Allerton Park Sangamon River Bridge
Robert Allerton Park
Section 21
Township 18 North, Range 5 East
Willow Branch Township
Piatt County
Illinois

IL HAER No. PI-2009-1

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Illinois Historic American Buildings Survey
Illinois Historic Preservation Agency
1 Old State Capitol Plaza
Springfield, Illinois 62701

ILLINOIS HISTORIC AMERICAN ENGINEERING SURVEY

ALLERTON PARK SANGAMON RIVER BRIDGE
ROBERT ALLERTON PARK

IL HAER No. PI-2009-1

Location:	NW¼, NE¼, SE¼ of Section 21 Township 18 North, Range 5 East of the 3rd Principal Meridian Piatt County, Illinois USGS Weldon East Quadrangle (1984) UTM: 4429260 North / 360383 East (Zone 16)
Present Owner:	Board of Trustees—University of Illinois 352 Henry Administration Building, MC-350 506 South Wright Street Urbana, Illinois 61801
Present Use:	None. The bridge has been sealed off from vehicle traffic since 2001 and is scheduled for removal.
Statement of Significance:	The Allerton Park Sangamon River Bridge is a five-span, through-girder, reinforced concrete structure spanning the Sangamon River, which was constructed by Robert Allerton in 1915 or 1916 in association with the development of his extensive country estate west of Monticello. Robert Allerton (1873-1964) was a wealthy farmer, art connoisseur, and philanthropist, whose father Samuel had amassed a fortune in land, livestock, banking, and other commercial enterprises in the second half of the nineteenth century. Although born and raised in Chicago, Robert Allerton had a close connection to Piatt County from childhood through his father, who was one of largest landholders in the county and had given Robert (when still a boy) a gift of 280 acres there. In 1897, Robert took up farming on his Piatt County property and also assumed direct management of additional lands owned by his father in the area. Originally named "The Farms", Robert Allerton's country estate ultimately encompassed nearly 12,000 acres, spanning both sides of the Sangamon River. The centerpiece of the estate was Allerton's

impressive Georgian-Revival-style mansion, built in 1900 on a bluff overlooking the north bank of the river. A lover of nature and art, Robert Allerton surrounded his mansion with formal gardens decorated with an impressive array of sculptures he had collected in his world-wide travels or had personally commissioned. As suggested by its name, however, the estate also was a working farm, or rather a collection of farms (numbering twenty at one time), producing both grains and livestock. Robert was as devoted to agriculture as he was to art, and he strove to make his farms "models" in respect agricultural science. The bridge he constructed across the Sangamon River in 1915-1916 eased the general movement of traffic within the estate and, equally important, facilitated the transportation of agricultural products from farm to market. Though built at private expense, the bridge and 1.5-mile roadway associated with it were open to the public—one of Robert Allerton's many philanthropic gestures. The bridge was constructed during a period when there was growing demand for better roads and bridges, due in large measure to the proliferation of the automobile. The automobile posed multiple challenges to the existing road network in respect to traffic volume and patterns as well as load requirements. Not surprisingly, this was a time of great experimentation in respect to construction methods and materials, with reinforced concrete playing a particularly prominent role. The Allerton Park Sangamon River Bridge and its associated road are emblematic and representative of this important period of transportation history in Illinois. The bridge also is a contributing resource to the Robert Allerton Estate Historic District, which was listed on the National Register of Historic Places in 2007.

Part I. HISTORICAL INFORMATION

A. Physical History:

1. Date(s) of Construction: The bridge was constructed in 1915 or 1916. Sources conflict on which date. A 1917 county history states that the bridge was erected in 1916, while more recent works on Allerton Park present 1915 (or circa 1915) as the date of construction.[1]

---

[1] Newton Bateman et al. (editors), *Historical Encyclopedia of Illinois and History of Piatt County* (Chicago: Munsell Publishing Company), p. 705; Steven A. Thompson, Historical Resources Survey and Evaluation of the University of Illinois at Urbana-Champaign's Allerton Related Properties, (Office for Planning, Design, and Construction, University of Illinois at Urbana-Champaign, 2002), p. 10; Jean Guarino Clark, National Register of Historic Places Nomination Form for the Robert Allerton Estate Historic District (2006), sec. 7, p. 14.

2. Original and Subsequent Owners: During the period it was used for vehicular traffic, the bridge was maintained first by Robert Allerton. Since 1946, the span has been owned and maintained by the University of Illinois.

3. Builders, Contractors, Suppliers: The bridge may have been designed by Joseph C. Llewellyn, a Chicago-based architect hired by Robert Allerton to remodel various parts of the main house at Allerton's estate and an adjacent carriage house in 1915. Allerton and Llewellyn may have become acquainted through Piatt County or University of Illinois connections.[2] Llewellyn's connection to the bridge's design is speculative, however. It also is possible that the bridge may have been designed in consultation with the Bureau of Bridges of the Illinois State Highway Department—then headed by bridge engineer Clifford Older. The contractors and suppliers involved in the construction of the bridge remain unidentified.

4. Original Plans and Construction: No original drawings or plans for the bridge were able to be located.

5. Alterations and Additions: The basic structural components of the Allerton Park Bridge have remained virtually unaltered save for limited patching and repairing to correct deterioration and weathering.

B. Historical Context:

1. Robert Allerton

Born in Chicago on 20 March 1873, Robert Allerton was the only son of Samuel Waters Allerton (1828-1914) and Pamilla (Thompson) Allerton (1840-1880). His father, Samuel, was a Mayflower descendant and had made his fortune in land, livestock, banking and other commercial enterprises. Robert's mother, Pamilla, died shortly before his seventh birthday. Two years later, his father married Agnes Thompson, Pamilla's younger sister (1858-1924), who was to become mother, friend and cultural mentor for Robert. She inspired him by cultivating his mind with literature, music, gardening and especially the visual arts. Her strong and positive influence on her stepson would show in his becoming an art connoisseur, philanthropist and generally a source of enrichment for the citizens of Illinois.[3]

The great wealth of Robert's father enabled him to grow up in extraordinarily fortunate circumstances, as the family lived in an Italianate mansion on Prairie Avenue, then one of the most fashionable neighborhoods in Chicago. Robert first attended Harvard School in Chicago, then St. Paul's school in Concord, New

[2] Clark, sec. 7-p. 14, sec. 8-p. 41; Thompson, p. 10.

[3] Clark, sec. 8-pp.20-21.

Hampshire. Robert chose not to go to college but instead decided to study art in Europe with a Chicago friend and classmate at St. Paul's, Frederic Clay Bartlett. Chicago's Columbian Exposition of 1893 proved a significant inspiration behind his decision to go to Europe. Young Robert spent nearly five years studying art in Europe, first in Munich, then in Paris. In 1892-93, Robert was one of the few Americans admitted to the Royal Academy of Bavaria in Munich upon successfully passing the academy's entrance examination. This event proved a significant point of departure for Robert from his father's expectations that he would follow the elder Allerton into a business career. After leaving Munich, Robert went to Paris and enrolled in the Ecole Collin for drawing classes and the Ecole Aman-Jean for painting classes. Robert may also have attended the Academy Julien in Paris.[4]

However, by the age of 24, Robert had decided against pursuing a career in painting and abruptly quit his brief artist's life and in 1897 returned to the U.S. He thereupon decided to become a farmer, in this sense fulfilling at least one of his father's expectations, as Samuel Allerton had grown up on a farm in New York and had acquired fairly extensive farm holdings throughout Illinois, Ohio, Iowa, Wisconsin, and Nebraska. As a youth Robert had spent his summers visiting these farms with his family, and his memories of these visits no doubt exercised a powerful formative influence on his later years as a wealthy landowner in his own right.[5]

Samuel Allerton had given Robert, while still a boy, a gift of 280 acres of farmland in Piatt County, Illinois. In 1897, Samuel Allerton gave Robert the money to build a house on this land along with the responsibility of managing the other Allerton family land holdings nearby. By the early 1910s, these landholdings amounted to nearly 12,000 acres on both sides of the Sangamon River. Robert Allerton then established twenty model production farms for both crop and livestock production, all of which he named *The Farms.* He personally practiced on these farms the latest scientific methods in crop rotation, for example, as well as traditional and accepted practices described in his father's 1907 book, *Practical Farming.* His success as a modern farmer soon attracted nationwide attention for his thorough application and practice of the latest and most scientific of agricultural theories and practices. By 1898, the father's gift of money to the son to build a house on a select section of these lands would soon be manifested in one of the premier country estate homes in the United States.[6]

2. Robert Allerton's Country Estate

[4] Ibid, sec. 8-p.21.

[5] Ibid, sec. 8-pp.21-22.

[6] Ibid, sec. 8-p.22.

In 1898, Robert Allerton traveled to England with Philadelphia architect John Borie (1869-1926), whom Allerton had met while studying in Paris. Allerton had decided to build his estate house on the Sangamon River in the English (not American Colonial) version of the Georgian style of architecture prevalent in England from the late seventeenth to mid-eighteenth centuries. Allerton and Borie's inspiration for the new residence apparently was Ham House, a seventeenth century English Georgian manor house on the Thames River. This house is generally cited as the model for Borie's design for Allerton House, constructed from 1899 to 1900. The basic features of the English Georgian houses of the seventeenth century—formal, symmetrical design, red brick cladding, projecting bays, a steeply pitched roof with dormers, multi-light windows, modillioned cornice, restrained ornamentation of Classical detailing in limestone (lintels, pilasters and urns)—all were incorporated into Borie's plans for Allerton House. Equally so, the interior floor plan of the new house on the Sangamon is similar to those of seventeenth century English Georgian houses in that a great central hall (ninety feet long by twenty-five feet wide) is flanked by important living spaces such as a dining room, conservatory, and library to the south and a beautiful mahogany stairway, two-story music room (later library) and an office to the north. All of these rooms have wood paneling and fireplaces. A three-story service wing and a carriage house are connected to Allerton House.[7]

Obviously, Borie and Allerton did not conceive of the new mansion on the Sangamon in a cultural vacuum. Rather, both men were keenly aware of the latest architectural design trends, notions and ideas of the 1890's and the first decade of the twentieth century. Playing a central role in Borie and Allerton's design for Allerton House is the American Country Place movement. The very placing of Allerton House high above the Sangamon River and easily accommodating it to the surrounding natural landscape reveals the prevailing philosophy of this movement at its best. Borie and Allerton planned that the five formal rooms on the first floor—dining room, conservatory, office, music room and library—would all open onto exterior terraces and grassy lawns to provide sweeping, dramatic vistas of the surrounding Sangamon River Valley and its wilderness setting through large windows and French doors. From the conservatory one had a clear view of a terrace, the mansion's reflecting pond, and a meadow framed with native trees. Across the great hall from the conservatory, the music room's French doors opened onto a graveled terrace, the east lawn and the Sangamon River Valley beyond. All of these views were even more impressive from the second floor level.[8]

An illustrated article in a 1904 edition of *House Beautiful*, entitled "A Modern Farm-House," praises Allerton's House for its "good taste and beauty." The

---

[7] Ibid, sec. 8-p.30.

[8] Ibid.

Allerton estate—house and grounds as a unified whole—became a pre-eminent example of the Country Place Era home and estate in that eclecticism and historicism dominated its landscape and architectural design. Allerton and Borie produced a mansion that in a picturesque fashion blended well into its natural surroundings. At the same time, they surrounded the house with an axially planned series of formal gardens that easily and naturally unified the interior plan of the house with these exterior gardens. Allerton and Borie thus incorporated into the landscape two kinds of gardens in keeping with the principles of European horticulture—one of geometrically planned beds close to the house, the other given over to the wilderness surrounding the perimeters of the estate.[9]

While architect Borie would continue on in service to Allerton as his architect through the years of the First World War, Allerton would by this time also enlist the service of Chicago-based architect Joseph C. Llewellyn (1855-1932), who would remodel some of the interior of the main house and its dependencies and introduce a new heating system into the house as well. Llewellyn would also design a guesthouse (the "House in the Woods) for the estate in 1916.[10]

In 1922, Allerton met young John W. Gregg (1899-1986), then an architecture student at the University of Illinois, at a fraternity party near campus. Allerton—still a bachelor and with no children of his own—invited Gregg to become his collaborator in the planning and developing of Allerton Estate's many and large gardens. Gregg, having lost both parents only a few years before, would ultimately become Allerton's adopted son. From this time on until the late 1930's, Allerton and Gregg would introduce into the newer gardens surrounding the estate a more contemporary, rather whimsical and very exotic Art Deco style of garden decoration in the form of statuary and architectural motifs in keeping with that style. This all would be a significant shift from Allerton's earlier Classical tastes as typified by the earliest of the estate's sculptures, the two copies of the famous *Charioteer of Delphi* atop each of the gate pillars at the north entrance of the estate.[11]

In 1937, Allerton purchased a choice parcel of property on the island of Kauai, Hawaii for which Gregg would design and build a new home. It was completed the following year, and the two men soon after decided to make it—to which they gave the name Lawai-Kai—their permanent residence. During this time, Allerton made plans to transfer nearly 6,000 acres of his Piatt County estate—including his house and gardens—to the University of Illinois. This became official in 1946. Allerton made his removal to his new home in Hawaii permanent by 1939,

[9] Ibid, sec. 8-pp.30-31.

[10] Ibid, sec. 8-pp.39-41.

