little traffic with exception of Sunday travel to and from the English Chapel (see Figure 4). The road remains gated during the week days and thus only receives recreational foot traffic.

The English Chapel bridge spans the Davidson River and is considerably longer than the Avery Creek bridges. Its total length is 93 ft. with a distance of 90 ft. between abutment walls (Plate 15). It is a one lane, single span, steel Warren pony truss bridge with a structure width of 14 ft., 12.5 ft. out to out, and an 11.2 ft. curb to curb width (Plate 16). Curbs are constructed with six inch squared treated lumber and are bolted to the decking. Bridge decking consists of treated timber planks covered with an 1.5 inch asphalt overlay.

This bridge possesses the same engineering characteristics as the Avery Creek War truss bridges. Several of the steel truss beams is stamped with *Pencoyd USA* and a single beam is stamped with *Carnegie USA*. All are bound together with steel rivets and bolts. Diagonal and vertical truss beams are present, and the entire structure is painted gray with varying degrees of rust (see Plate 15). Located adjacent to the Davidson River Campground, many visitors use the bridge and there are numerous names, initials and dates scratched into the paint and steel.

Abutments with the English Chapel bridge are very similar to the Avery Creek bridge abutments in size and height. Abutment walls are constructed with stone masonry characterized by random coursed setting with an asymmetrical Flemish bond and joint stacking (Brick and Stone Work 1937) (Figure 13). They are configured with a face wall roughly horizontal with the stream, and flanking wing-walls extending out at approximately 50% angles. The abutments are capped with a poured concrete slab 18 inches thick and the truss rests directly upon these. Maximum vertical height of the abutments above ground level is 9.5 ft. (Plate 17). These abutments are several feet above the river and did not experience the undercutting like the Avery Creek bridges. However, Roach recommended immediate repairs to the concrete bridge seats in 1981 and they were subsequently repaired shortly there after.

Plate 15: English Chapel Bridge. View NW.

Plate 16: English Chapel Bridge. View E.

Plate 17: English Chapel Bridge, abutment wall. View E.

Statement of Significance

Evaluation systems used to assess the significance of metal truss bridges have varied from a strict numerical rating system (Newlon 1978) to the simple application of the National Register criteria (National Register Bulletin 15, 1991). Griffith and Bevin (in prep) observed inherent conflicts between a numerical rating system and its objective application to the National Register guidelines when determining eligibility. It being that they were evaluating a large variety of truss bridges with varying degrees of integrity, Griffith and Bevin utilized a National Register criteria multiple property submission format in conjunction with a numerical rating system (National Register Bulletin 16-B 1991). The Avery Creek and English Chapel bridges are a relatively small structure group (4), and with respect to integrity and significance they possess homogeneous attributes. Therefore, a numerical rating system would not provide additional data and is not needed to quantify significance with these bridges. They have been evaluated using the pertinent National Register criteria.

The three Avery Creek and English Chapel bridges are eligible to the National Register of Historic Places under Criteria A and C (36 CFR 60.6), they "(a) are associated with events that have made a significant contribution to the broad patterns of our history" and they "(c) embody the distinctive characteristics of a type, period" and "method of construction". The bridges are a World War I vintage steel Warren Pony truss type that were most likely manufactured within the American Bridge Company conglomeration (Cegelis pers com). They are consistent with bridges surplused by the United States Army in the years following World War I, and were delivered in 1935 in sections to the individual construction sites (Boggs pers com). As detailed by available evidence, they were received and constructed by members of the John Rock Civilian Conservation Corps Camp (NCF-1), the first CCC camp on the National Forest in North Carolina. The CCC was the first nationally sponsored conservation movement in the United States, part of the New Deal Era following the Great Depression. The bridges were constructed across Avery Creek and the Davidson River, under the direction of the U.S. Forest Service on the Pisgah National Forest, the first National Forest in the East. This area was also the site of the First Forestry School in America, directed by Dr. Carl Schenck and funded by George Vanderbilt, owner of the original Pisgah Forest. Vanderbilt had hired Forester Gifford Pinchot to oversee his forest holdings in the spirit of conservation, and Pinchot later became the first head of the U.S. Division of Forestry. The Cradle of Forestry, a National Historic Site is located upstream from the bridges.

