

HISTORIC AMERICAN ENGINEERING RECORD

LEXINGTON BRIDGE  
(Bridge No. G-55R)

HAER No. MO-111

- Location: Spanning the Missouri River along State Route 13  
Lexington and Henrietta Vicinity  
Lafayette County and Ray County  
Missouri
- UTM: Zone 15  
Northing 4337700  
Easting 422587
- Quad: Lexington West, Missouri – Missouri 7.5' Quadrangle, 1949 (1979)
- Date of Construction: 1923-25
- Designer: John Alexander Low Waddell
- Present Owner: Missouri Department of Transportation, Jefferson City, Missouri
- Present Use: Vehicular bridge to be removed and replaced by a new vehicular bridge;  
projected date of removal in 2004.
- Significance: The Lexington Bridge (Bridge No. G-55R) is a monumental, multi-span structure with seven Warren through-truss spans, three Warren deck trusses, and eight steel girder approach spans. The total length of the bridge is 3,073', and it has only undergone minor alterations since its construction in 1923-25. The bridge was built as part of a multi-bridge program sponsored by the Missouri State Highway Commission to span the Missouri River. It represents an excellent example of large-scale highway bridge construction. The bridge had a tremendous impact on the local and regional economy, eliminating a natural barrier to regional commerce.
- Project Information: The bridge was recorded in 2003 by Thomas Gubbels, Missouri Department of Transportation, Cultural Resources Section, 601 West Main Street, Jefferson City, Missouri, 65101.

## I. Physical Description of the Lexington Bridge

The Lexington Bridge over the Missouri River was built between 1923-25. The bridge consists of two twelve-panel Warren through-trusses that are each 408' long, five eight-panel Warren through-trusses that are each 246' long, three nine-panel Warren deck trusses that each 208' long, eight steel girder approach spans, and 1,315' of earth embankment supporting the north approach. The overall length of the bridge is 3,073', and the bridge deck has a roadway width of 20'. The bridge rests on eleven dumbbell piers sunk to bedrock, with eight buried concrete pedestal bents supporting the south approach. During the 1920s and 1930s, the Missouri State Highway Commission almost exclusively used rigid-connected Pratt and Parker trusses for its medium-span trusses. For longer structures such as bridges across the Missouri and Mississippi rivers, however, the commission preferred Warren truss configurations. The Lexington Bridge represents an excellent example of this construction approach used by the Missouri State Highway Commission during the 1920s and 1930s.

The substructure of the Lexington Bridge consists of abutments, piers, and bents, all made from reinforced concrete. The piers that support the truss spans of the Lexington Bridge generally consist of two concrete columns joined by a wall of reinforced concrete. Each column rests upon a steel cylinder sunk to bedrock by the pneumatic process, attached thereto, and then filled with concrete. All pier columns are linked by 2' concrete web walls. Pier 1 on the south end of the bridge is one of the smallest within the substructure. It rests on 7' 2" square footings, is 36' 11" in height, and its columns are transversely spaced 18' apart (space between the center of the concrete columns). The foundation for Pier 1 is relatively shallow (only 32' to bedrock), so it was carried to bedrock by means of a cofferdam rather than by the pneumatic process.

Piers 2, 3, and 10 of the Lexington Bridge are very similar in size to Pier 1. Piers 2 and 3 are both 23' 11" in height just as Pier 1. Pier 10 is slightly taller at 39' 6- $\frac{3}{4}$ ". Piers 2 and 3 rest on 7' 8" square footings, while Pier 10 has a slightly larger 8' 3" square footing. Piers 2 and 3 feature 18' transverse spacing between columns, while Pier 10 features 23' 6" transverse spacing. Pier 4 is very similar in size to Piers 2 and 3. Pier 4 has a 8' 2" square footing for each column, is 36' 11" tall, features 21' 6" of transverse spacing between columns, and had to be sunk 84' to reach bedrock. Pier 9 is essentially the same as Pier 10, except it has a height of 52' 1- $\frac{3}{4}$ " and 8' 7" square footings. Pier 5 features 9' square footings and 23' 6" of transverse spacing. It has a total height of 64' 8" making it the tallest of the eleven piers.

Piers 6, 7, and 8 are the most imposing elements of the substructure. These three piers support two 408-foot long Warren through-trusses, and they had to be sunk to depths of up to 110' in order to land them on bedrock. The footings that support Piers 6, 7, and 8 are massive 10' 8- $\frac{1}{4}$ " squares. All three piers feature 24' of transverse spacing between their columns that is filled with 2-foot thick cement. Pier 11, the final pier on the north side of the bridge substructure, is better characterized as a backwall end bent. Pier 11 is capped by an open abutment with 15' and 13' wingwalls and a 5' 4" bridge seat.

The superstructure of the Lexington Bridge was produced by the American Bridge Company and erected by the Kansas City Bridge Company. The south approach to the actual bridge consists of eight steel girder approach spans ranging from 25' to 50' in length, creating a 255-foot trestle. These approach spans are supported by eight pedestal bents. The bents vary in size, but all feature five concrete piles and 21" crowns to carry the approach trestle along a 2.7 percent grade.

The first spans of the Lexington Bridge are three rigid-connected Warren deck trusses that are each 285' in length. The upper chord of the deck trusses carrying the bridge deck consists of four angles with cover plates and lattice bars, while the lower chord features four angles with batten plates and cover plates. The top and bottom chords both feature lateral bracing made of two angles, while the actual floor beams are made of four angles with continuous plates. The vertical members of the deck trusses consist of four angles with batten bars alternating with two channels with lacing. The diagonals consist of four angles with double lacing and cover plates.

The majority of the superstructure of the Lexington Bridge is composed of seven Warren through-trusses varying in length from 208' to 408'. All of these trusses have almost identical designs, and they all carry the bridge deck along their bottom chord. The top chord of the through-trusses consist of two channels with cover plates and lattice bars, while the bottom chords are made from four channels riveted together along with double lacing and continuous cover plates. The verticals of the through-trusses generally consist of two channels with lacing alternating with four angles with lacing, while the diagonals consist of two channels with lacing. The two 408' spans have a slightly different design, featuring verticals consisting of four angles with lacing and diagonals consisting of four angles with lacing and gusset cover plates throughout. All through-trusses feature top lateral bracing made from four angles with lattice bars and bottom lateral bracing made from riveted angles. The struts along the top chord of the through trusses are also made from riveted angles, and the bridge deck is supported throughout with steel I-beams. The portals leading to the through-trusses consist of two angles with lattice bars, and the entire steel superstructure is lined with lattice guardrails. The superstructure rests upon fixed cement shoes that are immobile alternating with rocker expansion shoes that allow the superstructure to move slightly atop the bridge piers.

The deck of the Lexington Bridge is composed of concrete laid over steel stringers. The reinforced concrete deck features an 8-foot thick concrete slab with a 1" wearing surface. There is an 18' clearance between the deck and the portals of the steel through-truss structure. The bridge deck also features steel lattice handrails and a lighting system installed by the City of Lexington, but no pedestrian sidewalks or road shoulders were built along the deck. In 1985 the bridge deck was repaired. A top layer of sealant was removed, a new coat of modern sealant was placed across the deck, and a 3-foot layer of asphalt was laid across the bridge. A plaque atop the north portal of the bridge reads:

1924 Lexington Bridge built by Lafayette County, Ray County, City of Lexington;  
Federal Aid appropriated by Missouri Highway Commission; Designed by J.A.L.

Waddell, Consulting Engineer, New York, NY and Kansas City, MO; Supervised by Missouri State Highway Commission; B.H. Piepmeier, Chief Engineer; Contractor – Kansas City Bridge Co., Kansas City, MO.

Completion of the Lexington Bridge represented a major technological achievement, and the history behind the effort to finance and construct this structure illustrates the challenges and obstacles that had to be overcome in order to span the Missouri River.

## II. History of the Lexington Bridge

### A. Historical Background

The Lexington-Richmond corridor within Missouri has a long and rich history. Lexington was a nineteenth century commercial center, and the community played a role in the growth of west-central Missouri and U.S. expansion to the west. The first Europeans to enter the region were probably French traders and voyageurs. The voyageurs interacted with numerous Native American groups such as the Sauk, Osage, and Fox, but they did not establish permanent settlements. Following the Louisiana Purchase of 1803, the region was explored by the Lewis and Clark expedition. The first European to permanently settle in the area was Gilead Rupe. Rupe arrived in the area in 1815, settling on a farmstead a few miles to the south of the modern City of Lexington. When Rupe died in 1847, he lived in the northeast quarter of Section Nine, just southwest of Lexington.<sup>1</sup>

Following in the footsteps of Gilead Rupe, European settlers began to migrate to the Lexington area in the 1810s and 1820s. These settlers were primarily from the American South, with the majority coming from Virginia, Kentucky, and Tennessee. A small community sprang up in 1819 around the site of a ferry crossing operated by William Jack. Jack's ferry was located on a point where the Missouri River, several Indian trails, and a wilderness road between Fort Osage and eastern Missouri converged. The small community that arose around Jack's ferry was chosen as the county seat of Lillard County in 1823, and the community was renamed Lexington. Lexington was platted on April 8, 1822, and within two years the first county courthouse had been built. Lillard County was renamed Lafayette County in 1825 in honor of the Revolutionary War hero the Marquis de Lafayette. Ray County experienced a similar pattern of settlement to Lafayette County. Most European settlers who came to the area were from the Upland South, and they also traveled to the area along the Missouri River. Ray County was created in 1820, and it was named in honor of John Ray, a delegate to Missouri's first constitutional convention. Ray County originally embraced all of Missouri west of the Grand River and north of the

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<sup>1</sup>B. M. Little, *The National Old Trails Road and the Part Played by Lexington in the Westward Movement* (Lexington: by the author, n.d.), n.p.; Mary Matthews, "Historic Resources of Lexington, Missouri," Lafayette County, Missouri, National Register of Historic Places Nomination, U.S. Department of the Interior, National Park Service, 1980, section 8: 1; Mary Matthews, "Historic Resources of Lexington, Missouri, Amendment," Lafayette County, Missouri, National Register of Historic Places Nomination, U.S. Department of the Interior, National Park Service, 1982, section 8: 1-3.

Missouri River, an area that was later divided into twelve different counties. In 1827, the county seat of Ray County was removed from Blufton to Richmond. The county seat of Ray County was named in honor of Richmond, Virginia, while the county seat of Lafayette County was named in honor of Lexington, Kentucky, reflecting the region's southern heritage.<sup>2</sup>

Following the initial settlement of Lafayette and Ray counties, the town of Lexington quickly emerged as a commercial center. Several factors encouraged rapid economic growth, including Lexington's location on the Missouri River, the high demand for locally produced agricultural products, and the intensive use of slave labor. However, the primary focus of Lexington's early economy was trade along the Santa Fe Trail. Trade between the United States and Mexico began in the early nineteenth century, and in 1825 the United States ordered the survey of a formal commercial trail linking the two nations.<sup>3</sup> Lexington served as an outfitting point for traders using the Santa Fe Trail and several Lexington businesses catered to the needs of its travelers. For example, the Aull brothers operated a series of warehouses along the Santa Fe Trail. John Aull migrated from Delaware to Lexington in 1822, and he operated a warehouse and store there until his death in 1842. His brother James Aull then took over the Lexington operation, and he also ran trading posts in Independence, Liberty, and Richmond, Missouri. The Aull Brothers were widely known for their policy of advancing credit to traders and speculators, creating a consistent debt problem for the company.<sup>4</sup> In addition, the Lexington firm of Russell, Majors, and Waddell became successful as distributors and merchandisers. Alexander Majors migrated to Missouri as a child, and in 1848 he operated a freight business with six wagons and ox teams. He later formed a partnership with William Russell, and the two men contracted to move supplies to several U.S. Army posts on the edge of the frontier. By 1856 the company ran a large shipping business with an annual profit of about \$300,000.<sup>5</sup> Overall, trade along the Santa Fe Trail provided an initial stimulus to Lexington's economy that led to growth and

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<sup>2</sup>Little, *The National Old Trails Road*, n.p.; Mary Matthews, "Historic Resources of Lexington, Missouri, Amendment," section 8: 5; Anderson House and Lexington Battlefield Foundation, "Historic Lexington: Its Southern Heritage," pamphlet as held in the Missouri State Library, Jefferson City, Missouri: 1955, 3; "A Brief Look at the History of Ray County," *Ray County Mirror*, February 1988, 5-6; *History of Lafayette County, Missouri* (St. Louis: Missouri Historical Company, 1881), passim; James Goodrich, ed., *Marking Missouri History* (Columbia: State Historical Society of Missouri, 1998), 28, 102; Lexington Sesquicentennial Committee, *Lexington, Missouri, Sesquicentennial: 1822-1972* (Higginsville: Advance Publishing and Printing Co., 1972), 2-3; Roger Maserang and Warren Christopher, *Architectural Resources of Lafayette County, Missouri (Exclusive of Higginsville and Lexington)* (Warrensburg: Show-Me Regional Planning Commission, 1989), 30-32; Marian Ohman, *Twenty Towns: Their Histories, Town Plans, and Architecture* (Columbia: University of Missouri Extension Division, 1985), 49; and Works Projects Administration, Writers' Program, *The WPA Guide to 1930s Missouri* (Jefferson City: Missouri State Highway Department 1941; reprint, Lawrence: University Press of Kansas, 1986), 377 (page citations are to the reprint edition).

<sup>3</sup> Mary Matthews, "Historic Resources of Lexington, Missouri, Amendment," section 8: 6-7.

<sup>4</sup>Goodrich, *Marking Missouri History*, 103; and Lexington Sesquicentennial Committee, *Lexington, Missouri, Sesquicentennial*, 34.

<sup>5</sup>Ohman, *Twenty Towns*, 50; and Anderson House and Lexington Battlefield Foundation, "Historic Lexington," 3. Russell, Majors, and Waddell later operated the famous Pony Express Mail Service headquartered in St. Joseph, Missouri.

prosperity. An early nineteenth century visitor to Lexington vividly described the impact of western trade on the local community:

Lexington is one of the towns from which outfits are made in merchandise, mules, oxen and wagons, for the Santa Fe or New Mexican Trade. The fur traders who pass to the mountains by land, make this town a place of rendezvous, and frequently are going out and coming in with their wagons and packed mules, at the same period of going and coming that is chosen by the Mexican traders. Lexington is therefore occasionally a thoroughfare of traders of great enterprise, and caravans of infinite value. The dress and arms of the traders, trappers and hunters of these caravans, and comparison of the horses and mules they ride, present as great diversity as the general resurrection itself of all the nations and ages can promise for the speculations of the curious.<sup>6</sup>

Although Lexington initially prospered due to commercial traffic along the Santa Fe Trail, it was the town's easy access to water transportation that sustained the antebellum economic boom. The community was located along bluffs overlooking the Missouri River, and the geography of the town provided the ideal location for steamboat docks. As early as 1828, Lexington's waterfront was jammed with warehouses, wholesalers, and hemp walks. Steamboat traffic peaked in the 1850s and 1870s when boats traveled from St. Louis to as far north as Sioux City, Iowa. Steamboats linked Lexington and the area to the outside world. Lexington residents were able to purchase luxury items such as coffee from Brazil and sugar from New Orleans while shipping their agricultural products, usually hemp or tobacco, to national and international markets. It was not unusual for twenty to thirty steamboats to make daily stops in Lexington. Because of the extensive steamboat network and the Santa Fe Trail trade, Lexington evolved into a town with, "a mixture of prosperous merchants from all parts of the Nation, mechanics and laborers from Kentucky and Virginia, and a shifting group of gamblers, slave traders, and speculators."<sup>7</sup> Steamboat travel along the Missouri River was a difficult and dangerous business. During the winter the river was often frozen and impassable, and the river was filled with dangerous sandbars, snags, and debris. In one of the worst river disasters in Missouri history, an estimated 200 people were killed outside Lexington when the steamboat *Saluda* exploded on April 9, 1852.<sup>8</sup> Despite these dangers, steamboats provided the major link between Lexington and the outside world well into the late nineteenth century. Railroads eventually displaced steamboats as the area's main source of transportation, and not until the modern highway system was built did Lexington and Richmond regain full access to national and international markets.

The primary commercial crop grown in the antebellum Ray-Lafayette County region was hemp. Settlers from the American South introduced hemp to the area. Demand for hemp was

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<sup>6</sup>Quoted in Lexington Sesquicentennial Committee, *Lexington, Missouri, Sesquicentennial*, 18; and Charter Bank of Lexington, Missouri, "100<sup>th</sup> Anniversary, Charter Bank: 1884-1984," privately published pamphlet, 1984, 22-23.

<sup>7</sup>WPA, *The WPA Guide to 1930s Missouri*, 373.

<sup>8</sup>Lexington Sesquicentennial Committee, *Lexington, Missouri, Sesquicentennial*, 17-18.

high due to its usefulness in producing rope and bags for use in cotton production. Lexington featured numerous hemp walks, early factories where raw hemp was converted into rope or cloth, along its riverfront. Hemp was an extremely labor intensive crop, and to solve the labor problem, local farmers turned to slavery. Many settlers who came to the Lafayette-Ray County area brought along their African slaves, and plantations dotted the countryside. In 1840, twenty-nine percent of Lafayette County's population lived in slavery. By the start of the Civil War, one out every three residents of Lafayette County was an African slave. Ray County had a slave population of 2,047 in 1860, and slaves in Ray County worked in the production of both hemp and tobacco. When anti-slavery agitation began in Missouri, residents of Ray and Lafayette counties pronounced their unwavering support for the institution. However, a small number of German immigrants to the area opposed slavery and called for its abolition. On the eve of the Civil War, the Lafayette-Ray County area was a prosperous region with a strong economy based on slavery, hemp, and commerce. At the time, Lexington was the fifth largest city in the state, serving as a major steamboat port along the Missouri River.<sup>9</sup>

The Civil War had a dramatic impact on life in the Lafayette-Ray County area, and the City of Lexington was the site of a major Civil War battle. Although most local residents had ties to the American South, they preferred to remain neutral in the war due to their commercial interests. At the start of the Civil War, federal forces occupied Lexington. The town was considered a strategic site due to its location along the Missouri River, and the town was seen as a critical link in a chain designed to keep Confederate sympathizers in northern Missouri from joining General Sterling Price's Confederate Army. In September 1861, Price decided that it was time to break the federal chain along the Missouri River, and he chose Lexington as his target. Lexington was under the command of Colonel James Mulligan, and the city was occupied by approximately 3,000 federal troops, less than one-fourth the number of men commanded by Price. Mulligan's forces entrenched themselves at a hill located outside Lexington, and on September 18, 1861, Price's men laid siege to the federal encampments. After three days of fighting, Price's troops were able to breach the federal flank by using large bales of hemp as mobile breastworks. Confederate forces quickly gained the field and the federals surrendered. Despite the intensity of the battle, casualties were low on both sides. The Confederates reported thirty-three killed and 150 wounded, while the Union troops reported forty killed and 150 wounded. The Battle of Lexington might have been a turning point in the war, but Sterling Price was unable to hold the city. Federal General John C. Fremont sent 20,000 soldiers to recapture Lexington, and Price was forced to once again retreat to Southern Missouri. The practical impact of the war on the region was the destruction of the hemp-slave economy. Area residents turned to new commercial crops and industries to revive the local economy, and despite renewed prosperity, Lexington never regained its antebellum status as a major commercial center.<sup>10</sup>

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<sup>9</sup>John Gueguen, Jr., "The Battle of Lexington, Missouri 1861," downloaded August 2000 from <http://www.historiclexington.com/battle.html>; Ohman, *Twenty Towns*, 50-51; Ray County Historical Society, *Ray County 1973* (Marceline: Walsworth Publishing, 1973), 23; and Mary Matthews, "Historic Resources of Lexington, Missouri, Amendment," section 8: 13-16.

