Salt Fork of the Arkansas River Bridge
Structure #3606 0089 X
Northeast of Marland
Kay County
Oklahoma

PHOTOGRAPHS

COPIES OF PLANS

AND

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
Submitted to:
Oklahoma State Historic Preservation Office
800 Nazih Zuhdi Drive
Oklahoma City, Oklahoma 73105

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Anna M. Eddings, Photographer, March 2010

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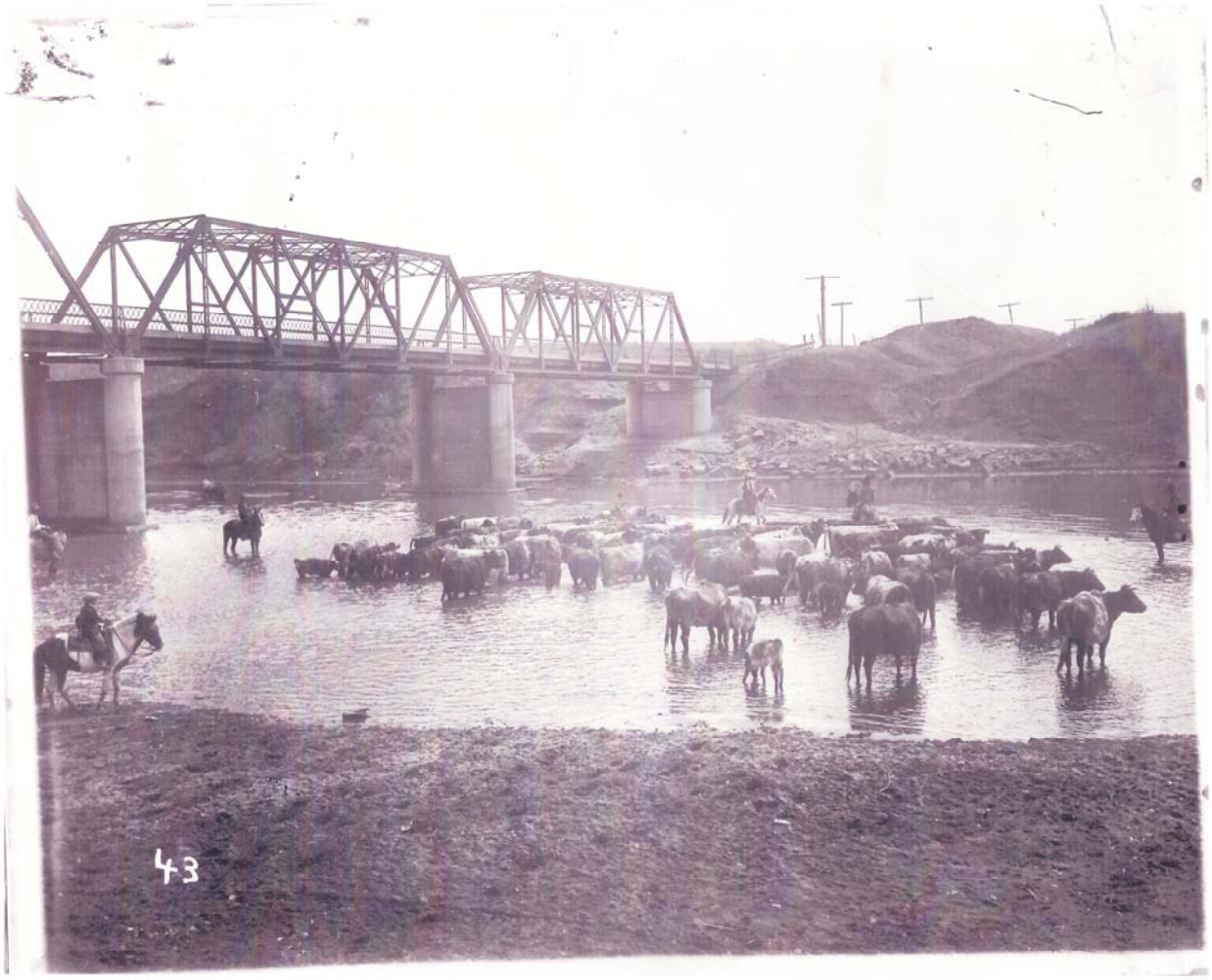

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Source of plans: State of Oklahoma, Department of Highways. "Plan and Profile of Proposed State Highway, Federal Aid Project No. 123," fiscal year 1923. On file at Office Services Division, Oklahoma Department of Transportation.

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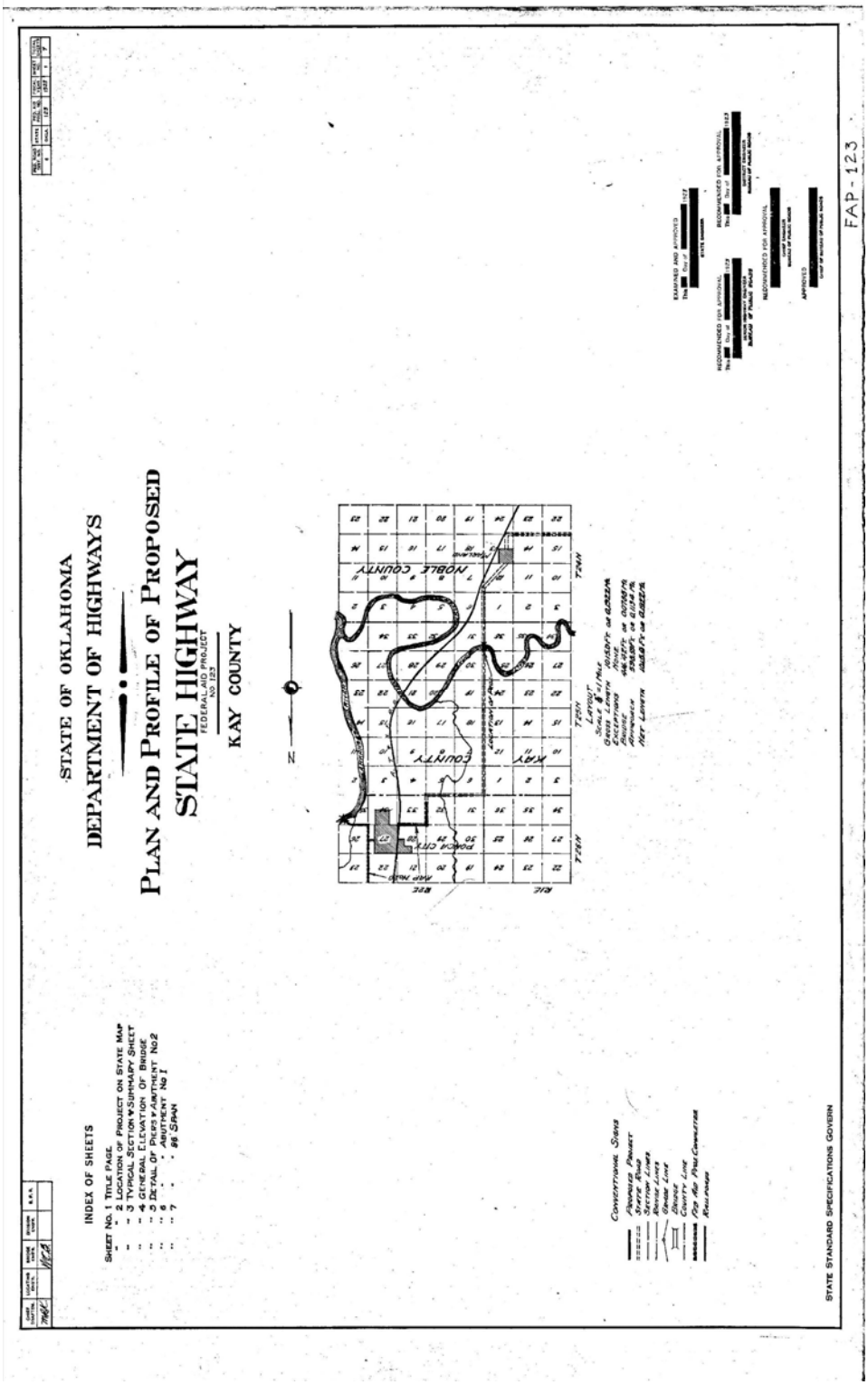