The Avery Creek and English Chapel Warren Pony metal truss bridges are historic "properties that possess integrity of location, design, setting, material, workmanship, feeling and association with events that have made a significant contribution to the broad patterns" of our American conservation efforts and National Forest history. National movements or events that address Criterion A, embodied in these bridge properties include:

1. World War I mass industrial production of bridges.
2. New Deal Era, the Civilian Conservation Corps, a government sponsored response to mass unemployment during the Great Depression, who's contributions changed the Nations perception of, and relationship with the "Great Outdoors."
3. Victorian Age of grandiose wealth, and the vision of George Vanderbilt III to finance Pisgah Forest and the birthplace of modern American forestry (the Cradle of Forestry is a National Historic Site).
4. The creation of the Weeks Act in 1911 and subsequent creation of the first National Forest in the east, the Pisgah National Forest.

The Avery Creek and English Chapel bridges are also "properties that possess integrity of location, design, setting, materials, workmanship, feeling and association and embody the distinctive characteristics of (Criterion C) New Deal Era Civilian Conservation Corps construction. The bridges are World War I army surplus, put in place with rustic, random coursed masonry work and Flemish bonded abutments of locally quarried stone.

The Avery Creek and English Chapel Bridges are significant properties on local, state and national levels. The metal trusses were originally constructed for WW I then surplused and erected by the first CCC camp, John Rock (NC F-1), on the first National Forest, the Pisgah, that was purchased from the Vanderbilt's under authorization of the Weeks Act. Gifford Pinchot, was Vanderbilt's first forester and later became the first head of the U.S. Division of Forestry in 1905. Carl Schenck replaced Pinchot and started the first American forestry school, the Biltmore School.

MITIGATION OF EFFECTS

Moving and replacing the Avery Creek Bridges Nos. 1, 2 and 4 will have an effect on National Register of Historic Places eligible properties. The bridges have been evaluated and documented along with the contemporary English Chapel Bridge.

The abutments for the Avery Creek bridges will remain in place. Ownership of the bridges is being transferred (Form AD107 Appendix 2) to the North Carolina Department of Transportation, State Bridge Maintenance Division for future use.

The English Chapel Bridge has also been determined eligible to the NRHP and will remain in place and be maintained and interpreted by the US Forest Service.

The only other remaining Warren pony metal truss bridge located on the National Forests in North Carolina is on the Highlands Ranger District of the Nanathala National Forest in Jackson County. It is on Bullpen Road, crossing the Chatooga River. It was most likely constructed by the enrollees at Horse Cove Civilian Conservation Corps Camp (NC F-19). This bridge will be evaluated and documented for NRHP eligibility and managed accordingly by the US Forest Service.

The above actions are stipulated in a Memorandum Of Agreement with the NC SHPO for a Determination of No Adverse Effect (Appendix 2) for the Replacement of Avery Creek Bridges Nos. 1, 2 and 4.

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Appendix I

1981 Bridge Inspection Report Information Pages
B. L. Roach - Inspector

US FOREST SERVICE

BRIDGE INSPECTION REPORT

RANGER DISTRICT Pisgah BRIDGE NO. #15 (477-00.9)

BRIDGE NAME Avery Creek LOCATION 0.9 mi. mi. from US 276

DATE OF INSPECTION April 2, 1981 DATE BUILT Unknown

DESCRIPTION Single span, one lane stream crossing, consisting of timber deck, steel stringers, steel floorbeams and steel pony truss.

LENGTH 50'0" WIDTH 11'2" * SKEW 90°

SPANS 1 @ 50'0"

SIDEWALK None SURFACING 1-1/2" aws RAILING None

DESIGN LIVE LOADING Unknown ENCROACHMENTS None

RECOMMENDATIONS Repair all bridge seats and undermined areas at abutments. Clean and paint all bearing assemblies. Sign as recommended.

INSPECTED BY B.L. Roach

WATERWAY Inadequate, alignment is very poor.