<sup>10</sup>Gueguen, "The Battle of Lexington;" Mary Matthews, "Historic Resources of Lexington, Missouri," section 8: 15-16; Maserang and Christopher, *Architectural Resources*, 35-36; and Missouri Department of Natural

Between the end of the Civil War and the early twentieth century, several new industries emerged in the Ray-Lafayette County area. Hemp growing declined, but new commercial crops such as corn, wheat, rye, and apples came to dominate the agriculture of the region. During the 1870s coal mines began to spring up throughout the region. Coal had been mined for local use for many years, but after the Civil War, coal mining emerged as a major industry. Hundreds of local residents worked in the mines, and by 1881 coal mining was Lexington's leading industry. Statistics from 1907 show fifty-one active mines in Ray County employing 1,990 people. New railroads also were built through Lafayette and Ray counties during the postbellum era, gradually displacing steamboats as the major means of transportation. By the beginning of the twentieth century, Lexington had evolved into a stable community with a strong economy based on both the mining industry and agricultural production. The population of the city in 1900 was 4,190, and the local population remained fairly stable throughout the twentieth century.<sup>11</sup>

#### B. Pre-Construction History

Ever since the founding of Lafayette and Ray counties, area residents sought to overcome the physical barrier created by the Missouri River. Although the river was a useful transportation source, it prevented Richmond and Lexington from interacting as economic partners. Early settlers attempted to overcome the obstacle created by the river through the use of ferries. Before Lexington was founded, William Jack offered ferry service across the Missouri River. Jack's ferry was a rough flatboat that was pulled across the river by a crude rope and windlass contrivance, and a team of horses or a group of African slaves provided the power needed to move the ferry across the river. Thomas Hinkle brought the first steam-powered ferry to Lexington from New Albany, Indiana, in 1851. Hinkle's boat was named the "Flora Temple," and it was destroyed during the Civil War. Ferry service across the Missouri River continued well into the twentieth century. The last boat to offer service between Lexington and Ray County was the "Lexington" owned by Tilton Davis. This boat operated until the opening of the Lexington Bridge in 1925, and it was later moved to Illinois.<sup>12</sup>

Although ferry service between Lafayette and Ray counties existed for over a century, it was not an efficient transportation link. The ferries did not offer service when the Missouri River froze during the winter, they charged high rates that many travelers were unwilling to pay,

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Resources, "Battle of Lexington Historic Site," downloaded August 2000 from <http://www.mostateparks.com/Lexington/battle.htm>.

<sup>11</sup>"A Brief Look at the History of Ray County," 7; Lexington Sesquicentennial Committee, *Lexington, Missouri, Sesquicentennial*, 18; 25-26, 49; Maserang and Christopher, *Architectural Resources*, 36-41; and Ohman, *Twenty Towns*, 51-52.

<sup>12</sup>Charter Bank of Lexington, "100<sup>th</sup> Anniversary," 18; Lexington Sesquicentennial Committee, *Lexington, Missouri, Sesquicentennial*, 17-18; Little, *The National Old Trails Road*, n.p.; Mary Matthews, "Historic Resources of Lexington, Missouri, Amendment," section 8: 5; and "The Missouri River," *Lafayette Raconteur* 1, no. 4 (April 1982), 6.

they did not offer evening service, and they did not operate in a timely manner, often spending twenty minutes on either side of the river before leaving.<sup>13</sup> Local residents realized that a more permanent crossing was necessary, and almost as soon as the area was settled, they began to clamor for a bridge linking Lafayette and Ray counties. Many residents were interested in inexpensive ways to cross the river, and this impulse led to the construction of several pontoon bridges across the Missouri River. On September 30, 1889, a pontoon bridge linking Ray and Lafayette counties was dedicated at Lexington. The bridge was built by S. N. Stewart at a cost of less than \$25,000. The Lexington pontoon bridge consisted of a long line of boats tied together with a wood deck laid across them, and the owners of the structure only charged fifty cents to cross. The bridge also featured two spans in its center that could be opened to allow riverboats to safely pass. The opening of the pontoon bridge led to a large celebration in Lexington. A formal dedication ceremony was held on September 30, 1889, featuring a parade, baseball games, shooting contests, and an exhibition by Charles Geyer, a Lexington native who gained worldwide fame as a contortionist. Hundreds of people participated in the celebration, and the *Lexington Intelligencer* joyously declared, "Altogether it will be of immense benefit for all our people, and we confidently look for a large increase in trade, population and real estate prices."<sup>14</sup>

The reaction to the pontoon bridge was more subdued in Ray County. The *Richmond Conservator* predicted that the pontoon bridge would not generate any new cross-county commerce, and it warned that the bridge was little more than an expensive luxury that would prove to be a burden to local businesses and investors. The Richmond newspaper also noted that the pontoon bridge did not appear to be very stable, and it warned, "the true test has not yet been given it... it may be that when the large drifts and the ice begin to sweep down upon it that it will not prove so substantial and safe as it now appears."<sup>15</sup> This prediction proved to be uncannily accurate. The pontoon bridge was badly damaged by high water and a livestock stampede, and within a few years it was taken out of service.<sup>16</sup> The pontoon bridge experience foreshadowed issues that would arise when the Lexington Bridge was built. The Missouri River would prove to be a formidable obstacle to construction of the Lexington Bridge, and Ray County residents would be less enthusiastic about a bridge than Lexington's citizens and civic leaders.

A second effort to construct a bridge across the Missouri River at Lexington occurred in the late nineteenth century. The Lexington Bridge and Terminal Company incorporated in 1894. This company solicited subscriptions from Lexington area residents, and \$158,000 was raised in support of a bridge across the Missouri to carry wagon and rail traffic. In October 1895, J. R. Morehead, Secretary of the Lexington Bridge and Terminal Company, began negotiations with

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<sup>13</sup>Bonnie Mitchell, "Bridge Dedicated in 1925," *Lexington News*, 11 November 1987, 5A.

<sup>14</sup>"Whoop, Whoop, Hurrah!," *Lexington Intelligencer*, 7 September 1889, 1.

<sup>15</sup>"Pontoon Bridge Celebration," *Richmond Conservator*, 3 October 1889, 2.

<sup>16</sup>Charter Bank of Lexington, "100<sup>th</sup> Anniversary," 18; "A Grand Affair," *Lexington Intelligencer*, 5 October 1889, 1; Mitchell, "Bridge Dedicated," 5A; Ohman, *Twenty Towns*, 49; Ray County Historical Society, *Ray County 1973*, 120; and "Transportation: Spanning the Rivers," *Missouri Historical Review* 62 (April 1968): 361.

officials from the Santa Fe Railway Company for their involvement in construction of a bridge at Lexington. Morehead attempted to win favor with the Santa Fe Railway by sending its board of directors a barrel of apples harvested in the Lexington area, but the surreptitious bribe attempt failed. The Lexington Bridge and Terminal Company declared bankruptcy in 1897, and its assets were liquidated to pay outstanding debts.<sup>17</sup> This failed effort taught the residents of Ray and Lafayette counties a valuable lesson. Private efforts to bridge the Missouri could not raise enough money to pay for a river bridge. Some type of government aid was needed if the dream of a bridge between the two counties was to ever become a reality.

Prior to 1907, road and bridge building in Missouri fell under the control of county governments. Each county decided how much money to spend for road construction, and local taxes were levied for road and bridge maintenance. Unfortunately, this strategy led to a jumbled system of uncoordinated roads and local governments could not raise sufficient funds for large projects such as bridging the Missouri River. This difficult situation changed in 1921 when the Missouri General Assembly passed the Centennial Road Act. This law created the State Highway Commission to guide the construction of a highway system linking the State's county seats. Funded by a \$60 million bond issue, the Missouri State Highway Commission let many contracts for the building of hard-surfaced state highways and roads. State involvement in road construction was a critical prerequisite for bridging the Missouri River, and the stage was set for Lexington and Richmond citizens to demand action regarding the need for a bridge between Lafayette and Ray counties.<sup>18</sup>

By the early 1920s, new highways were being built throughout Missouri. Automobile traffic was steadily increasing, and many communities realized that bridges across the Missouri River were critical prerequisites for continued economic prosperity and growth. The desire for new bridges rapidly spread throughout Central Missouri, and soon the Lafayette County communities of Waverly and Lexington were agitating for river bridges. The origins of the Lexington Bridge can be traced to the efforts of the Lexington Chamber of Commerce. In April 1922, Chamber President B. M. Little received a picture of a proposed bridge over the Missouri River at Boonville, Missouri. Boonville area merchants under the leadership of John Cosgrove, a Boonville lawyer, and Thomas Johnston, superintendent of Boonville's Kemper Military Academy, had successfully lobbied local citizens and won financial support for a Missouri River bridge. Little took the picture of the Boonville Bridge and placed it in the window of the Chamber's downtown offices. Many people saw the picture and began to ask if Lexington could also successfully build a bridge across the Missouri River. Several businessmen approached Little and offered to take stock in a river bridge, and Little realized that the potential existed for a local groundswell in favor of a new bridge. To build on this early momentum, the Lexington Chamber of Commerce formed a committee to seek public support and state funding for a bridge across the Missouri River. E. J. McGrew, the owner and operator of a local mine, was selected

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<sup>17</sup>"The Missouri River," *Lafayette Raconteur* 1, no. 4 (April 1982), 6.

<sup>18</sup>Missouri Department of Transportation, "History Summary," downloaded May 2000 from <http://www.modot.state.mo.us/about/history/htm>; and Milton Rafferty, *The Ozarks: Land and Life* (Norman: University of Oklahoma Press, 1980), 108-110.

to head the bridge committee. On June 13, 1922, McGrew and other representatives from Richmond and Lexington appeared before the Missouri State Highway Commission. The representatives asked the Commission to promise economic support for a bridge across the Missouri River at Lexington. They told the Commission that a bridge would generate new commerce between the two communities, improve transportation throughout Missouri, and possibly draw a highway consortium such as the Old Trails Highway Association to locate a national road through Missouri. The Commission agreed that bridges across the Missouri River were critical for the State's growth, and they noted that immediate action was critical since federal aid programs for new river bridges expired at the end of 1922. Before the Commission could take action, however, local counties would have to raise enough money through subscriptions or bond issues to pay for fifty percent of the costs of building the bridge. The Lexington Chamber of Commerce had secured state funding, but they faced a daunting task, convincing fiscally conservative local voters to spend their tax dollars for the construction of a bridge over the Missouri River.<sup>19</sup>

The Lafayette County Court scheduled a special election on September 5, 1922, so local voters could approve the sale of bonds to pay for the county's share of the bridge costs. Based on estimates provided by John Alexander Low Waddell, a New York-based engineer hired by the Lexington Chamber of Commerce to study possible locations for the Lexington Bridge, Lafayette County needed to provide \$258,000 in bond money, while Ray County would have to provide \$192,000. Since Lafayette County had a larger population than Ray County, it was expected to pay for a larger share of the costs of the proposed bridge, but the majority of funds for the structure would come from federal and state grants.<sup>20</sup> Representatives from the Lexington Chamber of Commerce's Bridge Committee held public meetings throughout the county to disseminate information about the bridge project. Numerous arguments were put forth to win support for the bridge bonds. These arguments frequently appealed to the financial conservatism of area voters. For example, articles in the *Lexington News* pointed out that by investing \$258,000, Lafayette County voters would get a new bridge and hard-surfaced roads worth much more than their initial investment. In addition, since the bridge and approaches would be owned by the state, Lafayette County would not have to pay for their maintenance. This would free up county funds for other road projects and ultimately save local taxpayers

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<sup>19</sup>"The Missouri River," *Lafayette Raconteur*, 1, no. 4 (April 1982), 6; "Want a Bridge Here Too," *Lexington News*, 13 April 1922, 1; "Commission Will O.K. Aid for Bridge Here," *Lexington News*, 14 June 1922, 1; "Bridge Prospects Appear to Be Better," *Lexington News*, 16 June 1922; and David Austin, "Boonville Bridge," HAER No. MO-80, Historic American Engineering Record (HAER), National Park Service, U.S. Department of the Interior, 1994, 1-5. Lafayette County businessmen purchased \$130,000 worth of bonds offered in support of the Boonville Bridge. Such regional support was common, and businessmen throughout Central Missouri invested money in the Lexington Bridge bonds. See "A List of Results Achieved by the C. of C. [sic]," *Lexington News*, 19 June 1922, 1.

<sup>20</sup>"Statement of the Members of County Court of Lafayette County Concerning the Proposed Bond Issue of \$258,000," *Lexington News*, 13 August 1922, 1; and Missouri State Highway Department, "Description of Layout and Design for a Proposed Highway Bridge over the Missouri River at Lexington, Missouri," 24 July 1922, microfiche copy in "General Bridge File - Federal Aid Project 223," Collection 12-0227 and 12-0228, Bridge Division, Missouri Department of Transportation Headquarters, Jefferson City, Missouri. This collection henceforth cited as "Bridge File."

thousands of dollars. In addition, bridge proponents noted that since county residents already contributed to state coffers through license fees, it was time for them to get their fair share of Missouri's road funds.<sup>21</sup> Finally, bridge supporters promised a rosy economic future for the entire county if the bridge was built. In an optimistic editorial, the Lexington Chamber of Commerce described the potential impact of a new bridge and associated highway:

This river separates the state in two parts which can be connected only by bridges at proper locations to meet the travel...There is no part of Missouri which will in the next ten years show a greater increase in population and commercial development than will the ten counties along the proposed route.<sup>22</sup>

Supporters of the Lexington Bridge proposal also used emotional appeals to win support for the bridge bonds. For example, a full-page newspaper advertisement proclaimed that local voters had a duty to their family, community, county, and state to support the bridge bonds.<sup>23</sup> In a strongly worded editorial, the *Lexington News* appealed to emotion and civic duty to win support for the Lexington Bridge:

Lexington is going ahead. A small group of stalwart citizens in the Chamber of Commerce will see to that. Are you one of them? Or are you staying out of for some petty reason so small that you would be ashamed of yourself if you told it? The location is right, but remember that while God made the country, man makes the town. So it is up to you whether you have a town or a thriving, bustling city.<sup>24</sup>

The arguments in favor of the bridge bonds bore fruit on September 5, 1922, when Lafayette voters overwhelmingly approved their share of the costs of the Lexington Bridge. Lexington voted almost unanimously in favor of the bonds, and the county returned the two-thirds majority necessary to secure approval of the bond issue. Lexington residents showed even more support for the bridge when they approved the issuance of \$180,000 of municipal bonds in November 1922 to pay for additional bridge and approach costs. Residents also pledged \$38,000 in private subscriptions to finance the Lexington Bridge.<sup>25</sup> Lafayette County voters gave overwhelming approval for the bridge bonds, but unless Ray County residents did the same, the bridge would not be built.

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<sup>21</sup>"Committees at Work for Bridge and Road," *Lexington News*, 21 July 1922, 1; "Facts Are Being Given to Voters of County," *Lexington News*, 30 August 1922, 1; and "The Bridge Bonds Will Reduce Taxes," *Lexington News*, 1 September 1922, 1.

<sup>22</sup>"Interest in the Highway is Growing Steadily," *Lexington News*, 14 August 1922, 1.

<sup>23</sup>Advertisement, *Lexington News*, 30 August 1922, 3.

<sup>24</sup>"Stand By Your Town, Men," *Lexington News*, 7 July 1922, 1.

<sup>25</sup>"Lafayette County Takes Forward Step," *Lexington News*, 6 September 1922, 1; "Bonds Carried by 2,043," *Lexington News*, 13 November 1922, 1; and "Success for Bridge Fund Drive Sighted," *Lexington News*, 22 December 1922, 1. Lexington residents voted 2,043 to two in favor of the municipal bond issue.

The campaign to convince Ray County voters to approve their share of the Lexington Bridge bonds proved to be a very difficult battle. Unlike Lafayette County, organized opposition to the bonds arose in Ray County. Many communities believed that they would not benefit from a bridge between Lexington and Richmond, fearing that they would be left out of the state's road building program. Ray County had no hard-surfaced roads in 1922. All the county's highways were either dirt roads or oil-treated roads, and Missouri had not earmarked any of its highway funds for Ray County. Unless the state government promised to construct a hard-surfaced, modern highway between the Lexington Bridge and Richmond, there was no chance that the bridge bonds would pass in Ray County. As the *Richmond News* insightfully pointed out, "The road question is one of great importance to this county. Practically no one could be found to work for the bridge were not the road assured."<sup>26</sup> Organized opposition to the Lexington Bridge bonds in Ray County was focused around Orrick, Missouri. Orrick was located in southwest Ray County and was one Missouri's leading potato producers. Orrick's residents believed that a bridge between Lexington and Richmond offered no benefit to their economy. They preferred a bridge across the Missouri River linking their town to Sibley, which was located in Jackson County, Missouri. Orrick business leaders also feared that once the Lexington Bridge was built, ferry service between Orrick and Sibley would end, leaving their town with no direct transportation across the Missouri River. Finally, Orrick residents feared that the new road and bridge program would actually harm their economy by making Richmond the center of the county's commerce and trade. The effort to win support for the Lexington Bridge failed to influence Orrick residents, and as local observers noted, "The battle grew in intensity until it took on the aspects of a small Ray County civil war. Speeches and parades were held – and almost invariably minor skirmishes took place with fisticuffs."<sup>27</sup>

The Lexington and Richmond Chambers of Commerce faced an uphill battle in convincing Ray County voters to approve their share of the costs of the Lexington Bridge. The same basic arguments in favor of the bridge that were used in Lafayette County were also presented at meetings in Ray County, but a few new items were added to the mix. For example, speakers claimed that it was inevitable that new road construction would follow construction of the bridge. Newspaper editorials and speakers pointed out that the bridge was just the first in what would hopefully be many state projects in Ray County. Supporters claimed that new road paving and improvement programs would follow if the bridge bonds passed, and they described the bond election as a chance for Ray County voters to display their faith in the Missouri State Highway Commission. In addition, bridge supporters used the "two hen" argument to counteract claims that the bonds would inevitably lead to major tax increases for Ray County residents. The Ray County Clerk estimated that to pay off the bonds and their interest, a property tax levy of fifty cents per \$1,000 would need to be implemented for twenty years. Based on this estimate,

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<sup>26</sup>"No Highway Guarantee," *Richmond News*, 19 June 1922, 1; "Bridge Means State Road," *Richmond News*, 9 August 1922, 1; and Ray County Historical Society, *Ray County 1973*, 45-46. Quote from "Bridge Means State Road," 1.