[11] Ibid, sec. 8-pp.31-33, 41-42.

although he kept his residency status active in Illinois. He would visit his estate on the Sangamon River on an annual basis thenceforth until his death in 1964 at age 91.[12]

Since acquiring the estate, the University of Illinois has used the house and its adjoining gardens and buildings for a variety of functions. Perhaps the most significant historic events occurring at the estate after the University's acquisition would be the two conferences held there, in 1949 and 1950 respectively, that would usher in the era of national educational public broadcasting.[13] All the while, the university has carefully maintained and preserved the house, its various dependencies, the grounds and its large, beautiful gardens as a singularly exceptional and—today—a very rare surviving example of the long-vanished Country Place Era of a century ago. In this capacity, the estate mansion and its surrounding gardens and scenic landscape vividly recall an era of wealth, social standing and European-style aristocratic aspirations of a now all-but-vanished elite class of American landed gentry country farmers flourishing from the last decade of the nineteenth century to the first years of the Great Depression of the 1930's.[14]

In 1970, approximately 1,100 acres of the Allerton Estate adjacent to the Sangamon River were designated as a National Historic Landmark in recognition of the tract being an excellent example of a rapidly disappearing Illinois stream valley ecosystem containing undisturbed examples of bottomland and upland forest.[15] The designated acreage lies directly west (or downstream) from the Allerton Park Sangamon River Bridge.

Robert Allerton Estate Historic District was nominated to the National Register of Historic Places in 2006, achieving formal listing on the Register in 2007. The property was nominated under three of the defined criteria for National Register eligibility: Criterion A (social history), in regards to the area of communications and the estate's role in the foundation of the public broadcasting industry; Criterion B (significant individuals), in its connection to wealthy farmer, art connoisseur, and philanthropist Robert Allerton; and Criterion C (architecture), in recognition of the estate's impressive architectural resources and landscape design. The National Register District encompasses approximately 500 acres and includes

---

[12] Ibid, sec.8-p. 33, 42.

[13] Ibid, sec. 8-pp.34-39.

[14] Ibid, sec. 8-p.33.

[15] Thompson, p. 1; National Park Service, "Allerton Natural Area," available at http://www.nature.nps.gov/nnl/site.cfm?Site=ALLE-IL.

the Allerton Mansion, support buildings, formal gardens and surrounding landscape, and over 100 freestanding sculptures.[16]

3. Early Reinforced Concrete Construction in the United States

Concrete was used as a building material in ancient times, most prominently by the Romans who used it extensively in the construction of buildings, fortification walls, roads, and bridges. Following the fall of the Western Roman Empire, however, concrete construction disappeared from Europe and remained a lost art for some 1,300 years until British engineer John Smeaton developed a natural hydraulic cement made from crushed limestone in 1756. Smeaton's accomplishment was but the first step in a long process of reintroducing cement and concrete to the building trades. Considerable time and experimentation were required before either material was readily embraced by engineers and architects, let alone the common builder.[17]

The successful and widespread use of hydraulic cement in the construction of the Erie Canal (opened in 1825) provided an early, prominent display of its great potential. Later on in Illinois, natural hydraulic cement found a similar application during the construction of the Illinois and Michigan Canal (1837-1848), being used primarily as a mortar for binding stonework located below the waterline. In the latter instance, the cement was manufactured from a vein of rock discovered near Utica (La Salle County) while excavating the canal. A cement factory was established in Utica to service the needs of the canal builders, being the ninth such facility founded in the United States. The factory in question continued production after the canal was completed, and at least three other natural cement firms ultimately would be established in the Utica area during the latter half of the nineteenth century. The industry would suffer a precipitous decline after 1900, however, in the face of competition from Portland cement.[18]

A noticeable shift in attitude towards concrete construction in the United States occurred after Portland cement became increasingly available. First developed by English brick mason Joseph Aspdin in 1824, Portland cement was an "artificial" product, in that it represented the combination of multiple, finely processed ingredients. It proved to be stronger and more consistent than the natural cements employed previously. Commercial manufacture of Portland cement began in 1825, but it was not until circa 1860 that the cement became generally available in Great

---

[16] Clark, sec. 8-p.20.

[17] William Radford, *Cement and How to Use It* (Chicago: The Radford Architectural Company, 1910), pp. 5-14.

[17] William B. Coney and Barbara M. Posadas, "Concrete in Illinois: Its History and Preservation," *Illinois Preservation Series* No. 8 (Springfield: Illinois Historic Preservation Agency, 1987, p. 3.

Britain or continental Europe. David O. Saylor opened the first Portland cement factory in the United States at Coplay, Pennsylvania in 1872 and put his product on display at the 1876 Centennial Exhibition held in Philadelphia. Domestic production grew steadily in the years that followed, though it remained modest compared to that in Europe. American Portland cement, in fact, faced sharp competition from European brands for several decades due to the perceived superiority of the latter; indeed, as late as 1893 four-fifths of the Portland cement consumed in the United States was imported. This situation reversed in the latter half of the 1890s, when there was a marked upswing in American production and consumption. By 1910, American cement manufacturers could claim a dominant position both nationally and worldwide.[19]

Portland-cement-based concrete was used on a massive scale during the construction of the Illinois and Mississippi (or Hennepin) Canal in northwestern Illinois between 1892 and 1907. Authorized by Congress in 1890, this canal was to provide a connecting link between the Illinois and Mississippi Rivers and extended for 75 miles. In 189,1 Major W. L. Marshall, the commanding officer of the canal project, had requested and received permission from the Secretary of War to use concrete for all of the locks, damns, sluices, and viaducts to be built. Previous canals in the United States had employed stone for such structures, but Marshall argued that concrete was stronger and more durable than stone and also significantly cheaper to build with. The volume of concrete used in the construction of the canal was unprecedented, and it required innovative engineering in respect to formwork and preparation and handling of concrete. The concrete for the thirty-three locks was mixed by machinery on site and dumped in a continuous pour. Even though the Hennepin Canal ultimately proved to be a commercial failure, it was a decided success from an engineering standpoint, and the construction methods employed there later were implemented on a much larger scale on the Panama Canal.[20] It no doubt also contributed to the acceptance of concrete as a bridge material.

Radford (1910) cites several factors in the remarkable growth of the Portland cement industry during the late 1890s and first decade of the twentieth century:

> The general use of concrete on steel structures about 1895, opened up a wide field of new opportunities for the use of cement. This field was enormously expanded by the general acceptance, about 1900, of reinforced concrete as a type of construction of practically unlimited possibilities. The subsequent history of the Portland cement industry in the United States has, in fact, coincided with

---

[19] Ibid, pp. 12-17.

[20] Ibid, p. 6; "The Illinois and Mississippi Canal Lock Works," *Engineering News* Vol.XXXIII, No. 7:98-102 (1895).

> that of reinforced concrete, one being but a reflex of the other in its unexampled growth.[21]

Poured concrete has great strength in compression but is weaker in tension. To compensate for this weaker tensile strength, metal bars—commonly known as "rebar"—can be embedded in the concrete in order to reinforce it. This creates a much stronger structure than plain concrete alone. As Coney and Posadas (1987) note, "concrete, with its high alkalinity, adheres with great tenacity to the metal bars and protects them from corrosion, and the two materials expand and contract equally with changes in temperature."[22] Formal systems for reinforced concrete construction were not introduced until the 1870s, though modest experimentation had taken place prior to that time in Europe.[23] The first building in the United States constructed entirely of reinforced concrete was the William Ward residence in Port Chester, New York, which was erected in 1873-1876. William Ward was trained as a mechanical engineer, and he directly supervised construction of his Second-Empire/Gothic-style mansion in collaboration with architect William Mook. Light I-beams and metal rods were used to reinforce the concrete.[24] Ward placed the reinforcing bars for the concrete beams in the house near their base where they were most exposed to tensile forces. This was an innovative design, but one that Ward neglected to patent.[25]

In 1877, Thaddeus Hyatt published the first book on reinforced concrete, in which he described various tests he had made and formulated the principal that "concrete had to resist enough tensile forces to balance existing compressive stresses."[26] The following year Hyatt filed a patent for a reinforced concrete system designed for floors, roofs, and pavements, which called for a grid of flat iron ties threaded with wires embedded near the base of a concrete slab (preferably one made of Portland

---

[21] Ibid, p. 18.

[22] Coney and Posadas, p. 5.

[23] In 1854 an English plasterer named William B. Wilkinson erected a small two-story servants' cottage of reinforced concrete, embedding iron bars and wire rope in the concrete floor and roof. This is recognized as the earliest known reinforced concrete building in the world. In France, Jean-Louis Lambot constructed several small rowboats of reinforced concrete around 1848. Lambot reinforced the concrete with wire mesh and iron bars. In the 1860s Joseph Monier, another Frenchman, patented designs for reinforced concrete garden tubs and posts and beams for railway and road guardrails ("Historical Timeline of Concrete", available at http://fp.auburn.edu/heinmic/ConcreteHistory/Pages/timeline.htm).

[24] "William E. Ward House," available at http://en.wikipedia.org/wiki/William_E._Ward_House.

[25] Abigail M. Glanville, "Conde B. McCullogh's Oregon Bridges: A Typological Study of the Designs and the Preservation of His Legacy" (2009).

[26] Ibid.

cement). Hyatt had found that concrete made with a proper Portland cement was fire resistant. Similar floor systems had been developed previously in England and France, but Hyatt's was the first to be patented in the United States and represented an improvement—from his viewpoint—to these earlier systems. Hyatt's system of reinforced concrete sidewalks saw extensive use in the burgeoning West Coast city of San Francisco, where Peter Jackson (of P. H. Jackson and Company) began manufacturing them under Hyatt's patent. Many of the buildings in the city had cellars that extended beneath the sidewalks, and Jackson promoted Hyatt's concrete panels as a safer, more permanent alternative for covering these subterranean vaults than the wood sidewalks widely employed at the time. The market for such a system received a boost in the 1880s after the City of San Francisco began requiring property owners to replace their wood sidewalks with ones of less perishable material. Jackson would later patent concrete-related inventions in his own right.[27]

Peter Jackson was one of a trio of San Francisco residents who would place California on the cutting edge of reinforced concrete construction in the late nineteenth century and "help establish reinforce concrete as a mainstream building material in the United States." Another was Ernest L. Ransome, who patented a twisted reinforcement bar for concrete in 1884. Ransome's twisted bars presented several advantages over Hyatt's grid of flat irons and wire. For one thing, they provided an excellent bonding surface for the concrete to adhere to along their entire length. They also were cheaper to manufacture and assemble. Rather than creating a grid, the Ransome system involved twisted bars laid parallel to one another. In 1885, Ransome received a commission to construct a fireproof warehouse for the Artic Oil Company in San Francisco, the roof of which was built with a series of concrete arches of uniform thickness. In 1889, he built an addition on the Borax Works in Alameda, California, in which he employed a ribbed concrete floor and reinforced concrete posts.[28]

Much of Ernest Ransome's work in California was done in collaboration with San Francisco architect George W. Percy, who became a convert to reinforced concrete after witnessing the effectiveness of the systems devised by Ransome and Hyatt. Early on, Percy experimented with reinforced concrete in a variety of applications, using it for lintels for storefronts (having spans of 15' and supporting the weight of three floors above), for floors (both flat and arched), and even a residential cistern. In 1888, Percy hired Ransome to build reinforced concrete floors for two large building projects he was architect on: the Bourn & Wise wine cellar in Pasadena, California and the California Academy of Science in San

[27] Sara E. Wermeil, "California Concrete, 1876-1906: Jackson, Percy, and the Beginnings of Reinforced Concrete Construction in the United States," Proceedings of the Third International Congress on Construction History, Cottbus, May 2009.

[28] Ibid.

Francisco. Both buildings had traditional masonry bearing walls but utilized reinforced concrete floors in innovative ways. In the case of the Academy of Science building, the floors were made of 8"-thick flat panels resting concrete beams set 15' apart. Percy and Ransome followed up these successes with the construction of the Leland Sanford, Jr., Museum and the Robie Hall dormitory at Stanford University in 1891. The museum and dormitory were the first all-reinforced concrete buildings built in the United States since the William Ward House nearly two decades earlier. Their exterior concrete was scored, tooled, and colored to emulate the sandstone blocks used for the other buildings on campus. The fifteen years after their construction, the museum and Robie Hall proved the structural merits of reinforced concrete when they survived the devastating 1906 San Francisco earthquake with minor damage while other traditional masonry buildings on the Stanford campus crumbled.[29]

In 1897, Ernest Ransome left California and took his considerable skills and experience in reinforced concrete construction to the East Coast, where he would enjoy great success. Ransome designed prominent reinforced concrete buildings in own right in the East, including the Borax Refinery in Bayonne, New Jersey (1897) and most notably the fifteen-story Ingalls Building in Cincinnati, Ohio (1903), the world's first reinforced concrete skyscraper. Equally important, he furthered the spread of reinforced concrete construction by licensing other builders to use his system and by continuing to make advances in respect to mixing equipment, formwork, and integrated building systems.[30]

By 1910, reinforced concrete had become accepted as a mainstream building material in the United States. Even on buildings with a steel skeleton, reinforced concrete floors and wall panels became the norm due to their fireproofing quality. Cost, speed of construction, and longevity also contributed to the popularization of reinforced concrete, as did a growing awareness of the material's remarkable versatility in regards to form. These same characteristics made the material especially attractive for bridge engineers.

The first reinforced concrete bridge known to have been constructed in the United States was erected by Ernest Ransome in 1879 in San Francisco's Golden Gate Park. Reinforced concrete arch bridges were not immediately popular in the United States, however, and it is estimated that perhaps only 100 of them were built prior to 1900. Significant advances in the field were made during the 1890s, particularly by the European engineers, which demonstrated the utility and strength of concrete bridges. Engineer Edwin Thatcher built the first large, multi-span concrete bridge in the United States in 1897, spanning the Kansas River in Topeka. An early, aggressive promoter of arched concrete bridges was Daniel Luten,

[29] Ibid.