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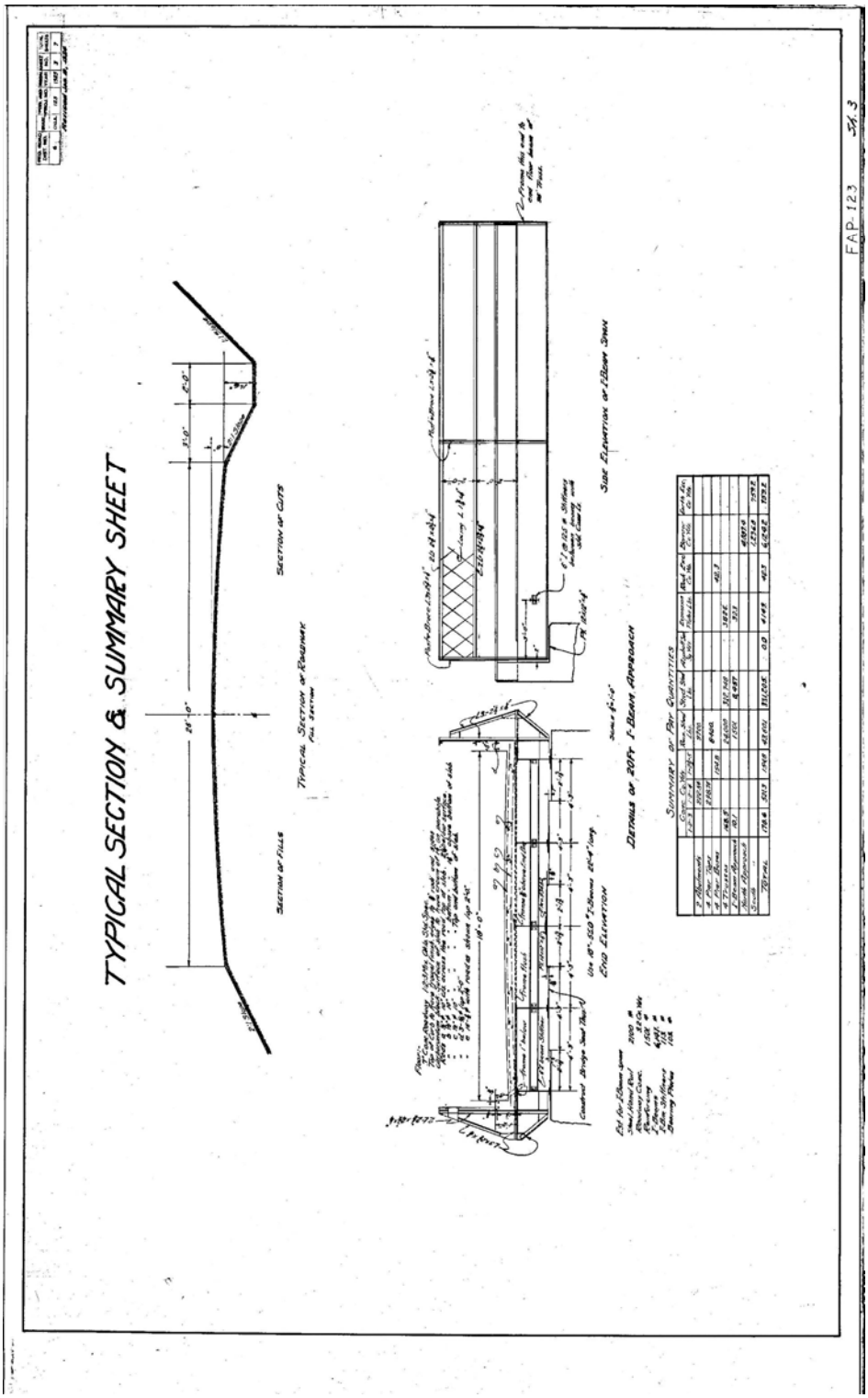

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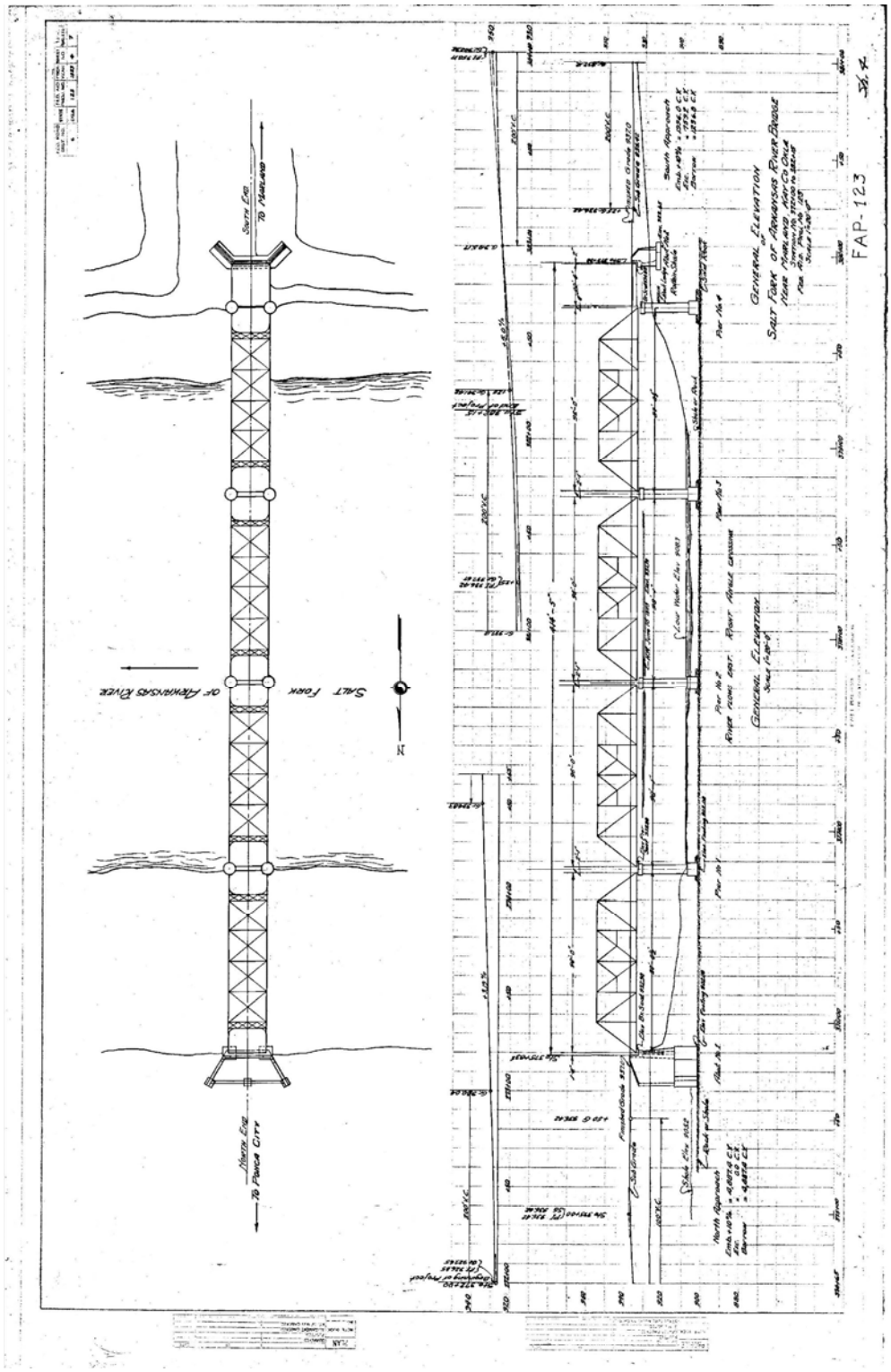