<sup>27</sup>"Cold Shoulder at Orrick," *Richmond News*, 1 September 1922, 1; and Ray County Historical Society, *Ray County 1973*, 45-46. Quote from Ray County Historical Society, *Ray County 1973*, 46.

the owner of a 160-acre farm in Ray County would have to pay an additional \$4.50 per year in property tax. Since eggs were selling for twenty-five cents per dozen, the annual production of two hens would be sufficient to cover the costs of the bonds for the average Ray County farmer. This argument provided a simple way to show Ray County residents that the bridge bonds would not lead to a dramatic tax increase, and it proved to be extremely effective in convincing local farmers to support the Lexington Bridge.<sup>28</sup>

On September 8, 1922, Ray County voters went to the polls to decide whether or not to approve the bonds needed to pay the \$192,000 needed to build the Lexington Bridge. When the polls closed, the bonds had carried by a large margin. The final vote was 8,516 in favor of the bonds with 3,005 opposed. Communities in the eastern part of Ray County voted overwhelmingly in favor of the bonds, with the town of Henrietta voting 842 in favor, zero opposed. However, other communities turned out against the bonds with Orrick voting 890 to two in opposition. In an effort to derail the bond issue, several Orrick businessmen filed a lawsuit alleging irregularities in the bond election. The plaintiffs claimed that the Ray County Court had never formally approved the bond election and that election details were not publicized appropriately as required by state law. The plaintiffs also claimed that fraud occurred at several polling places in Henrietta and Richmond. Numerous Lafayette County citizens allegedly crossed the river to cast votes in favor of the bonds, and judges at local precincts were accused of allowing residents who favored the bond issue to cast multiple ballots. The plaintiffs hoped that their suit would tie up the bond election in court until the end of the year. Since the offer of federal support for river bridges expired at that time, a delay in the execution of the bonds could have derailed the entire bridge project. Fortunately for supporters of the Lexington Bridge, the Missouri Supreme Court voted unanimously against the lawsuit, and the sale of the bridge bonds was allowed to proceed.<sup>29</sup>

Initial surveys and studies were performed in the summer and fall of 1922 to determine the best location for the Lexington Bridge and to create comprehensive designs for the new structure. This task fell to John Alexander Low Waddell, a consulting engineer hired by the Lexington Chamber of Commerce's Bridge Committee. After engineering teams surveyed the area, Waddell submitted an initial design for a monumental steel bridge over the Missouri River. The substructure of the bridge was to consist of cement and steel piers sunk to bedrock underlying the river. The cylinders of the piers were to be connected by steel web plates with concrete filling to protect the bridge from the drift of the river. The superstructure would consist of several Warren through-trusses carefully riveted together. Waddell provided the following description of the location of his proposed bridge:

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<sup>28</sup>"Vote for the Bridge Bonds," *Richmond News*, 4 August 1922, 4; "Gives Road Assurance," *Richmond News*, 30 August 1922, 1; "Spoke on Good Roads," *Richmond News*, 6 September 1922, 1; and "What the Bridge Means to Ray County," *Richmond News*, 6 September 1922, 4.

<sup>29</sup>Ray County Historical Society, *Ray County 1973*, 46; "Voters 'Built' a Bridge," *Richmond News*, 11 September 1922, 1, 4; "Ray County Returns an Overwhelming Majority for Bonds to Build Bridge Across the Missouri," *Lexington News*, 11 September 1922, 1; "Another Injunction Suit is Filed in Ray County," *Lexington News*, 6 October 1922, 1; "Bridge Case Big Victory," *Lexington News*, 22 November 1922, 1; and J. A. L. Waddell to B. H. Piepmeier, Correspondence, 27 October 1922, Bridge File.

The location chosen as the best part for the purpose desired is a short distance west of Tenth Street. The centre [sic] line of structure crosses the river at right angles to the channel and reaches the present high water bank at the County Road that lies alongside of the abandoned railway track. At the South end the structure starts from a buried pier on the hillside; and from this point Southward there will be a thirty-foot-wide road, carrying over to the intersection of Tenth and Highland Streets on a five and half-per cent (5.5%) rising grade.<sup>30</sup>

The most unique aspect of Waddell's proposed bridge was its plan to rectify and re-channel the Missouri River. Waddell noted that the Missouri River was too wide and swift to effectively span anywhere near the City of Lexington. Before any bridge could be built, the Missouri River would have to be brought under control. Waddell recommended that a series of wood river breaks known as retards be placed to slow the current, and he suggested that steps be taken to prevent the erosion of the banks on both sides of the proposed bridge. He also suggested that \$100,000 be added to the cost of the bridge contract to pay for river rectification.<sup>31</sup> Previous efforts to build a bridge across the Missouri River at Lexington had fallen victim to the river's strong currents, and Waddell believed that unless steps were taken to reign in the power of the Missouri, no bridge could survive at Lexington.

An early delay in the construction of the Lexington Bridge was encountered when the designs created by J. A. L. Waddell were submitted to the federal government. Federal engineers expressed several concerns with the proposed Lexington Bridge. They noted that drivers crossing the bridge from Lexington would have to slice down a hill and then make a sharp turn while descending along a steep grade. In addition, federal inspectors noted that due to consistent cutting and shifting of the river channel, the Lexington location would require an unusually long bridge and ambitious rectification projects. In order to appease federal bridge engineers, Waddell surveyed another possible bridge location approximately 3,300' above the original site. Waddell concluded that the alternate was too expensive compared to the original Tenth Street site, and his bridge designs received the eventual approval of both the Department

of Agriculture and the War Department.<sup>32</sup> The stage was set to open the Lexington Bridge to competitive bids, but once again, difficulties arose that threatened to delay the start of work on the proposed structure.

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<sup>30</sup>Waddell, "Description of Layout and Design for a Proposed Highway Bridge over the Missouri River at Lexington, Missouri," Bridge File.

<sup>31</sup>*Ibid.*; and J. A. L. Waddell, "Estimate of Cost for a Proposed Bridge over the Missouri River at Lexington, Missouri," 24 July 1922, Bridge File.

<sup>32</sup>U.S. Department of Agriculture, "Inspection Report, Bridge over Missouri River at Lexington, Missouri," 6 September 1922, Bridge File; U.S. Department of Agriculture, "Inspection Report, Lexington Bridge," 29 September 1922, Bridge File; John Chamberlin to B. H. Piepmeier, Telegram, 20 October 1922, Bridge File; U. S. Department of Agriculture, "Inspection Report, Lexington Bridge," 14 November 1922, Bridge File; B. H. Piepmeier to J. A. L. Waddell, Correspondence, 14 November 1922, Bridge File; J. A. L. Waddell, "Estimate of

On October 30, 1922, the Missouri State Highway Commission began to solicit bids for the construction of the Lexington Bridge. The commission's instructions to bidders carefully followed the plans for the bridge designed by J. A. L. Waddell, but the commission also added a section calling for work to rectify the river:

A short distance above the bridge tangent there is a split in the channel that forms a sand bar island at ordinary stages of water. In order to reduce the width of the crossing to a reasonable amount and thus render possible the bridging of the river at Lexington, it is necessary to force the North Channel to join the South Channel by cutting out the island between them. This is to be effected by starting a wattled, trailing pile-dyke at a point on the north bank some 6,800' upstream from the bridge tangent and carrying it down thereto in a direction about parallel to the shore-line above the said point, and by putting in two (or possibly more) cross-dykes to lower the velocity of the current at high water and thus cause a deposition of sand and silt.<sup>33</sup>

The Missouri Highway Commission also called for the construction of a woven mattress made of willow branches to protect the dikes that would re-channel the river. The total cost of the entire project was estimated to be less than \$100,000, and the Commission hoped to award the job before the end of the year.<sup>34</sup>

Issues arose during the bidding process that caused the Missouri State Highway Commission to reject the low bid and instead award the contract to the company that submitted the second lowest bid for construction of the Lexington Bridge. Several companies that were initially interested in building the bridge quickly withdrew from consideration. For example, the Virginia Bridge and Iron Company asked for a set of bridge plans and the notes for contractors, but they decided not to offer a bid when they realized that freight rates for shipping made the project too costly.<sup>35</sup> Other companies complained that the specifications called for by the Missouri State Highway Commission were stringent and unrealistic. For example, several

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Cost for Proposed Bridge at the Foot of Wall Street, Lexington, Missouri," 18 November 1922, Bridge File; and F. B. Downing to B. H. Piepmeier, Correspondence, 29 November 1922, Bridge File. Privately, U.S. Senior Bridge Engineer John Chamberlin complained that the site selected for the Lexington Bridge was impractical due to the unpredictability of the river and the necessary length of the bridge. Chamberlin preferred that the Lexington Bridge be built at a different site, but he reluctantly agreed to go along with momentum and accept Waddell's proposal. See J. R. Chamberlin, "Memorandum to Mr. Wonders," 27 October 1922, Bridge File.

<sup>33</sup>Missouri State Highway Department, "Notice to Contractors, Specifications, Proposal, Proposal Bond, Contract Agreement, and Contractor's Bond for the Missouri River Bridge at Lexington, Missouri, between Lafayette and Ray Counties for the Missouri State Highway Commission, Project Missouri No. 223," 30 October 1922, Bridge File, 46-47.

<sup>34</sup>*Ibid.*, *passim*. The Missouri State Highway Commission had to award the contract for the Lexington Bridge by the end of 1922 in order to qualify for federal funding, so the letting process was conducted as quickly as possible.

<sup>35</sup>W. E. Leigh to B. H. Piepmeier, Correspondence, 11 December 1922, Bridge File.

companies complained that the commission's requirement that all dike work be guaranteed to survive for at least five years was excessive. In addition, the Mount Vernon Bridge Company complained about the commission's payment schedule, asking in their bid that even if river conditions led to delays in erection of the superstructure, the commission still be held liable to pay ninety percent of the cost of the bridge by April 1924. Despite these complaints, four submittals had been received when the commission opened the bids for the Lexington Bridge on December 4, 1922.<sup>36</sup>

The lowest bid submitted for the construction of the Lexington Bridge was a combined bid offered by the Mount Vernon Bridge Company and the Missouri Valley Bridge and Iron Company. This bid divided the project with the Mt. Vernon Bridge Company erecting the superstructure and the Missouri Valley Bridge and Iron Company building the substructure, and it was \$7,564 less than the bid submitted by the Kansas City Bridge Company. However, several irregularities led to the rejection of the combined bid. One problem was that the Missouri Valley Bridge and Iron Company refused to follow the specifications listed for the bridge piers. The Missouri Valley Bridge and Iron Company said that due to the depth of the bedrock, it would be impossible to meet the Highway Commission's requirement that all piers be set within 1-1/2" of pre-determined locations within the river. The company also claimed that it was impossible to sink cylinders that were less than 10' in diameter to a depth of greater than 50' below the water line.<sup>37</sup> In addition, the Missouri Valley Bridge and Iron Company failed to follow the Missouri State Highway Commission's guideline for submission of a contractor's bond. Missouri law required all construction companies to submit a performance bond along with their proposals, but the Missouri Valley Bridge and Iron Company sent a certified check instead. Attorneys for the highway commission advised that a certified check was not an acceptable substitute for a bidder's bond, and they recommended that the bid submitted by the Missouri Valley Bridge and Iron Company be rejected. This led the Missouri State Highway Commission to award the contract for the Lexington Bridge to the second lowest bidder, the Kansas City Bridge Company. The bid submitted by the Kansas City Bridge Company was still less than the initial cost estimates provided by J. A. L. Waddell, and their bid was accompanied by all the proper paperwork and bonds.<sup>38</sup>

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<sup>36</sup>H. P. Treadway to J. A. L. Waddell, Correspondence, 26 October 1922, Bridge File; L. S. Stewart to J. A. L. Waddell, Correspondence, 27 October 1922, Bridge File; B. H. Piepmeier, "Notice to Contractors," November 1922, Bridge File; and "Remarks Concerning Bids Received December 4, 1922 for Bridge Over Missouri River at Lexington," Internal Missouri Highway Department Memorandum, n.d., Bridge File, 1-2.

<sup>37</sup>Missouri State Highway Department, "Notice to Contractors, Specifications, Proposal, Proposal Bond, Contract Agreement, and Contractor's Bond for the Missouri River Bridge at Lexington, Missouri, between Lafayette and Ray Counties for the Missouri State Highway Commission, Project Missouri No. 223," 50-51; "Remarks Concerning Bids Received December 4, 1922, for Bridge Over Missouri River at Lexington," 1-2; and E. H. Connor to County Clerk, Lafayette County, Correspondence, 1 December 1922, Bridge File.

<sup>38</sup>"Remarks Concerning Bids Received December 4, 1922, for Bridge Over Missouri River at Lexington," 1-2; B. H. Piepmeier to J. C. Wonders, Correspondence, 20 December 1922, Bridge File; and B. H. Piepmeier to the Missouri State Highway Commission, Correspondence, 29 December 1922, Bridge File.

Needless to say, the leaders of the Missouri Valley Bridge and Iron Company were extremely angry that they did not receive the contract for the bridge over the Missouri River at Lexington. Representatives from the Missouri Valley Bridge and Iron Company approached Murray Carleton, a member of the Missouri State Highway Commission from St. Louis, and complained that the competition for the Lexington Bridge contract was conducted unfairly. They claimed that their company was never given fair consideration, and they argued that by awarding the contract for the Lexington Bridge to the Kansas City Bridge Company, the highway commission was wasting over \$50,000 of taxpayer money. However, B. H. Piepmeier, Chief Engineer of the Missouri State Highway Department, assured Carleton that every consideration was given to the Missouri Valley Bridge and Iron Company, but irregularities in their proposal made it impossible to accept.<sup>39</sup> It is impossible to determine why the Missouri Valley Bridge and Iron Company submitted a check instead of a bond with their proposal, but one possible explanation is faulty information provided by J. A. L. Waddell. In a letter to prospective bidders, Waddell recommended that a certified check should be submitted instead of a contractor's bond. However, the Notice to Contractors provided by the Missouri State Highway Commission specifically warned that bids for construction of the Lexington Bridge would be rejected if they contained "any omissions, alterations, or irregularities of any kind."<sup>40</sup> The controversy over the bidding process soon died down and the stage was set for construction of the Lexington Bridge to begin.

### C. Construction History

Construction of the substructure of the Lexington Bridge began in March 1923. Instead of performing all work necessary to build the entire bridge, the Kansas City Bridge Company chose to build the superstructure and subcontract the remainder of the work. The Union Bridge and Construction Company of Kansas City, Missouri, was hired to build the steel and cement substructure, while the American Bridge Company was employed to fabricate the steel superstructure.<sup>41</sup> Construction of the substructure was accomplished through the use of the pneumatic process. A tramway was built along a series of falseworks to move men and material

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<sup>39</sup>B. H. Piepmeier to Murray Carleton, Correspondence, 3 January 1923, Bridge File; Unsigned Memorandum, Missouri Valley Bridge and Iron Company, 5 January 1923, Bridge File; and Murray Carleton to B. H. Piepmeier, Correspondence, 24 January 1923.

<sup>40</sup>J. A. L. Waddell, Correspondence, 14 November 1922, Bridge File; and Missouri State Highway Department, "Notice to Contractors, Specifications, Proposal, Proposal Bond, Contract Agreement, and Contractor's Bond for the Missouri River Bridge at Lexington, Missouri, between Lafayette and Ray Counties for the Missouri State Highway Commission, Project Missouri No. 223," 7.

<sup>41</sup>O. A. Zimmerman to B. H. Piepmeier, Correspondence, 29 March 1923, Bridge File. The steel used in the Lexington Bridge was fabricated at American Bridge Company plants in Gary, Indiana, and Chicago, Illinois. See O. A. Zimmerman to B. H. Piepmeier, Correspondence, 31 January 1923, Bridge File.

across the river, and a barge that contained a cement mixer was used to move cement so it could be poured to form the bridge piers in place.<sup>42</sup>

The basic construction tool used to set the piers for the Lexington Bridge was the caisson. The piers had to be set on solid concrete bases that reached down through the Missouri River to the bedrock below. This complex task was achieved by building wood and steel boxes and allowing them to sink to the bottom of the river and then to the underlying bedrock. H. F. Nelson, a Missouri State Highway Department engineer who supervised construction of the Missouri River Bridge at Waverly, Missouri, presented a useful and detailed explanation of how caissons worked at a 1923 public meeting:

Caissons might be compared to an airtight box of steel or wood and turned upside down. These used were made of heavy timber. After being placed in position in the water the concrete forms which were built on top are filled with concrete, except for the shaft which allows the men, called sand hogs, to be lowered into the caisson where they work under air pressure digging out the sand which goes to the top through suction lines. The weight of the concrete sinks the caisson as the sand is excavated and more concrete is added keeping the concrete above the water line until the caisson lands on solid foundation, which in this case is two feet of shale. All the caissons are sunk two feet into shale to prevent any danger of scowing or slipping from river pressure, ice or drift. The caisson is then filled with concrete through the supply shaft and the foundation is then ready for the pier.<sup>43</sup>

This technique was extremely effective for setting the foundations for the bridge down to underlying bedrock, but it was very dangerous for caisson workers. The Lexington Bridge required the sinking of eleven piers into the river, and they had to be set to depths of over 110' below the water line. The pressure in the caissons reached levels of fifty-two pounds per square inch, which was considered the absolute maximum that could be safely endured.<sup>44</sup> Negative air pressure in the caissons often caused men to suffer from "the bends," causing pain, bleeding, and even death. For example, two workers were paralyzed when they emerged too quickly from the caisson used to sink pier seven of the Lexington Bridge. Additional workers were killed by accidents involving heavy construction equipment. Overall, eleven workers were killed during

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<sup>42</sup>B. H. Piepmeier to Agnes Moore, Correspondence, 22 September 1924, Bridge File; and B. H. Piepmeier to *Manufacturers Record*, Correspondence, 7 December 1925. Agnes Moore was the editor of the *Kansas City Journal-Post*, and Piepmeier was writing to her to provide information on the construction of the Lexington Bridge.