[30] Ibid; "Ernest L. Ransome," http://en.wikipedia.org/wiki/Ernest_L._Ransome.

founder of the Luten Company of Indianapolis. Luten filed multiple patents related to concrete arch bridges between 1900 and 1906, and his company occupied a dominant position in the field of small-scale bridges of this type during the period 1900 and 1920.[31] In time, a wide variety of other concrete bridge designs came to be utilized by bridge engineers in the United States. For shorter spans, box culvert, slab, through-girder, T-beam designs were widely used prior to circa 1940. Some of the impressive and elegant examples of concrete bridges built during the early twentieth century had open spandrel arch designs (see Supplemental Figures S15).

4. <u>Concrete Bridge Construction in Illinois</u>:

For most of the nineteenth century, the majority of bridges in Illinois were of wood frame construction. Indeed, as late as 1915 more than one-third of the bridges in the state were wood.[32] Although a certain percentage of these wood frame bridges were covered, the preponderance had open decks. Stone and/or brick spans also were built during this period, though they were less numerous and their distribution around the state was variable, being dependent on availability of materials and local expertise; they also tended to more expensive to build than wood ones. The downside to timber bridges was that they suffered a faster rate of deterioration and required more frequent maintenance and replacement compared to those of masonry construction.

Beginning in the 1880s, an alternative presented itself in the form of wrought-iron and steel-frame bridges. In contrast to the previous generation of bridges, which were craftsman designed, these metal spans typically were pre-fabricated and marketed by non-local bridge companies. A wide variety of the truss designs were employed on these bridges (including the Pratt, Warren, Parker, and Whipple among others), and they were suitable for both railroad and standard vehicle traffic. At least seven such bridges are known to have been constructed over the Sangamon River in Piatt County during the 1890s and early 1900s. One of these was a Pratt through-truss bridge, which formerly carried the Illinois Central Railroad across the Sangamon at Monticello (now called the Heartland Pathways Bridge). Another was the Hog Chute Bridge, a through-truss span for vehicles located three miles downstream from the Allerton Bridge. A number of other steel-truss bridges were built over smaller streams in the county during this same period.[33]

[31] Martha Carver, *Tennessee's Survey Report for Historic Bridges* (Nashville: Tennessee Department of Transportation, 2008), pp. 237, 240.

[32] Illinois State Highway Department, *Fifth Report of the Illinois State Highway Department for the Years 1913, 1914, 1915, 1916* (Springfield, 1917), p.63.

[33] Bridgehunter.com, "Piatt County," http://bridgehunter.com/il/piatt.

Concrete bridges did not begin to be constructed to any extent in Illinois until the first decade of the twentieth century. One of—if not *the*—first large concrete bridges built in the state was a 40'-long, unreinforced span erected in Belleville (St. Clair County) in 1895.[34] Another early concrete bridge (and certainly one of the most impressive) was that constructed by the Illinois Central Railroad over the Big Muddy River between De Soto and Carbondale (Jackson County) in 1902-1903 (see Supplemental Materials S-12). This was a massive structure measuring 574'-6" in length and having an open-spandrel-arch design. It replaced an earlier iron truss bridge at the same location. Interestingly, the concrete used for the Big Muddy Bridge was not reinforced, like the one at Belleville.[35]

The early promotion and eventual widespread adoption of *reinforced* concrete bridges in Illinois was due in large measure to the Illinois Highway Commission (later reorganized as the Illinois State Highway Department) and was intimately connected to that body's efforts at improving roads in the state. An act to establish a State Highway Commission in Illinois was approved on May 18, 1905. The commission consisted of a bipartisan board whose three members were appointed by the Governor. The primary duty of the commission, as described by the Act creating it, was "to investigate and to carry on such experimental work in road building, different methods of construction, kinds of material and system of drainage as will enable it to determine upon the various methods of road construction best adapted to the various sections and soils of the State, the cost of the same, and recommend standards for the construction of highways in the various sections of the State." The commission could be consulted by any local officers (county, township, city or village) having authority over highways and bridges, and, upon request, was to advise and give any information relevant to the construction, repairing, alteration, and maintenance of those transportation features—all free of charge. Conversely, the Act made it the duty of local road commissioners to supply "detailed information concerning their work and of the highways under their control" to the State Highway Commission upon written request. This information was essential if the commission was to make an accurate evaluation of the general condition of roads and bridges across the state and assess where improvements were needed. The commission also was given the authority to appoint a State Highway Engineer and hire necessary support staff.[36]

---

[34] Coney and Posadas, p. 7.

[35] "A Concrete Railroad Bridge," *Traction and Transmission*, Vol. X:242-247 (1904); "The Concrete Bridge of the Illinois Central Railroad Over the Big Muddy River," *Municipal Engineering (Index)*, Vol. XXVI, No. 3: 152-155 (1904); Coney and Posadas, p. 7.

[36] Illinois Highway Commission, *First Annual Report of the Illinois Highway Commission for the Year 1906* (Springfield, 1907), pp.xv-xvi).

Recognizing that there were some misperception as to their function, the members of the Illinois Highway Commission issued an open letter to people of Illinois—attached to their first annual report—in which they pointed out that the commission was “not called in the law a hard roads commission, or even a good roads commission, but simply a highway commission.” They were embarking “upon this work without preconceived notion or pre-determined policies” and disclaimed any intention “to urge upon the people of this State, or upon those of any section, any special policy as to their respective highways.” They would not propagandize for hard roads or state aid. On the contrary, the commissioners acknowledged that road policy was determined at the local level by public officials representing the various county, township, and road districts. Their duty and desire was “to be of any use or assistance in [their] power to any or all of the road officials in this State in the performance of their respective duties.” This attitude is reflected in the commissioners’ approach towards dirt roads. Observing that over ninety percent of the roads in the state were dirt in 1906, the commissioners accepted that this might remain the prevailing road surface for “generations to come.” As such, it made little sense to push a comprehensive hard roads program when the shear scale and expense of such a program made it unlikely to succeed at this point in time. Instead, the commissioners proposed to conduct a thorough study of construction, care, and improvement of dirt roads, “keeping in mind the fact that the improvement of these roads benefits immediately all classes of the community and every part of the State alike.” Similar studies were to be conducted on gravel and macadam roads in order to assist districts using those paving materials.[37] Bridge construction also was to be evaluated and tested. The results of these various studies were to be disseminated to local officers through the distribution of pamphlets and circulars as well public meetings held throughout the state. Pragmatism mixed with aggressive education efforts would characterize the early years of the Illinois Highway Commission.

The State Highway Engineer and his staff were responsible for the technical aspects of the highway commission’s work. Tasks falling under their prevue included: conducting test studies on construction materials and methods, the preparation of plans and specifications for bridge and road projects, survey work, and compilation of transportation data. Arthur N. Johnson as was appointed as the first State Engineer in 1906. Trained as a civil engineer, Johnson had previously been in charge of the highway division of the United States Department of Agriculture in Washington, D. C. and had wide experience in modern road construction.[38]

---

[37] Ibid, pp. 1-3.

[38] Ibid, p. 3. Born in 1870, Arthur N. Johnson received his B. S. from Harvard University and a Doctorate of Engineering from the University of Maryland. In addition to serving as State Highway Engineer in Illinois, his professional career included positions as Assistant Engineer of the Maryland Highway Commission, State Highway Engineer for Maryland, Chief Engineer for the Bureau of Public Roads, and consulting highway engineer with the

After conducting a general survey of the existing bridges in the state, Johnson found failings on several critical points, including design, maintenance, and the method of letting contracts. In his report for 1906, he states:

> In the short time available it has been impracticable to attempt a thorough examination of many bridges, but information gathered from actual inspection and from numerous reports made those who are familiar with the conditions points to but one conclusion—that highway bridges have cost the taxpayers far too much. Not alone have the bridges cost too much, but the type of bridge erected is often unsuited to the conditions. Many of these bridges have become dangerous to the traveling public. Old bridges are in use which are rotted and weak, and few new ones are built of sufficient strength. When the unsafe condition of many bridges is combined with too high cost, the chance for improvement in this class of highway work can be readily appreciated.[39]

According to Johnson, "The cause of such deplorable conditions may be summed up as due to lack of skilled supervision." The typical county highway commissioner was not trained as a structural engineer and hence had limited knowledge on which to base decisions regarding new bridges within his jurisdiction. Professional advice, when sought, often came from bridge company representatives, who were far from disinterested parties and who Johnson characterized as trying to sell "as large a bridge as they can possibly induce the local officials to undertake, and, wherever it is at all possible, to recommend steel in place of any other material." Johnson cited instances of bridge projects where steel tubes had been recommended in favor of concrete abutments only to have those bridges later fail during floods. On the opposite extreme, some steel bridges in the state had been under-built or poorly designed due to lack of specifications in bid requests (which often provided just a length and a width). In order to secure a contract as the lowest bidder, bridge companies—in absence of detailed specifications—had a natural inducement to "submit for consideration the very lightest form of construction which is believed will hold up to ordinary traffic, taking a chance on the bridge sustaining some extraordinary load which, however, it is quite likely it will have to bear sooner or later." This approach, while perhaps good for the company's profits, inherently put the public's safety at risk.[40]

Portland Cement Company. He was appointed Dean of the College of Engineering at the University of Maryland in 1920—a position he retained until his retirement in 1936 (http://www.ite.org/aboutite/honorymembers/JohnsonAN.asp).

[39] Illinois Highway Commission, p. 55.

[40] Ibid, p. 56.

Given his choice of materials, State Engineer Johnson exhibited a clear preference for reinforced concrete over steel for bridges of short-to-moderate length in Illinois. This preference was based partly on cost comparisons but also longevity. A steel-frame bridge could experience significant deterioration within several decades of its construction, particularly on those sections on or adjacent to the road deck (which was most exposed to moisture and also to salt during the winter). Moreover, rust and corrosion over the whole frame presented an going concern over the lifetime of the bridge. Johnson and his assistant engineers especially favored concrete bridges with through girders. While not appropriate for spanning major rivers where commercial navigation was an issue, through-girder concrete bridges were well-suited for most stream crossings in Illinois and for across secondary rivers like the Sangamon. Two representative plans for reinforced concrete bridges were presented in the Illinois Highway Commission's report for 1906. One of these was for a bridge with a 15' span, while the other for a bridge with a 30' span (see Supplemental Materials S-1 and S-2). Both bridges have solid railings with recessed panels—a feature that would remain a persistent feature on state-engineer-designed bridges in Illinois into the 1930s.[41]

Johnson believed that the "expense of concrete construction is within the means of every township." He recommended that townships adopt a graduated program where two or three of the bridge spans and wood culverts in the worst condition be replaced with concrete ones immediately, to be followed by one or two additional ones each successive year depending on the funds available.[42] This "slow-but-steady" approach made sense financially and also fit the prevailing political mood. The time would soon come, however, where the Illinois Highway Commission would push for a far more aggressive program of bridge improvements.

In addition to the public meetings he held around the state, Arthur Johnson detailed the highway commission's work at professional forums such as the annual convention of the Illinois Society of Engineers and Surveyors. At the latter's January 1908 convention, for instance, Johnson presented a paper outlining the educational purposes of the commission and the procedure followed in its work. Clifford Older, one of Johnson's assistant engineers, made a presentation on the standard reinforced concrete highway bridges being designed by the commission. For short spans of up to 20', the commission had developed a standard design for a slab bridge. For longer spans of 20' to 50', the commission had a standard design for a concrete girder bridge. At this same meeting, Professor A. N. Talbot presented a paper on the tests then being done on reinforced concrete at the

[41] Ibid, pp. 59-60, figs. 15-16.

[42] Ibid, pp. 59.

University of Illinois. The journal *Engineering-Contracting* observed that Talbot's "monumental work in testing reinforced concrete is…well known and justly famous both in this country and abroad."[43]

Some indication of the pace of concrete bridge construction in the state is provided by the September 1912 edition of *American Motorist*, which features an article entitled "Concrete Bridges Replace Steel in Illinois." The article provides a summary of the research Arthur Johnson had done to date on bridges, outlining his arguments in favor of reinforced concrete versus steel (particularly in regards to cost) and preference of girder bridges over arched types. Johnson's rationale on the latter point was summarized as follows:

> The girder type is chosen rather than the arch for two reasons: One is that in an arch type of bridge the thrust pressure against the end piers, which is naturally transferred to the banks, is very severe; and as the banks become soft in wet weather the stability of such a structure might be endangered; the other reason is that the girder type offers greater clearance than the arch, allowing freer movement of water in time of flood.[44]

The article states that, "Since the Illinois Highway Department began its work in connection with the highway bridges, several hundred bridges have been erected, and the applications for more bridges are numerous. Thousands of miles of road have been made available for motorists by reason of the construction of these bridges." Johnson is credited with having become a recognized authority on the subject of reinforced concrete short-span bridges—a subject to which he had contributed much information on "through addresses and papers before scientific societies, both as to the technique construction and cost." The article also observes that the State Automobile Club and its affiliate clubs, the Chambers of Commerce, and other civic organizations had joined in an effort to elect members to the General Assembly who would "forward the highway interests of the State." Significantly, "one of the leading influences in [this] movement is the high regard with which the concrete highway bridges have come to be held."[45]

State officials were paying increasing attention to the issue. Recognizing the growing demand for the highway commission's services, the Illinois General Assembly in 1911 quadrupled that body's annual appropriation from $25,000 to

---

[43] "Annual Convention Illinois Society of Engineers and Surveyors," *Engineering-Contracting*, 22 January 1908:63-64.

[44] "Concrete Bridges Replace Steel in Illinois," *American Motorist*, September 1912: 701-702.

[45] Ibid.

