

Oconaluftee Bridge
(Great Smoky Mountains National Park)
Spanning the Oconaluftee River
Cherokee
Swain County
North Carolina

HAER No. NC-40

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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Department of the Interior
Southeast Region
Atlanta, Georgia 30303

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HISTORIC AMERICAN ENGINEERING RECORD

Oconaluftee Bridge
(Great Smoky Mountains National Park)

HAER No. NC-40

Location: Spanning the Oconaluftee River
Cherokee, Swain County, North Carolina

Date of Construction: 1921

Builder/Designer: Luten Bridge Company of Knoxville, Tennessee

Present Owner: National Park Service, U. S. Department of the Interior

Present Use: Closed in 1976; unsafe for vehicular traffic

Significance: This three-span reinforced concrete arch bridge is significant as an engineering work of this century. It is one among more than 20 remaining multiple span bridges constructed by Daniel Luten or one of his companies in Tennessee, North Carolina, or Georgia.

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The single-lane, reinforced concrete arch bridges that crosses the Oconaluftee River a quarter of a mile north of the Oconaluftee Visitor in Great Smoky Mountains National Park has neither a historic or common name. It connects the maintenance and residential area used by the National Park Service and the Oconaluftee Job Corps Center with U. S. Highway 441. In addition, the bridge was used by traffic between Big Cove Road and U. S. 441.

According to a plaque on the three-span bridge, it was designed and built in 1921 by the Luten Bridge Company of Knoxville, Tennessee. A second plaque lists the names of the Board of County Commissioners of Swain County as T. C. Queen, chairman; W. H. Patterson and J. H. McHam, members; and D. C. Nickels, clerk. The bridge is 180 feet long, 17 feet wide, and 10-15 feet above the river. Solid concrete walls form the sides. There are two single-span Luten bridges within a mile of the Oconaluftee Bridge. The term "Luten Bridge" refers to reinforced concrete arch bridges constructed by any of several bridge companies established or chartered by Daniel Benjamin Luten. By 1921, Luten had been constructing bridges for 20 years.

Daniel Luten was born in 1869. After securing a degree from the University of Michigan in 1894, he taught there for one year before moving to Purdue University, where he taught for four years (1896-1900). In 1900, he resigned to practice engineering and, in 1901, established the National Bridge Company of Indianapolis, Indiana. Combining his skills in engineering and self-advancement, as well as having the ability to interpret patent laws to his advantage, Luten began to construct reinforced concrete bridges in the Midwest.

The idea of using steel rods to strengthen arched concrete bridges was known by 1880 and in use in Europe and the United States. Daniel Luten developed several new and innovative ideas in regard to this and, using "upward of 30 skilled foreman and 50 assistants," had erected approximately 700 "Luten Bridges" by 1907. A brochure published that year offered several alternative methods of constructing a Luten Bridge--direct supervision of the work by a foreman; supply the steel, working drawings, engineering advice and a license to utilize the patents to erect a bridge for a flat fee; or supplying working drawings and license for a royalty of 10 percent of the contract. It was a very lucrative business for Luten, the parent company in Indianapolis, and the seven companies listed as "Representatives" in Los Angeles; Topeka; Chicago; Philadelphia; Des Moines; Berlin, Connecticut; and Indianapolis (National Concrete Company). At a later date, the Luten Bridge Companies of York, Pennsylvania, and Knoxville, Tennessee, became very active in construction of bridges.

Daniel Luten's skills were more evident in the merchandising than in the engineering field. A representative of one of the several Luten Bridge Companies would visit the county seat on County Court Day. He would provide information on Luten bridges, visit the site where the county was proposing

to construct a bridge, and offer to build a bridge of a size appropriate to the situation for a specific price. Using a modular concept, arches could be added as needed. A telling argument often was the use of local labor to build the forms, pour the concrete, which was purchased locally, and do other construction work. The company provided the engineering expertise.

A biographical sketch in Who's Who in 1921-22 indicated that Luten had supervised the design and erection of over 11,000 concrete bridges and held 49 patents for improvement in bridge construction. By the mid-1930s (Luten had retired in 1932), the number of bridges totaled 15,000. Daniel Luten died on July 3, 1946.

How many of these bridges are in existence today is not known. Interest in concrete bridges is just now developing and the process of separating out those bridges that were built under the auspices of Luten or one of his satellite companies from other arched bridges is only beginning. Those that have survived are for the most part located on lesser-used travel routes and in rural areas where a single land bridge, 17 to 20 feet wide, is still sufficient. In the fall of 1980, an informal telephone survey of individuals in the Southeast interested in Luten bridges and/or familiar with the inventory of older bridges in their States indicated that there are a considerable number of single or multiple arch Luten bridges remaining.