<sup>43</sup>Quoted in "Waverly Bridge in Early Days," *Carrollton Daily Democrat*, 7 August 1975, 2.

<sup>44</sup>B. H. Piepmeier to Agnes Moore, Correspondence, 22 September 1924. New York had a state law stating that the maximum air pressure allowed in a caisson was fifty pounds per square inch. This was the standard used by most states and construction companies, but since Missouri had no laws to protect the health of the workers, the "sand hogs" who built the Lexington Bridge were routinely exposed to dangerously high negative air pressure. The workers who built the substructure were paid forty to fifty cents per hour, while salaried foreman were paid as much as \$9.08 per day. See Missouri State Highway Commission, "Force Account Form for Itemized Labor and Material Costs," 7 December 1923, Bridge File.

the construction of the Lexington Bridge, showing how dangerous bridge work on the Missouri River was during the 1920s.<sup>45</sup>

Despite the obstacles presented by the Missouri River and the pneumatic process, the Union Bridge and Construction Company made good progress in 1923 on the construction of the Lexington Bridge substructure. Weekly progress reports noted that as many as ninety men were employed during the height of the construction season, and inspectors frequently praised the company's rapid progress. Local residents also showed great interest in progress along the new bridge. Many people came out to view the construction process, and delegations of local businessmen often toured the job site.<sup>46</sup> However, the Union Bridge and Construction Company experienced several construction delays during 1923. Many days were lost due to high water and the failure of the American Bridge Company to provide structural steel in a timely manner. Other delays were encountered when the Missouri State Highway Commission ordered changes in the design of the bridge and when J. A. L. Waddell provided inaccurate information on the depth to bedrock. Time was also lost due to the difficulty encountered in removing bedrock from the bottom of the Missouri River and due to a loss of workers during the winter months. Officials estimated that 163 working days were lost in 1923 due to factors beyond their control.<sup>47</sup> Despite these delays, the substructure of the Lexington Bridge was almost complete by the end of 1923, and it appeared that the bridge would open to traffic by the end of 1924.

Construction of the Lexington Bridge continued during the early months of 1924, but the Missouri River continued to cause problems. Workers from the Union Bridge and Construction Company performed work on the substructure, and workers from the Kansas City Bridge Company began to erect the superstructure. Work was done simultaneously on both the superstructure and substructure of the Lexington Bridge, and the superstructure was built using traditional falsework instead of relying on a cantilevering method. One problem encountered by both contractors, however, involved the repeated destruction of portions of the tramway. Ice floes and other debris caused significant damage to the tramway during the winter months, and in the early spring, high water frequently washed away pieces of the tramway. For example, on January 31, 1924, ice destroyed part of the tramway between pier nine and the south bank of the river, forcing construction to be delayed until new air lines could be brought out to the caissons.

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<sup>45</sup>"Bridge Worker Dies of Injuries in Fall," *Lexington News*, 19 February 1923; U. S. Department of Agriculture, "Inspection Report, Lexington Bridge Project," 5 November 1923, Bridge File; Missouri State Highway Commission, "Weekly Progress Report of the Missouri and Gasconade River Bridges," 15 December 1923, Bridge File; and Theodore Gary to L. J. Sverdrup, Correspondence, 30 October 1925, Bridge File.

<sup>46</sup>Missouri State Highway Department, "Lexington Bridge Project 223: Weekly Report for the Week Ending April 7<sup>th</sup>, 1923," Bridge File; Missouri Highway Department, "Weekly Report for Week Ending June 2<sup>nd</sup>, 1923," Bridge File; and Missouri Highway Department, "Weekly Report for Week Ending June 9<sup>th</sup>, 1923," Bridge File.

<sup>47</sup>Missouri State Highway Department, "Project No. 223: Weekly Progress Report," 2 August 1923, Bridge File; Missouri State Highway Department, "Project No. 223: Weekly Progress Report," 4 October 1923, Bridge File; and O. A. Zimmerman to B. H. Piepmeier, Correspondence, 5 February 1924, Bridge File. Similar delays and construction problems continued to plague the contractors for the Lexington Bridge throughout 1924 and 1925.

Another delay occurred in March 1924, when high water knocked out approximately 900' of the tramway and delayed construction for several weeks.<sup>48</sup>

Despite these problems, construction proceeded steadily, and the Union Bridge and Construction Company completed the substructure by June 1924. In a final inspection of the substructure, Missouri Bridge Engineer Leif Sverdrup noted that the bridge company had performed competent work:

Inasmuch as this site has been visited quite frequently by me during construction, the inspection did not consume a great length of time, inasmuch as most of the work has already been seen. All the work is satisfactory with the exception of the south abutment. Some very poor concrete has been poured at this place, or rather some very poor form work has been done and as a result some rather rough surfaces are present. However, inasmuch as these surfaces will be entirely buried in the dirt approach, the contractor was not requested to rub them down or in any manner try to finish them up. This work was accepted... final estimate will be prepared on this immediately.<sup>49</sup>

Although all structural steel needed to complete the Lexington Bridge was on site by May 1924, the foreman advised that it would be wise to delay work on the superstructure until the summer river rise ended. Construction of the superstructure resumed in late July, and work was begun on the pouring of the concrete deck. Rapid progress was being made on construction of the bridge.<sup>50</sup> The Missouri River, however, was beginning to shift course, and this new problem needed immediate attention and action.

During the spring and summer of 1924, the Missouri River threatened to cut a new channel at Lexington. Due to changes in current, the north bank of the river began to erode away, and inspectors worried that, "the Missouri River may cut a new channel toward Lexington Junction, leaving the bridge high and dry."<sup>51</sup> To make sure that shifting of the Missouri River did not ruin the bridge, a contract was let in the summer of 1924 for protection work both near and above the bridge site. The Missouri River had threatened to cause similar damage at bridges being built at Glasgow and Waverly, but retards built by the Woods Brothers Construction Company of Lincoln, Nebraska, had provided sufficient protection to save these projects. As a result of these successful precedents, the Woods Brothers Construction Company was hired to

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<sup>48</sup>U.S. Department of Agriculture, "Report on Construction of the Lexington Bridge," 1 February 1924, Bridge File; and Missouri State Highway Commission, "Weekly Progress Report of the Missouri and Gasconade River Bridges," 15 March 1924, Bridge File.

<sup>49</sup>Missouri State Highway Department, "Inspection Report, Project 223," 8 June 1924, Bridge File. This report also noted that seventy-five percent of the steel work on the superstructure had been completed by June 1924.

<sup>50</sup>Missouri State Highway Department, "Weekly Progress Report of the Missouri and Gasconade River Bridges," 31 May 1924, Bridge File; and Missouri State Highway Department, "Weekly Progress Report of the Construction of the Missouri River Bridges for Week Ending July 19, 1924," Bridge File.

<sup>51</sup>B. H. Piepmeier to Agnes Moore, Correspondence, 22 September 1924, Bridge File.

place retards in the Missouri River to protect the Lexington Bridge. Approximately 2,000' of wood retards were to be placed two miles above the Lexington Bridge, while 400' of retards were to be placed directly above the north bridge abutment.<sup>52</sup> B. H. Piepmeier provided a detailed description of how the retards were designed and how they worked at Lexington:

Due to a change in the course of the river immediately above the bridge site some time after construction of the bridge had started, it became necessary to install quite an extensive system of bank protection and stream control. This construction... consists of [a] system of current retards. These retards consist of rows of trees placed at approximately right angles to the bank. These rows of trees were anchored at intervals to concrete piling which were in turn sunk to bed rock. The trees were then fastened together by winding cables about them and the entire structure anchored to the stream bank.<sup>53</sup>

Construction of the retards began in early July 1924. A work force of fifty to seventy-five men worked on this project, and by September, the retard system was in place. A total of 7,395 trees were used in the retards, and the retards kept the Missouri River from cutting a new channel and rendering the Lexington Bridge irrelevant.<sup>54</sup>

Work on the Lexington Bridge proceeded smoothly throughout the fall of 1924. The steel superstructure was erected quickly, and work resumed on the concrete bridge deck. A mild controversy arose when B. H. Piepmeier made a personal inspection of the Lexington Bridge. He noted that the bridge floor at Lexington seemed to be poorly laid, and he advised the Kansas City Bridge Company that he expected better workmanship on the bridge project. Representatives from the bridge company admitted that the bridge did have some rough concrete, but they claimed that this was merely a cosmetic issue that would have no practical impact on automobile traffic.<sup>55</sup> Piepmeier agreed, but he also expressed disappointment in the failure of the Kansas City Bridge Company to live up to the standards set by other bridge projects along the Missouri River, saying:

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<sup>52</sup>*Ibid.*; B. H. Piepmeier to Kansas City Bridge Company, Correspondence, 5 April 1924; and Missouri State Highway Commission, "Contract Agreement," Signed by the Woods Brothers Construction Company, 12 June 1924, Bridge File.

<sup>53</sup>B. H. Piepmeier to *Manufacturers Record*, Correspondence, 7 December 1925, Bridge File.

<sup>54</sup>Missouri State Highway Department, "Progress Report on the Construction of the Missouri River Bridges for the Week Ending June 28, 1924," Bridge File; Missouri State Highway Department, "Progress Report on the Construction of the Missouri River Bridges for the Week Ending July 5th, 1924," Bridge File; Missouri State Highway Department, "Progress Report on the Construction of the Missouri River Bridges for the Week Ending September 20<sup>th</sup>, 1924," Bridge File; and Missouri State Highway Department, "Progress Report on the Construction of the Missouri River Bridges for the Week Ending October 11<sup>th</sup>, 1924," Bridge File.

<sup>55</sup>B. H. Piepmeier to Kansas City Bridge Company, Correspondence, 24 September 1924, Bridge File; and O. A. Zimmerman to B. H. Piepmeier, Correspondence, 26 September 1924, Bridge File.

In making the comparison between the floor on the Lexington Bridge and that on the Glasgow Bridge, I can not see how anyone could say a better finish and all around job is being gotten at Lexington. The reports we have from Federal Engineers clearly state that they consider the work at Glasgow to be superior to that at Lexington. This is also my opinion... I believe all interested parties would appreciate seeing a little better finish than is being obtained at the present time.<sup>56</sup>

Despite Piepmeier's concerns, work on the Lexington Bridge was essentially finished by October 1924. H. H. Boyd, the Resident Engineer in charge of overseeing the Lexington Bridge for the Missouri State Highway Commission, noted in an October letter to Chief Bridge Engineer Leif Sverdrup, "the steel is now practically completed, three weeks ahead of our estimated date, and I believe that this project can be finished in time allotted by contract."<sup>57</sup> The only work that remained was the application of a second coat of paint and the laying of approximately 1000' of roadbed, and it appeared that the Kansas City Bridge Company would complete the Lexington Bridge by the December 30, 1924, deadline.<sup>58</sup>

Although a minimal amount of work remained on the Lexington Bridge in the Fall of 1924, the Kansas City Bridge Company did not want to continue through the winter. Leaders from the company remembered numerous washouts that occurred during the previous winter season, and they also feared that concrete poured during the winter would suffer from severe frost damage. Based on these concerns, the Kansas City Bridge Company announced on December 13, 1924, that it was shutting down work on the Lexington Bridge until the following Spring. The company realized that its contract with the Missouri State Highway Commission promised completion of the bridge by the end of 1924, but the company asked for an extension until June 1, 1925. Construction delays had been caused by bad weather, subcontractor problems, and high water, so the Kansas City Bridge Company believed it should not be held to the original deadline. The work force at the Lexington Bridge was reduced to a bare minimum, and in the early months of 1925 only minor tasks were performed when weather allowed.<sup>59</sup>

The Missouri State Highway Commission showed no sympathy to the Kansas City Bridge Company. B. H. Piepmeier informed the company that no extension of the contract deadline would be granted and that he expected the Lexington Bridge to be completed as soon as

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<sup>56</sup>B. H. Piepmeier to Kansas City Bridge Company, Correspondence, 29 September 1924, Bridge File.

<sup>57</sup>H. H. Boyd to L. J. Sverdrup, Correspondence, 14 October 1924, Bridge File.

<sup>58</sup>O. A. Zimmerman to B. H. Piepmeier, Correspondence, 13 December 1924, Bridge File.

<sup>59</sup>*Ibid.*; and O. A. Zimmerman to B. H. Piepmeier, Correspondence, 9 January 1925, Bridge File. Federal engineers agreed that it would be unwise for the Kansas City Bridge Company to work on the Lexington Bridge during the winter. In an inspection report from November 1925, federal officials noted, "It is doubtful whether the remaining floor can be poured so as to be of any service for traffic this winter and under these circumstances there seems little to gain by working in face of increasingly colder weather." See U.S. Department of Agriculture, "Report on Construction: Project 223," 25 November 1924, Bridge File.

possible. Piepmeier also placed the blame for construction delays on the Kansas City Bridge Company, saying that they should have anticipated them in their bid for the Lexington Bridge:

We have read your letter and noted carefully the various items of delay set forth by you and will say that we agree with you that a number of these items are justifiable. However, it might also be stated that you, at the time the contract was given to you, knew quite well that you could not expect to work continuously for two years without any delays whatsoever. In other words, a certain amount of delay must necessarily have been contemplated when you made your bid. For instance it is a well known fact that high water will always be encountered during the months of June and July and undoubtedly you took this into account when preparing your bid.<sup>60</sup>

When the construction of the Lexington Bridge was completed in the Spring of 1925, the Kansas City Bridge Company was penalized a lump sum of \$1,500 for failing to meet the deadline contained in its original contract with the Missouri State Highway Commission.<sup>61</sup> The highway commission wanted the Lexington Bridge opened as soon as possible, and they were not going to allow any delays in completion of the bridge project.

Not only was the Commission interested in completing the Lexington Bridge as soon as possible, area residents were also anxious to have access to the new structure. In December 1924, local residents asked workers from the Kansas City Bridge Company to use surplus lumber to lay a temporary floor across the superstructure of the bridge. The Missouri State Highway Commission agreed to pay the Kansas City Bridge Company \$185 to set up the temporary wood bridge floor and promised that the company would not be held liable for any accidents that occurred on the temporary bridge.<sup>62</sup> The temporary crossing opened in late December 1924, and pedestrians began to regularly use the bridge to cross between Lafayette and Ray counties.<sup>63</sup> When the Kansas City Bridge Company wanted to resume concrete work on the bridge in February 1925, they feared that local residents would rebel when the temporary wood crossing was removed. They asked the Missouri State Highway Commission to allow them to delay construction of the concrete deck until the spring thaw when ferry service across the Missouri River would resume.<sup>64</sup> B. H. Piepmeier rejected this suggestion, commenting, "The people at Lexington have gotten along without a bridge and without a ferry every winter so far so we do

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<sup>60</sup>B. H. Piepmeier to Kansas City Bridge Company, Correspondence, 17 December 1924, Bridge File.

<sup>61</sup>H. P. Treadway to B. H. Piepmeier, Correspondence, 17 March 1925, Bridge File.

<sup>62</sup>B. H. Piepmeier to Kansas City Bridge Company, Correspondence, 17 December 1924, Bridge File. A sign posted on either side of the Lexington Bridge warned, "Bridge Opened Temporarily to Foot Traffic Only. To Be Crossed By User At Own Risk." See *Ibid.*

<sup>63</sup>One local resident recalled driving a load of apples to the bridge site and then carrying the apples across the bridge one bushel at a time to a waiting truck on the other side of the river. See Lexington Sesquicentennial Committee, *Lexington, Missouri, Sesquicentennial*, 48.

<sup>64</sup>H. P. Treadway to B. H. Piepmeier, Correspondence, 9 February 1925, Bridge File.

not believe that an unusual hardship is being worked on them in case this is being repeated again."<sup>65</sup> The Kansas City Bridge Company removed the temporary wood roadbed and resumed work on the concrete deck, and they promised to work quickly so the bridge could be opened as soon as possible to automobile traffic.<sup>66</sup>

During the spring and summer of 1925 a number of minor projects were completed in preparation for the opening of the Lexington Bridge. Erosion had cut away a portion of the north bank of the river in 1924, and thus a temporary wood approach was built between the north abutment and the earth fill on the north bank. This temporary approach was built from lumber from the falseworks, and it was replaced by the end of the year with a steel and concrete approach span.<sup>67</sup> By August 1925, all work was finished on the Lexington Bridge except for some work on the north fill and some painting.<sup>68</sup> Chief Engineer B. H. Piepmeier expressed disappointment with the appearance of the Lexington Bridge, noting that it contained numerous white spots instead of having the solid red coat of paint called for in the contract. The Kansas City Bridge Company told Piepmeier that it had no plans to repaint the bridge, but Piepmeier demanded action, telling the construction company, "Unless you are able to prove that gasoline or something also equally injurious was added to the paint, we will naturally have to believe that the paint in question is at fault and will request you to replace it, as well as pay for the cost of application."<sup>69</sup> The additional painting was finished by the middle of October 1925, and the stage was set for the Lexington Bridge to finally open and link together the people of Lafayette and Ray counties.<sup>70</sup>

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<sup>65</sup>B. H. Piepmeier to Kansas City Bridge Company, Correspondence, 11 February 1925, Bridge File.

<sup>66</sup>O. A. Zimmerman to B. H. Piepmeier, Correspondence, 18 February 1925, Bridge File.

<sup>67</sup>U.S. Department of Agriculture, "Inspection Report on Project 223," 20 October 1924, Bridge File; and H. P. Treadway to B. H. Piepmeier, Correspondence, 4 January 1925, Bridge File. The temporary wood trestle approach actually collapsed and washed away into the Missouri River in April 1925. The approach was then replaced with a steel and concrete approach span, and the lumber from the trestle was sold as salvage. See Missouri State Highway Department, "Inspection Report Project 223: Lexington Bridge," 20 April 1924; and B. H. Piepmeier to H. H. Boyd, Correspondence, 12 May 1925.

<sup>68</sup>B. H. Piepmeier to R. B. Sparne, Correspondence, 11 August 1925, Bridge File.

<sup>69</sup>B. H. Piepmeier to C. L. Haas, Correspondence, 21 August 1925, Bridge File. The Missouri State Highway Commission encountered numerous problems with the painting of the Lexington Bridge. In March 1924, inspectors discovered that the American Bridge Company was ignoring contract specifications and not painting the surfaces of the structural steel produced at their Gary, Indiana, factory. The U.S. Department of Agriculture decided it would not pay for any painting costs associated with the Lexington Bridge since field inspectors discovered that the steel had never been painted. Finally, Piepmeier exploded when the Kansas City Bridge Company demanded extra payment for painting the handrail surface of the Lexington Bridge, saying that such an expense was frivolous and unnecessary. These problems set the stage for Piepmeier's 1925 outburst. See J. A. Williams to L. J. Sverdrup, Correspondence, 22 March 1924, Bridge File; J. A. Williams to S. G. Gould, Correspondence, 31 March 1924, Bridge File; B. H. Piepmeier to Kansas City Bridge Company, Correspondence, 17 April 1924, Bridge File; and B. H. Piepmeier to O. A. Zimmerman, Correspondence, 30 July 1924, Bridge File.