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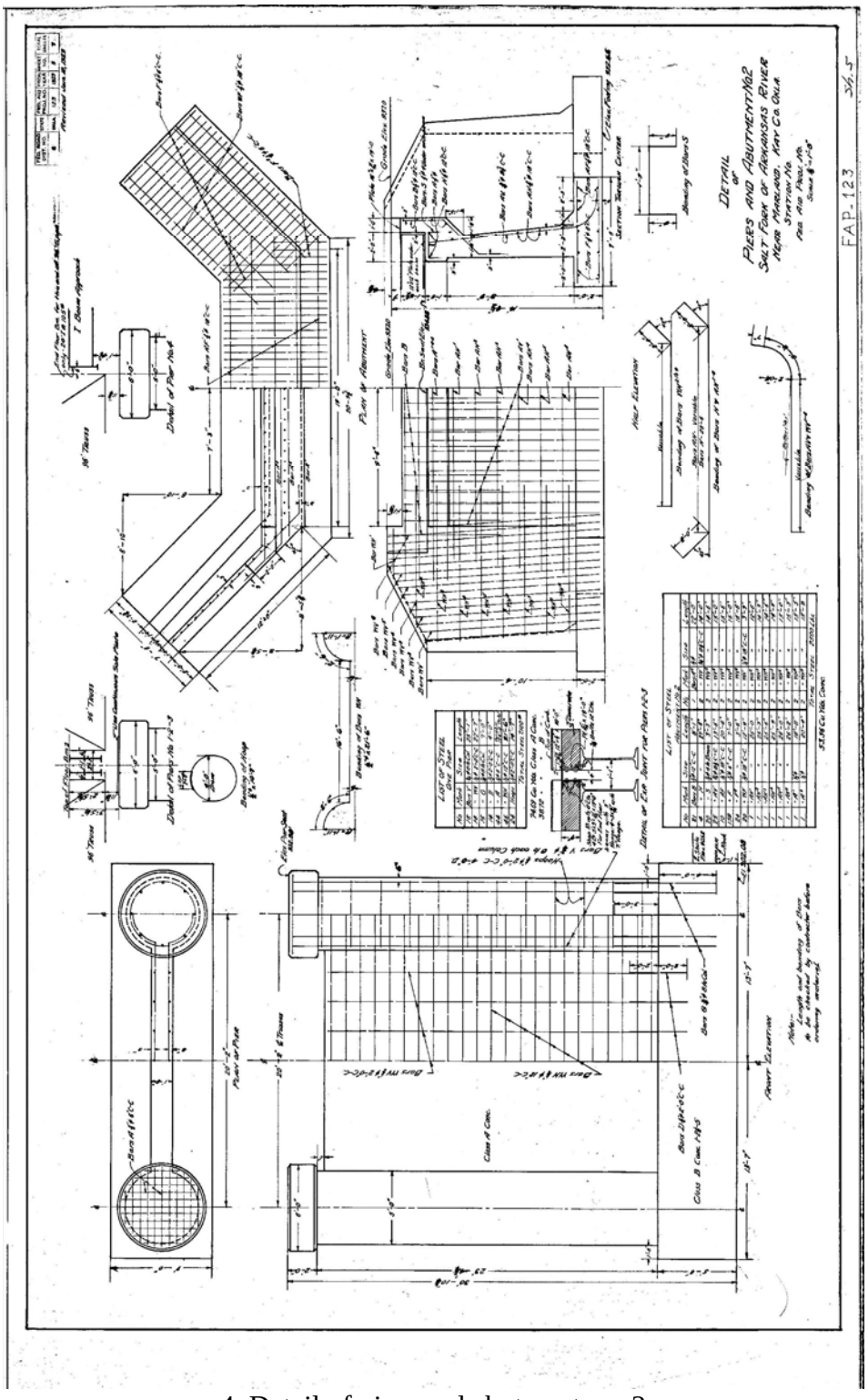

4. Detail of piers and abutment no. 2

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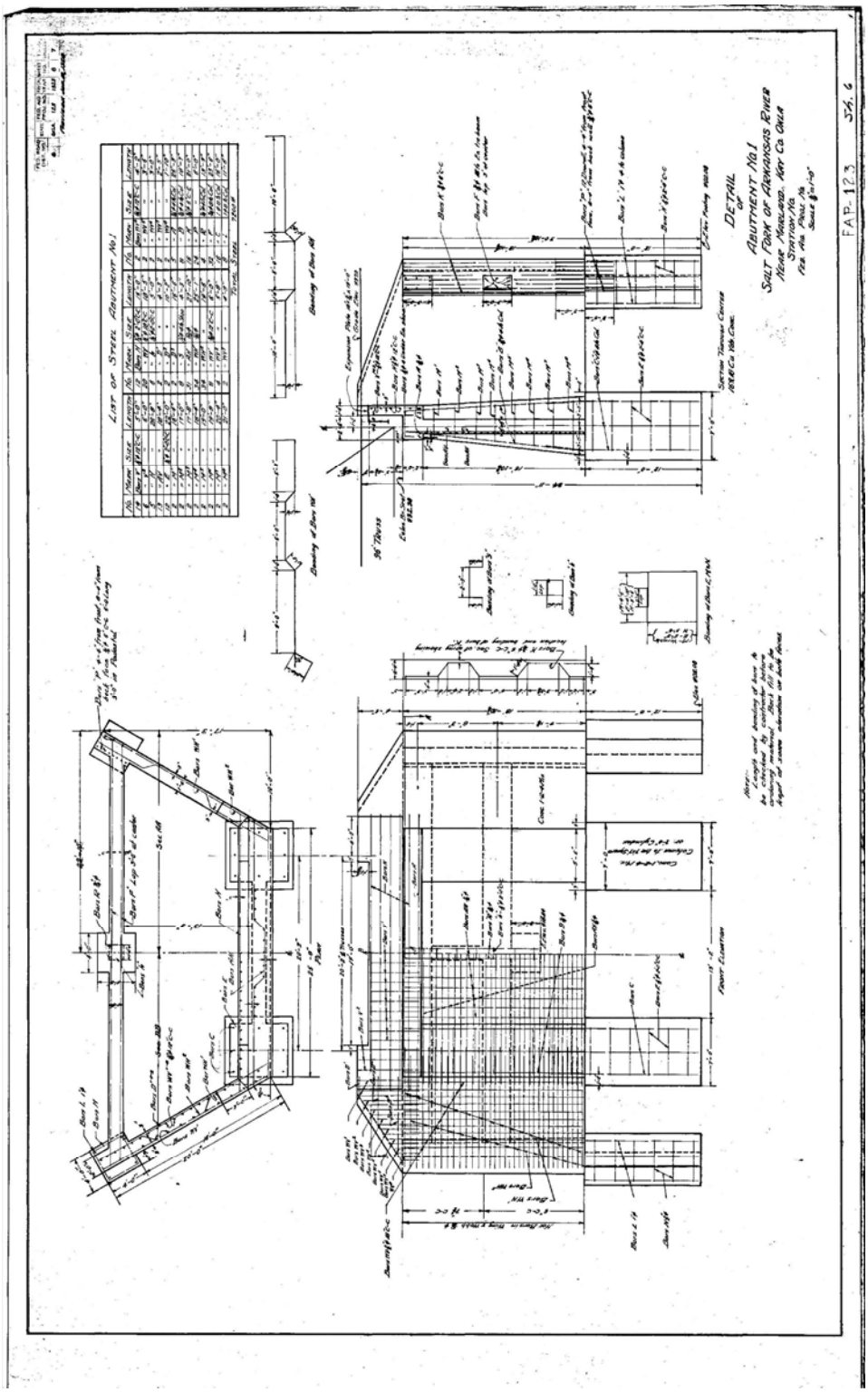