The longest bridge located in this survey was a four or five span structure across the Emory River in Harriman, Tennessee. Built between 1914 and 1916, it is approximately 400 feet long and 40 feet above the river. Individuals in the Harriman City Clerks Office were not definite about the number of spans or the exact length, but stated that it was still in constant use. Harriman is off Interstates 40 and 75, west of Knoxville.

Clellon Loveall, Structure Engineer in the Tennessee Department of Transportation, identified 13 other Luten bridges in the State. Seven of the 13 are single span. The six multiple span bridges include a bridge with five spans of 60 feet, in Carter County. Carter County also contains a three span bridge, 234 feet long and 57 feet wide. In Giles and Humphreys counties, there are double arch bridges 107 and 118 feet long. A four-arch bridge in Smith County is 140 feet long. In Wilson County, Tennessee, there is a three-arch open spandrel bridge, constructed by the Luten Bridge Company, that is 189 feet in length. Each span measures 63 feet. Of the 13 bridges, eight are on State routes and carry a wide range of traffic. Humphreys, Smith and Wilson counties are located east and west of Nashville, Tennessee. Carter County is in the northeast corner of the State and Giles is on the Alabama line, south of Nashville.

Also in the fall of 1980, North Carolina was in the process of putting their structural inventory of bridges on a computer. For this reason, data could not be easily retrieved at the time this report was prepared. However, there

were four known multiple span Luten bridges in western North Carolina. In adjacent Whitfield County, there are seven Luten bridges--three double arch and four triple arch. The longest, Looper's Bridge, is on the Whitfield-Murray County line. Crossing the Conasauga River, the bridge is 245-250 feet long with three 75 foot spans and two 13 foot abutments. This one-lane bridge was constructed in 1926 by the Luten Bridge Company of York, Pennsylvania. A second triple arch bridge across the Conasauga River is located on County Route 137. It measures 130 feet in length. Of the other five, both of the triple spans and two of the double spans are between 90 and 110 feet long. The fifth consists of two 38 foot arches. Construction dates are not known. Double span bridges are also found in Macon, Murray and Polk counties, with dates between 1910 and 1924.

For obvious reasons, shorter bridges (single span) are more numerous than the longer multi-span structures (Virginia has 25-30 Luten bridges--all single span). Inquiries made during this investigation were directed toward existing multi-arch bridges. Information on the number, size and condition of reinforced concrete arch bridges erected by companies associated with Daniel Luten and his "patented designs and improvements," is scanty. General interest in bridges as cultural resources worthy of preservation is less than a decade old. In many States, inventories of covered bridges and steel truss bridges are completed or well underway. However, inventories of concrete arch bridges are either still in process or not yet begun. Thus, assessments of historic values have not, except in a few cases, been undertaken. For this reason, no absolute statements can be made regarding the significance of the three-span bridge over the Oconaluftee River in Great Smoky Mountains National Park.

But some general observations regarding its significance can be made. First, as a work of engineering or as an example of a type or method of construction, the bridge over the Oconaluftee River is not one of the few surviving structures within the southeastern States. The brief information survey documented above indicates this. Second, there is no question that the bridge is endangered. In June 1976, the bridge was determined unsafe to carry vehicular traffic and was then closed. Funds for stabilization of the bridge were not available in fiscal years 1978 and 1979. By 1980, the bridge had deteriorated even further; scouring under one pier had caused cracking and settling on at least two of the three spans as well as displacement of 4-6 inches in the roadway. Exfoliation of the reinforcing rods had caused spalling of the concrete surface.

In 1977-78, in consultation with the North Carolina State Historic Preservation Office, a proposal to place a reinforced concrete arch beneath the bridge was developed. However, by 1982 the cost of this stabilization was nearly a million dollars and its execution would have resulted in the loss of integrity of setting feeling and design to a point where the structures eligible for the National Register of Historic Places would be open to question. Removal of the old bridge and construction of a new one would cost half a million dollars.

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Based on the above, a Section 106 case report was prepared in November 1980, proposing removal of the bridge. The adverse effect of this action would be mitigated by recording it to Historic American Engineering Record (HAER) standards, prior to its removal. This report fulfills that requirement.