<sup>70</sup>U.S. Department of Agriculture, "Final Inspection Report, Project 223," 5 November 1925, Bridge File.

The Lexington Bridge opened to automobile traffic on Sunday, October 31, 1925. Observers estimated that more than 4,000 vehicles crossed the bridge on that day and no problems were encountered.<sup>71</sup> On Friday November 5, 1925, a formal ceremony was held to commemorate the opening of the Lexington Bridge. The celebration began with an early morning salute from the river bluffs and a release of balloons. A parade was held across the bridge, and prizes were given to the most creatively decorated floats and cars. During the afternoon a series of speeches in honor of the new bridge was presented at the Lafayette County Courthouse. Speakers included Governor Sam Baker, Chief Engineer B. H. Piepmeier, and E. J. McGrew, chairman of the Lexington Chamber of Commerce's Bridge Committee. Additional activities included football games, movie showings, street dances, and airplane fly-overs. An estimated crowd of 25,000 attended the ceremonies, and approximately 8,000 automobiles crossed the new bridge.<sup>72</sup> An editorial comment from the *Lexington Intelligencer* captured the sense of joy and hope created by the opening of the new bridge:

Thus ended a day long to be remembered by the thousands who visited Lexington, and the beginning of a new era in the home and commercial life of Lexington and surrounding country. Lafayette and Ray are now truly neighbors. The Big Muddy may flow on and on, at low water or raging torrent, and the people of Lafayette and Ray may intermingle hourly without hindrance. The bridge is a great achievement, and the forces making it possible may to the end of time point with pride to its building.<sup>73</sup>

#### D. Post-Construction History

The completion of the Lexington Bridge represented a major achievement for the local communities of Lexington and Richmond and the residents of Ray and Lafayette counties. The bridge was one of four built across the Missouri River by the Missouri State Highway Commission during the 1920s, and it was the largest and most expensive of the four bridge projects.<sup>74</sup> Final totals for the bridge showed that the cost to build the Lexington Bridge and associated river work was \$1,242,407, of which \$634,000 came from local funds.<sup>75</sup> The Lexington Bridge effectively promoted commerce and travel between Ray and Lafayette

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<sup>71</sup>"Bridge Thoroughly Tested Sunday," *Lexington Intelligencer*, 6 November 1925, 1.

<sup>72</sup>"Bridge Opening Plans Are Ready," *Lexington News*, 29 October 1925, 1; "City is Ready for Gala Day," *Lexington News*, 5 November 1925, 1; "Opening of the Missouri River Bridge Draws Crowd of 25,000," *Richmond News*, 6 November 1925, 1,4; "Dedication Was a Grand Affair," *Lexington News*, 12 November 1925, 1,8; and "Lafayette-Ray County Bridge Now Dedicated," *Lexington Intelligencer*, 13 November 1925, 1, 4.

<sup>73</sup>"Lafayette-Ray County Bridge Now Dedicated," *Lexington Intelligencer*, 13 November 1925, 4.

<sup>74</sup> Clayton Fraser, *Missouri Historic Bridge Inventory*, (Loveland, Colorado: Fraserdesign, Inc., 1996), *passim*.

<sup>75</sup>B. H. Piepmeier to S. N. Wilson, Correspondence, 13 April 1926, Bridge File.

counties, but it did not have a dramatic impact on Lexington or Richmond. Both communities remained small cities, and Lexington never regained its nineteenth century status as a commercial center. Richmond and Lexington today are rural communities that support diverse industries such as automotive parts production, health care, and tourism. Richmond currently has a population of 5,738, while Lexington has a population of 4,860.<sup>76</sup>

The Lexington Bridge has not been significantly altered since its construction. The deck has been repaved and the superstructure repainted, but no major changes have been made in the design or structure of the bridge.<sup>77</sup> Unfortunately, the Lexington Bridge is no longer sufficient to handle modern road traffic. The road deck is only 20' wide, and this is too narrow to accommodate the 5,600 cars that cross the bridge on an average day. Records from the early 1990s show that anywhere from six to fifteen accidents occurred annually on the Lexington Bridge and maintenance costs have dramatically escalated in recent years. The Lexington Bridge has deteriorated significantly over the past decade. A three-inch asphalt mat was added to reinforce the bridge deck in 1985, but this has not slowed deterioration of the roadbed. The superstructure is badly rusted, and holes ranging in size from 1" to 8" can be found in the steel members that support the bridge. The substructure shows signs of cracking and spalling at all bents, and several pier caps need extensive repairs. Estimates indicate that it would cost \$12 million to repair and renovate the current Lexington Bridge, while \$5 million would be needed to safely convert it into a pedestrian bridge. Since the estimated cost to demolish the structure is only \$1 million the historic Lexington Bridge will be removed when a new bridge located approximately one kilometer downstream from the current structure is completed in 2004.<sup>78</sup>

### III. Construction Contractors

#### A. John Alexander Low Waddell

John Alexander Low Waddell, a nationally known consulting engineer, designed the bridge over the Missouri River at Lexington, Missouri. Waddell was born on January 15, 1854, in Port Hope, Ontario. He received his early education at public and private schools in Port Hope, and due to his strong mathematical skills, he was encouraged to enter a career in

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<sup>76</sup>Lexington Sesquicentennial Committee, *Lexington, Missouri, Sesquicentennial*, 9; Richmond Chamber of Commerce, "Richmond Community Profile," downloaded August 2000 from <http://www.richmondchamber.org/profile.html>; and Office of Social and Economic Data Analysis, University of Missouri System, "1990 STF3 Extract Report: Lexington City," downloaded August 2000 from <http://www.oseda.missouri.edu/mscdc/census/mo/basicables/mo.text/places/L/LEXINGTON.html>.

<sup>77</sup>National Park Service, "HAER Inventory – Lexington Bridge," 1992, Reproduced in Clayton Fraser, *Missouri Historic Bridge Inventory*, (Loveland, Colorado: Fraserdesign, Inc., 1996).

<sup>78</sup>Missouri Department of Transportation, "Bridge Inspection Report – Bridge No. G-554R," 9 November 1999, copy provided by Bridge Maintenance Division, Missouri Department of Transportation General Headquarters, Jefferson City, Missouri; and Missouri Highway and Transportation Department, "Report on the Feasibility of Rehabilitating the Missouri River Bridge At Lexington," Internal Memorandum, Missouri Highway and Transportation Department, Jefferson City, Missouri: 1994, copy provided by Bridge Maintenance Division, Missouri Department of Transportation General Headquarters, Jefferson City, Missouri.

engineering. He attended the Renselaer Polytechnic Institute in Troy, New York, receiving a degree in civil engineering. Waddell later received additional degrees, including doctoral degrees from McGill University in Montreal, Canada, the University of Missouri, and the University of Nebraska. After college Waddell worked briefly as an engineer for several railroads before accepting a faculty position at Renselaer Institute. As a result of his technical writings and publications, Waddell in 1882 received an appointment as a professor of Civil Engineering at the Imperial University in Tokyo, Japan. Waddell returned to the United States in 1886, choosing to open a consulting engineering firm based in Kansas City, Missouri. Waddell was a partner in a succession of engineering firms in Kansas City, including Waddell and Hedrick and Waddell and Harrington. In 1920 Waddell moved to New York City due to increased international business, but he maintained an office in Kansas City, Missouri. Waddell passed away in New York in 1938. At the time of his death, Waddell was serving as the supervising engineer for the New York World's Fair. Three engineering firms currently claim John Alexander Low Waddell as their founder: Harrington and Cortelyou of Kansas City, Missouri; HNTB Enterprises of Kansas City, Missouri; and Hardesty and Hanover of New York, New York.<sup>79</sup>

During his long career, John Alexander Low Waddell designed numerous structures, created several design innovations, published many books, and received many awards. While Waddell was teaching in Japan, he noted that many of the nation's railroad bridges were based on outmoded British designs. When he returned to America, Waddell developed a design for an economical, short-span, pin-connected truss that could withstand heavy stresses and support modern railroad traffic. Only two such Waddell "A" truss bridges still exist in the United States, including a bridge spanning Linn Creek along Highway 4 near Trimble, Missouri. In addition to designing the Linn Creek Bridge and the Lexington Bridge, Waddell also was responsible for two notable structures in Kansas City, Missouri; the Twelfth Street Viaduct and the Armour, Swift, Burlington Bridge. The Twelfth Street Viaduct featured a double-tiered design that allowed both automobile and train traffic to move easily between Kansas City's central business district and the nearby industrial district. The Armour, Swift, Burlington Bridge served as a rail, car, wagon, and pedestrian crossing of the Missouri River. Waddell designed a unique bridge that featured automotive traffic on a top deck and rail traffic on a lower deck that could be raised to allow riverboats to pass beneath. Waddell became a nationally recognized leader in the construction of moveable bridges, and his vertical lift design became the prototype for such

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<sup>79</sup>Carrie Westlake Whitney, *Kansas City, Missouri, Its History and Its People: 1800-1908* (Chicago: S. J. Clarke Publishing Co., 1908), 258-260; Arthur Alkire, *Men of Affairs in Greater Kansas City, 1912* (Kansas City: Kansas City Press Club, 1912), 116; Missouri Highway and Transportation Department, "Armour, Swift, Burlington Bridge," HAER No. MO-2, Historic American Engineering Record (HAER), National Park Service, U.S. Department of the Interior, 1984, 7; Deborah Slaton, "Colorado Street Bridge," HAER No. CA-58, Historic American Engineering Record (HAER), National Park Service, U.S. Department of the Interior, 1988, 7; Arthur Waddell, "Famous Waddells," downloaded September 2000 from <http://www.pompano.net/~tahlyn2/famous/johnwaddell.htm>; "Hardesty and Hanover: Company Profile and History," downloaded September 2000 from [http://www.hardesty-hanover.com/company\\_profile\\_history.htm](http://www.hardesty-hanover.com/company_profile_history.htm); "Harrington and Cortelyou: History," downloaded September 2000 from <http://www.hcbridges.com/history/history.html>; and, "HNTB Enterprises: 85 Years of Service," downloaded September 2000 from <http://www.hntb.com>.

structures. Other notable bridges designed by Waddell include the South Halstead vertical lift bridge in Chicago, Illinois, the Arroyo Seco Bridge in Pasadena, California, and the Detroit-Superior Bridge in Cleveland, Ohio. In addition to designing structures in Japan and the United States, Waddell also designed bridges built in Russia, Mexico, Cuba, China and Canada. Waddell received numerous awards for his work, and he was the recipient of the American Society of Civil Engineering's first Clausen Gold Medal honoring his contributions to the social and economic welfare of the profession. Waddell also wrote several books that became standard design manuals, including *De Pontibus: A Pocket Book for Bridge Engineers* in 1898 and *Bridge Engineering*, a two-volume work released in 1916.<sup>80</sup>

#### B. Kansas City Bridge Company

The Kansas City Bridge Company received the primary contract to build the Lexington Bridge. This company built the superstructure and bridge deck of the Lexington Bridge, while construction of the substructure was sub-contracted to the Union Bridge and Construction Company. Following its incorporation in 1893, the Kansas City Bridge Company built numerous steel bridges throughout central and western Missouri. Most of the company's surviving structures within Missouri date from the 1880s through the 1920s. These structures include more than a dozen pin-connected Pratt through-truss bridges with spans up to 150' in length, and seven pin-connected Parker through-trusses with spans up to 170'. Shorter spans built by the Kansas City Bridge Company include numerous Pratt pony trusses and half-hip pony trusses. The company also built some of the first rigid-connected Warren pony truss bridges, the earliest dating to 1904. Between 1918 and 1919, the Kansas City Bridge Company built a bridge near Carrollton Missouri over Wakenda Creek. While longer than the other riveted Warren pony bridges built by the company, the Carrollton Bridge was probably based on one of the company's earlier designs. In the 1920s the Kansas City Bridge Company began to focus on larger truss structures such as the Lexington Bridge and Platte County's Fairfax Bridge built in 1935. The last known bridge in Missouri attributed to the Kansas City Bridge Company was the Manchester Trafficway completed in 1940.<sup>81</sup>

Joseph Hoover, a local engineer with ties to several Kansas City area bridge companies, founded the Kansas City Bridge Company. Hoover was born near North Canton, Ohio, in 1850, and he received a civil engineering degree from the University of Michigan in 1875. He worked as the chief engineer of the Indianapolis Bridge Company before joining the Wrought Iron

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<sup>80</sup>"Hardesty and Hanover: Company Profile and History;" Missouri Highway and Transportation Department, "Historic American Engineering Record: Armour, Swift, Burlington Bridge," *passim*; Cydney Millstein, "The Building of a Municipal Dream: An Historical Perspective of Kansas City's Twelfth Street Viaduct, 1887-1915," *Society of Architectural Historians Newsletter, Missouri Valley Chapter 4* (Summer 1998): 3-5; American Society of Civil Engineers, "The Armour-Swift-Burlington Bridge," downloaded September 2000 from <http://www.asce.org/gsd/sections/kc/kchist.html>; and Donald Jackson, "Waddell 'A' Truss Bridge," HAER No. MO-8, Historic American Engineering Record (HAER), National Park Service, U.S. Department of the Interior, n.d., 2-10.

<sup>81</sup>Clayton Fraser, *Missouri Historic Bridge Inventory*, *passim*; and David Austin, "Carrollton Bridge Over Wakenda Creek," Internal Memorandum, Missouri Department of Transportation, Jefferson City, Missouri, 1999, 4.

Bridge Company of Canton, Ohio, in 1878. Hoover moved to Kansas City in 1884 as the western agent for the Wrought Iron Bridge Company, and he continued in that position after the company was purchased by the American Bridge Company in 1900. While still employed by the Wrought Iron Bridge Company, Hoover created his own bridge company in 1893. The Kansas City Bridge Company incorporated on January 30, 1893, with an initial capital fund of \$10,000 divided into one hundred shares. According to its charter, the Kansas City Bridge Company planned to perform a wide variety of construction tasks:

The purposes for which said corporation is formed are the following to wit: To do a general manufacturing and mercantile business and more particularly to work in wood and iron, to design, build and sell railway and highway bridges and all kinds of structural work, to buy take own hold or lease real estate for the purposes of said company and to sell or mortgage any property belonging to said company as provided by law, to borrow money and secure the same upon any and all property of the company and in general to transact such other business as is usually transacted by companies of like character.<sup>82</sup>

By 1908 Hoover had expanded his business dealings, owning stakes in the Hoover Construction Company and the Contractors Machinery Company. He remained with the Kansas City Bridge Company in an advisory capacity until his death in 1925.<sup>83</sup>

By 1910, Hoover had surrendered the presidency of the Kansas City Bridge Company to Alexander Maitland, Jr. Maitland was born near Richmond, Missouri, in 1866, and he received his degree in civil engineering from the University of Missouri in 1889. Maitland briefly taught as an assistant professor of civil engineering at the University of Missouri, and then he served for five years as an assistant engineer in the bridge and building department of the Missouri Pacific Railroad. Maitland moved to Kansas City in 1898, and in 1901 he became the contracting manager for the American Bridge Company. In 1905 Maitland joined the Kansas City Bridge Company, soon becoming its president. Maitland was the president of the company when it built the superstructure of the Lexington Bridge. H. P. Treadway served as vice-president and treasurer of the Kansas City Bridge Company under Maitland and the two men were founding members of the Kansas City Chapter of the American Society of Civil Engineers. The Kansas City Bridge Company continued to pursue a number of construction projects after it completed the Lexington Bridge. In 1953 the company amended its articles of incorporation to include the construction of ships and shipyards, and the buying and selling of electrical plants, heating equipment, and industrial refrigeration equipment. The company was dissolved by the Missouri Secretary of State at the request of the company's board of directors on August 2, 2000.<sup>84</sup>

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<sup>82</sup>Kansas City Bridge Company, "Articles of Association," 30 January 1893, as held in the Corporations Division, Missouri Secretary of State, Missouri State Information Center, Jefferson City, Missouri.

<sup>83</sup>*Ibid.*; David Austin, "Carrollton Bridge Over Wakenda Creek," 4-5; and Carrie Westlake Whitney, *Kansas City, Missouri, Its History and Its People: 1800-1908*, 396-399.

<sup>84</sup>David Austin, "Carrollton Bridge Over Wakenda Creek," 4-5; Arthur Alkire, *Men of Affairs in Greater Kansas City, 1912*, 43; Kansas City Bridge Company, "Articles of Amendment," 5 May 1953, as held in the Corporations Division, Missouri Secretary of State, Missouri State Information Center, Jefferson City, Missouri; and

### C. Union Bridge and Construction Company

The Union Bridge and Construction Company built the substructure of the Lexington Bridge. It was incorporated in December 1906 by L. S. Stewart, Leo Treadwell, H. K. Seltzer, and Clarence A. Neal. Located in Kansas City, Missouri, the company began with \$50,000 in capital divided among the four founders who constituted the company's board of directors. The company's articles of incorporation carefully outlined the intentions of the new corporation:

To construct bridges, tunnels, canals, viaducts, buildings, foundations, retaining walls, sewers, sidewalks and pavements, drive piling, build wharves, trestles, and do dredging, grading, and concrete and masonry work of all kinds, make surveys, borings, and engineering plans for construction work and to do all things properly incident to the matters above mentioned.<sup>85</sup>

A little more than three years later, the capital stock of the company was doubled to \$100,000. The company's headquarters was located in the Sharp Building at Eleventh and Walnut streets in downtown Kansas City, Missouri. The company's declared assets totaled \$128,067, while the company's liabilities totaled only \$16,015. Stewart was the president and chairman of the board of the company in 1910, with Neal serving as corporate secretary.<sup>86</sup>

Twenty years later, Clarence A. Neal founded another construction company with the same name. In July 1932 the Union Bridge and Construction Company was incorporated under the state laws of Delaware. Joining Neal in the new venture were fellow Kansas City residents E. M. Philpot and H. C. Beck. The new company established its Delaware office in Dover, where its acting agent was Arley B. Magee, Inc. The new company once again had a long list of principal intentions including owning, operating, and building railway and highway bridges; charging bridge tolls; constructing and operating elevators, warehouses, terminals, and ice plants; acquiring and controlling lands for railway terminals and yards; to construct a variety of engineered structures and facilities; and to trade in goods, stocks, land, and securities.<sup>87</sup> In December 1932, Neal formally dissolved the Missouri-based Union Bridge and Construction Company and at the same time applied for a license for his Delaware-based Union Bridge and

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Kansas City Bridge Company, "Certificate of Termination," 2 August 2000, as held in the Corporations Division, Missouri Secretary of State, Missouri State Information Center, Jefferson City, Missouri.

