BRAZIL CREEK BRIDGE Structure #: 40N4575E1320002 Bokoshe LeFlore County Oklahoma

PHOTOGRAPHS

WRITTEN AND DESCRIPTIVE DATA

BRAZIL CREEK BRIDGE BOKOSHE, LE FLORE COUNTY, OKLAHOMA

Structure #: 40N4575E1320002

The bridge is located off of County Road 161 on County Road 159 over Brazil

Location:

Creek near Bokoshe in LeFlore County, Oklahoma. USGS Quadrangle map: McCurtain SW, OK. UTM Coordinates: Zone 15 E239909 N3885631 Date of The bridge was constructed in 1911. Construction: Designer/ **Central States Bridge Company** Builder: Present Owner: Le Flore County Roadway Bridge (public) Previous Use: Roadway Bridge (public) Present Use: Significance: In a previous survey (date unknown), it was noted that per interview with Veldo Brewer (ODOT engineer, 8/10/1992), this bridge was taken from the old Lexington-Purcell toll bridge which was dismantled in the late 1930s. Erica L. Howard, Sherry N. DeFreece Emery, and Kate Singleton; URS Corporation, Author: Dallas, Texas; April 2012 This project consists of Historic American Engineering Record (HAER) Level II Project Information: equivalent documentation of the Brazil Creek Bridge in LeFlore County, Oklahoma. This HAER recordation serves as mitigation for the removal of this structure from

the transportation system. Field work was accomplished by Kate Singleton on December 21, 2011. At the site, 35mm format, black and white photographs were taken and the character and conditions of the structure were recorded. No original drawings were available at the time of the field work.

Research was conducted at the Leflore County Courthouse and the County Clerk's Office. Unfortunately, there were no records available for this time period. According to the County Clerk and one of the County Commissioners, the earlier county records had been stored in the basement of the courthouse. The basement flooded several times and many of these earlier records have been

destroyed. The remaining records were viewed and there were very few remaining records from the time periods when the three bridges were constructed. There are no County Commissioner Minutes before the 1980s. The remaining records were deed and mortgage records. Deed records were reviewed however; they did not note road easements or bridge construction. It was also indicated that the records pertaining to roads and bridges were thrown out when the County offices were moved.

PART I: HISTORICAL INFORMATION

Oklahoma has two main drainage systems: the Arkansas River and the Red River. These rivers along with their tributaries flow into Oklahoma by the six surrounding states. The waters flow out of the state by way of the Red, Arkansas, and Little Rivers, and Lee Creek. These rivers and creeks proved a challenge as Oklahoma travel evolved from horseback and foot travel to motorized transportation, necessitating the construction of ferries, and later bridges over many of these creeks and rivers.^{1,2,3}

When people and goods first came across Oklahoma, trails were developed based on the easiest route to travel or from animal tracks. Osage Indian trails were later used for resettlement of additional tribes and by Anglos, and by their arrival an established network of roads and fords had formed. From these routes, later highways developed, including the Texas Road (later U.S. Highway 69). Individuals established better crossings at rivers and streams beginning in the 1820s using wooden rafts, flatboats, and later ferries powered by steam engines.

Military roads were begun in the early 1800s when the U.S. Army arrived to the territory. The first surveyed road in the state was conducted by the army under Lieutenant James L. Dawson in 1826; this route extended 55 miles from Fort Gibson to Fort Smith. Military roads became the chief routes for travel, supplies, livestock, and communication not only for the military but for other settlers and tradespeople, and continued to be developed into the 1870s. The army also built and operated ferries, most of which were timber plank bridges intended only for temporary use.

After Indians were relocated to Oklahoma Territory in the 1830s and 1840s the tribes gained control of travel routes and ferries and the governments of the Cherokee, Choctaw, Chickasaw, and Creek tribes began a series of legislative actions that further established public roads, primarily along section lines. In 1849 the Cherokee Nation approved annual taxes for the ferries they regulated on the Arkansas, Canadian, Neosho, Illinois, and Verdigris rivers. Each tribal government established ferry regulations that applied to its landholdings, and individual landholders operated ferries and toll bridges on the creeks and rivers on their land. Traders often operated ferries associated with their stores. By the 1850s, the army built more permanent wooden and wrought iron bridges.