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North Carolina

Chief of Police, Luke Lure

City Clerk, Brookfield

Brent Glass, Deputy State Historic Preservation Officer for North Carolina, in 1979

Harold Stallcup, North Carolina Highway Department, Asheville

Sam Usry and Joel Johnston, Bridge Department, North Carolina Department of Transportation, Raleigh

Tennessee

City Clerk, Harriman

Clellon Loveall, Structural Engineer, Tennessee Department of Transportation, Nashville

Ann Toplovich, Tennessee Historical Commission, Nashville

Virginia

Howard Newlon, Virginia Highway and Transportation Research Council, Charlottesville. Mr. Newlon is considered to be the most knowledgeable individual on Luten bridges.

West Virginia

Dr. Emory Kemp, Department of Engineering, University of West Virginia, Morgantown

U. S. Department of the Interior

Donald C. Jackson, Staff Engineer, Historic American Engineering Record (HAER), National Park Service

Ed Trout, Park Historian, Great Smoky Mountains National Park

John Garner, Chief, Cultural Resource Management, Southeast Regional Office, National Park Service

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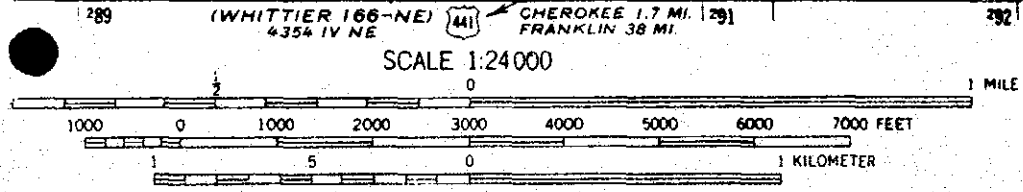
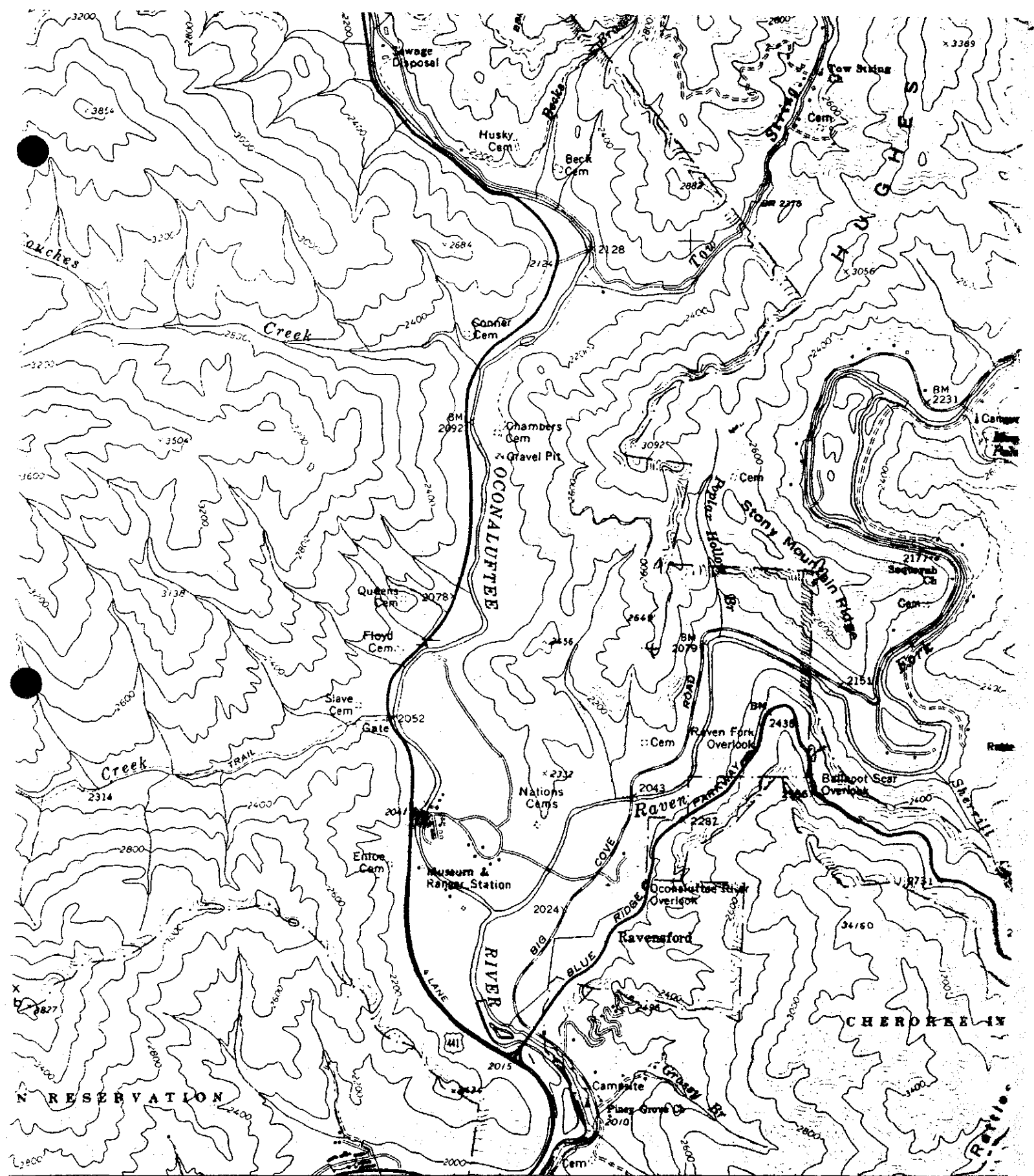
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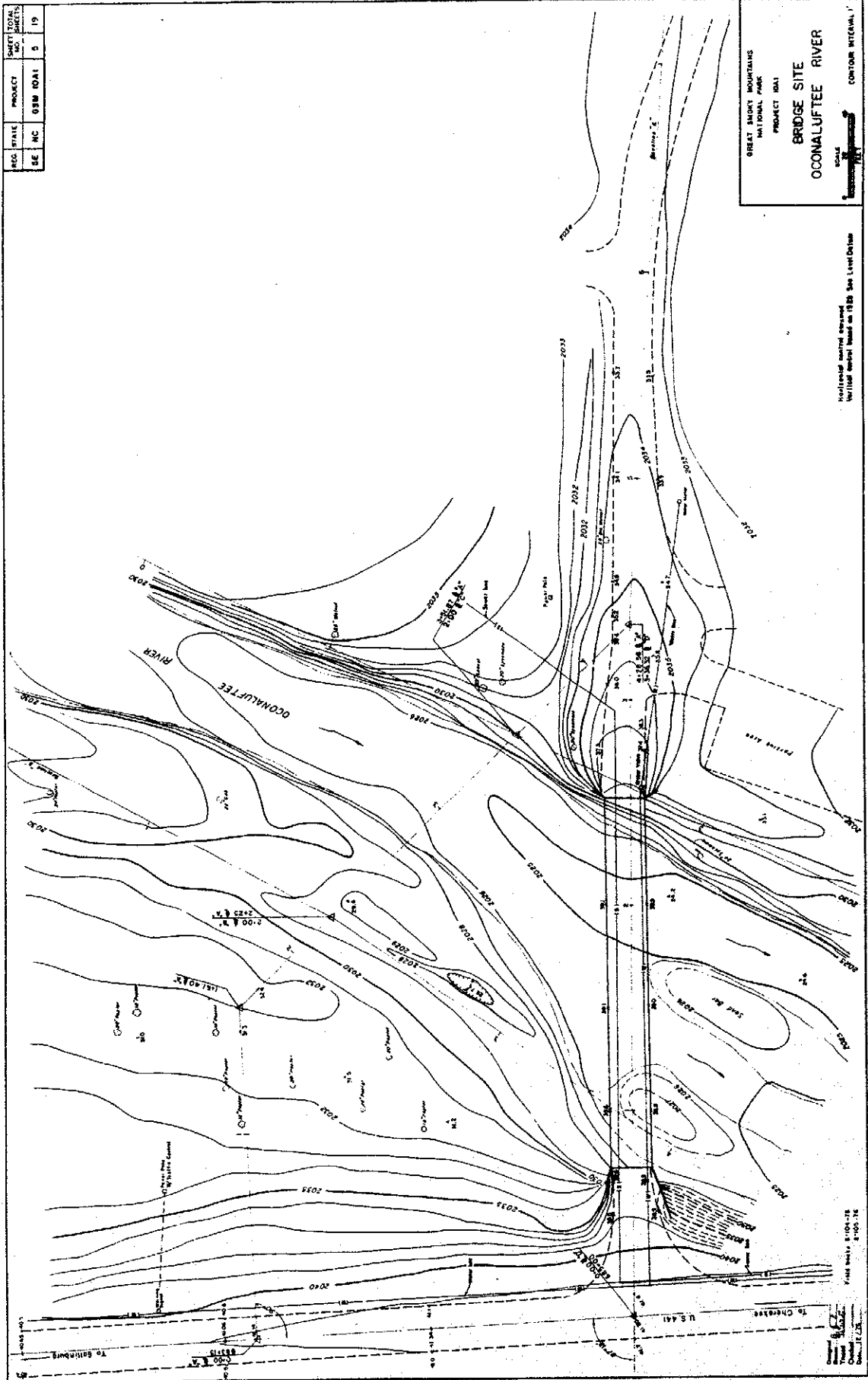
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NOTE: Photographs were taken by Paul Qually, Preservation Specialist, Great Smoky Mountains National Park, October 1, 1981