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INTRODUCTION

Location:	Carries SH-156 over the Salt Fork of the Arkansas River northeast of Marland in Kay County, Oklahoma (between Section 36, T25N, R1E; and Section 31, T25N, R2E). UTM: Zone 14, 4052958N, 666438E
Map Reference:	U.S.G.S. 7.5' series, *Marland, Okla.* (1968)
Present Owner:	Oklahoma Department of Transportation
Present Use:	No longer extant
Significance:	The Salt Fork of the Arkansas River Bridge is a distinctive example of an Oklahoma state-standard bridge design representative of the work of the Oklahoma State Highway Commission and the development of the state highway system. It is also a contributing resource to the NRHP-listed 101 Ranch Historic District because of the importance of transportation and the Salt Fork of the Arkansas River in this ranch's history.
Project Information:	Historic American Engineering Record (HAER) Level II equivalent documentation was performed in 2015. Anna M. Eddings, Architectural Historian for the Oklahoma Department of Transportation Cultural Resources Program, conducted photographic documentation of the bridge in March of 2010 and compiled the historical information in 2015. Photographs for this report have been submitted to the Oklahoma State Historic Preservation Office (SHPO), following their guidelines for 35mm black and white images. Per a Memorandum of Agreement, this HAER documentation serves as mitigation for the demolition of this structure.
Preparer:	Anna M. Eddings, Historian / Architectural Historian, ODOT Cultural Resources Program, Norman, Oklahoma

PART I. HISTORICAL INFORMATION

A. Physical History:

1. Date of Construction: 1924

2. Architect/Engineer: W. C. Burnham, State Bridge Engineer; C. H. Rightmire, Project Engineer

3. Builder/Contractor/Supplier: Pioneer Construction Company

4. Original Plans: State of Oklahoma, Department of Highways. "Plan and Profile of Proposed State Highway, Federal Aid Project No. 123," fiscal year 1923. On file at Office Services Division, Oklahoma Department of Transportation.

5. Alterations and/or Additions: W-beam guardrail attached to original lattice guardrail; minor repair work, mostly beneath the bridge deck.

B. Historical Context:

The Salt Fork of the Arkansas River influenced the early history of north central Oklahoma. It flows through southern Kay County before emptying into the Arkansas River. Salt deposits left along its banks and sand bars attracted the attention of the area's early inhabitants: the French called it the Grand Saline, while the Osage Indians called it the Big White River. In the early 1700s, the Wichita Indians had villages along the Arkansas River and acted as middlemen for the French, traveling west to trade with the Comanche Indians. Their routes probably led along the Arkansas River and its tributaries such as the Salt Fork. However, the Wichitas left this area in 1757 because of the ascendancy of the Osage Indians. The Osages had numerous trails from their villages in eastern Oklahoma, Kansas, and Missouri, which they traveled annually to hunt buffalo on the Plains. One of these was the Black Dog Trail. Although it originated farther east, from the Arkansas River this trail extended west along the Salt Fork to the Plains. It was also the favored route of Osage mourning parties. By the early 1800s, American explorers were entering this region, including Nathan Boone in 1843. He led an expedition to the Great Salt Plain on the Salt Fork of the Arkansas River, during which his party crossed the Salt Fork in the area where it loops southward before flowing into the Arkansas River, and re-crossed it farther west near the present-day town of Tonkawa, Oklahoma. The Cherokees next claimed title to this region, when treaties for their removal to eastern Oklahoma gave them a fifty-eight-mile-wide "outlet" to the West.[1]

[1] William Paul Corbett, "Oklahoma's Highways: Indian Trails to Urban Expressways," (Ph.D. dissertation, Oklahoma State University, 1982), 5-7, 10-14; [J.B. Thoburn], "Kay County," WPA Historical Records Survey, Sketches of County Histories, MS-21-1-4, Box 2, Folder 36. Oklahoma Documents, Archives and Records Division, Oklahoma Department of Libraries, Oklahoma City, Oklahoma, 1-4; W. Julian Fessler, "Captain Nathan Boone's Journal," *Chronicles of Oklahoma* 7 (March 1929), 68-70; Carolyn Thomas Foreman, "Nathan Boone: Trapper,

After the Civil War, the Cherokee Outlet lay on the path of some of the great cattle trails, and the Cherokees leased it to ranchers and cattle companies for grazing. The earliest cattle trail from Texas to cross Oklahoma was the Shawnee Trail, which entered Kansas at Baxter Springs, east of the Outlet. However, railroads extended their lines and established new shipping points farther west in Kansas, expanding the cattle industry in the Outlet. A western offshoot of the Shawnee Trail, the Arkansas River Branch, closely followed this river northwest into Kansas. Another offshoot, the West Shawnee Trail, departed from the main branch at Boggy Depot in southern Indian Territory and continued north-northwest into the Cherokee Outlet, crossing the Salt Fork near its juncture with the Arkansas River. The Chisholm Trail and the Great Western Trail also traversed the Outlet.[2]

The cattle drives and ranching brought George W. Miller to the Cherokee Outlet. Miller and his family came from Kentucky to Newtonia, Missouri, and started trailing Texas longhorns through Indian Territory to ship from Baxter Springs, Kansas in 1871. He leased grazing land from the Quapaw Indians and established a ranch near this town. Because of the westward movement of the rail shipping points, by 1879 Miller was leasing two pastures in the Cherokee Outlet: his Deer Creek Ranch was south of Hunnewell, Kansas; and his Salt Fork Ranch was near the present-day town of Lamont in Grant County, Oklahoma. Although he made use of the Shawnee Trails, he more often took the Chisholm Trail, letting the cattle graze along the Salt Fork of the Arkansas River on the way. Miller, however, was also planning for when the federal government would terminate the grazing leases, buy the Outlet from the Cherokees, and open it to homesteaders in a land run. Miller family history sources relate that he and his son Joe Miller, who had a prior relationship with the Ponca Indians, influenced them to choose a reservation location in the eastern part of the Cherokee Outlet where the Salt Fork flows into the Arkansas River. Whatever the reason, in 1878 the Ponca Indians did move to a reservation here. Then in the Fall of 1892, when grazing leases from the Cherokees were ending because of the impending Land Run, the Millers moved their ranch headquarters to land they were leasing from the Poncas, a site on a bluff on the south side of the Salt Fork, approximately four miles west of its juncture with the Arkansas River, where they built a half-dugout. Although previously documented crossings of the Salt Fork were in this vicinity, such as those used by Nathan Boone's 1843 expedition and the West Shawnee Cattle Trail, whether an established crossing was at the site the Millers chose is unknown.[3] Operations at this new ranch headquarters would most likely lead to

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Manufacturer, Surveyor, Militiaman, Legislator, Ranger and Dragoon," *Chronicles of Oklahoma* 19 (December 1941), 338.