Oklahoma Territory roads became popular routes during this time, and travelers to the frontiers of Texas and California passed through the area. Along the Texas Road turnpikes, toll bridges, and ferries were built by the 1870s. As railroads extended their lines through the territory, they also brought iron and steel truss bridges that were often the first permanent bridges erected in some areas. Railroad bridges were often adapted to allow crossing by horse and wagon; other times railroad bridge designs, or actual retired railroad bridges were used for road use. By the 1880s, cattle trails became important, and the Chisholm (later U.S. Highway 81) and Great Western trails were extended through Oklahoma Territory. Ferries began being regulated by Oklahoma Territory in 1890, which allowed counties to fix tolls, license ferries, and regulate their locations; after statehood, these regulations became state law.^{4,5,6}

Prior to statehood, a system of county-led road construction and maintenance had been established, but roads and bridges on tribal lands were controlled by the Bureau of Indian Affairs. The mostly dirt roads were only sporadically maintained. Since the Indian nations and Oklahoma Territory did not have the financial resources nor the technology to properly maintain the roads, the public found they often had to deal with washed out crossings, quicksand filled stream and river beds, and other problems. Although railroad bridges were in use, most were simple wooden structures or "straw bridges" that consisted of straw mats which were laid on the river bottom.

The national campaign known as the "Good Roads" movement was founded in St. Louis in 1893 and found a foothold in Oklahoma in 1902 after a series of disastrous floods. The movement was sponsored by the U.S. Department of Agriculture's Office of Road Inquiry (later Office of Public Roads) and railroad companies. The railroad had just as much of an interest in good roads as the public, since better access meant that farmers could reach rail lines and markets more easily. In fact, railroads such as the St. Louis and San Francisco even used excursion trains to showcase the demonstration roads it had helped build in the Oklahoma Territory. The movement was able to secure provisions (including the establishment of a state highway department) during the 1906 Oklahoma State Constitutional Convention.

During the early years of statehood, individual townships had the responsibility of maintaining roads and local individuals were required to maintain the section-line roads, which were often the only roads that existed in the area. By 1911, the highway department existed, but received no funding for construction or maintenance of roads, nor did they have any authority. In fact, Oklahoma claimed only 23 miles of hard surfaced roads, the fewest in the United States. Only with the passage of the 1916 Federal Aid Highway Act were matching funds provided and state legislators made funding for state roads available. Previously, funding was channeled through county road improvement districts that had been established in 1909. Between 1917 and 1919, \$690,834.00 in federal money was appropriated for Oklahoma roads, and counties matched this 50-50. Primarily due to the efforts of the Good Roads Association, rural roads continued to improve; farmers had better access to towns, railroads, and markets, which in turn improved the values of farm property and businesses.^{7,8,9,10}

The turn of the twentieth century also brought advancements in bridge construction to Oklahoma. Counties increasingly purchased prefabricated, often mass-produced, metal trusses and suspension bridges (often tolled to save public money) from Midwestern bridge companies such as the Central States Bridge Company, Rochester Bridge Company, Vincennes Bridge Company of Indiana; the Canton Bridge Company of Ohio; John Gilligan Company and Monarch Engineering of Nebraska; Midland Bridge Company, Kansas City Bridge Company, and Canton Bridge Company of Kansas City, and the Missouri Valley Bridge and Iron Company of Kansas. These bridges could be transported to the site by railroad gondolas and erected by local workers supervised by a bridge company representative. This mode of bridge construction became a regular practice in the state, and several bridge company (later Robberson Steel Company) and the Boardman Company both opened offices in Oklahoma City. Generally these metal truss and suspension bridges were good durable designs, and the convenience of "turnkey" service by bridge companies proved to be a successful solution for many small creeks and streams. Toll bridges lost favor in the late 1920s, and public money was spent to buy out owners and transfer ownership to the state.¹¹