PLANS None

MISCELLANEOUS -

POSTING 12 tons H 21 tons HS

GROSS VEHICLE WT.	INV. H (TONS)	INV. HS (TONS)	OP. H (TONS)	OP. HS (TONS)
DECK	50.0	102.8	66.7	137.1
TRANSVERSE FLOOR BEAMS	17.3	31.1	25.6	46.0
LONGITUDINAL STRINGERS	12.1	21.8	17.2	30.9
~~CAPS~~ TRUSS	20.9	29.2	32.9	46.0
PILING OR PIERS	-	-	-	-

*BETWEEN CURBS

Thompson - Gordon - Shook Engineers, Incorporated

US FOREST SERVICE

BRIDGE INSPECTION REPORT

RANGER DISTRICT Pisgah BRIDGE NO. #16 (477-01.2)

BRIDGE NAME Avery Creek LOCATION 1.2 Mi. N. Jct. US 276

DATE OF INSPECTION April 2, 1981 DATE BUILT Unknown

DESCRIPTION Single span, one lane stream crossing, consisting of a steel pony truss on rock masonry abutments.

LENGTH 38.3' WIDTH 11.2' * SKEW 90°

SPANS 1 @ 30.7' face to face

SIDEWALK None SURFACING 1.5" asphalt RAILING None

DESIGN LIVE LOADING Unknown ENCROACHMENTS 1" tele. conduit

RECOMMENDATIONS Repair abutment bridge seats and scoured abutment footings, sign as recommended in report.

INSPECTED BY Ben L. Roach

WATERWAY Adequate

PLANS Not available

MISCELLANEOUS -

POSTING 12 tons H 21 tons HS

GROSS VEHICLE WT.	INV. H (TONS)	INV. HS (TONS)	OP. H (TONS)	OP. HS (TONS)
DECK	50	102	66	137
TRANSVERSE FLOOR BEAMS	17	31	25	46
LONGITUDINAL STRINGERS	12	21	17	30
~~CAPS~~ TRUSS	39	56	58	83
PILING OR PIERS				

*BETWEEN CURBS

NORTH CAROLINA

Thompson - Gordon - Shook
Engineers, Incorporated

U.S. FOREST SERVICE

BRIDGE INSPECTION REPORT

RANGER DISTRICT Pisgah BRIDGE NO. #18 (477-01.7)

BRIDGE NAME Avery Creek LOCATION 1.7 Mi. N. Jct. NC 276

DATE OF INSPECTION April 2, 1981 DATE BUILT Unknown

DESCRIPTION Single span, one lane stream crossing, consisting of steel pony truss with timber deck, steel stringers and steel floorbeams.

LENGTH 50.0' WIDTH 10.83' * SKEW 90°

SPANS 1 @ 50.0'

SIDEWALK None SURFACING 1.5" asphalt RAILING None

DESIGN LIVE LOADING Unknown ENCROACHMENTS None

RECOMMENDATIONS Clean and paint bearing assemblies, repair bridge seats and abutments, sign as recommended in report.

INSPECTED BY Ben L. Roach

WATERWAY Barely adequate

PLANS Not available

MISCELLANEOUS -

POSTING 12 tons SV 21 tons TTST

GROSS VEHICLE WT.	INV. H (TONS)	INV. HS (TONS)	OP. H (TONS)	OP. HS (TONS)
DECK	50	102	66	137
TRANSVERSE FLOOR BEAMS	17	31	25	46
LONGITUDINAL STRINGERS	12	21	17	30
CAPS				
PILING OR PIERS				

*BETWEEN CURBS

Prepared by:

Thompson - Gordon - Shook Engineers, Incorporated

Raleigh, N.C.

CONTRACT NO. 53-4527-0001(3)

SUBMITTED: JUN 03 1981

North CAROLINA SEAL

U.S. FOREST SERVICE

BRIDGE INSPECTION REPORT

RANGER DISTRICT Pisgah **BRIDGE NO.** #5 (474-00.0)

BRIDGE NAME Davidson River **LOCATION** 75' SW U.S.276

DATE OF INSPECTION April 1, 1981 **DATE BUILT** Unknown

DESCRIPTION Single span, one lane stream crossing, consisting of timber floor system, steel stringers, steel floorbeam & steel pony truss.