NC-40-1	VIEW OF SOUTH (DOWNSTREAM) ELEVATION
NC-40-2	VIEW OF NORTH (UPSTREAM) ELEVATION, SHOWING WEST AND CENTER ARCHES
NC-40-3	VIEW OF NORTH (UPSTREAM) ELEVATION
NC-40-4	VIEW OF NORTH (UPSTREAM) ELEVATION, SHOWING WESTERN ARCH
NC-40-5	VIEW OF SOUTH (DOWNSTREAM) ELEVATION, SHOWING CENTER AND EAST ARCHES



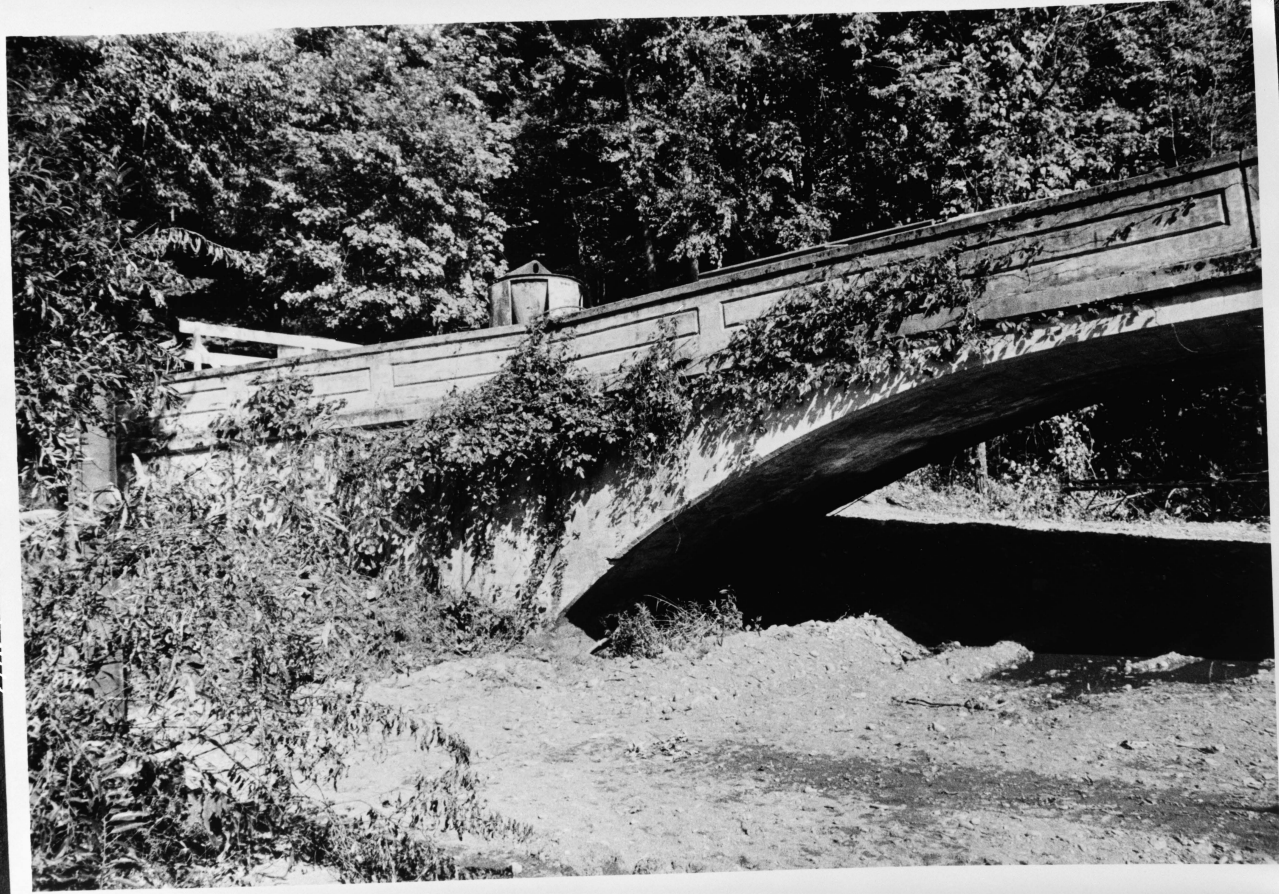
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