Around 1915 the type of trusses used for shorter spans shifted from pin-connected Pratt pony trusses to half-hip, truss leg bedstead, and most commonly, the Warren pony truss with vertical members. Construction of bridges stalled with the United States' entry into World War I as labor and construction materials were reallocated to the war effort. After the war bridge construction resumed and transportation demands of the oil industry further spawned their construction. Steel truss bridges became the most popular choice for shorter spans, and were also used in combination with each other or with other span types for larger spans. Later, longer spans and heavier loads necessitated a further shift to the use of Parker through-trusses, and concrete pile trestles also saw wider use. In the 1920s, the camelback pony truss became the preferred type of state highway department engineers and was most commonly used from the 1930s through the 1950s on federally funded roads. This truss was also used in combination with other trusses such as K-trusses on larger spans. Automobile travel had arrived in Oklahoma in the 1920s and by 1926 there were 500,000 cars registered in the state. In 1924 Governor Martin Trapp established a state highway system to comply with a demand from the federal government for accountability for the funding it provided for roads; the newly created department was responsible for road construction and maintenance. The legislation also allowed for a gasoline tax and created the state highway commission. Roads in Oklahoma continued to expand, with asphalt, brick, and concrete roads replacing dirt roads. Even in the early 1930s, ferries and fords were still used, but had increasingly been replaced by bridges, and their types became more standardized as a result of more centralized control.¹²

During the Depression, construction of bridges and roads slowed, with the exception of those funded by federal programs like the Works Progress Administration (WPA) and the Civilian Conservation Corps. WPA grants amounted to over \$4 million in 1937 alone. Funds were typically allocated to smaller projects and repairs, and it also provided for dismantling and moving trusses to new locations; however, some of the largest bridges in the state were built during the Depression. In all, 24 bridges that each spanned over 700 feet were built during that period.¹³

Bridge and road construction again slowed as the United States entered World War II; 24 road projects were stalled, and maintenance was deferred even as roads saw increased heavy use. The budget for the highway department was cut to below 1922 levels, and older metal bridges were demolished for scrap for the war effort. Road and bridge work was restricted to military and oil field purposes, which did lead to the construction of 65 bridges during the war years. Interstate highways and state sponsored turnpikes were constructed in the state after the war to meet increased demand and repair infrastructure damaged by wartime use and even in 1955 twenty percent of Oklahoma roads were unpaved. Standardized highway and bridge designs became the norm in the 1950s; concrete was increasingly used for both, and the use of metal truss bridges declined. Oklahoma's economy was jolted by the booming oil industry, and so was its transportation infrastructure by the time that the 1956 Interstate Highway program was created. By 2000, Oklahoma had 10 turnpikes and two Interstate highways carrying goods and travelers across the state.^{14,15}

Le Flore County

The Double Intersection Warren through Truss bridge is located off of County Road 161 on County Road 159 over Brazil Creek near Bokoshe in LeFlore County, Oklahoma.

Named for a prominent family of the Choctaw Nation, Le Flore County encompasses 1,608 square miles and is located in the southeastern portion of Oklahoma. The county is bound by Sequoyah County on the north; Haskell, Latimer, and Pushmataha counties on the west; McCurtain County on the south; and the Arkansas state line on the east. The majority of the county is mountainous with the Ouachita Mountains extending across the southern portion. Other ranges in the south include the Winding Stair and Kiamichi Mountains; while the area to the north includes Sugar Loaf and Cavanal Mountains. The region is also prosperous in the lumber industry due to the high forested area. The Arkansas River and its tributaries, the Poteau and the James Fork rivers, drain most of the county. In the southern portion of the county, the Kiamichi, Little and Mountain Fork rivers drain into the Red River. Caston Creek, located in LeFlore County, is a tributary of Poteau River which is in the Arkansas River Valley.¹⁶

French explorers, traders, and trappers began to survey the area in the eighteenth century. It was these men that gave name to several features in the county. When the United States purchased Louisiana in 1803, American explorers and military personal began surveying the area.¹⁷

By the early 1800s, the United States began to establish military outposts and roads were established throughout the county and into the state. These roads connected forts such as Fort Smith (1817) to Fort Gibson (1824). The Choctaw Nation signed treaties that ceded their home lands to the government and gave them land in southeastern Oklahoma. In 1832, the federal government constructed a building for the Choctaw Agency at Skullyville, fifteen miles west of Fort Smith. This building also served as a station for the Butterfield Overland Mail route on the California Road. This town served as the Choctaw capitol for a time. During the late 1830s until the Civil War, the Choctaw Nation allowed schools and a mission to be operated at Fort Coffee. During the Civil War, battles and skirmishes occurred in the county. After the Civil War, the Choctaw government passed legislation to fund schools and several were established in the county. Schools for Choctaw Freedmen were established at Boggy Depot, Skullyville, Fort Coffee and Talihina.^{18,19}