LENGTH 93'-0" **WIDTH** 11'-2" **SKEW** 90°

SPANS 1 @ 90'-0"

SIDEWALK None **SURFACING** 1-1/2" aws **RAILING** None

DESIGN LIVE LOADING Unknown **ENCROACHMENTS** 1" tele. conduit

RECOMMENDATIONS Member L_0 L_1 (left truss) needs repair. Repair all bridge seats. Paint bearing assemblies. Sign as recommended.

INSPECTED BY B.L. Roach

WATERWAY Barely adequate

PLANS None

MISCELLANEOUS -

POSTING H - 4 tons HS - 8 tons

GROSS VEHICLE WT.	INV. H (TONS)	INV. HS (TONS)	OP. H (TONS)	OP. HS (TONS)
DECK SYSTEM - JOISTS	4.6	8.3	6.1	11.0
TRANSVERSE FLOOR BEAMS STEEL	18.1	32.5	26.3	47.4
LONGITUDINAL STRINGERS	12.4	22.4	17.5	31.4
~~OAPS~~ TRUSS	6.7	10.4	15.1	23.5
PILING OR PIERS	-	-	-	-

*BETWEEN CURBS

Appendix II

DRAFT MOA

DRAFT

MEMORANDUM OF AGREEMENT BETWEEN THE UNITED STATES FOREST SERVICE, NATIONAL FORESTS IN NORTH CAROLINA AND THE NORTH CAROLINA STATE HISTORIC PRESERVATION OFFICER (36 CFR 800.6(b)(1)) FOR THE REPLACEMENT OF AVERY CREEK BRIDGES NOS. 1, 2 AND 4 ON THE PISGAH NATIONAL FOREST IN TRANSYLVANIA COUNTY, NORTH CAROLINA.

WHEREAS, the National Forests in North Carolina (Forest Service) proposes to replace three National Register of Historic Places (NRHP) eligible metal truss bridges crossing Avery Creek on the Pisgah National Forest; and

WHEREAS, the Forest Service is mandated to comply with Sections 106 and 110 of the National Historic Preservation Act (NHPA)(16 U.S.C. 470f and 470h-2) and implementing regulations under 36 CFR 800; and

WHEREAS, the Forest Service has completed historic and archival research and photographic and measured drawing documentation; and

WHEREAS, the Forest Service will transfer ownership of the three bridges to the North Carolina Department of Transportation, Bridge Maintenance Division (NC DOT) to be avialable for reuse; and

WHEREAS, the Forest Service will retain and maintain the NRHP eligible English Chapel Bridge and determine the NRHP eligibility and complete documentation of the Chatooga River Bridge; and

WHEREAS, replacement of these bridges would be an adverse effect on NRHP eligible properties;

NOW THEREFORE, the Forest Service, SHPO and NC DOT agree that the following stipulations shall be carried out to replace the historic bridges.

STIPULATIONS

The Forest Service will ensure that the following measures are carried out:

(1) The Forest Service will transfer ownership of the bridges to the North Carolina Department of Transportation, Bridge Maintenance Division (NC DOT), Attachment 1: AD 107, deliver them to Asheville, North Carolina to NC DOT for storage and future reuse; and

(2) The Forest Service will retain and maintain the original bridge abutments in place; and

(3) The Forest Service will retain the existing English Chapel metal truss bridge (No. 474 0.0) in place, place interpretive signing at the bridge, and maintain the bridge consistent with the Secretary of the Interior's Standards for Historic Preservation Projects and Guidelines for Maintenance and Rehabilitation of Historic Structures; and

(4) The Forest Service will inventory, evaluate and manage as necessary the only other existing Forest Service metal truss bridge (Bullpen Road crossing Chatooga River) on the Highlands Ranger District in Jackson County, North Carolina.

(5) NC DOT will coordinate bridge transfer with the Forest Service to ensure their appropriate reuse.