<sup>85</sup>Union Bridge and Construction Company, "Articles of Incorporation," 4 December 1906, as held in the Corporations Division, Missouri Secretary of State, Missouri State Information Center, Jefferson City, Missouri.

<sup>86</sup>*Ibid.*; Union Bridge and Construction Company, "Increase of Capital Stock," 9 March 1910, as held in the Corporations Division, Missouri Secretary of State, Missouri State Information Center, Jefferson City, Missouri; and David Austin and Toni Prawl, "Mark Twain Memorial Bridge," HAER No. MO-77, Historic American Engineering Record (HAER), National Park Service, U.S. Department of the Interior, 1995, 28-30.

<sup>87</sup>David Austin and Toni Prawl, "Historic American Engineering Record: Mark Twain Memorial Bridge," 28-30; and Union Bridge and Construction Company, "Articles of Incorporation," 1 July 1932, as held in the Corporations Division, Missouri Secretary of State, Missouri State Information Center, Jefferson City, Missouri.

Construction Company to conduct business within Missouri. The Delaware company's declared purposes of operation in Missouri, however, were exactly the same as those contained in the 1906 charter of the Union Bridge and Construction Company. Fenton Hume registered as the principal agent of the company's Missouri branch, and the Missouri office of the Union Bridge and Construction Company was located at 603 B. M. A. Building in Kansas City. In April 1938, the company retired from further business within the state of Missouri.<sup>88</sup>

Little is known of the projects built by the Union Bridge and Construction Company or the Union Bridge and Construction Company within Missouri. However, it appears that the company specialized in building the substructures of major river bridges. In 1923 the company received a subcontract from the Kansas City Bridge Company to sink the piers for the Lexington Bridge over the Missouri River. Later, in 1928, the company built the substructure for the Chain of Rocks Bridge spanning the Mississippi River at St. Louis, Missouri. Finally, the Union Bridge and Construction Company constructed the substructure of the monumental Mark Twain Memorial Bridge which spanned the Missouri River at Hannibal, Missouri, in 1934-1935.<sup>89</sup>

#### D. American Bridge Company

The American Bridge Company received a subcontract from the Kansas City Bridge Company to produce the steel that was used in the superstructure of the Lexington Bridge over the Missouri River. Several officers from the Kansas City Bridge Company had links to the American Bridge Company, including company founder Joseph Hoover and later company president Alexander Maitland, Jr.<sup>90</sup> The American Bridge Company was founded in 1900 when entrepreneur J. P. Morgan led the consolidation of twenty-eight of the nation's largest steel fabricators and construction companies into a single corporation. The company did have some roots in Missouri. The Keystone Bridge Works, one of the twenty-eight companies absorbed into the mega-corporation, constructed the Eads Bridge over the Mississippi River near St. Louis. This was the first steel bridge over the Mississippi River, and although it is closed to automobile traffic, it is still in use today as part of St. Louis' light rail system.<sup>91</sup> In 1901, the American Bridge Company became a subsidiary of a newly consolidated trust, the United States Steel

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<sup>88</sup>David Austin and Toni Prawl, "Historic American Engineering Record: Mark Twain Memorial Bridge," 28-30; Union Bridge and Construction Company, "Affidavit of Dissolution," 20 December 1932, as held in the Corporations Division, Missouri Secretary of State, Missouri State Information Center, Jefferson City, Missouri; Union Bridge and Construction Company, "Evidence of Incorporation," 20 December 1932, as held in the Corporations Division, Missouri Secretary of State, Missouri State Information Center, Jefferson City, Missouri; and Union Bridge and Construction Company, "Affidavit of Retirement," 1 April 1938, as held in the Corporations Division, Missouri Secretary of State, Missouri State Information Center, Jefferson City, Missouri.

<sup>89</sup>David Austin and Toni Prawl, "Historic American Engineering Record: Mark Twain Memorial Bridge," 28-30; and "Seven New Mississippi River Highway Bridges," *Engineering News Record* 105 (1930): 181-182.

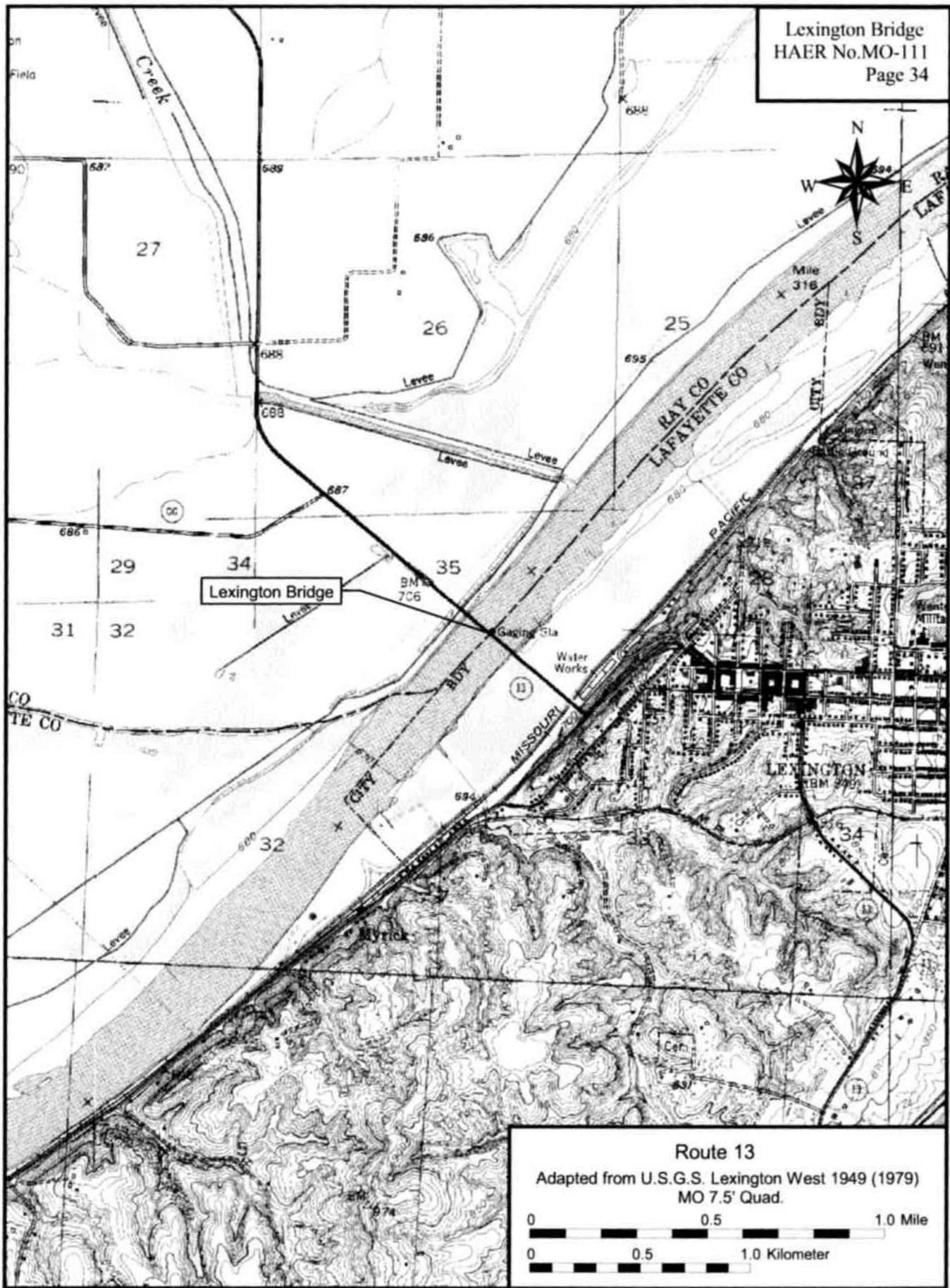
<sup>90</sup>David Austin, "Carrollton Bridge Over Wakenda Creek," 4-5.

<sup>91</sup>Owen Dutt, "Eads Bridge Pedestrian Promenade," downloaded September 2000 from <http://www.mvs.usace.army.mil/pm/rivesweb/cadsbridge.htm>.

Corporation. The American Bridge Company owned and operated several huge steel fabrication facilities, including shops in Chicago, Illinois, Gary, Indiana, and Ambridge, Pennsylvania. The company built several noted bridges and buildings, including the Carquinez Strait Bridge over the San Francisco Bay, the Galbraith Bridge over the Mississippi River at Rock Island, Illinois, the Chrysler Building in New York City, and the Superdome in New Orleans, Louisiana. The American Bridge Company became a privately held corporation in 1987, and it remains an international leader in engineering, manufacturing, and construction.<sup>92</sup>

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<sup>92</sup>"American Bridge Company: 100 Years," downloaded September 2000 from <http://www.americanbridge.net/Html/history.htm>; and "American Bridge Company: Chronological History," downloaded September 2000 from [http://www.americanbridge.net/Html/chronological\\_history.htm](http://www.americanbridge.net/Html/chronological_history.htm). The United States Steel Corporation is known colloquially as "U.S. Steel."



Route 13  
Adapted from U.S.G.S. Lexington West 1949 (1979)  
MO 7.5' Quad.  
0 0.5 1.0 Mile  
0 0.5 1.0 Kilometer

MISSOURI  
STATE HIGHWAY DEPARTMENT  
PLAN AND PROFILE OF PROPOSED  
BRIDGE OVER MISSOURI RIVER

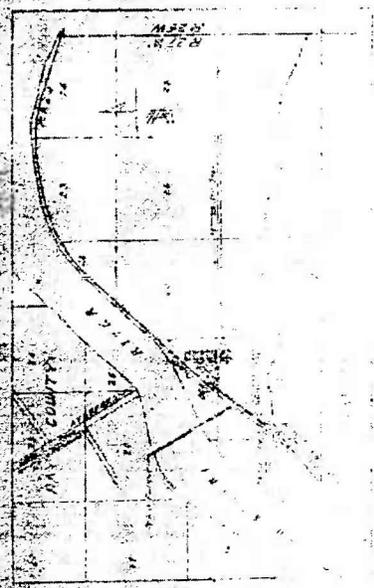
ON  
STATE ROAD  
FEDERAL AID PROJECT  
LAFAYETTE AND RAY COUNTIES

Scales As Shown on Plans

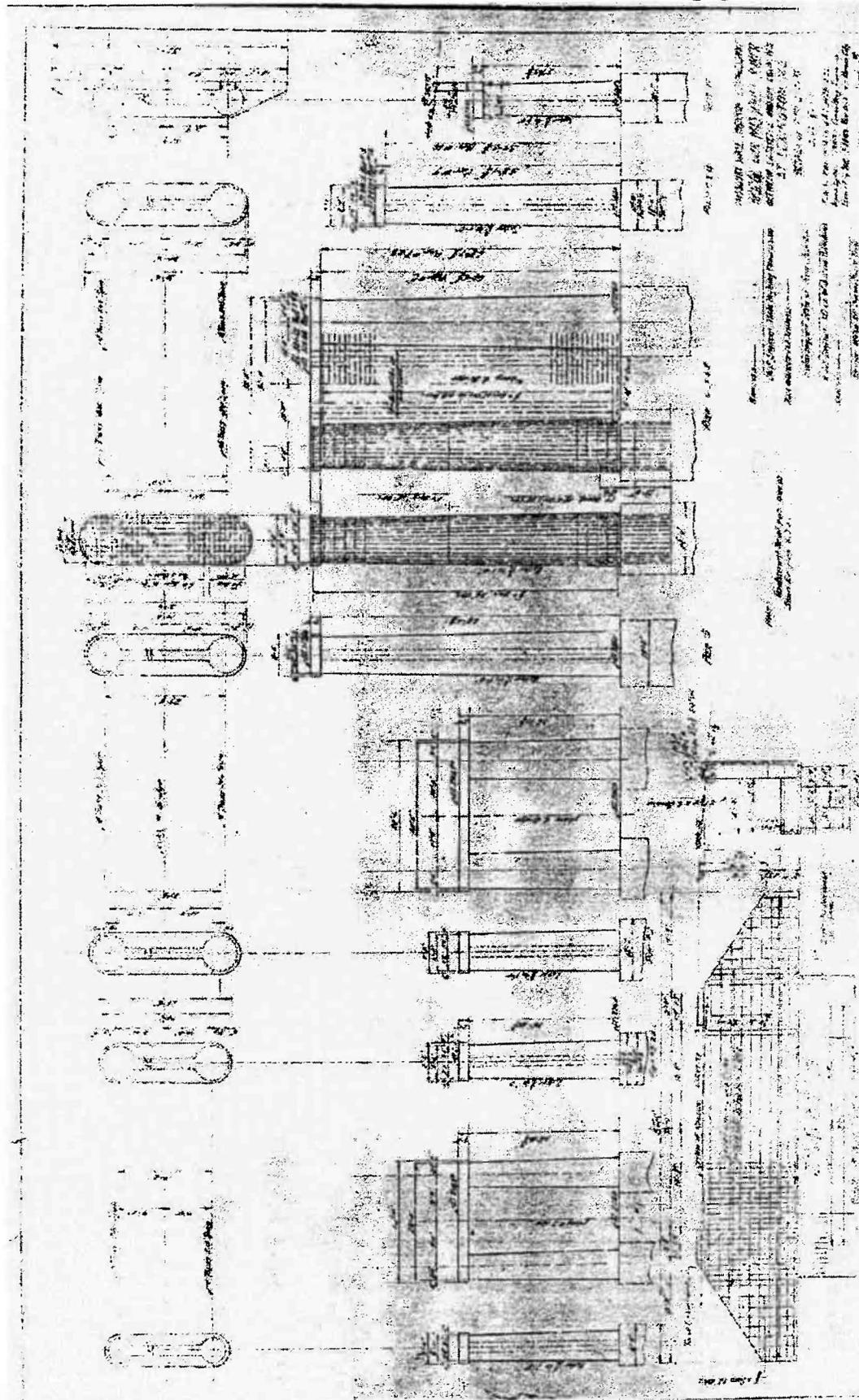
A. L. MADDELL  
CONSULTING ENGINEER  
NEW YORK & KANSAS CITY, MO

LIST OF DRAWINGS

- 1. General Location of Bridge
- 2. Plan of Bridge
- 3. Profile of Bridge
- 4. Plan of Approach
- 5. Profile of Approach
- 6. Plan of Foundation
- 7. Profile of Foundation
- 8. Plan of Abutment
- 9. Profile of Abutment
- 10. Plan of Pier
- 11. Profile of Pier
- 12. Plan of Spillway
- 13. Profile of Spillway
- 14. Plan of Culvert
- 15. Profile of Culvert
- 16. Plan of Roadway
- 17. Profile of Roadway
- 18. Plan of Drainage
- 19. Profile of Drainage
- 20. Plan of Utilities
- 21. Profile of Utilities
- 22. Plan of Fencing
- 23. Profile of Fencing
- 24. Plan of Landscaping
- 25. Profile of Landscaping