In the late nineteenth century, the natural resources of the county including the timber industry and coal mining attracted settlers and railroads to the county. The Fort Smith and Southern Railway (later purchased by St. Louis and San Francisco Railway) came through LeFlore County in 1886-1887. It was followed in rapid succession by the Choctaw, Oklahoma and Gulf Railroad (leased to the Chicago, Rock Island and Pacific Railway), the Indianola Coal and Railway, Kansas City, Pittsburg, and Gulf Railroad (acquired by the Kansas City Southern Railway), the Poteau Valley Railroad, Arkansas Western Railroad, Fort Smith and Western Railroad, Midland Valley Railroad and the Oklahoma and Rich Mountain Railroad (owned by Dierks Lumber and Coal Company).²⁰

Coal mining began in the late nineteenth century and continued to expand after statehood. At times, LeFlore County has led the state in coal production. Limestone, sand, gravel and natural gas were also produced in the county. All of these continue to be important to the county and state economies.²¹

Agriculture has been an important part of the local and state economy. The early crops were corn and cotton. By the 1960s, this had changed to soybeans, wheat, sorghum and corn. Raising cattle steadily increased over the years. By the 1950s, raising chickens became a significant part of the agricultural economy.²²

In 1907, when the county was organized, the population was 24,678. By the early 1920s it had almost doubled and in 1950 it was 45,866. As the timber industry and coal mining declined, so did the population. However, the population began to climb again with the construction of the McClellen-Kerr Arkansas Navigation System and as other industries including poultry farming began to develop. In 2010, the population had grown to 50,384.²³

PART II – ARCHITECTURAL AND ENGINEERING INFORMATION

Brazil Creek Bridge Description

The Brazil Creek Bridge is a one-span rivet connected Double Intersection Warren through truss with one lane to carry vehicular traffic over the creek. The bridge measures 153 feet in total length with a width of approximately 16 feet. The substructure of the bridge has two concrete abutments on either bank of the river. Information regarding the construction of this bridge was requested from the LeFlore County Commissioners Office. However, the County Commissioners Office indicated that they do not have records dating from this time period.²⁴

The top chord and end posts of the truss members are built-up steel beams with lace. The side panels consist of angled lace steel beams with a vertical lace steel beam on the ends. The bottom lateral bracing and floor beams are steel beams. The decking of the bridge is covered with 2"x 8" timbers running the length and width of the bridge.

The bridge has a steel beam guardrail which runs the length of the bridge. There is vandalism on the bridge which includes evidence of impact damage. Structural damage includes, but is not limited to rusted truss members and deteriorating asphalt decking.

Double Intersection Warren through Truss

The Warren truss was developed by British engineer Francis Nash and a Belgian engineer by the name of Neville. It was patented by James Warren and Willoughby Monzoni in 1848. An efficient design, the Warren truss consists of diagonal members forming equilateral triangles acting in tension and compression, which connect the top and bottom chords without vertical members. Often the truss type has added verticals or additional alternating diagonals, which are usually thin. Thicker members usually are used at the main diagonals, end posts, and at the top and bottom chords or as a bedstead pony truss. Like the Pratt truss, stress is easily calculated in the Warren truss.²⁵

The Warren truss was the first all wrought iron bridge type in Europe, possible through the rational use of diagonals as tensile and compressive members, with each member bearing load equally. The design retained popularity as a field riveted or bolted steel type, with Warren pony trusses becoming popular for county bridges (beginning in the 1890s) and state highway bridges (beginning in the 1920s). Railroad companies began using Warren trusses as well, and these bridges were popular through the 1930s.²⁶

A variation of the Warren truss is the Double Intersection Warren truss. It is also called a quadrangular or multiple-intersection Warren truss. The elevation of the truss shows a crosshatched pattern of diagonal bracing, giving the appearance of equilateral triangles overlapping one another. The Double Intersection variation may or may not have verticals; but the diagonals act in tension and compression like the typical Warren truss. The crossed diagonals simply add to the load carrying capacity and stiffness of the truss.²⁷