$100,000. That same year, the General Assembly passed a law requiring all automobile licensing fees be placed in a "road fund" for the construction of improved highways.[46] The reports of two legislative committees appointed in 1910 and 1911 made it clear that additional measures were needed. The 1911 committee found that only about 10 percent of the 95,000 miles of road in Illinois were "improved in a permanent manner," as compared to 38 percent in Indiana and upwards of 50 percent in Massachusetts. The committee also characterized Illinois roads being poorly constructed and maintained and followed no uniform standard between adjoining townships and counties.[47] Similar assessments had been previously made by the Illinois Highway Commission but they were now drawn more sharply into focus for lawmakers in Springfield.

The conclusions of the 1911 legislative committee on roads served as the basis of a State Aid Road Law passed by the Illinois General Assembly on July 1, 1913. Commonly referred to as the "Tice Road Law" after its principal sponsor—Representative Homer J. Tice of Greenview—this act changed the nature of the relationship between the State and local road districts.[48] Prior to its passage, the State Highway Commission functioned simply in an advisory role, as related above. The new law created the State Highway Department and provided direct regulation for the construction of roads and bridges. In terms of organization, the new highway department was overseen by a salaried, three-member State Highway Commission and was divided into five different divisions or bureaus, each headed by its own chief. The divisions in question were: the Bureau of Roads, the Bureau of Bridges, the Bureau of Maintenance, the Bureau of Tests, and Bureau of Audits. Each bureau chief reported directly to the Chief State Highway Engineer. The state was divided into seven districts, to which were assigned a division engineer and personnel representing the five bureaus.[49] In respect to bridges, the State Aid Law gave the State Highway Department "immediate and complete control of the construction and maintenance of all highway bridges built as State aid improvements." It also gave indirect control over most other new spans built in the state by requiring the plans and specifications for all county bridges and those built by townships costing over $200 be submitted for review and approval.[50]

---

[46] Ernest Ludlow Bogart and John Mabry Mathews, *The Modern Commenweath 1893-1918*, Volume Five of *The Centennial History of Illinois* (Springfield: Illinois Centennial Commission, 1920), p. 151.

[47] Ibid.

[48] Ibid, pp. 151-152; Robert P. Howard, *Illinois, A History of the Prairie State* (Grand Rapids: William B. Eerdman's Publishing Company, 1972), p. 488.

[49] Illinois State Highway Department, *Fifth Report of the Illinois Highway Department for the Years 1913, 1914, 1915, 1916* (Springfield, 1917), p. XI.

[50] Ibid, pp. 61-62.

Within three years of the passage of the State Aid Road law, the number of plans and specifications submitted for review to the State Highway Department had increased from 238 to 624 (1913-1916). Plans and specifications for an additional 3,832 bridges and culverts build in connection with State aid road work were prepared by the department in 1916 alone; another 111 such structures independent of State Aid Road projects were designed that same year.[51]

Another key provision in the State Aid Law was that it required counties to match any apportionment contributed by the State for road or bridge improvements. Counties could exceed the State apportionment if they wished. Yet, they were not obligated to take any money from the State.

Additional funds for road and bridge improvements became available in 1916, when Congress began to match state expenditures with federal appropriations. The Illinois Highway Commission subsequently drew up a plan for a 4,000-mile system of hard roads in the state. The difficulty lay in the financing. Previously, the State had taken a pay-as-you-go approach, but if this practice was continued the proposed hard road system might take several decades to build. Governor Frank O. Lowden, who took office in 1917, advocated a more accelerated program and pushed for a 60-million dollar bond issue to pay it. The General Assembly approved the bond issue in 1918. The enabling legislation called for 4,800 miles of hard roads and new bridges, with the debt accrued being retired through automobile licensing fees. Only modest progress on the hard road system had been made by the time Lowden left office in 1921, but work moved ahead at a dramatic pace under his successor, Len Small (1921-1929). Small won approval for a second bond issue—this time for 100 million dollars—and proclaimed a goal of 9,900 miles of paved roads, doubling that proposed by Lowden. By 1930, Illinois could claim 7,500 miles of paved roads, which represented roughly three-quarters of the primary system.[52] Thousands of new reinforced concrete bridges had been constructed along these routes during this same period.

In 1917, the Illinois State Highway Department reported that 90 percent of *all* structures (bridges, culverts, etc.) then being designed by the department were reinforced concrete. The department also was designing steel bridges but their number paled in comparison to those of concrete. In 1916, for example, only two steel bridges were designed for State Aid projects compared to 109 concrete bridges. A similar disparity was seen in respect to the 624 county and township bridges submitted for approval and review in 1916, with 545 of these concrete and seventy-nine being steel.[53] In order to streamline the design process, the bridge

[51] Ibid, p. 68, Table IV.

[52] Howard, pp.489-491.

[53] Illinois State Highway Department, p. 65, Table V.

engineers with the State Highway Department developed a series of standard plans and specifications for bridges, abutments, and culverts tailored to accommodate different conditions and needs. In respect to reinforced concrete, through-girder bridges, the engineers were using twenty-four standard plans by 1917, which covered "clear spans, 30 to 65 feet in length varying by 5 foot intervals and roadways of 16, 18, and 20 feet." In the event wider roadways were called for, the department recognized that deck girder bridges or those of an arch design might be "more economical or otherwise more desirable;" hence, plans for through-girder bridges wider than 20' had not been prepared at that date.[54]

A representative plan for a reinforced concrete, through-girder bridge with 65' span and 20' roadway designed by the Illinois State Highway Department is included with the supplemental materials attached to the IL-HAER documentation (see PI-2009-1-S-4). In terms of basic design, this bridge closely matches those presented by the Illinois Highway Commission in 1906. Highway departments in several other Midwestern states adopted through-girder bridge designs very similar to that used in Illinois, including those of Iowa, Wisconsin, and Michigan (see Supplemental Material S-6 through S-10). A shared characteristic of these designs was their solid railings with recessed panels—a feature also found on the Allerton Park Sangamon River Bridge. Representative examples of several county and township bridges of through-girder design constructed in Illinois during the early twentieth century also are illustrated in the Supplemental Materials (see S-10 and S11).

Concrete arch bridges were far less common in Illinois than through-girder ones. The level terrain common in large sections of the state largely obviated the need for such spans. Their construction also typically was more costly and complicated than through-girder or slab bridges, and some engineers—State Engineer Arthur N. Johnson for one—had reservations about the thrust pressure arches placed against the abutments. Even so, a number of notable arched concrete bridges were constructed in Illinois during the early twentieth century. The open-spandrel arch bridge constructed by the Illinois Central Railroad over the Big Muddy River (completed in 1903) already has been mentioned. Another very impressive example is the Morgan Street Bridge in Rockford, which was constructed across the Rock River in 1917 and has an open-spandrel arch design (see Supplemental Materials S-13). One other example is the unique rainbow arch concrete bridge constructed across the Little Wabash River at Carmi in 1916. The Carmi Bridge was based on a design patented by J. B. Walsh in 1912 and featured through spans with the road deck set above the level of the spring line (see Supplemental Materials S-13).

[54] Ibid, pp. 74, 78.

A number of moderately large concrete bridges are known to have been built at private expense in Illinois during the middle 1910s, like that at Allerton Park. Perhaps the most impressive examples—in respect to design and setting—are arched concrete bridges erected by industrialist F. W. Mattiessen at his Deer Park leisure grounds in rural La Salle County (present-day Mattiessen State Park). Deer Park was centered on a deep gorge extending off the Vermilion River, which Mattiessen bridged at several points with arched concrete spans. One of the bridges there has a filled-spandrel arch, while another has an open-spandrel arch; the latter was erected in 1916 (see Supplemental Materials S14 and S15). Another privately built reinforced-concrete bridge of note is the Ravine Bluffs Development Bridge in Glencoe (Cook County). This bridge was built in 1915 to provide access to a housing subdivision developed by attorney Sherman Booth and was designed by Frank Lloyd Wright—being one of two freestanding bridges built by the architect during his illustrious career. Its design exemplified many elements of Wright's Prairie style, particularly its emphasis on strong horizontal lines, and featured planting urns, seating, and built-in lighting.[55]

5. The Allerton Bridge and Roadway:

Like much of the bridge building that occurred throughout Illinois early in the twentieth century, the construction of the Allerton Park Sangamon River Bridge was closely connected to the "better roads" movement of the period. In 1905, Piatt County reportedly spent $39,298 on the maintenance and construction of roads and bridges. While modest by modern standards, this figure compares very favorably with what other counties in the state had spent when considered in proportion to the county's size and assessed value of taxable property. Indeed, Piatt had spent 15-16% more on its roads and bridges than the neighboring and comparably sized counties of DeWitt and Douglas. It is of note, however, that Piatt County had no gravel or macadam roads in 1905. The county was by no means unique in this respect, considering that thirty other counties in Illinois claimed no paved roads at this time either.[56] Even so, this distinction placed Piatt within a minority of counties seemingly resistant, or at least indifferent to, progressive road policies. This impression is strengthened by a story about a trip made by Piatt County Clerk Harvey Fay between Monticello and Deland in November 1908 (or 1909). Fay was delivering election supplies to Deland and had to travel on an exceptionally bad road to get there. The trip was so disagreeable that Fay proclaimed to a group of Deland men: "If I ever get a chance to vote for hard roads in Piatt County I shall certainly do it." The locals took such "violent exceptions" to the County Clerk's pronouncement that he "was almost driven out

[55] Bridgehunter.com, "Frank Lloyd Wright Bridge," http://bridgehunter.com/il/cook/frank-lloyd-wright/.

[56] Illinois Highway Commission, pp.14-15.

of town."[57] Although offering only anecdotal evidence, Fay's experience illustrates the degree of resistance found in some sections of Illinois to hard roads. Most of this resistance stemmed from the perceived costs of road improvements and the higher taxes attached to them.

The 1913 State Aid Road Law did much to alleviate the concerns of Piatt County taxpayers regarding road improvements since the burden was to be shared by the county and state. Piatt County's enthusiasm for hard roads was such that the county was featured in a 1917 article in *Dependable Highways* entitled "Illinois County to Build Brick Roads." By that date, the county could claim 11.6 miles of brick roads completed or under construction, which made it the leading county in central Illinois in this respect "with the possible exception of Vermillion and perhaps Douglas." This represented a remarkable reversal in attitude from that encountered by County Clerk Fay in Deland only eight or nine years earlier. Piatt County not only was accepting State Aid for road construction but was regularly exceeding its matching share—this at a time when the neighboring counties of Dewitt and Macon actually were refusing State Aid and agitating for repeal of the 1913 road bill. Ironically, one of the brick roads mentioned in the *Dependable Highways* article was a 2.25 segment between Monticello and Deland, which was due to be let for contract and presumably was the same route County Clerk Fay had found so exasperating in 1908/9. The Deland Road and the other brick roads completed or under construction within the county to date had brick pavements laid over concrete bases.[58]

The longest of the paved roads in Piatt County in 1917 was a 3.6 mile segment of present-day Allerton Road running southwest of Monticello and paralleling the south bank of the Sangamon River. *Dependable Highways* referred to this as the "State Aid brick road" due to the fact the State had contributed $11,504.75 towards its construction, to compliment the $7,891.68 put forward by the county. These moneys represented slightly less than half the total cost of the road, however. An additional $20,000 had been contributed by Robert Allerton, making him the primary benefactor in the project. Allerton's generosity in this instance was self-interested to a degree, in that the newly paved road passed through his estate and therefore improved transportation between it and Monticello; yet the road also served the public good, and Allerton's donation was characteristic of his philanthropic spirit. Significantly, the road in question was the first to be paved in the county and no doubt provided a good test case for promoting a hard roads program to local taxpayers. It could be argued that Allerton's gift of $20,000 was an essential component to kick-starting that program.

---

[57] "Illinois County Elects to Build Brick Roads," *Dependable Highways*, vol. 4, no. 1 (1917):16.

[58] Ibid.

Robert Allerton made a further contribution to Piatt County's incipient hard roads network in 1916, when he paid for the construction of a 1.5 mile brick road that extended north off Allerton Road and provided a connection to Old Timber Road on the north bank of the Sangamon River. The new brick road intersected Allerton Road near the point where the brick pavement on the latter terminated. The 1917 history of Piatt County provides a brief description of this project:

> During 1916 Robert Allerton spent $80,000 building a brick road and a concrete bridge over the Sangamon River to connect up with the State Aid road that leads southwest from the city of Monticello. The Allerton home is five miles from Monticello, and the brick road extends between the two places."[59]

The expense of the project was due to its complexity. Aside from the roadwork proper (grading, paving, ditching etc.), it involved the construction of a substantial bridge and also a long, elevated causeway to carry the roadway across the river bottoms. The preponderance of the project's expense was related to the construction of the bridge, which *Dependable Highways* reports as having cost $60,000—or two third's of the total. Although the road and associated bridge remained privately owned and maintained, they were "dedicated to the use of the public" in yet another of Robert Allerton's many civic gestures.[60] Once completed, the new road allowed Allerton, his guests, and estate staff to traverse the five miles between the mansion and Monticello on a dependable "all-weather" surface. It also provided a direct link between the estate's North and South Farms.

The person responsible for the design of the concrete bridge over the Sangamon River is not known with certainty though speculation has centered on architect Joseph C. Llewellyn, who was hired in 1915 to undertake several remodeling and building projects on Robert Allerton's estate. Llewellyn was responsible for remodeling Allerton's stable/carriage house in 1916 and also oversaw the remodeling of several bedrooms and the improvement of the heating system in the main house. In 1917 he designed the House-in-the-Woods, a two-story stuccoed, Georgian-Revival-style dwelling located west of the main house.[61] Llewellyn's hiring thus coincided with the construction of concrete bridge over the Sangamon River and the 1.5-mile-long brick roadway associated with it. Llewellyn, however, had no prior experience in bridge design, so far as known. Hence, one wonders whether the bridge and roadway may have been designed in consultation with engineers at the Illinois Highway Commission. Robert Allerton would have had

---

[59] Bateman et al., p. 705.