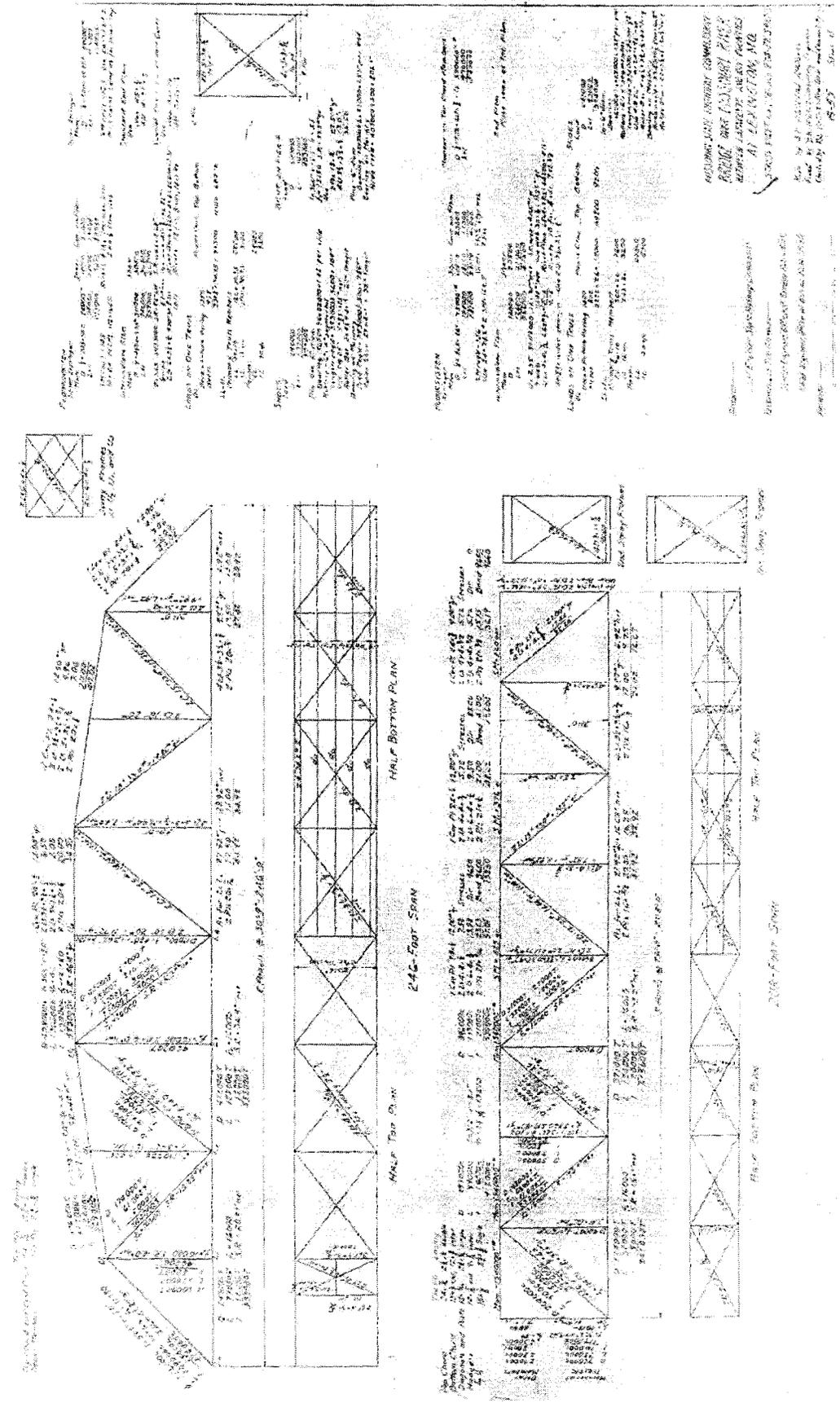
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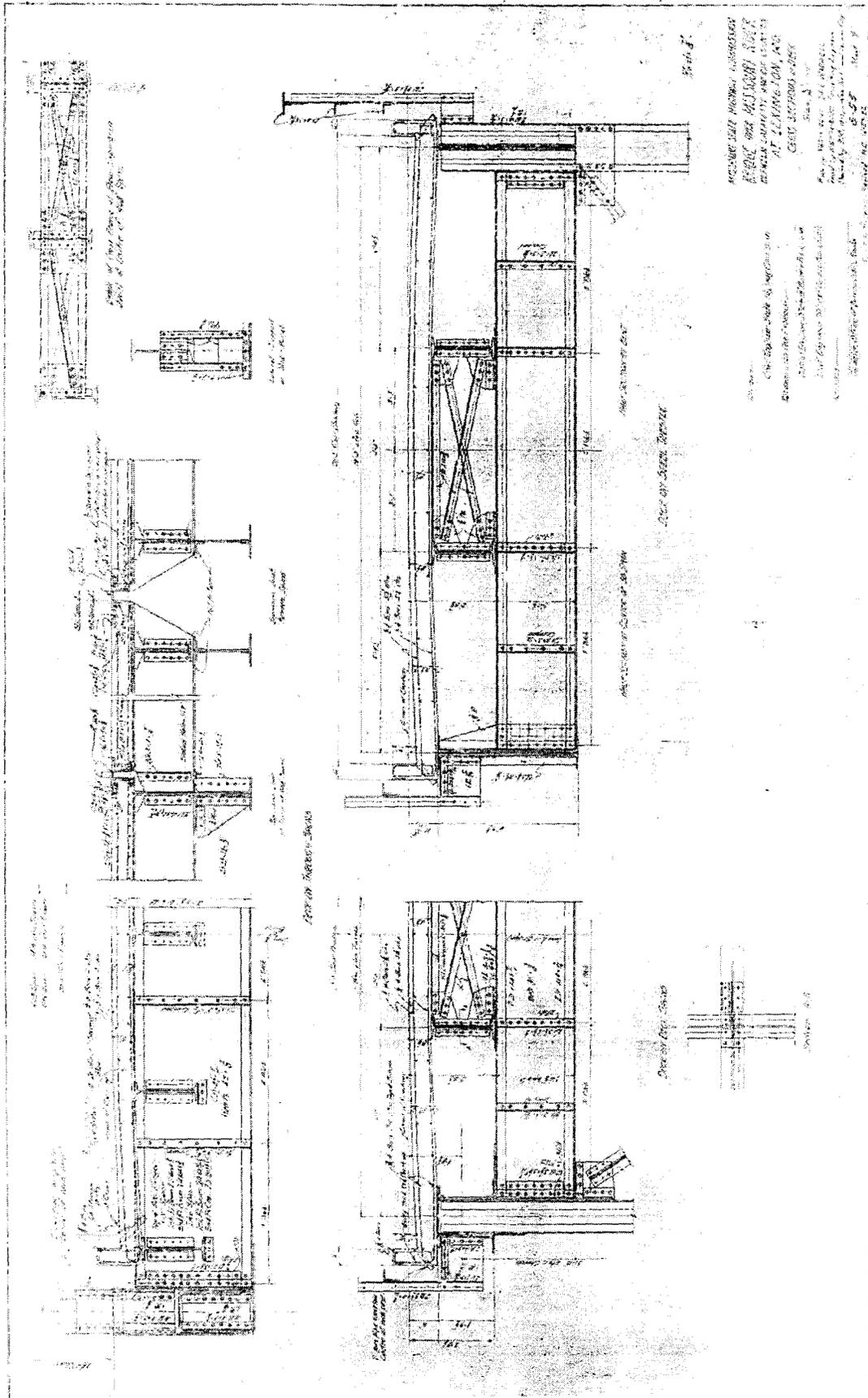