DISPUTE RESOLUTION

(1) Should the North Carolina SHPO object within (30) thirty days to any plans or documentation providied for review pursuant to this Memorandum of Agreement (MOA), the Forest Service shall consult with the North Carolina SHPO to resolve the objection. If the Forest Service or the SHPO determines that the objection can not be resolved, the Forest Service shall forward all documentation relevant to the dispute to the Advisory Council on Historic Preservation (ACHP) and request assistance in accordance with 36 CFR 800.2(b)(2).

(a) In accordance with 36 CFR 800.7(c)(2) the ACHP will provide recommedations to the Forest Service to take into account in reaching a final decision regarding the dispute, or

(b) the ACHP will notify the Forest Service that it will commnet pursuant to 36 CFR 800.7(c)(3) and proceed to comment. Any ACHP comment provided in response to such a request will be taken into account by the Forest Service in accordance with 36 CFR 800.7(c)(4) with reference to the subject of the dispute.

Any recommendation or comment provided by the ACHP will be understood to pertain only to the subject of the dispute; the Forest Service's responsibility to carry out all the actions under the MOA that are not the subject of the dispute will remain unchanged.

Execution of this Memorandum of Agreement evidences that the Forest Service has afforded the ACHP opportunity to comment on the proposed Avery Creek bridge replacements and that the Forest Service has taken into account the effects of the proposal on historic properties.

NATIONAL FORESTS IN NORTH CAROLINA

By: _____ Date _____

John H. Ramey, Forest Supervisor

NORTH CAROLINA STATE HISTORIC PRESERVATION OFFICER

By: _____ Date _____

Dr. Jeffrey J. Crow, NC State Historic Preseravtion Officer

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Concur: _____ Date _____

ADVISORY COUNCIL ON HISTORIC PRESERVATION

Filed by:_____ Date_____

AD-107 (11/89)

United States Department of Agriculture	Report No.
REPORT OF TRANSFER OR OTHER DISPOSITION OR CONSTRUCTION OF PROPERTY	Date **8/3/99**

1. Type of Transaction (Report Each Type Separately)	2. Authorization Reference	3. Proceed Received
[ ] Transfer [ ] Sale [ ] Trade [X] Donation	**41CFR101-44**	**$**

4. Reporting Agency:	5. Receiving Agency (Or Name of Purchaser or Donee)
USDA - FOREST SERVICE	**North Carolina Department of Transportation**
A. Organizational Unit **National Forest in North Carolina**	A. Organizational Unit (Or Address of Purchaser) **State Bridge Maintenance Division**
B. Location **Asheville, NC**	B. Location **PO Box 25201** **Raleigh, NC 27611**
C. Signature	C. Signature
D. Title **Forest Engineer**	D. Title **State Bridge Maint. Engineer** — E. Date

6. Property Items

Quantity (Or Prop. No.)	Item Description (Give Full Details Including Serial Number, If Any, And Condition Code)	Inventory Value
3	**Steel truss bridges currently located on FDR 477 at mile posts 0.9, 1.2, and 1.7 in the Pisgah National Forest. It is estimated that the continued care and handling of these bridges would exceed the estimated proceeds from their sale.** **It is agreed by the Receiving Agency to not hold the US Government liable for personal injuries to, disabilities of, or death of the donee's employees, or any other person arising from or incident to the donation of this property, its use, or its final disposition; and to hold the Government harmless from any or all debt, liabilities, judgments, costs, suits, actions or claims of any nature arising from or incident to the donation of this property, its use, or its final disposition.** **Be it known that there may be lead based paints on the bridges members.**	**Unknown**

CERTIFICATIONS OF PROPERTY AND FISCAL OFFICERS

7. Property Officer: This transaction is completed and the necessary entries have been made to adjust the Property Records. Proceeds, if any, are to be deposited to:	8. Fiscal Officer A. [ ] The sum indicated below has been received in payment for the property disposed of. B. [ ] The necessary entries have been made to adjust the accounting records.
	Amount ($) — Schedule No.
Signature — Date	Signature — Date