The historical significance of the Warren truss lies in their use during the nineteenth century, but few of these examples exist. More common early twentieth century designs are also significant as standardized bridge types used by highway departments. These include short span pony trusses and through trusses for intermediate span lengths that retain their character defining features, including: parallel top and bottom chords, inclined end posts, diagonals, floor beams, stringers, connection method, and struts and portal features such as struts and bracing for through trusses. The Double Intersection Warren through truss variation is not as common as the Warren through truss. Examples that retain their historic integrity are deemed highly significant. Character defining features of the Double Intersection Warren through truss include: parallel top and bottom chords, diagonal members, floor beams, stringers, struts, connection methods, and portal features such as struts as struts as struts and bottom chords, diagonal members, floor beams, stringers, struts, connection methods, and portal features such as struts and bottom chords, diagonal members, floor beams, stringers, struts, connection methods, and portal features such as struts and bottom chords, diagonal members, floor beams, stringers, struts, connection methods, and portal features such as struts and bracing.²⁸

PART III – SOURCES OF INFORMATION

Original Drawings and Other Sources

No original drawings were found. The Office of the County Commissioners indicated that they do not have the minutes for this time period. (Personal Communications, May 9, 2012, Visit to County June 12, 2012). Local Newspapers were also researched but did not have information pertaining to the bridge.

PART IV END NOTES

- ¹ Johnson, Kenneth S. "Rivers and Creeks," Encyclopedia of Oklahoma History and Culture. Oklahoma State University. Electronic document, available at http://digital.library.okstate.edu/encyclopedia, accessed March 14, 2012.
- ² Corbett, Bill. "Transportation," Encyclopedia of Oklahoma History and Culture. Oklahoma State University. Electronic document, available at http://digital.library.okstate.edu/encyclopedia, accessed 15 March 2012.
- ³ Birdwell, Jimmie. "Le Flore County," Works Progress Administration, 7 October 1936. Oklahoma Historical Society, Vertical Files; Oklahoma City: 1.

⁴ Corbett.

- ⁵ O'Dell, Larry. "Ferries and Fords," Encyclopedia of Oklahoma History and Culture. Oklahoma State University. Electronic document, available at http://digital.library.okstate.edu/encyclopedia, accessed 14 March 2012.
- ⁶ King, Joseph. *Spans of Time: Oklahoma Historic Highway Bridges*. Texas Tech University Center for Historic Preservation & Technology and the Oklahoma Department of Transportation Planning Division, 1993: 3-9.
- ⁷ Corbett.
- ⁸ O'Dell, "Ferries and Fords."
- ⁹ Everett, Dianna. "Good Roads Association," Encyclopedia of Oklahoma History and Culture. Oklahoma State University. Electronic document, available at http://digital.library.okstate.edu/encyclopedia; accessed 15 March 2012.
- ¹⁰ King, 5.
- ¹¹ King, 6-10.
- ¹² King, 10-17, 21.
- ¹³ King, 27-30.
- ¹⁴ Corbett.
- ¹⁵ King, 32.
- ¹⁶ Birdwell, 1.
- ¹⁷ Ibid.
- ¹⁸ O'Dell, Larry, "Le Flore County History", *Encyclopedia of Oklahoma History and Culture*, http://digital.library.okstate.edu/encyclopedia, accessed 28 March 2012.
- ¹⁹ Ibid.
- ²⁰ Ibid.
- ²¹ Ibid.
- ²² Ibid.
- ²³ Ibid.
- ²⁴ Personal Communication with Leflore County Commissioners Office, May 9, 2012.
- ²⁵ Parsons Brinkerhoff, "A Context for Common Historic Bridge Types" for NCHRP Project 25-25, October 2005, 3-39, Appendix B.
- ²⁶ Parsons Brinkerhoff, 3-43.
- ²⁷ Ibid.
- ²⁸ Ibid.

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INDEX TO PHOTOGRAPHS

Documentation: Photographer:	12 Photographs (December 2011) Kate Singleton, Architectural Historian
1	NORTH VIEW, FACING SOUTH
2	SOUTH VIEW, FACING NORTHWEST
3	PANELS ON EAST SIDE, FACING NORTH
4	END POST ON SOUTH SIDE, FACING NORTHEAST
5	TOP LATERAL BRACING, FACING EAST
6	DIAGONAL BRACING, FACING SOUTHEAST
7	GUARD RAIL AND BRACING, FACING SOUTHEAST
8	TOP CHORD, FACING WEST
9	NORTH SIDE OF BRIDGE, FACING SOUTHEAST
10	FLOOR BEAM, FACING SOUTHEAST
11	BRIDGE ANCHOR, FACING WEST
12	NORTH SIDE OF BRIDGE, FACING SOUTHWEST

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