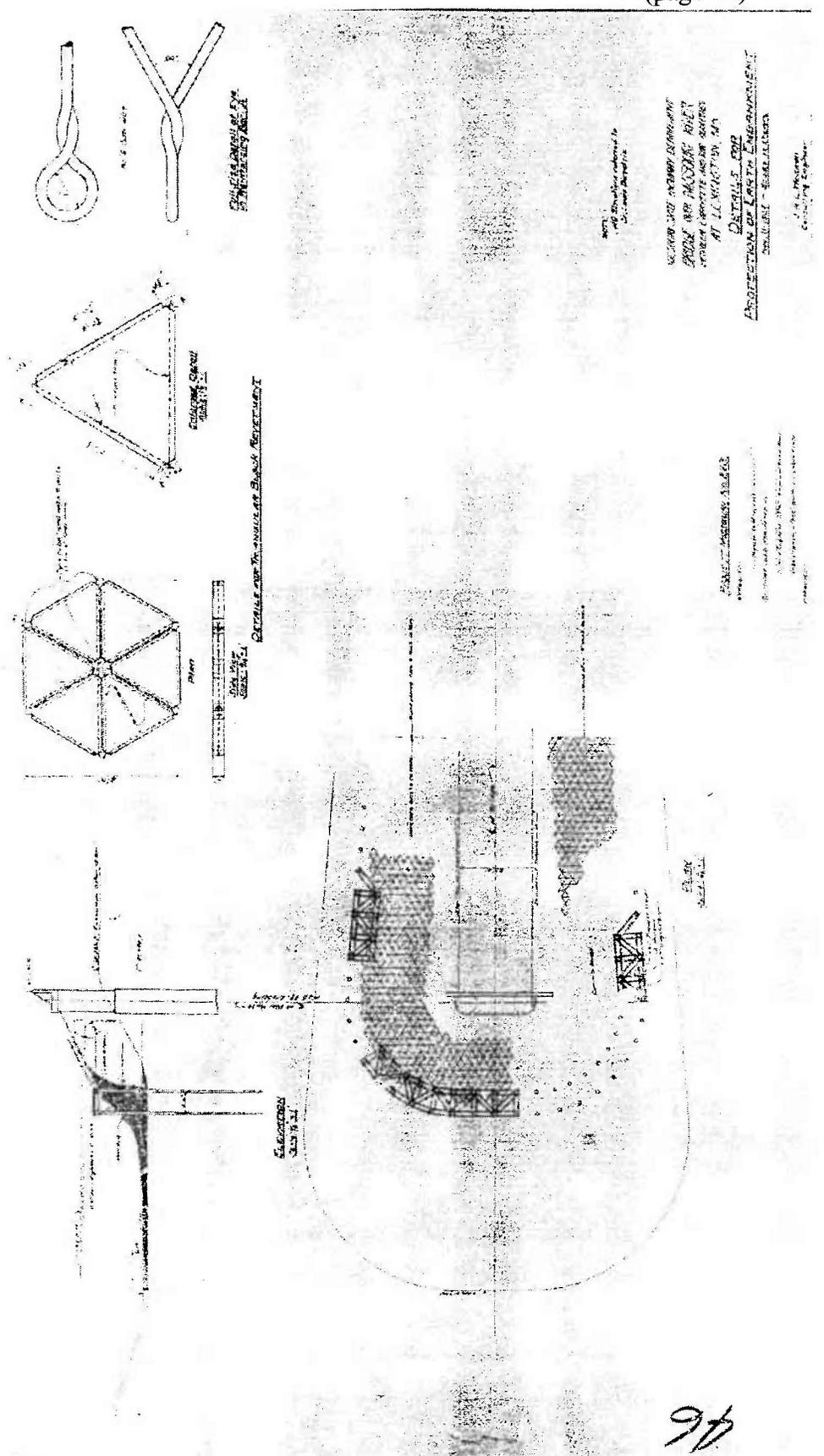




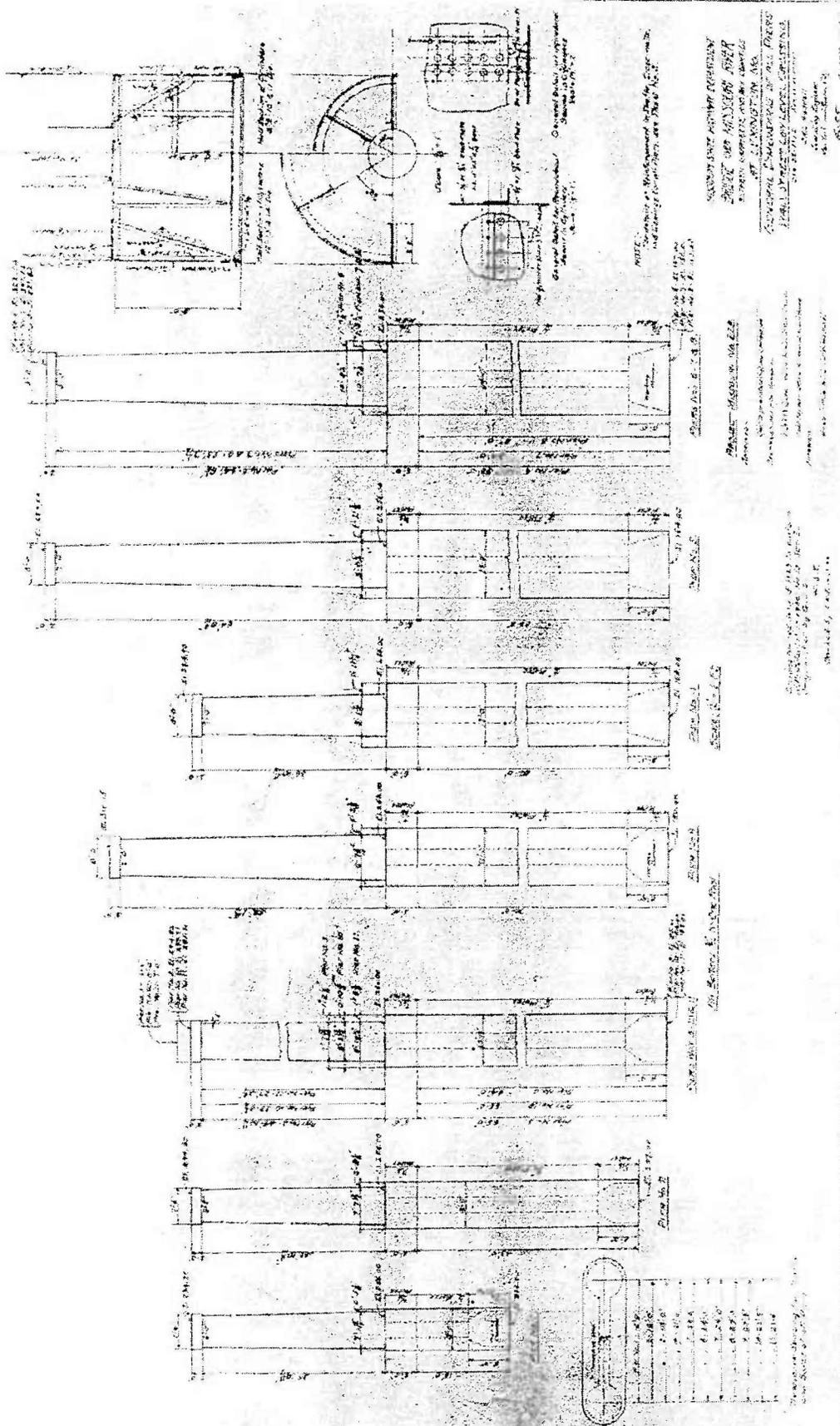


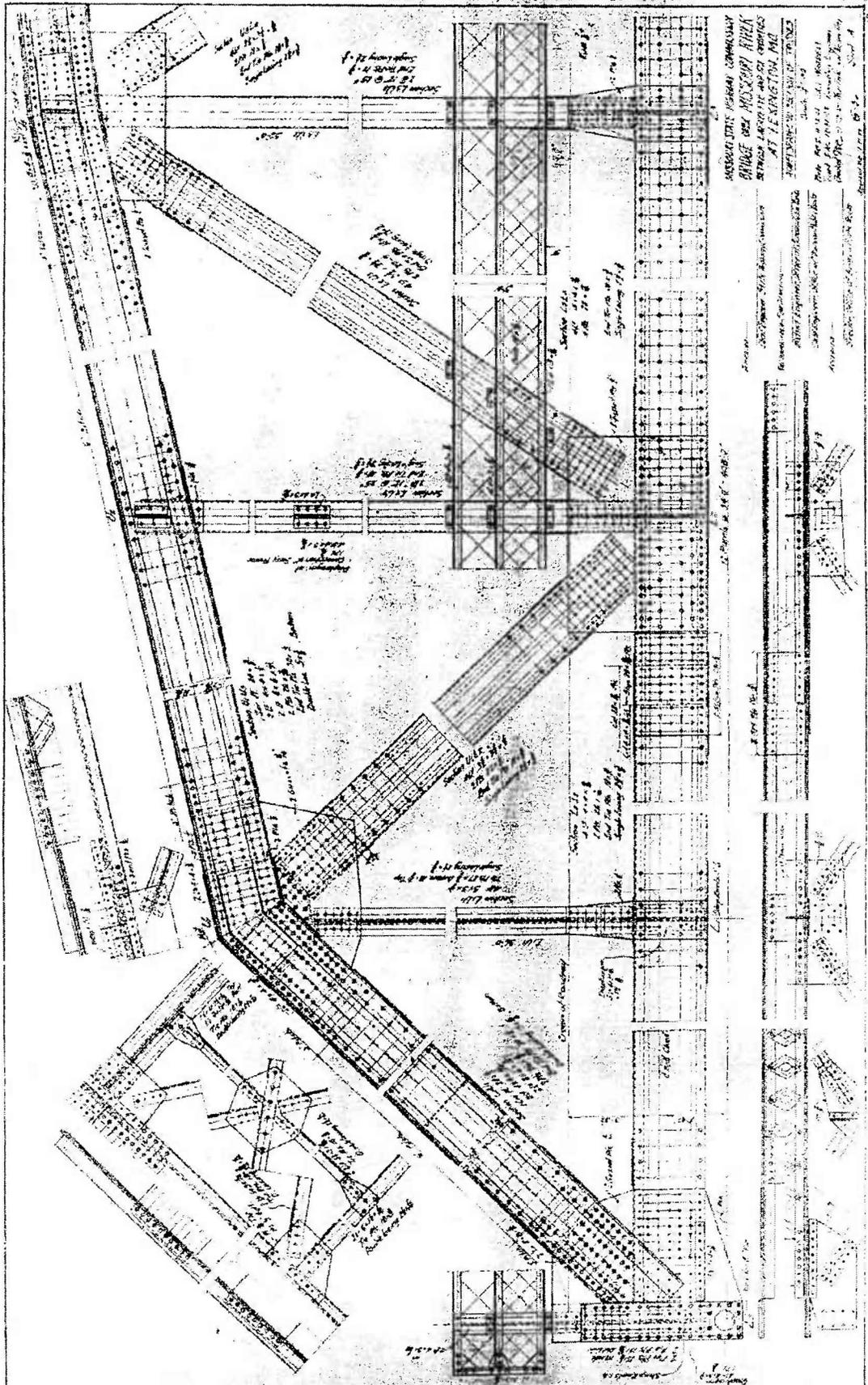




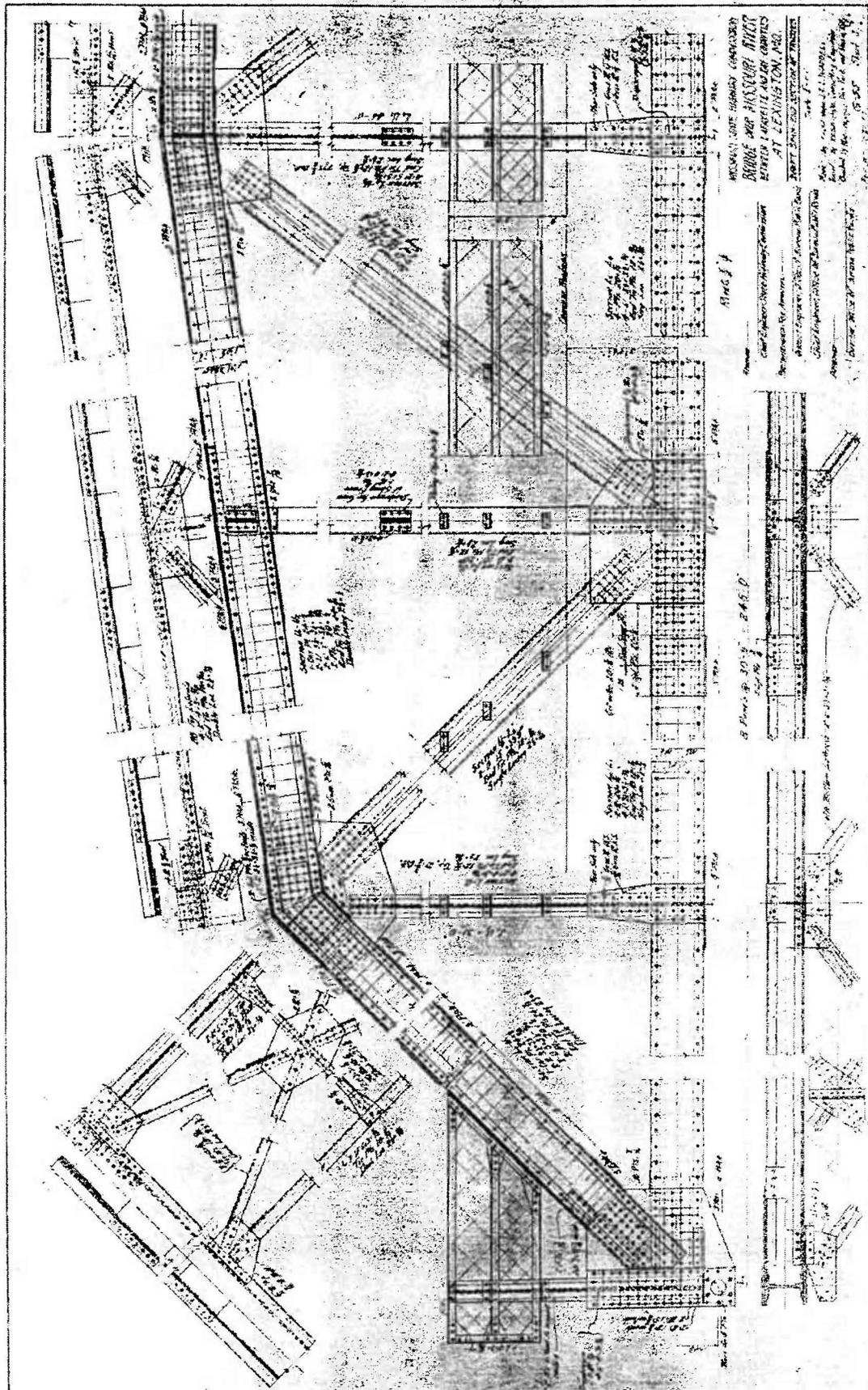


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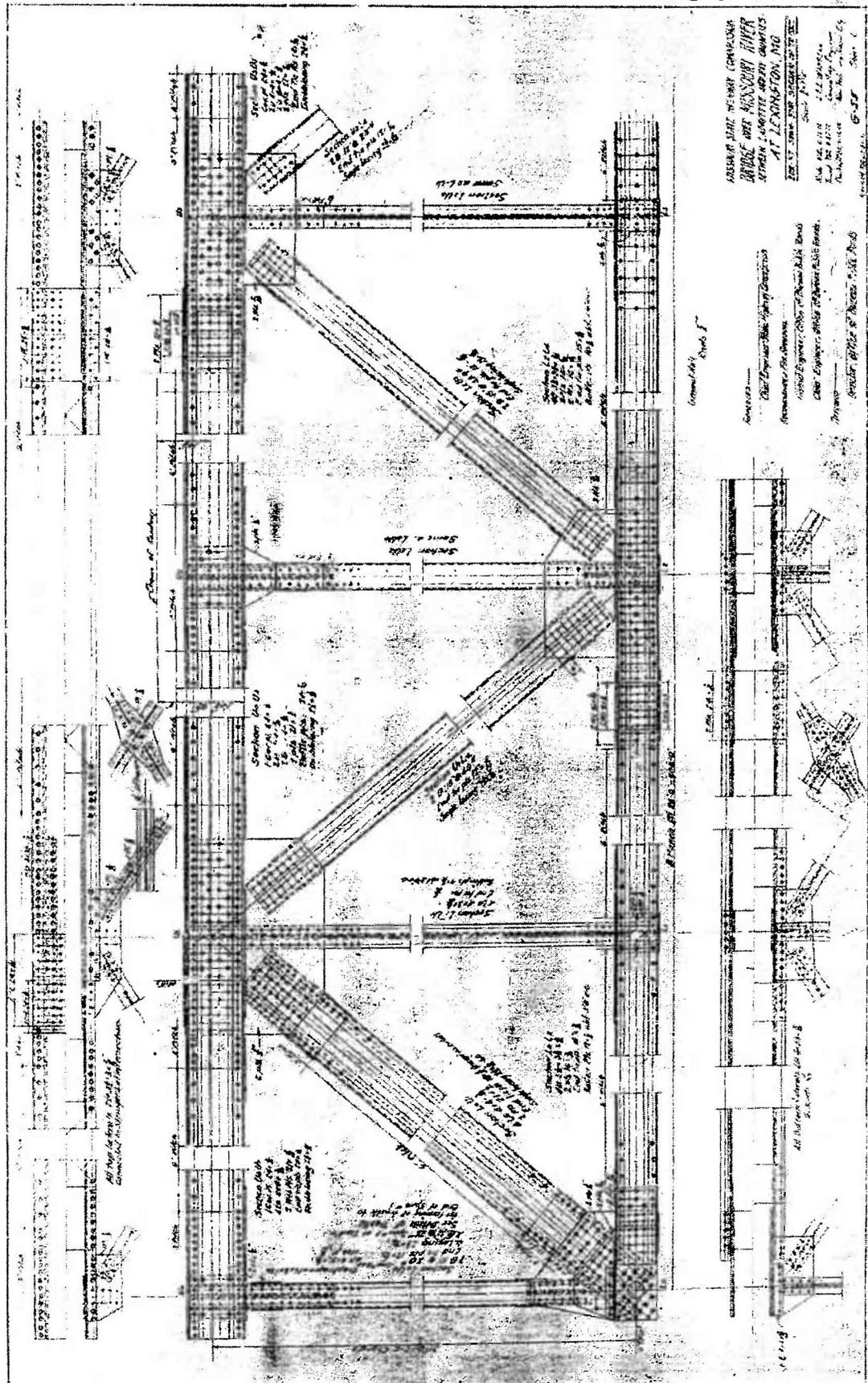




LEXINGTON BRIDGE  
HAER No. MO-111  
(page 45)







DESIGNED BY STATE ENGINEER  
 DRAWN BY HENRY H. HARRIS  
 CHECKED BY J. H. HARRIS  
 AT LEXINGTON, MO  
 FEB. 17, 1910

Chief Engineer  
 State Engineer  
 Chief Engineer  
 State Engineer

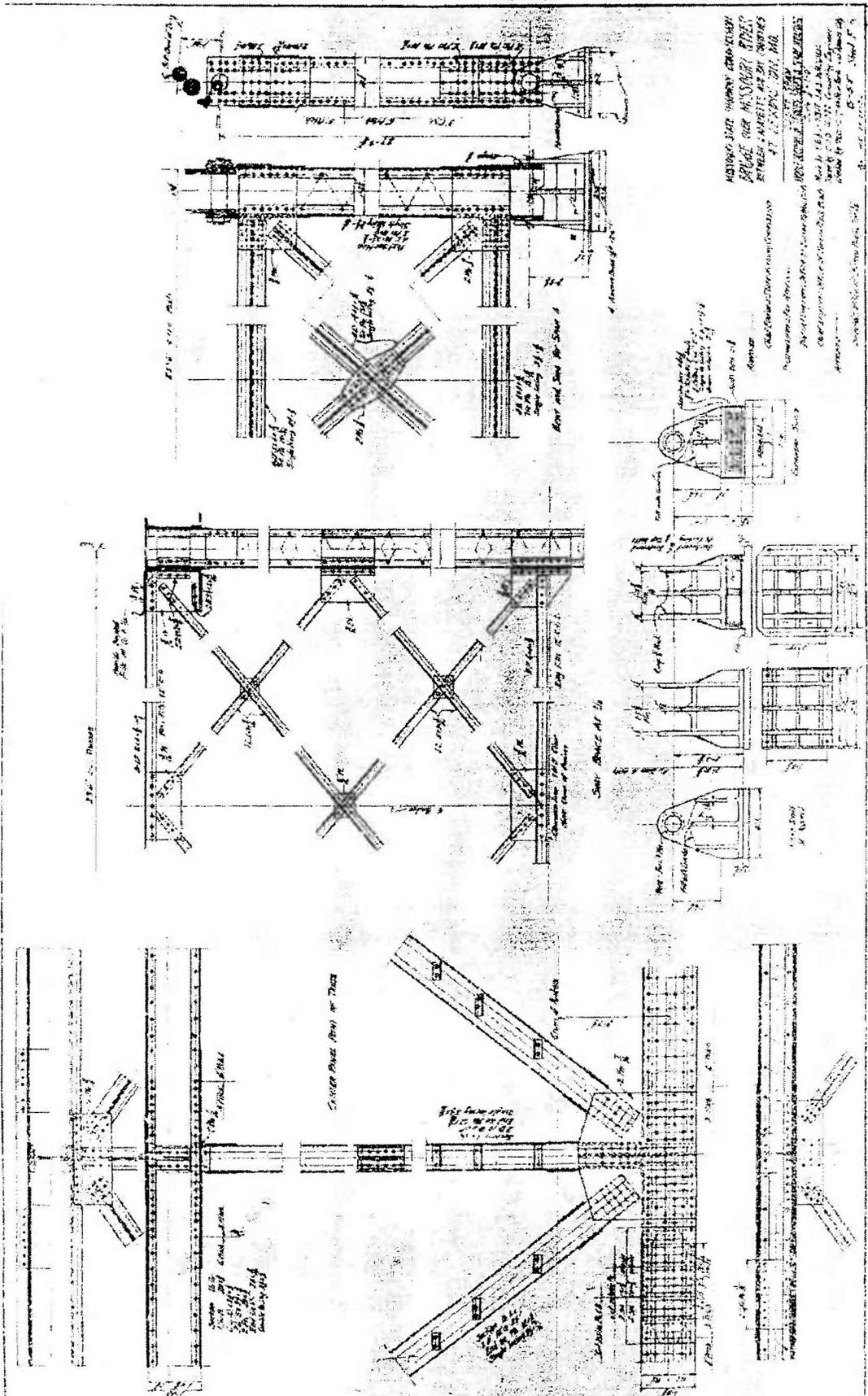
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Section 1  
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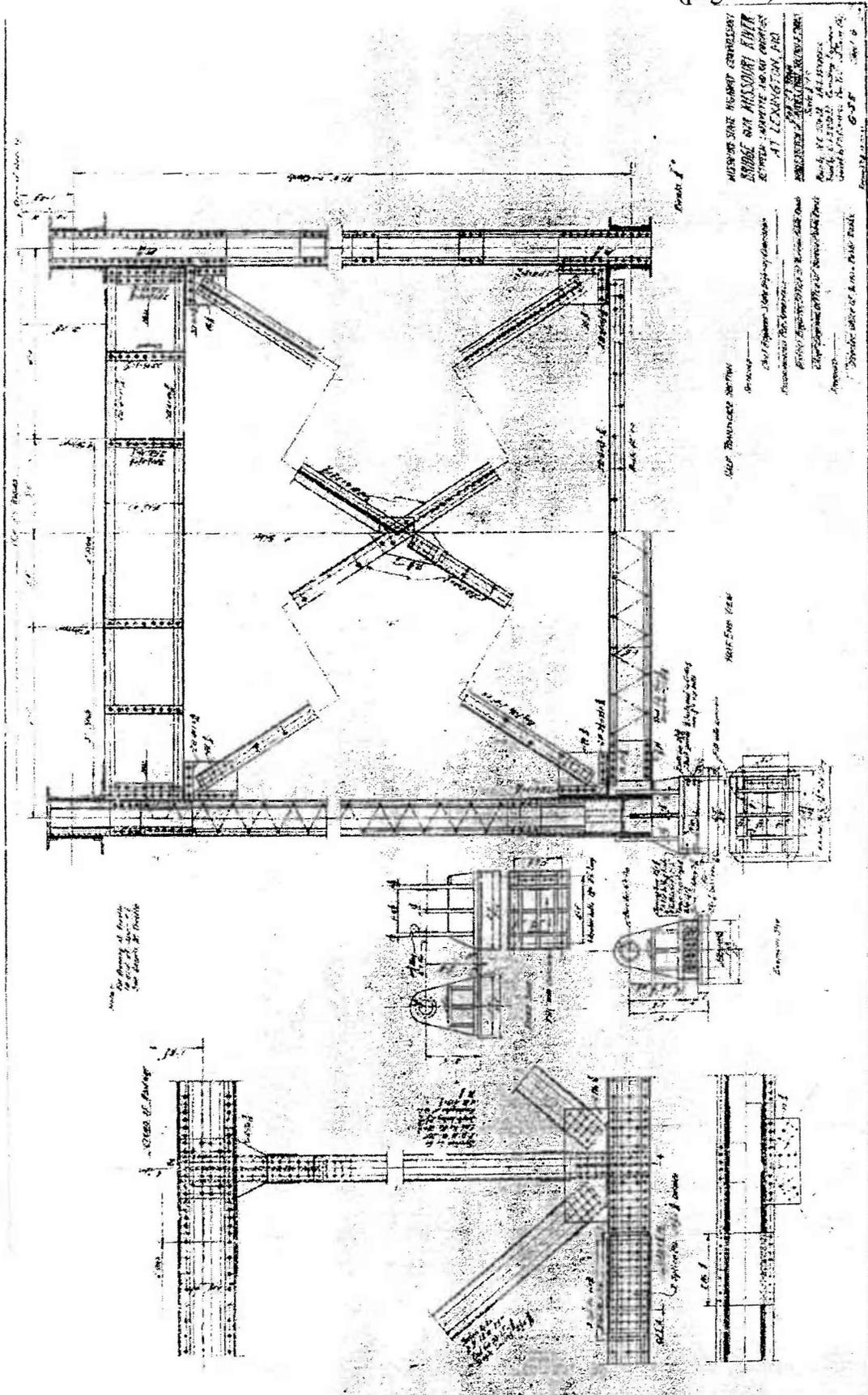
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Section 1  
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 Section 4  
 Section 5



LEXINGTON BRIDGE  
 HAER No. MO-111  
 (page 49)



MISSOURI STATE HIGHWAY COMMISSION  
 ENGINEER FOR MISSOURI HIGHWAY  
 DIVISION - BRIDGE AND STRUCTURES  
 AT LEXINGTON, MO.  
 DRAWN BY: [Name]  
 CHECKED BY: [Name]  
 DATE: [Date]

MISSOURI STATE HIGHWAY COMMISSION  
 ENGINEER FOR MISSOURI HIGHWAY  
 DIVISION - BRIDGE AND STRUCTURES  
 AT LEXINGTON, MO.  
 DRAWN BY: [Name]  
 CHECKED BY: [Name]  
 DATE: [Date]

MISSOURI STATE HIGHWAY COMMISSION  
 ENGINEER FOR MISSOURI HIGHWAY  
 DIVISION - BRIDGE AND STRUCTURES  
 AT LEXINGTON, MO.  
 DRAWN BY: [Name]  
 CHECKED BY: [Name]  
 DATE: [Date]

MISSOURI STATE HIGHWAY COMMISSION  
 ENGINEER FOR MISSOURI HIGHWAY  
 DIVISION - BRIDGE AND STRUCTURES  
 AT LEXINGTON, MO.  
 DRAWN BY: [Name]  
 CHECKED BY: [Name]  
 DATE: [Date]

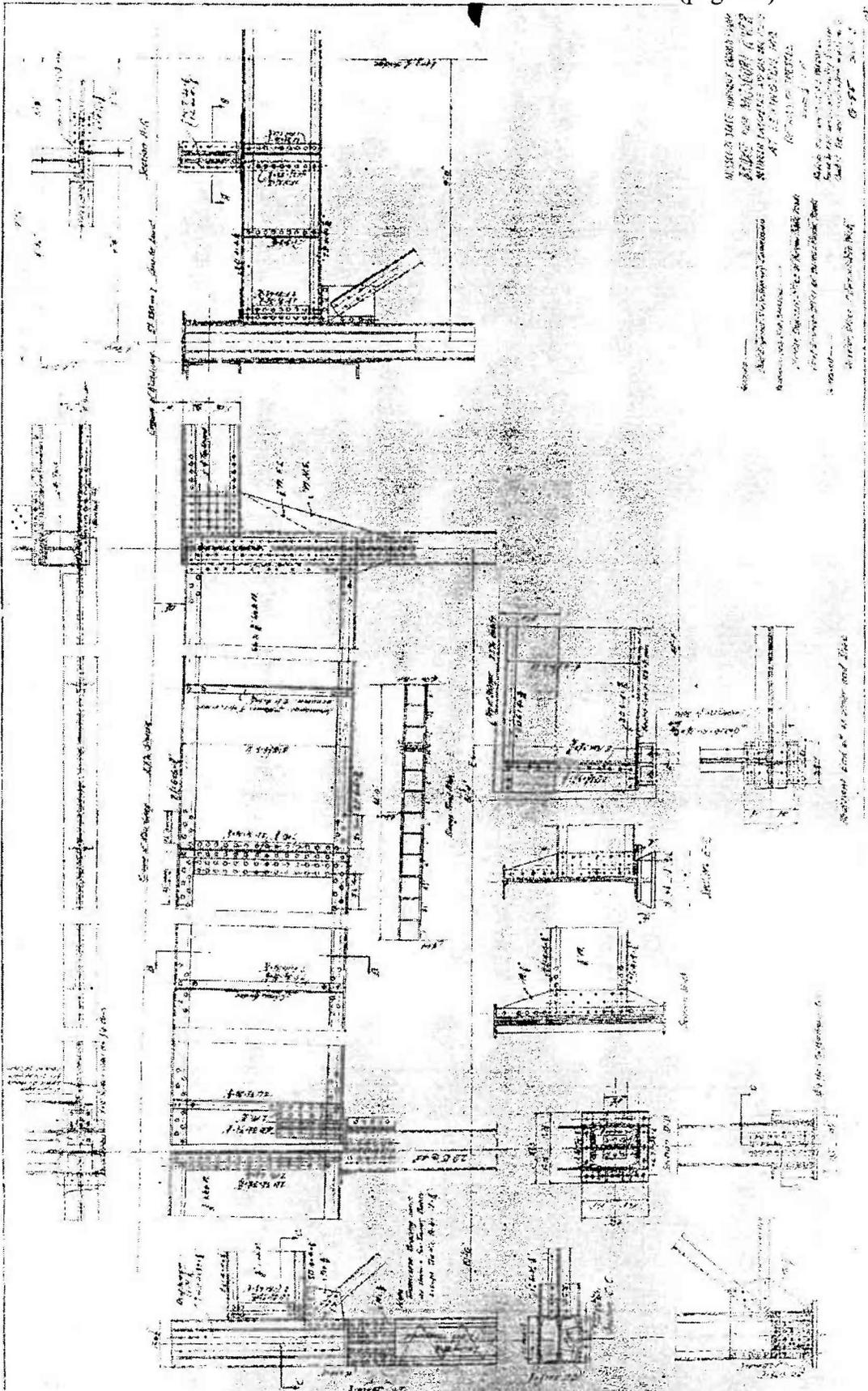
MISSOURI STATE HIGHWAY COMMISSION  
 ENGINEER FOR MISSOURI HIGHWAY  
 DIVISION - BRIDGE AND STRUCTURES  
 AT LEXINGTON, MO.  
 DRAWN BY: [Name]  
 CHECKED BY: [Name]  
 DATE: [Date]

MISSOURI STATE HIGHWAY COMMISSION  
 ENGINEER FOR MISSOURI HIGHWAY  
 DIVISION - BRIDGE AND STRUCTURES  
 AT LEXINGTON, MO.  
 DRAWN BY: [Name]  
 CHECKED BY: [Name]  
 DATE: [Date]

MISSOURI STATE HIGHWAY COMMISSION  
 ENGINEER FOR MISSOURI HIGHWAY  
 DIVISION - BRIDGE AND STRUCTURES  
 AT LEXINGTON, MO.  
 DRAWN BY: [Name]  
 CHECKED BY: [Name]  
 DATE: [Date]







ALL STEEL THIS PROJECT SHALL BE  
 SUPPLIED BY THE CONTRACTOR  
 AT THE CONTRACTOR'S RISK  
 AND SHALL BE SUBJECT TO  
 THE APPROVAL OF THE ENGINEER  
 AND THE CONTRACTOR SHALL BE  
 RESPONSIBLE FOR THE PROTECTION  
 OF THE BRIDGE AND THE  
 SURROUNDING AREA

SECTION A-A TO BE SHOWN AND LINED  
 AS SHOWN

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