[60] "Illinois County Elects to Build Brick Roads," p. 16.

[61] Clark, sec. 8, p. 41.

some familiarity with the Highway Commission, at least tangentially, through his participation in the funding of the "State Aid Road" leading southwest of Monticello. The Allerton Park Sangamon River Bridge certainly bears a close resemblance to contemporary spans designed by state engineers, albeit being somewhat more elegant in respect to its slight arch (or "humpback") profile and more pronounced railing posts. The bridge admittedly was less graceful than the arched spans built by F. W. Matthiessen at Deer Park, but it also had a decidedly different function—being intended for general vehicle traffic and connected to the public road system, as opposed to being used for pedestrian and light vehicle traffic within a private park.

By the 1980s, the concrete and reinforcement bars on the bridge were showing sufficient deterioration for the University of Illinois to implement an on-going monitoring program on the structure. Hanson Engineers, Inc. conducted an initial engineering investigation in 1985, at which time it was determined that the bridge was reaching the end of its normal useful life span. Hanson subsequently was retained to carry out yearly assessments on the span.[62] Formal reports were prepared in 1988 and 1990 to supplement that done in 1985, and these eventually were submitted to the Illinois Department of Transportation's Bureau of Bridge and Structures for comments in 1991. Based on these findings, it was recommended that the bridge be replaced as opposed to rehabilitated—a recommendation ultimately accepted by the University of Illinois.

Upon reviewing the University's request to replace the bridge, the Illinois Historic Preservation Agency determined that the span was a contributing structure in a potential Allerton Park Historic District, and was eligible for listing on the National Register of Historic Places under Criterion C. The IHPA requested the University to "explore all feasible and prudent alternatives taking into account the important elements of hydrology, lane width, and matching architectural style." In respect to design guidance, the Agency also recommended that "any proposed alternative which includes rehabilitation or replacement of the existing bridge should attempt to match architectural features and materials present."[63]

The Allerton Park Sangamon River Bridge was closed off to vehicle and pedestrian access in 2001, and fencing was erected across both ends of the span. The bridge was cited as a contributing resource to the Robert Allerton Estate Historic District

[62] Hanson Engineers, "Allerton Bridge and Roadway Replacement Project," Illinois Transportation Enhancement Program Nomination Form prepared for the University of Illinois at Urbana-Champaign (1993), pp. 2, 3a, 7.

[63] Thedore W. Hild, Deputy State Historic Preservation Officer to University of Illinois at Urbana-Champaign Office of Facility Planning and Management, 6 December 1991 (IHPA log number 01112691).

when the property was nominated to the National Register of Historic Places in 2006.[64]

Part II. ENGINEERING INFORMATION

A. General Statement: The Allerton Park Sangamon River Bridge is a four-span, through-girder, reinforced-concrete bridge measuring 234' in length and 19'-5" in width. The bridge spans the Sangamon River as well as a secondary outlet for Wildcat Creek. The principal decorative features on the bridge are its paneled side railings, which terminate at posts with capstones. In respect to its basic design, the bridge resembles many of the through-girder, reinforced-concrete spans constructed under the guidance of the Illinois Highway Commission in the 1910s. Unlike those state-designed spans, however, the profile of the Allerton Park Sangamon River Bridge is slightly arched (or "hump backed") rather than straight and the railing posts are given greater prominence. These elements lend the bridge a modest elegance befitting the country estate with which it was associated. For reference, see the plans attached below as Figure 3.

B. Structural Description: The through girders, which are the distinguishing feature of this bridge type, are of reinforced concrete (employing square rebar) and measure 1'-8" square. The girders have tapered "shoulders" where they intersect the abutments and piers. Their bottom edges have a 1-½" chamfer.

The bridge deck is a 6"-thick reinforced concrete slab measuring 16'-1" wide between the girders. The top of the deck is paved with a concrete wearing surface. The wearing surface varies in thickness from 4" to ½", being the thickest in the center of the roadway and thinning down towards the curbs. The tapered surface directed rainwater away from the center of the roadway towards a line of weep holes along its edges. The wearing surface is scored with regularly spaced grooves (approximately 4" on center) to facilitate traction. The curbs bordering the roadway are 6" wide and have a 1" chamfered edge.

Reinforced concrete railings measuring 1'-11" wide and 4'-½" tall border the eastern and western sides of the bridge deck. The railing are solid but are punctuated with regularly spaced, recessed panels on their inner and outer sides—seven panels per span. The outside panels are larger than those on the interior (3' tall vs. 1'-2-½"). The top of the railings extend ½" beyond the surface below them, creating the appearance of a coping and providing further relief to the railing section. The railings terminate at concrete posts, of which there are two at each end of the bridge. The corner posts are paneled on three sides and topped with a concrete capstone.

The bridge span is supported by three poured-concrete piers set 58'-0" on center from one another. The piers measure 3'-1" wide at the top and have battered sides that widen out

[64] Clark, sec. 7, p. 14.

1"-in-12." The ends of the piers have nosings, both upstream and down. The footings on which the piers rest are obscured by the river and sediment.

The bridge has poured concrete abutments at each end. The abutment breastwalls measure 2'-7" thick while the wingwalls are 1'-8" thick. The wingwalls flare back from the breastwalls for a distance of 23'-6". The top of the wingwalls are angled downward.

The roadway extending either side of the bridge is asphalt, but this surface is applied over a layer of brick which represents the original road surface from 1915-1916. No subsurface testing of the roadway was conducted as part of the IL HAER documentation. An assessment of the roadway's structure was based on a geotechnical survey conducted in September 2010, which involved nine test borings at different points along the road. The geotechnical survey report suggests that the brick was laid on an aggregate base consisting primarily of sand and gravel, with cinders possibly used in some areas. Oddly, the boring charts attached to the report make no mention of the brick pavement itself (despite clearly delineating the bituminous pavement); however, they do mention brick fragments as having been recovered. No poured concrete appears to have been encountered during the borings, which would suggest that the Allerton Road did not have a poured concrete base, in contrast to the State Aid Road leading southwest of Monticello (to which it was connected), which reportedly did have such a base.[65]

C. Site:

1. General Setting and Orientation: The Allerton Park Bridge crosses the Sangamon River in a northwest-by-southeast direction approximately one-quarter mile east of the Allerton Mansion. The bridge is located along a paved lane that connects Old Timber Road (on the north) and Allerton Road (on the south), which run parallel to one another on opposite sides of the Sangamon River. This section of the Sangamon flows through a wooded valley over one-quarter mile wide and bordered by bluffs 80-100' high. In the vicinity of the bridge, the river hugs the southern bluff line, leaving a broad stretch of bottomland between the bridge crossing and bluffs to the north. Due to the breadth of the bottomland, the northern approach to the bridge is made via a raised roadbed, or causeway, roughly 1,600' in length. This causeway allowed to the bridge to remain open during periods of seasonal flooding along the Sangamon. Wildcat Creek descends from the bluffs into the bottoms immediately east of the northern end of the causeway and winds its way through the bottoms to the Sangamon. A secondary channel of the creek runs parallels to the causeway and joins the river at the bridge site. The Allerton Park Bridge is located approximately four miles southeast of Monticello, the county seat of Piatt County.

[65] Testing Service Corporation, "Geotechnical Recommendations: Allerton Park—Bridge Replacement and Roadway Improvements," report prepared for Hanson Professional Service (2010).

2. Historic Landscape Design: Given its utilitarian function and isolation, the bridge lacks the formal landscape design characteristic of the grounds immediately surrounding the Allerton Mansion. However, certain landscape elements are associated with the bridge, the most prominent of these being the long causeway on the northern approach to the bridge. The causeway rises 8' to 10' above the surrounding floodplain and provides a surface for a roadway approximately 20' wide. The road originally was paved with hard-pressed, red brick and later was resurfaced with asphalt (leaving the original paving brick in place). A certain amount of grading and ditching also was required for the section of roadway on the southern end of bridge, where it surmounts the bluffs. A substantial poured-concrete culvert is located southeast of the bridge. The culvert is rectangular in section and has curved retaining walls on each end. The retaining walls have stepped parapets that rise slightly above the level of the road deck and serve as railings. In terms of its basic structure, the culvert reflects contemporary design standards followed by the Illinois State Highway Department (see Supplemental Material S-16), though is more substantial. Immediately south of the culvert, the road is lined with Norway spruce[66] to create the effect of an allée. Conifers also were used to similar effect elsewhere on the Allerton Estate.[67]

Another landscape feature of note in the vicinity of the bridge is a control dam, located on the east side of the causeway leading to/from the bridge. Constructed of poured concrete, the dam helped regulate the flow of the secondary channel of Wildcat Creek along its lower course. The spillway in the center of the dam is flanked by two large piers. Each of the piers has vertical slot on the side facing onto the spillway, which were used to secure the ends of planking used (as needed) to raise the height of the pool behind the dam.

PART III. SOURCES OF INFORMATION

A. Original Architectural Drawings: No original drawings of the bridge are known to exist.

B. Early Views: No early views of the bridge were found.

C. Interviews: None were conducted.

D. Bibliography:

1. Primary and Unpublished Sources:

---

[66] The species of trees is cited in 1951 publication on Robert Allerton Park published by the University of Illinois (University of Illinois, *Robert Allerton Park, Monticello, Illinois* [Urbana: University of Illinois Press, 1951]).

[67] See Thompson, p. 18.

"A Concrete Railroad Bridge." *Traction and Transmission*, Vol. X:242-247 (1904).

"Annual Convention Illinois Society of Engineers and Surveyors." *Engineering-Contracting*, 22 January 1908:63-64.

"Combined Concrete Arch Bridge and Concrete Dam." *Engineering News* 77, no. 10 (1917):377.

"Concrete Bridges with Through Arches." *Engineering News* 77, no. 7 (1917):272-273.

"Concrete Bridges Replace Steel in Illinois," *American Motorist*, September 1912: 701-702.

Enscore, Susan. "Guide to the University of Illinois' Documentation Related to the Allerton Family and Robert Allerton Park and Conference Center." 1991 (Available at http://www.library.illinois.edu/archives/guides/allerton/allertonguide.pdf.)

Hale, C. D. Design and Construction Details of a Long Concrete Arch Bridge." *Engineering News* 77, no. 10 (1917):377-379.

"Illinois County Elects to Build Brick Roads." *Dependable Highways* 4, no. 1 (1917):16.

Hanson Engineers. "Allerton Bridge and Roadway Replacement Project." Illinois Transportation Enhancement Program Nomination Form prepared for the University of Illinois at Urbana-Champaign. 1993.

Illinois Transportation Enhancement Program. "Allerton Bridge and Roadway Replacement Project." 1993.

Illinois Highway Commission. *First Annual Report of the Illinois Highway Commission for the Year 1906.* Springfield, 1907.

Illinois State Highway Department. *Fifth Annual Report of the Illinois State Highway Department for the Years 1913, 1914, 1915, and 1916.* Springfield, 1917.

"The Concrete Bridge of the Illinois Central Railroad Over the Big Muddy River." *Municipal Engineering (Index)*, Vol. XXVI, No. 3: 152-155 (1904).

"The Illinois and Mississippi Canal Lock Works." *Engineering News* Vol.XXXIII, No. 7:98-102 (1895).

2. Secondary and Published Sources:

"Arthur N. Johnson." http://www.ite.org/aboutite/honorymembers/JohnsonAN.asp.

Bateman, Newton, Paul Selby, and Francis M. Shonkwiler (editors). *Historical Encyclopedia of Illinois and History of Piatt County*. Chicago: Munsell Publishing Company, 1917.

Bogart, Ernest Ludlow and John Mabry Mathews. *The Modern Commonwealth 1893-1918*. Volume Five of *The Centennial History of Illinois*. Springfield: Illinois Centennial Commission, 1920.

Bridgehunter.com

Carver, Martha. *Tennessee's Survey Report for Historic Bridges* Nashville: Tennessee Department of Transportation, 2008.

Clark, Jean Guarino. National Register of Historic Places Nomination Form for the Robert Allerton Estate Historic District, 2006.

Coney, William B. and Barbara M. Poasdas. "Concrete in Illinois: Its History and Preservation." *Illinois Preservation Series* No. 8. Springfield: Illinois Historic Preservation Agency, 1987.

"Ernest L. Ransome." http://en.wikipedia.org/wiki/Ernest_L._Ransome.

Glanville, Abigail M. "Conde B. McCullogh's Oregon Bridges: A Typological Study of the Designs and the Preservation of His Legacy." 2009.

"Historical Timeline of Concrete." Available at http://fp.auburn.edu/heinmic/ConcreteHistory/Pages/timeline.htm.

Ketchum, Milo S. *The Design of Highway Bridges of Steel, Timber and Concrete.* New York: McGraw-Hill Book Company, 1920.

National Park Service. "Allerton Natural Area." Available at http://www.nature.nps.gov/ nnl/site.cfm?Site=ALLE-IL.

Radford, William. *Cement and How to Use It.* Chicago: The Radford Architectural Company, 1910.

Thompson, Steven A. "Historical Resources Survey and Evaluation of the University of Illinois at Urbana-Champaign's Allerton Related Properties." Prepared for Office for Planning, Design, and Construction, University of Illinois at Urbana-Champaign, 2002.

University of Illinois. *Robert Allerton Park, Monticello, Illinois*. Urbana: University of Illinois Press, 1951.