[2] Michael D. Green, "Cherokee Lands in the West," in *Historical Atlas of Oklahoma*, 4th edition, ed. Charles Robert Goins and Danny Goble (Norman, OK: University of Oklahoma Press, 2006), 61; John R. Lovett, "Major Cattle Trails, 1866-1889," in *Historical Atlas of Oklahoma*, 4th edition, ed. Charles Robert Goins and Danny Goble (Norman, OK: University of Oklahoma Press, 2006), 116-117; Wayne Guard, "The Shawnee Cattle Trail," *Southwestern Historical Quarterly* 56 (January 1953), 375-377.

[3] Michael Wallis, *The Real Wild West: The 101 Ranch and the Creation of the American West* (New York, NY: St. Martin's Press, 1999), 69, 81-83, 100, 168-69, 181; Ellsworth Collings and Alma (Miller) England, *The 101 Ranch* (Norman, OK: University of Oklahoma Press, 1937; reprint, 1971), 6, 14, 22-25 (page citations are to

establishing a crossing of the river at this location if one did not exist already. There remains immediately west of the Salt Fork of the Arkansas River Bridge an area where the river bank is low and has a distinct cut, evidence that a ford was here long before bridge construction.

Besides a river crossing, this location provided a water supply and fertile river-bottom land that aided the growth of Miller's 101 Ranch. Upon the death of George W. Miller, his sons George L., Joe, and Zach continued to operate the ranch. Across from the old half-dugout, on the north side of the Salt Fork of the Arkansas River, the ranch headquarters grew to include numerous agricultural buildings and an imposing, three-story ranch house known simply as the White House. The Millers expanded their land holdings by leasing from the Otoe, Pawnee, and Osage Indians in addition to the Poncas in this vicinity, and put ranch profits into purchasing when restrictions were removed from the Indians' land; the 101 Ranch encompassed 110,000 acres at its largest. While continuing to raise cattle, farming also became important to the ranch, with wheat, corn, oats, and melons being some of its main crops. The Millers experimented with innovative farming methods that helped advance agriculture in the region. Oil discoveries on the ranch added greatly to its profits and growth. Tourism and promotion were also a large part of the 101 Ranch. A camp with cottages, the Riverside Camp, was in place for vacationers who came to watch and participate in ranch operations and activities. The Millers hosted many prominent guests at the White House, including politicians, celebrities, and wealthy oilmen. In 1905, they held a ranch round-up exhibition for the National Editorial Association convention. This exhibition was a catalyst for creating the 101 Ranch Wild West Show, which toured throughout the United States and into Europe, Mexico, and Canada. These activities made the ranch quite an interesting place because not only was it home to working cowboys and cowgirls, but also Wild West Show performers and exotic animals like camels, elephants, monkeys, and bears. Life at the ranch was captured on film, and many of its cowboys and cowgirls performed in the early Western movies. This exposure helped give the ranch a prominent place in the imagery of the American West.[4]

When ranchers like the Millers and Indian tribes initially occupied present-day Oklahoma, before the proliferation of railroads and auto roads, interregional trails and wagon roads taking advantage of topography, natural drainage, and expedient river crossings were in place for the

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the reprint edition); "Miller Brothers 101 Ranch 1906-1908 Newspaper Trivia," in "Miller Brothers 101 Ranch" vertical file, Research Division, Oklahoma Historical Society, Oklahoma City, Oklahoma, 14; Green, "Cherokee Lands," 61; Mary Jane Warde, "White Eagle Park," National Register of Historic Places Nomination Form, Oklahoma State Historic Preservation Office, 2007, http://nr_shpo.okstate.edu (accessed February 9, 2015), 14, 16; Daughters of the American Revolution, *The Last Run: Kay County, Oklahoma, 1893* (Ponca City, OK: Courier Printing Company, 1939), 261-262; Lovett, "Cattle Trails," 117; Fessler, "Boone's Journal," 70-71.

[4] [Jack Haley], "Fame of 101 Ranch Made Entire Nation Acquainted with Marland and Ponca City," in "101 Ranch—History" vertical file, Research Division, Oklahoma Historical Society, Oklahoma City, Oklahoma; Wallis, *Real Wild West*, 3-6, 191, 214; Erica L. Howard, Sherry N. DeFreece Emery et. al., "Geophysical, Archaeological, and Architectural Investigations at 101 Ranch Historic District, Ponca City Vicinity, Kay County, Oklahoma (report prepared by URS Corporation, Dallas, Texas, for the Oklahoma Department of Transportation, Oklahoma City, Oklahoma, September 2012), 13, 17, Appendix A; Daughters of the American Revolution, *Last Run*, 262-263, 265; [Thoburn], "Kay County," 12.

long-distance travel of stagecoaches, mail, and freighters. These roads, entering the Cherokee Outlet from the Kansas border towns of Arkansas City, Hunnewell, and Caldwell, carried supplies to southwestern Indian agencies and forts. One of these, the Arkansas City-Reno Road, went southwest from Arkansas City to Fort Reno, crossing the Salt Fork of the Arkansas River southeast of the present-day town of Lamont in Grant County. In the early 1880s, government road builders blazed a more direct path for it by plowing a furrow and burning the adjacent grass for a fire guard. This new route crossed the Salt Fork at Yellow Bull Ford near the present-day town of Tonkawa in Kay County. Another wagon road was known as the Old Ponca Trail. It also began at Arkansas City, but took a more southerly route through the Ponca Reservation and southwest through the Otoe Reservation. This trail had heavy use even after the Oklahoma land runs, because Arkansas City was a major supply point for the territory. It crossed the Salt Fork of the Arkansas River at the 101 Ranch. One traveler remembered that this ford was a difficult one, and that cowboys helped him and his companions across. Fording was relatively routine when a river was low because travelers could follow sand bars in the river bed, entering and leaving the river at fixed points on the banks. However, these sand bars could shift during high water. It helped to have men on horseback locate the sand bars anew after a flood for travelers. The Salt Fork was particularly prone to overflow and difficult to cross because its sand was deep, fine, and tended to quicksand. These early wagon roads and their river crossings became less important as railroad lines expanded into the areas that they served, and in 1887 the Southern Kansas Railway began construction on a line from Arkansas City south through the Cherokee Outlet. Although local traffic continued to use these routes, the roads that directly served the Territory's growing towns became more of a focus for improvements.[5]

The Oklahoma State Highway Department took shape over a period of years as the necessity of a coordinated network of state highways became evident. Prior to a state highway agency, groups of business and civic leaders improved and designated the roads linking towns, forming good roads associations and organizations supporting named interstate highways like the Ozark Trails or the Postal Highway. Although Oklahoma's constitution had a provision for a state highway department, it was not until 1911 that the state legislature created the Oklahoma Department of Highways. The governor appointed Sidney Suggs, a leader in the good roads movement, as State Commissioner of Highways. At this time, the main duties of the agency were planning and promoting highways, working closely with good roads associations, collecting information about road building, and recommending standards for road and bridge construction. New state