Wermeil, Sara E. "California Concrete, 1876-1906: Jackson, Percy, and the Beginnings of Reinforced Concrete Construction in the United States." Proceedings of the Third International Congress on Construction History, Cottbus, May 2009.

"William E. Ward House." Available at http://en.wikipedia.org/wiki/ William_E._Ward_House.

E. Likely Sources Not Yet Investigated:

There is a wealth of primary information related to Allerton Park on file at the Robert Allerton Park and Conference Center and on the University of Illinois at Urbana-Champaign campus, being distributed between multiple offices/departments at each facility. These records include photographs, architectural and engineering drawings, correspondence, newspaper clippings, and other materials. The majority post-dates the University's acquisition of Allerton Park in 1946, though some do date from Robert Allerton's period of ownership. A review of the inventory compiled by Susan Enscore in 1991 found no specific mention of original drawings, *early* photographs, or construction-related correspondence concerning the bridge over the Sangamon River. Some may exist, however, being "buried" within larger collections. For example, there is a map case in the Program Director's Office at Allerton Park and Conference Center that Enscore describes as having sixteen drawers containing "hundreds of map and drawings (originals and copies) relating to the Allerton House, Robert Allerton Park and the 4-H Memorial Camp."[68] There also is a collection of "Historical Photos" on file at the Superintendent's Office at Allerton Park containing over 200 images taken between circa 1915 and the 1970s. The bridge is not specifically mentioned, though it is perhaps featured in some of the scenes generically

[68] Enscore, p. 74.

classified as “woodlands.”[69] An on-line copy of Susan Enscore’s “Guide to the University of Illinois’ Documentation Related to the Allerton Family and Robert Allerton Park and Conference Center” can be found at: http://www.library.illinois.edu/archives/ guides/allerton/allertonguide.pdf

The records of the Illinois State Highway Department might also contain some correspondence regarding, or reference to, the construction of the Allerton Park Sangamon River Bridge. These records are on file at the Illinois State Archives in Springfield.

Another avenue of research that could be pursued is local newspapers in Piatt County, particularly those published in Monticello. Given Robert Allerton’s prominence, there is little doubt that the local press would have reported on the construction of his bridge over the Sangamon River and related roadwork. These articles quite possible would identify the architect/engineer and contractors involved in the bridge project.

F. Supplemental Material: Supplemental materials illustrating comparable through-grider concrete bridges have been attached to the IL-HAER documentation package

PART IV. METHODOLOGY OF RESEARCH

A. Research Strategy: The history and physical development of Allerton Park has been the subject of several recent studies, most notably a historic resources survey and evaluation competed by Steven A. Thompson in 2002 and the National Register of Historic Places nomination prepared by Jean Guarino Clark in 2006. The Allerton Park Sangamon River Bridge also has been the subject of multiple structural inspection reports since 1985 (1985, 1988, 1990, 1991, and 1993), through the course of which scaled plan, elevation, and section drawings of the bridge had been prepared. The research strategy adopted for the IL-HAER documentation called for the documentation to rely upon these previous studies (both historical and engineering), but also to supplement them in respect to photographs and historical context. In respect to the historical context, the IL-HAER documentation was to address three main areas: 1) a brief chronological context on the origins, development, and function of the Allerton estate; 2) a history on the construction, maintenance, and use of the Allerton Park Sangamon River Bridge; and 3) a discussion of early-twentieth-century reinforced-concrete through-girder bridges, with some discussion regarding other privately constructed bridges contemporary with that at Allerton Park.

B. Actual Research Process: The first step in the research process involved obtaining copies of previous reports pertaining to Allerton Park, specifically ones addressing

[69] Ibid, p. 70.

the bridge over the Sangamon. Engineering studies and drawings of the bridge and surrounding site were obtained through Hanson Professional Services, Inc. Copies of Thomson and Clark's reports on Allerton Park also were obtained; these ultimately served as the principal sources of information on Robert Allerton and the development of Allerton Park used in preparing the historical context component of the of the IL HAER documentation.

A field visit to the bridge was made by Fever River Research personnel in December 2, 2010. At this time, digital images were taken of the bridge, roadway, and associated features nearby (i.e. a culvert and control dam). General views of the surrounding site also were taken. Particular emphasis was placed on views capturing the architectural and structural character of the bridge. A total of 103 digital images were taken, from which a select number ultimately were chosen for inclusion with the IL HAER submittal. No measurements of the bridge were required on account of drawings of the span having already been drawn in previous engineering studies.

Although much was known of Robert Allerton and the development of his rural estate, relatively little known was known about the bridge he had built across the Sangamon or the broader context of its construction. Research found several contemporary references to Allerton's bridge project, including one in the 1916 publication *Dependable Highways* and another in a 1917 history of Piatt County (both discussed above in Section I.B.5). Both of these sources established a clear connection between the bridge's construction and the development of a system of hard roads in Piatt County, which was part of a larger movement towards improved roads and bridges in Illinois during this period. In order to place the Allerton Park Bridge and associated roadway within their proper context, annual reports of the Illinois Highway Commission were consulted, as were a number of trade magazines, including *Engineering-Contracting*, *Dependable Highways*, and *American Motorist*. Research also was directed towards presenting a general history of reinforced-concrete construction in the late nineteenth and early twentieth centuries.

Another avenue of research pursued during the project involved an assessment of the prevalence and character of through-truss, reinforced-concrete bridges in Piatt County, in Illinois, and regionally. Several databases/inventories were used in this regard, one of these being the Illinois Department of Transportation's (IDOT) Historic Bridge Survey, which was completed in 1990 and includes some 350 bridges around the state. Lists of concrete bridges previously documented under the auspices of the Historic American Engineering Record (administered by the National Park Service) and the Illinois Historic Engineering Record (administered by the Illinois Historic Preservation Agency) also were consulted. The search of bridges documented under the national HAER program was conducted through the Library of Congress's website (http://memory.loc.gov/ammem/

collections/habs_haer/). Several other websites also were used during the bridge research. Bridgehunter.com, in particular, proved useful in that it allows searches based on location, bridge type, and/or material of construction. HistoricBridges.org. Another website consulted for context was http://okbridges.wkinsler.com/technology/.

C. Archives and Repositories Used: Much of the research for the IL HAER documentation was web based. The Library of Congress's "American Memory" web site provided access to HAER documentations previously done on other bridges. These materials can be accessed at: http://memory.loc.gov/ammem/collections/habs_haer/. Google Books (http://books.google.com/) also proved to be a convenient search engine for researching the Allerton Park Sangamon River Bridge specifically, but also contemporary through-girder concrete bridge construction in Illinois. Scanned copies of a number of the primary sources used in the IL HAER documentation are available on line via Google Books, including the annual reports of the Illinois Highway Commission.

D. Research Staff:

1. Primary Preparer: The written HAER documentation form was prepared principally by Christopher Stratton, a research historian with Fever River Research. Tim Simandl prepared those portions of the historical context related to Robert Allerton and the history of Allerton Park.

2. Photographer: The images of the Allerton Bridge showing existing conditions were taken by Floyd Mansberger of Fever River Research. A Nikon D40 camera with a 6.1 megapixel resolution was used. Photographs were printed on Sappi 100-pound glossy card stock.

3. Delineator: The elevation, plan, and section views of the bridge attached to the IL-HAER documentation package were prepared by Hanson Professional Services, Inc. in a previous study they conducted in 1985.[70]

4. Additional Staff: All aspects of this project were carried out under the direct supervision of Mr. Floyd R. Mansberger, principal investigator, Fever River Research, Inc., P. O. Box 5234, Springfield, Illinois, 62705.

PART V. PROJECT INFORMATION

This Illinois Historic American Engineering Record (IL HAER) project was undertaken to mitigate the impacts of the Allerton Bridge and Roadway Replacement Project. In 1985, Hanson

[70] Hanson Engineers, "Structural Investigation, Bridge Over the Sangamon River, Allerton Park, University of Illinois" (1985).

Engineers conducted a structural investigation of the Allerton Bridge and determined that this structure was nearing the end of it "normal useful life span." Discussions regarding the replacement of the Allerton Bridge and Roadway were initiated by the University of Illinois with the Illinois Department of Transportation as part of an Illinois Transportation Enhancement Program project in July 1993. As part of the state review process, as per Section 707 of the Illinois State Historic Resources Preservation Act (20 ILCS 3420), this project was reviewed by the Illinois Historic Preservation Agency. At that time, the historical significance of the bridge was brought to the attention of the University of Illinois, and a draft Memorandum of Agreement between the Board of Trustees of the University of Illinois, the Capital Development Board (State of Illinois), and the Illinois Historic Preservation Agency's Preservation Services Division concerning the demolition of the Allerton Park Sangamon River Bridge was drawn up, but never signed. This subject memorandum of agreement outlined a strategy for mitigating the impact of the proposed demolition and replacement of the bridge and its associated roadway with the preparation of an IL-HAER documentation package. On August 6th, 2010 a proposal from Fever River Research (Springfield) was submitted to Hanson Professional Services to conduct a Level III IL-HAER documentation package for the Allerton Bridge, as outlined in the draft memorandum. A contract with Hanson Professional Services for this work was signed on October 25th, 2010. Fieldwork for the project was undertaken in December 2010. In mid-May, 2011 digital photographs were submitted to the IHPA for review, and a "Conditional Clearance" for the demolition of the structure was requested (and obtained). The attached report was subsequently written in the spring and summer 2011, with a 95% draft submitted to Hanson Professional Services (and the Illinois Historic Preservation Agency) in late July 2011. A letter from the IHPA, accepting the 95% draft submittal, was received on July 28, 2011.

During the spring 2011, prior to the completion of the IL HAER document, the project came under federal review, in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, and Section 404 of the Clean Water Act of 1972 (33 U.S.C. 1344). In July 2011, a Memorandum of Agreement between the University of Illinois—Allerton Park and Retreat Center, the U.S. Army Corps of Engineers, and the Illinois Capital Development Board was prepared and signed. This document outlined the mitigation efforts drawn up in the earlier draft MOA, which included the need for the IL HAER document. A 100% IL HAER document was submitted to the IHPA in early September 2011.

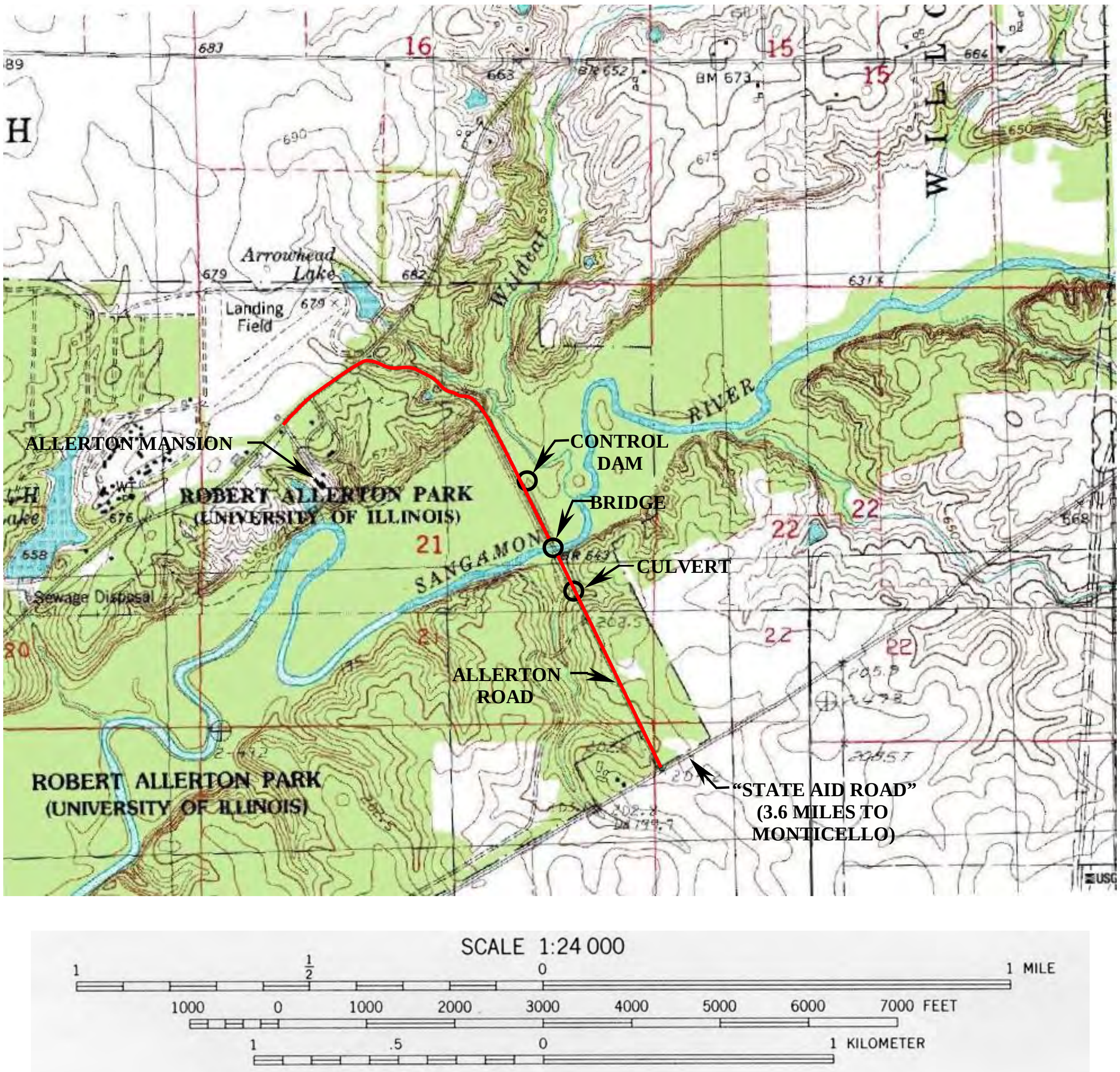


Figure 1. United States Geological Survey (USGS) map showing the location of the Allerton Park Sangamon River Bridge, Allerton Road (outlined in red), and related features (Weldon East Quadrangle, 1979; Cerro Gordo Quadrangle, 1983).