[5] *Biennial Report of the Department of Highways, 1911-1912* (N.p.: January 1, 1913), 56-57; *North Central Oklahoma: Rooted in the Past—Growing for the Future* (Ponca City, OK: North Central Oklahoma Historical Association, 1995), 51H; Interviews with Samuel A. Dunham, A.H. Barns, and Warren Prather, Indian-Pioneer Papers Collection, Western History Collections, University of Oklahoma, Norman, Oklahoma; Mrs. Bennett Rhinehart, *Blaze Marks on the Border: The Story of Arkansas City, Kansas* (North Newton, KS: Mennonite Press, 1970), 168; *Ponca City News*, 14 September 1952 (1952 Cherokee Strip Edition); T. E. Beck, "When the Territory was Young," *Chronicles of Oklahoma* 14 (September 1936), 364; *Spans in Time: A History of Nebraska Bridges* (N.p.: Nebraska State Historical Society & Nebraska Department of Roads, 1999), 36, 16; Bruce W. Hoagland and Danney Goble, "Railroads, 1870-1907" in *Historical Atlas of Oklahoma*, 4th edition, ed. Charles Robert Goins and Danny Goble (Norman, OK: University of Oklahoma Press, 2006), 118.

legislation in 1915 strengthened the department with additional funding and staffing, then in 1916 the US Congress passed the Federal Aid Road Act which required the states to provide matching funds to receive federal aid for construction projects. Subsequently, the state appropriated such funds and matched county funds for construction, with the counties most often raising the money through road bond issues. Although the resulting construction work had to conform to the state standards and specifications, counties rather than the state highway department were ultimately responsible for the construction and maintenance of these projects. Maintenance became an issue when Bureau of Public Roads officials found that it was lacking on federal-aid projects, and called for a centralized state agency with this responsibility. They even threatened to suspend federal funding until reform took place. As a result, in 1924 state legislation effected a reorganization, creating a three-member Oklahoma State Highway Commission and giving it authority to build and maintain the roads designated as state highways.[6]

Before the State Highway Commission took control of the state highway system, nearly all road construction and maintenance was the responsibility of county government. The county instituted the poll tax system, which required every man to devote a certain number of days per year to road work. Each township in the county had a three-member board with oversight of this maintenance, including culverts and bridges under twenty feet long. The county also had a road and bridge fund that came from tax levies, which could fund more expensive projects. Incidentally, the 101 Ranch headquarters, because it was on leased Ponca Reservation land, was not a part of Kay County until the Spring of 1904, when the county took in the Ponca and Kaw reservations. The Ponca Reservation became Miller Township, and George L. Miller was appointed as its assessor. There was no bridge over the Salt Fork of the Arkansas River at the 101 Ranch yet, evinced by a May 1904 newspaper notice informing visitors of the ease of fording the river because of its low water level. However, with county funding available for construction, residents of Miller Township as well as Ponca City leaders looking for an increase in commerce from the south advocated for a bridge. Subsequently, the Kay County Commissioners included it in a group of bridges they advertised for bids. They let the contract for most of these, including the Salt Fork of the Arkansas River Bridge at the 101 Ranch, to the American Bridge Company of New York on December 21, 1904.[7]

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[6] Michael Cassity, "Route 66 and Associated Historic Resources in Oklahoma," National Register of Historic Places, Multiple Property Documentation Form, on file at the Oklahoma State Historic Preservation Office, Oklahoma City, Oklahoma, 2003, 7; Corbett, "Oklahoma's Highways," 173, 197, 202-206, 215-217; *Biennial Report of the State Highway Commission, 1929-1930* (Oklahoma City, OK: December 31, 1930), 9, 11; *Annual Report of the State Highway Commission, 1919-1924* (Oklahoma City, OK: January 1, 1925), 3.

[7] L.A. Cann, "Origin of Kay County Roads and How Charity Work was Handled After the County was Organized," Ponca City, Oklahoma, March 8, 1938, in "Kay County, Okla. Roads & Bridges" vertical file, Ponca City Library, Ponca City, Oklahoma, 1; Daughters of the American Revolution, *Last Run*, 304-305; *North Central Oklahoma*, 39H; Kay County Commissioners, *Record of Commissioners' Proceedings, Kay County*, vol. 2, County Clerk's Office, Kay County Courthouse, Newkirk, Oklahoma, 177-178, 200, 202; *Ponca City Daily Courier*, 7 May 1904; *Ponca City Democrat*, 7 May 1904, 19 May 1904, 17 November 1904, 24 November 1904, 22 December 1904.

The Miller Township continued an aggressive road improvement program. In 1910, its voters approved bonds for grading and drainage work including culverts on the road from the 101 Ranch headquarters to Ponca City. This road became part of one of the named interstate highways that pre-dated the numbered highway system. It went by various names, including the Meridian Postal Highway, the Meridian Road, and the Interstate Postal Highway. In 1911, the road's sponsors met in Salina, Kansas, and planned its route from Winnepeg, Ontario, to Galveston, Texas. In 1912, they formed the Interstate Postal Highway Association and elected Sindey Suggs (Oklahoma's first Commissioner of Highways) as vice president. The state highway department surveyed portions of this road and coordinated the improvement efforts of counties and townships that it passed through. At this time, it included 298 miles in Oklahoma. It entered the state in Kay County at Chilocco, and continued through Ponca City, Bliss (present-day Marland), Perry, Guthrie, Oklahoma City, Pauls Valley, Davis, Sulphur, Milburn, and Durant. The named highways diverged and changed names periodically, however, so that by the 1920s the portion of this route in Kay County was known as the Oklahoma, Texas & Gulf Highway, and later the T-K-O Route. When the Oklahoma State Highway Commission designated a numbered state highway system as part of their reorganization in 1924, it became State Highway 4.[8]

In Kay County as in the rest of the state, the focus gradually shifted to getting the roads paved. The county's first concrete roads were built in 1921 near Ponca City and Blackwell, and by 1923, there were approximately seventeen miles of hard-surfaced highways. Increasing oil production in Kay County gave it more revenue from the state's three percent gross production tax, because a portion of these funds were earmarked for road work. In 1923, there was a debate over which north-south road through Kay County would be the first to receive federal aid for paving to connect with a paved road from Wichita, Kansas, to the state line south of Wellington. The competition was between a western route through Braman, Blackwell, and Tonkawa; and an eastern route that would go east from Wellington along the state line to Arkansas City, Kansas, then south through Ponca City, the 101 Ranch, and Marland. The eastern route had strong proponents in the Miller Brothers and E. W. Marland, a wealthy Ponca City oilman. In support of this eastern route, George L. Miller organized a road improvement district in Miller Township and held an election for a bond issue to fund paving the highway through the township. The bond issue passed on 24 May 1924, then with these township matching funds, it became federal aid project 125A. The initial contract for its construction was let on 24 June 1924, and it was 25 percent complete by 1 January 1925. This work also anticipated the creation of the numbered interstate highway system. In 1925, the US Secretary of Agriculture appointed a Joint Board of State Highway Officials to lay out this system. Cyrus Avery, Chairman of the Oklahoma State Highway Commission at the time, was on this board. By one account, George L. Miller and L.

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[8] *Annual Report of the State Highway Commission, 1919-1924*, 144; *Daily Oklahoman*, 6 February 1927, p. 5; Corbett, "Oklahoma's Highways," 201; *Biennial Report of Department of Highways, 1911-1912*, 57-58; *Warden Atlas of Kay County, Oklahoma* (Oklahoma City, OK: Warden Company, 1921), 1; "Oklahoma Highway Guide," State Highway Commission, State of Oklahoma, 1925, Highway Department Collection. Oklahoma Documents, Archives and Records Division, Oklahoma Department of Libraries, Oklahoma City, Oklahoma.

A. Cann (Kay County Commissioner) attended a conference at which the joint board was working, and were instrumental in getting this road that passed through Ponca City and the 101 Ranch designated as part of US Highway 77, the central north-south highway through Oklahoma.[9] Regardless of whether or not this particular account is accurate, the eastward loop that US-77 took to go through Ponca City and the 101 Ranch is also evidence of their influence.