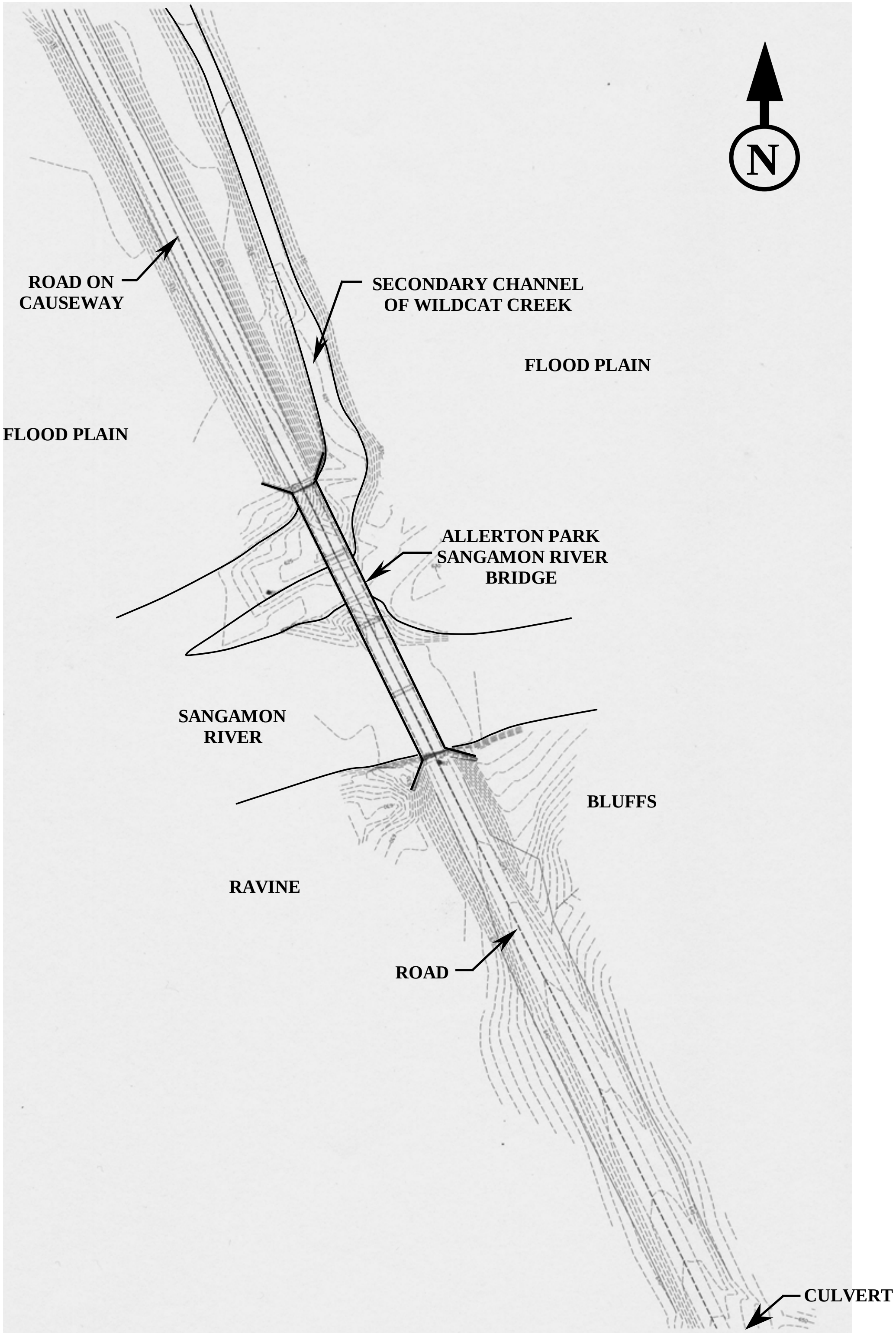


Figure 2. Site plan area around the Allerton Park Sangamon River Bridge (Topographic map prepared by Hanson Professional Services, Inc.).

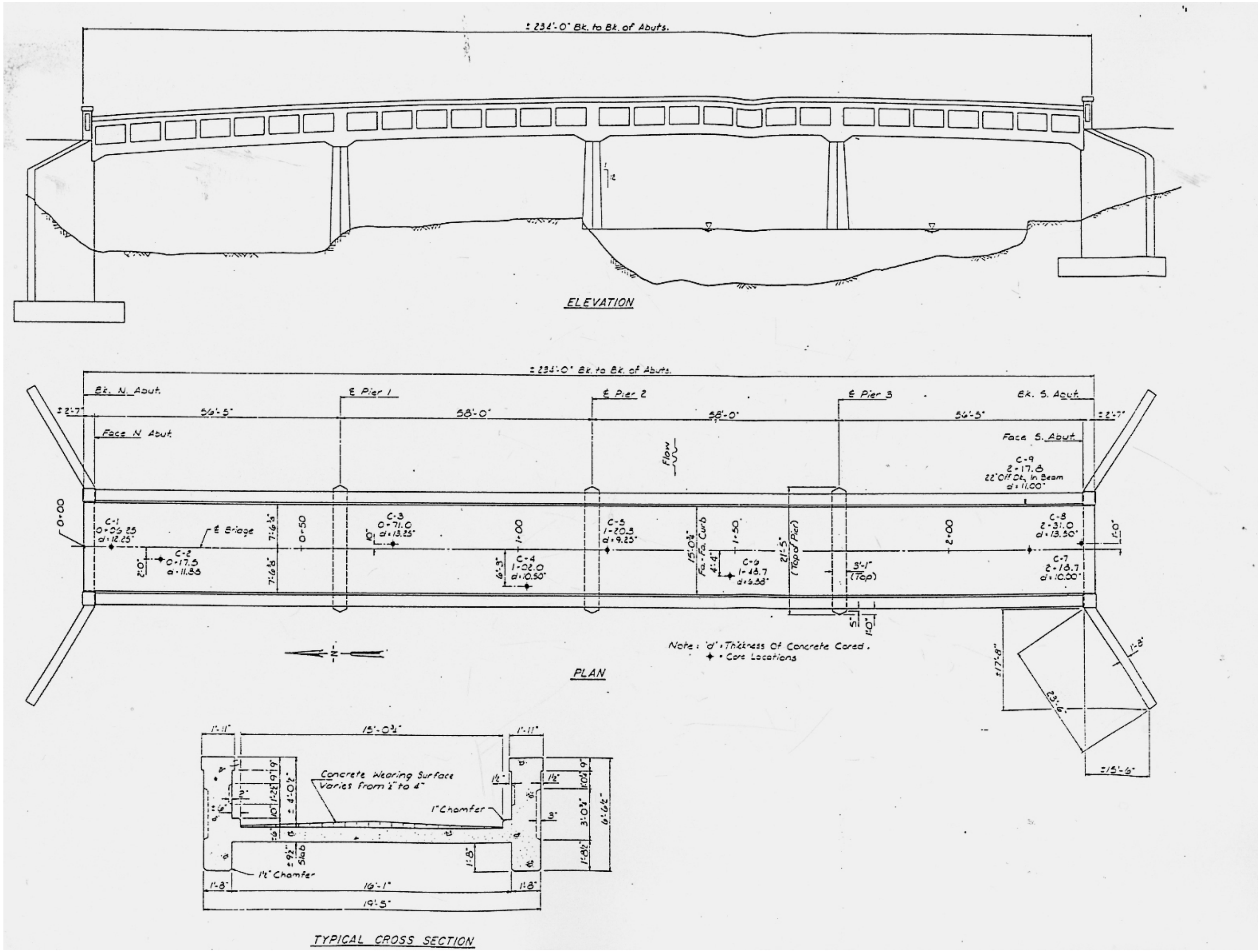


Figure 3. Elevation, plan, and sectional views of the Allerton Park Sangamon River Bridge (Hanson Engineers, Inc. 1993).

INDEX TO SUPPLEMENTAL MATERIALS

Allerton Park Sangamon River Bridge IL HAER No. PI-2009-1
Robert Allerton Park
Section 21
Township 18 North, Range 5 East
Willow Branch Township
Piatt County
Illinois

PI-2009-1-S1 Plan for a reinforced concrete girder bridge of 15' length designed by the Illinois Highway Commission.[1] This plan was included in the commission's first annual report (for 1906), published in 1907. The solid railings with recessed panels shown on this bridge would remain a standard feature on state-designed concrete bridges over the next three decades.

PI-2009-1-S2 Plan for a reinforced concrete girder bridge of 30' length designed by the Illinois Highway Commission. This plan was included in the commission's first annual report (for 1906), published in 1907. The solid railings with recessed panels shown on this bridge would remain a standard feature on state-designed concrete bridges over the next three decades, as would the "posts" at the ends of the railings.

PI-2009-1-S3 Photograph of a representative "Type of Illinois Concrete Bridge" constructed in years preceding World War I. The name/location of the bridge depicted is not known, but it has through-girders and appears to be at least 60' in length. It follows the standard design promoted by the Illinois Highway Commission. The photograph was included in a 1912 article entitled "Concrete Bridge Replace Steel in Illinois" published by the *American Motorist*.

PI-2009-1-S4 Plans for a reinforced concrete through-girder bridge with a 65' span and 20' roadway designed by engineers with the Illinois State Highway Department.[2] The date of these plans is not known, though they are suspected to date to circa 1920. The basic design of the bridge illustrated is identical to that formulated during the early years of the Illinois Highway Commission.

---

[1] Illinois Highway Commission, *First Annual Report of the Illinois Highway Commission for the Year1906* (Springfield, 1907), p. 60, fig. 17.

[2] Milo S. Ketchum, *The Design of Highway Bridges of Steel, Timber and Concrete* (New York: McGraw-Hill Book Company, 1920), p.358, fig. 12.

PI-2009-1-S5 Typical standard plan of reinforced concrete abutments for girder bridges (with cantilever type wings) used by the Illinois Highway Department during the 1910s.[3] This was part of a set of standard bridge plans developed by the department to streamline design work and cost estimates.

PI-2009-1-S6 Plans for a reinforced concrete through-girder bridge designed by the Wisconsin Highway Commission early in the twentieth century.[4] The bridge presented is very similar to those designed by the Illinois State Highway Department.

PI-2009-1-S7 Plans for a reinforced concrete through-deck girder bridge designed by the Wisconsin Highway Commission early in the twentieth century.[5]

PI-2009-1-S8 Plans for a continuous reinforced concrete girder-bridge, early twentieth century.[6]

PI-2009-1-S9 Plans for a concrete girder bridge designed by the Michigan State Highway Department early in the twentieth century.[7]

PI-2009-1-S10 (TOP) Spring Road Bridge, spanning the Mazon River in rural Grundy County, Illinois. Constructed in 1910, this reinforced concrete through-girder bridge has three spans, is 162' long, and has a 15'-wide road deck.[8] (BOTTOM) Cumberland Road Bridge, spanning the Embarras River Overflow in rural Cumberland County, Illinois. This reinforced concrete through-girder bridge was built in 1920 by the State of Illinois with federal aid. It is 86' long and has two spans.[9]

PI-2009-1-S11 Two examples of shorter reinforced concrete through-girder bridges in Illinois. (TOP) Gay Creek Bridge in rural Iroquois County. This bridge was built in 1920 and measures nearly 48' long. It is approached by a "half slab" road, whose center section is paved with concrete and

---

[3] Illinois State Highway Department, *Fifth Annual Report of the Illinois State Highway Department for the Years 1913, 1914, 1915, 1916* (Springfield, 1917), p. 79, fig. 6.

[4] Ketchum, p.356, fig. 10.

[5] Ibid, p. 355, fig. 9.

[6] Ibid, p. 364, fig. 16.

[7] Ibid, p. 357, fig. 11.

[8] Bridgehunter.com, "Spring Road Bridge," photo by Bill Burmaster (March 2006), http://bridgehunter.com/il/grundy/spring-road/.

[9] Bridgehunter.com "Cumberland Road Bridge," photo by Robert Stephenson (September 2007), (http://bridgehunter.com/il/cumberland/bh36808/).

accommodates a single lane of traffic. When passing oncoming traffic, vehicles are expected to drive on the gravel shoulders. The road is suspected to be contemporary with the bridge.[10] (BOTTOM) Ingham Road Bridge spanning Piasa Creek in rural Jersey County. This bridge was built in 1926, jointly by Jersey County and Piasa Township. It was replaced by a modern span in 2007.[11]

PI-2009-1-S12 Circa 1904 photograph of the Illinois Central Railroad's bridge over the Big Muddy River near Carbondale.[12] Constructed in 1902-1903, this open-spandrel arch bridge had three spans and measured 574'-6" long. It replaced an earlier Pratt through-truss iron bridge built in 1888. The concrete bridge still remains in service.