However, in the midst of these developments, a disastrous flood on the Salt Fork of the Arkansas River washed out the 1904 bridge at the 101 Ranch headquarters. On the morning of Sunday, June 10, 1923, a torrential storm began, following two months of unusually high rainfall amounts. The waters of the Salt Fork rose into many of the buildings of the 101 Ranch, covered over 4,000 acres of growing corn, washed away flocks of poultry, and drowned thousands of head of livestock. The river grew to as large as two miles wide. Flood refugees filled the White House of the 101 Ranch, and remained for days waiting for the water to recede. Flood waters demolished the 1904 bridge over the Salt Fork at 9 o'clock that Sunday morning. Despite the agricultural damage, contemporary observers considered the bridge to be the greatest loss because many relied on the river crossing at this location. When the Miller brothers constructed a cable-guided ferry boat pulled by mule teams, it was in use constantly, day and night, after its opening on June 15. Temporary bridges, which were themselves prone to being washed out, periodically supplanted the ferry. This flood also damaged or destroyed numerous roads and bridges in Kay and the surrounding counties. For instance, a survey of damage in Kay County immediately after the flood revealed that at least nineteen bridges were out; consequently, the County Commissioners took steps to rebuild or repair them.[10]

Planning for a new bridge over the Salt Fork of the Arkansas River at the 101 Ranch began immediately. In fact, as early as 11 June 1923, Kay County commissioner L. A. Cann anticipated a concrete and steel bridge costing around $85,000 for this location. By July of 1923, the Kay County commissioners had adopted a resolution to hold an election on 10 August for voting on the issuance of $600,000 in road bonds for constructing and repairing twenty-five bridges; included among these was the Salt Fork bridge at the 101 Ranch. However, prevailing sentiment was that the proposed bond amount was too high, and that the money should be raised by an additional levy instead. Accordingly, the voters defeated the bond issue. Nevertheless, county commissioners put a high priority on replacing the Salt Fork Bridge at the 101 Ranch, and therefore combined county funding with federal and state aid, making the bridge federal aid project #123. By September of 1923, engineers were at the 101 Ranch bridge site doing

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[9] Cann, "Origin," 2-3; *Ponca City News*, 16 June 1923, 22 August 1923, 23 May 1924; GLM [George L. Miller] to Mr. Frank Parkinson, 3 November 1923, Miller Brothers 101 Ranch Collection, box 18, folder 3. Western History Collections, University of Oklahoma, Norman, Oklahoma; *Annual Report of the State Highway Commission, 1919-1924*, 81; Corbett, "Oklahoma's Highways," 231-232; *Daily Oklahoman*, 6 February 1927, p. 5.

[10] Wallis, *Real Wild West*, 480-481; "Ranch Damage to be Great," (transcriptions of 101 Ranch-related newspaper articles), Oklahoma Outlaws Lawman History Association website, http://www.okolha.net/101_ranch_newspaper_1923_1929.htm (accessed 11 September 2007); Fred Gibson, *Fabulous Empire: Colonel Zack Miller's Story* (Boston, MA: Houghton Mifflin Company, 1946), 360-362; *Ponca City News*, 19 June 1923.

preliminary work. By December of 1923, the Oklahoma State Highway Department had approved the bridge plans, prepared under the direction of W. C. Burnham, the State Bridge Engineer. The project engineer was C. H. Rightmire, the highway department's engineer for its field division seven. The State Highway Commission let the contract for this bridge's construction to the Pioneer Construction Company of Kansas City, Missouri for $52,840.45 on 16 January 1924. Construction began around 1 February 1924, and was completed in August of 1924. The 101 Ranch hosted a dedication ceremony in late August which hundreds of people attended. It included speeches by local officials, christening the bridge with a bottle of crude oil, and refreshments on the lawn of the White House at the ranch.[11]

This design and construction process for the bridge over the Salt Fork of the Arkansas River was typical of current engineering practices. In the 1920s, metal truss bridges remained economical and reliable, often built following standard designs that state highway department engineers developed. The companies who built these bridges usually took on the role of fabricators or contractors, rather than the primary designers that they had been in the past. The Pioneer Construction Company of Kansas City, Missouri, originated in 1918. Fred R. Hoover was company president and majority stockholder. His father, Joseph W. Hoover, had been a Kansas City agent selling bridges in Oklahoma for Ohio's Canton Bridge Company. Likewise, the Pioneer Construction Company actively entered into construction work in Oklahoma, building small as well as large bridges and receiving contracts with the State Highway Commission. The company's surviving work also includes numerous bridges in Missouri and Arkansas. In addition to bridges, they constructed highways and dealt in building materials. The company lasted until 1952, but Fred Hoover's son Robert M. Hoover formed a separate Pioneer Construction Company which operated from 1951 to 1961.[12]

The Salt Fork of the Arkansas River Bridge, a modified Pratt through truss, was also typical of current metal truss bridge technology. The modified Pratt developed from the basic Pratt truss design, which Caleb and Thomas Pratt patented in 1844. In contrast to the prevalent wood trusses, the Pratt truss could be built of iron because its diagonals carried tensile forces and its verticals carried compressive forces. Bearing compressive forces made the verticals heavier to resist buckling, because they supported the top chord. In Oklahoma's early years of truss-building, Pratt through trusses were usually 80- to 100-feet long; moreover, they had pinned

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[11] *Ponca City News*, 11 June 1923, 12 July 1923, 3 August 1923, 9 August 1923, 13 August 1923, 14 August 1923, 28 December 1923, 16 February 1924, 26 August 1924; *Annual Report of the State Highway Commission, 1919-1924*, 1, 18, 53, 55, 81, 99; State of Oklahoma Department of Highways. "Plan and Profile of Proposed State Highway Federal Aid Project No. 123. On file at Office Services Division, Oklahoma Department of Transportation; *Daily Oklahoman*, 23 September 1923 page 9, 6 February 1927 page 5.

[12] Joseph E. King, *Spans of Time: Oklahoma Historic Highway Bridges* (Oklahoma City, OK: Oklahoma Department of Transportation Planning Division, 1993), 10, 23, 51, 58; Kerry C. McGrath, "Howard Ford Bridge Spanning James River on Cart Road 143, Nixa, Christian County, MO," Historic American Engineering Record, National Park Service, 1989, http://www.loc.gov/pictures/collection/hh/ (accessed April 16, 2015), 9. Bridge Survey Files, Oklahoma Department of Transportation Cultural Resources Program, Norman, Oklahoma; "Pioneer Construction Company" search on "Bridgehunter.com: Historic Bridges of the United States" website, http://bridgehunter.com/ (accessed April 16, 2015).

connections which allowed for a free transfer of forces between beams. After portable field pneumatic riveters became widely available in the 1910s, riveted connections gradually became more common. Riveted connections, which did not allow compressive and tensile forces to transfer freely between beams, made it necessary for diagonals to be heavier so that they could handle some secondary compression and reversible stresses. Stronger bridges with riveted connections were more suited to the automobile and heavy truck traffic that was increasing rapidly in the 1920s. Oklahoma State Highway Department engineers developed a modification of the riveted Pratt through truss for circa 96- to 120-foot spans that became standard in the 1920s and 1930s. This design subdivided the truss panels with half-panel diagonals and horizontal struts, which strengthened the adjacent verticals but did not normally carry loads. Although subdivided panels are also a feature of Baltimore through trusses, Oklahoma's modified Pratt through trusses are different because the subdivided panels do not support secondary floor beams as they do in Baltimore trusses, but instead serve primarily to strengthen the adjacent verticals. Oklahoma's modified Pratt through trusses appear to be uncommon if not unique, based upon a review of other states' truss bridge studies. In nearby states, truss bridges of similar age and length are most often typical, un-modified, riveted Pratt through trusses. In the 1930s, curved-top-chord-pony trusses with heavier built-up and rolled beams gradually began to replace modified Pratt through trusses in Oklahoma for circa 100-foot spans.[13]

The subsequent history of The Salt Fork of the Arkansas River Bridge illustrates its continued importance until changing transportation priorities caused a relative decrease in the amount of traffic through it. As described above, it carried State Highway 4 in 1924, then upon the creation of the numbered interstate highway system, State Highway 4 became US Highway 77. These designations owed much to the efforts of George L. Miller on behalf of the 101 Ranch. However, the fame and popularity of the 101 Ranch could not sustain it through the falling prices of agricultural commodities and oil that led up to the Great Depression. The end of the ranch came in bankruptcy, foreclosure, and breaking up the ranch holdings to pay debts in the 1930s. Further diminishing the prominence of this route, Interstate 35 was replacing US Highway 77 as the primary north-south arterial highway through the center of the state in the early 1960s. Nevertheless, US Highway 77 continued to connect numerous towns that the interstate bypassed. The Salt Fork of the Arkansas River Bridge carried this highway until the mid-1960s, when the

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[13] James L. Cooper, *Iron Monuments to Distant Posterity: Indiana's Metal Bridges,1870-1930* (n.p.: DePauw University, Federal Highway Administration, Indiana Department of Highways, Indiana Department of Natural Resources, National Park Service, 1987), 47, 55-56, 68; King, *Spans*, 23, 51; *Spans in Time*, 11, passim; "Building Bridges in Oklahoma," *Harlow's Weekly* 24 (August 29, 1925), 8; Wes Kinsler, "Truss Bridges in Oklahoma: Oklahoma's State-Standard Designs," http://okbridges.wkinsler.com/builders/oklahoma.html (accessed May 5, 2015); Helen P. Ross and Justin M. Spivey, "Addendum to Falls Bridge, Philadelphia County, Pennsylvania," Historic American Engineering Record, National Park Service, 2007, http://www.loc.gov/pictures/collection/hh/ (accessed May 5, 2015), 5; FRASERdesign, *Missouri Historic Bridge Inventory: Draft Inventory Report*, vol. 1 (n. p.: Missouri Highway and Transportation Department, April 1996), passim; Larry Jochims, "Metal Truss Bridges in Kansas, 1861-1939," National Register of Historic Places, Multiple Property Documentation Form, Kansas State Historic Preservation Office, 1990, http://www.nps.gov/nr/research/ (accessed May 5, 2015), passim; Various searches on "Bridgehunter.com: Historic Bridges of the United States" website, http://bridgehunter.com (accessed May 5, 2015).

segment that went through the former 101 Ranch headquarters and the nearby town of Marland (formerly Bliss) changed to State Highway 156, a short loop that branched off of US Highway 77 and served more local traffic needs.[14]

PART II. ARCHITECTURAL/DESIGN INFORMATION

The Salt Fork of the Arkansas River Bridge is composed of four modified Pratt through truss spans, with one steel I-beam approach span at their south end. Each truss is 96 feet long, the I-beam approach span is 22 feet long, the total length of the bridge is 416 feet, and the deck width is 18 feet. A lattice guardrail with a non-original W-beam guardrail affixed to it extends the length of the bridge. A-frame braces support the guardrail on the steel I-beam approach span. As noted above, the trusses have riveted connections.

Defining the parts of a truss bridge aids in its description. A truss's top and bottom beams are called the top and bottom chords, while the diagonal beam that connects the top and bottom chords at the end of a truss is called the inclined end post. It functions as an extension of the top chord, and therefore is usually fabricated the same. The web of the truss between these chords includes vertical beams, diagonal beams, and horizontal struts in some bridges. Following is a description of each of these beams in the Salt Fork of the Arkansas River Bridge:

> Top chord: Pair of C-beams with a riveted top plate and zig-zag lacing on bottom
> Inclined end posts: Same as the top chord
> Bottom chord: Pair of C-beams connected with batten plates
> Verticals: Built-up I-beam composed of two pair of L-beams with plate in between them (center); two pair of L-beams connected with batten plates (hip verticals)
> Diagonals: Two pair of L-beams connected with zig-zag lacing
> Horizontal struts: Pair of C-beams connected with batten plates

The composition of the truss beams is noteworthy because it helps to depict how they function. As described above, defining features of a Pratt truss are diagonals that are in tension and verticals that are in compression (except for the hip verticals which are in tension). In pin-connected bridges, this is evident because the diagonals in tension are thin eye-bars that cannot withstand compressive forces. However, riveted connections are less flexible than pinned connections and do not allow for the free transfer of forces between beams; therefore, the diagonals must be heavier and more rigid because they are subject to some secondary compressive forces as live loads move across the truss.[15] Nevertheless, in this bridge, the beams

[14] Daughters of the American Revolution, *Last Run*, 266; Collings, *101 Ranch*, 189-214 passim; Oklahoma Department of Transportation, "State Highway Map Archive" website, http://www.okladot.state.ok.us/maps/state/archive.htm (accessed May 5, 2015).

[15] Cooper, *Iron Monuments*, 56.

that are primarily subject to tensile forces are still lighter-weight than the beams that mainly carry compressive forces.

A "panel" is a unit referring to each space between two vertical beams, as well as the area between the hip vertical and the inclined end post at the end of the truss. The Salt Fork of the Arkansas River Bridge's trusses are each six panels long. As noted above, the center two panels of each truss have half-panel diagonals and horizontal struts, which strengthen the adjacent verticals but do not normally carry loads. These center two panels are where the bridge's stresses are the highest and the extra strengthening is most needed.

A "through truss" is a truss bridge that has struts and top lateral bracing over the top of the roadway (in contrast, a "pony truss" only has trusses on the sides of the roadway). The Salt Fork of the Arkansas River Bridge has paired L-beam struts, which extend across the bridge and connect the tops of the verticals. Between these struts, the top lateral bracing beams cross in an X-pattern, and are composed of two L-beams connected with zig-zag lacing. Sway bracing underneath the struts is a row X's formed of L-beams. Portal bracing at the ends of each truss, likewise, is a row of X's formed of L-beams; in addition, there are curved portal brackets.

The Salt Fork of the Arkansas River Bridge has a concrete deck. Beneath this deck are I-beams running longitudinally the length of the trusses, and larger I-beam floor beams spanning the width of the trusses. Between the floor beams, bottom lateral bracing consists of L-beams that cross in an X pattern. The I-beam approach at the south end of the bridge is simply a row of longitudinal I-beams running the length of the span. The abutments and wing walls are concrete. The wing walls extend out from the front wall of the abutment, forming an acute angle with the roadbed, to retain the roadbed fill. The concrete piers are in the shape of paired columns connected by solid web wall.

The Salt Fork of the Arkansas River Bridge carried a two-lane state highway in a rural setting. Little remains of the 101 Ranch complex just north of the bridge, but the site of the White House is maintained as a roadside interpretive park. The bridge was in poor condition before its removal, with most deterioration under the deck. There were areas of severe rust weakening the I-beams under the deck, while cracking and spalling impaired the concrete portions of the bridge. There was slight traffic damage to the verticals, diagonals, upper lateral bracing, and sway bracing, but not enough to affect their load-carrying capacity. There had been some minor repair work beneath the bridge deck as well. However, the bridge had no major alterations and it retained its historic integrity.

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