PI-2009-1-S13 (TOP) Historic photograph of the Morgan Street Bridge in Rockford, Illinois while under construction in 1917. This impressive open-spandrel arch concrete bridge still spans the Rock River.[13] (BOTTOM) Historic photograph of a "rainbow arch" concrete bridge spanning the Little Wabash River at Carmi, Illinois, built in 1916. This bridge design was patented by J. B. Walsh in 1912 and features through spans in which the road deck is above the level of the spring line.[14]

PI-2009-1-S14 Historic photograph of an open-spandrel arch concrete bridge at Mattiessen State Park, La Salle County, Illinois. This bridge was built private expense by F. W. Mathiessen in 1916 to span a deep gorge at his "Deer Park" leisure grounds. The abutments of the bridge were integrated into those of an adjacent dam and were given the appearance of stratified stone.[15]

PI-2009-1-S15 Two modern views of reinforced concrete bridges at Mattiessen State Park. (TOP) View of the open-spandrel arch bridge spanning the gorge just below the dam at the park. (BOTTOM) View of a filled-spandrel arch

---

[10] Bridgehunter.com, "Gay Creek Bridge," photo by Tom Hall (March 2007), http://bridgehunter.com/iroquois/3012408948/.

[11] Bridgehunter.com, "Ingham Bridge," photo by Charles Robinson (April 2006), http://bridgehunter.com/il/jersey/ingham/.

[12] "A Concrete Railway Bridge," *Traction and Transmission*, Vol. X:Plate XXXIX (1904).

[13] C. D. Hale, "Design and Construction Details of a Long Concrete Arch Bridge," *Engineering News* Vol. 77, No. 10:378, Fig. 1 (1917).

[14] "Concrete Bridges with Through Arches," *Engineering News* Vol. 77, No. 7:272, Fig. 1 (1917).

[15] "Combined Concrete Arch Bridge and Concrete Dam," *Engineering News* Vol. 77, No. 10:377.

bridge located farther down the gorge. A concrete stairway with latticed side rails provides access between the gorge and bridge.[16]

PI-2009-1-S16 View on an open-spandrel arch concrete bridge at Multnomah Falls in Oregon. This pedestrian bridge is one of many reinforced concrete spans built along the Columbia River Highway, which was developed between 1913 and 1922.[17]

PI-2009-1-S17 Plans and bill of material table for a concrete box culvert designed by engineers with the Illinois State Highway Department, 1917. The engineers drew up eighteen different designs based on this basic culvert model to address the varying demands/desires of a given project.[18]

[16] Photos by Christopher Stratton, 1997.

[17] Photo by Christopher Stratton, August 1997.

[18] Illinois State Highway Department, *Fifth Annual Report of the Illinois State Highway Department for the Years 1913, 1914, 1915, 1916* (Springfield, 1917), p. 76, fig. 5.

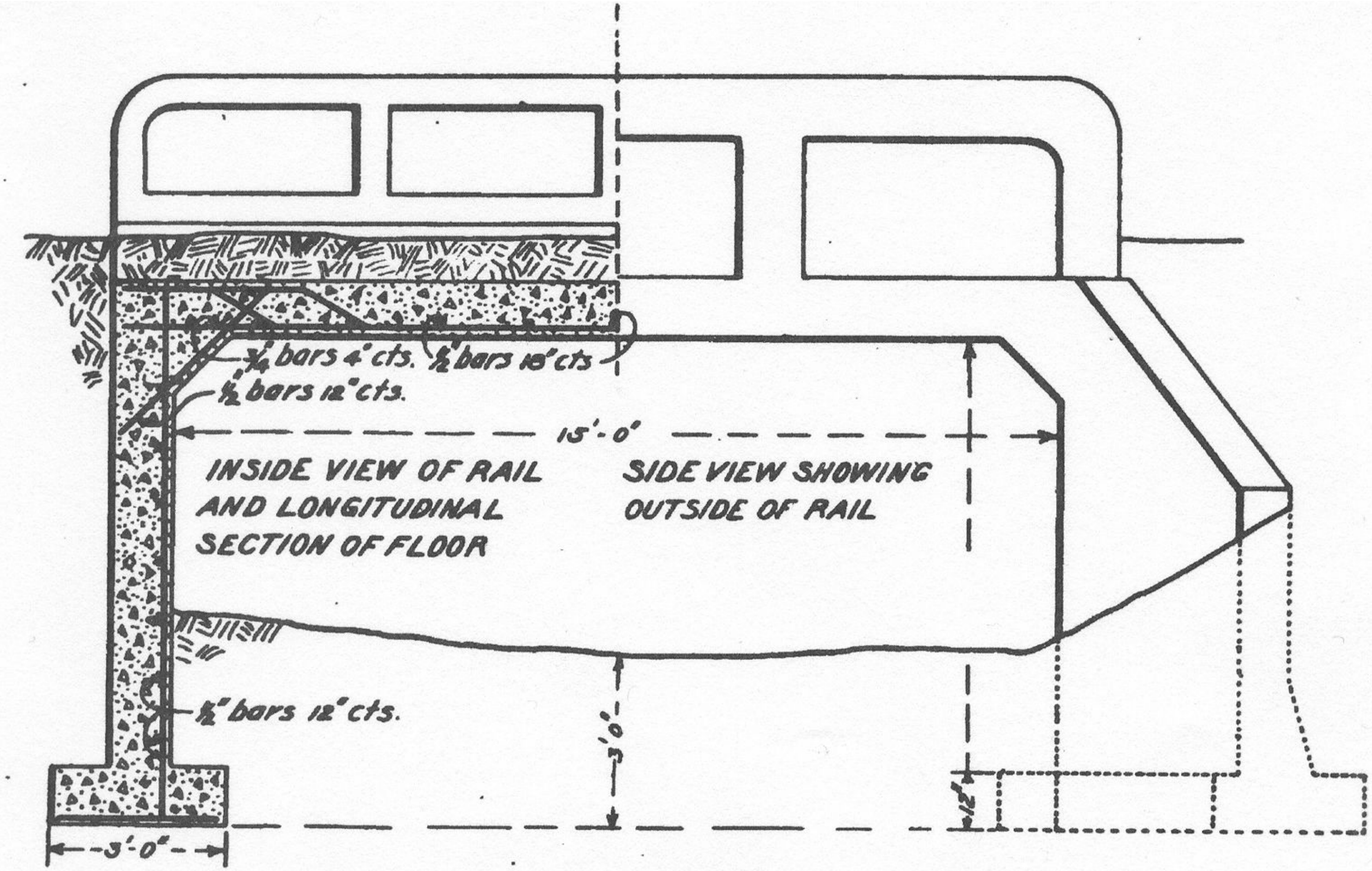


FIG. 16. Reinforced concrete bridge, 15 foot span.

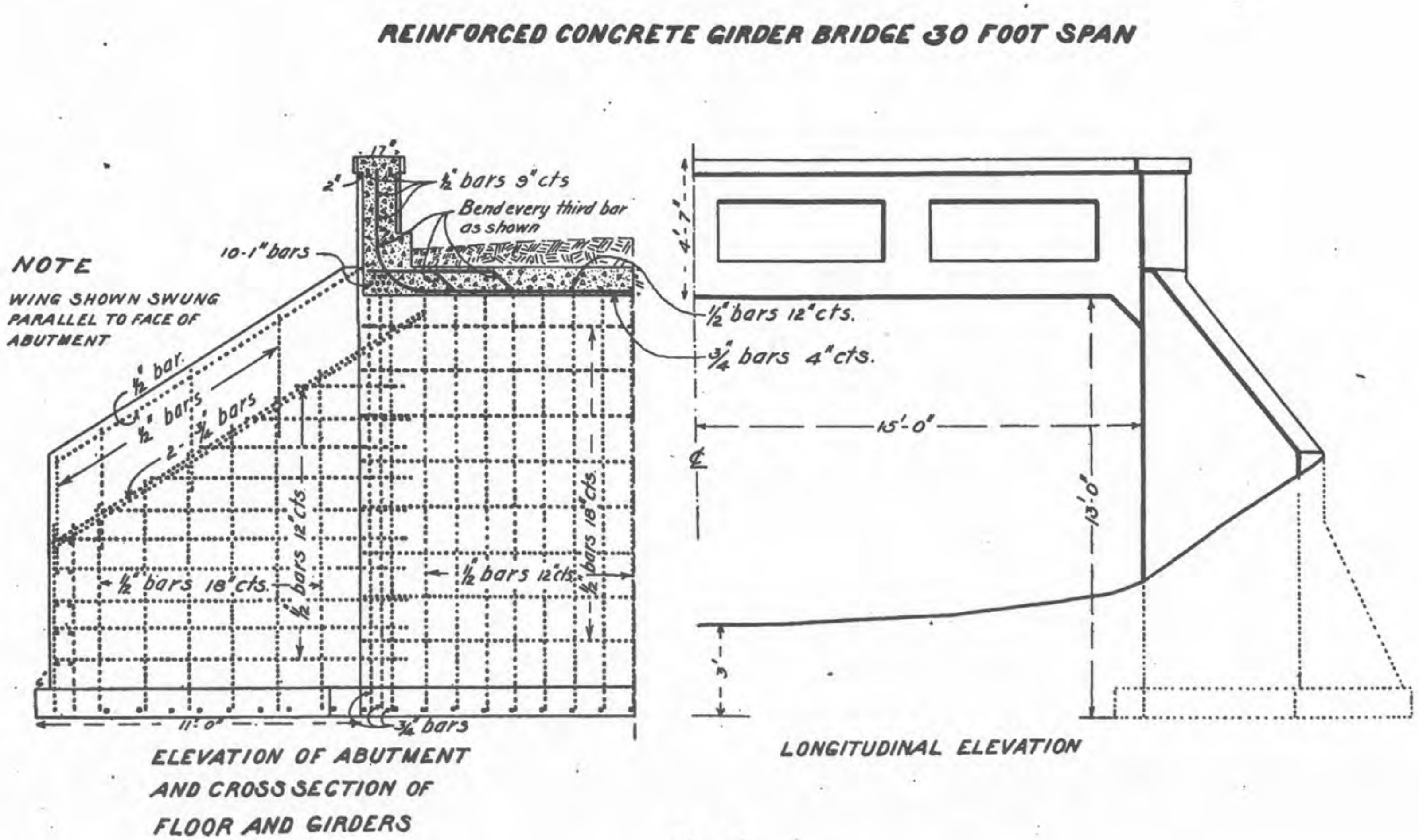
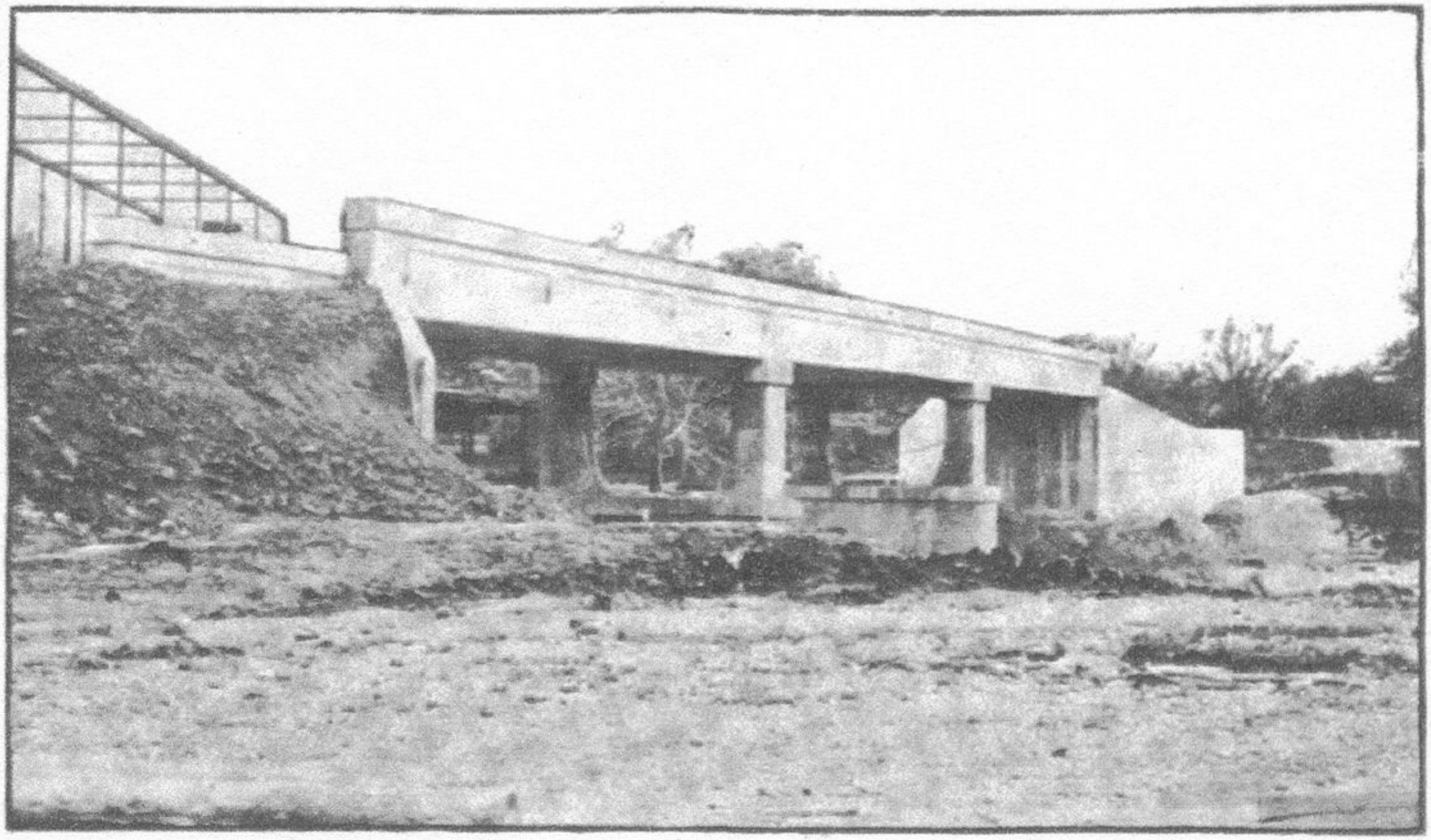
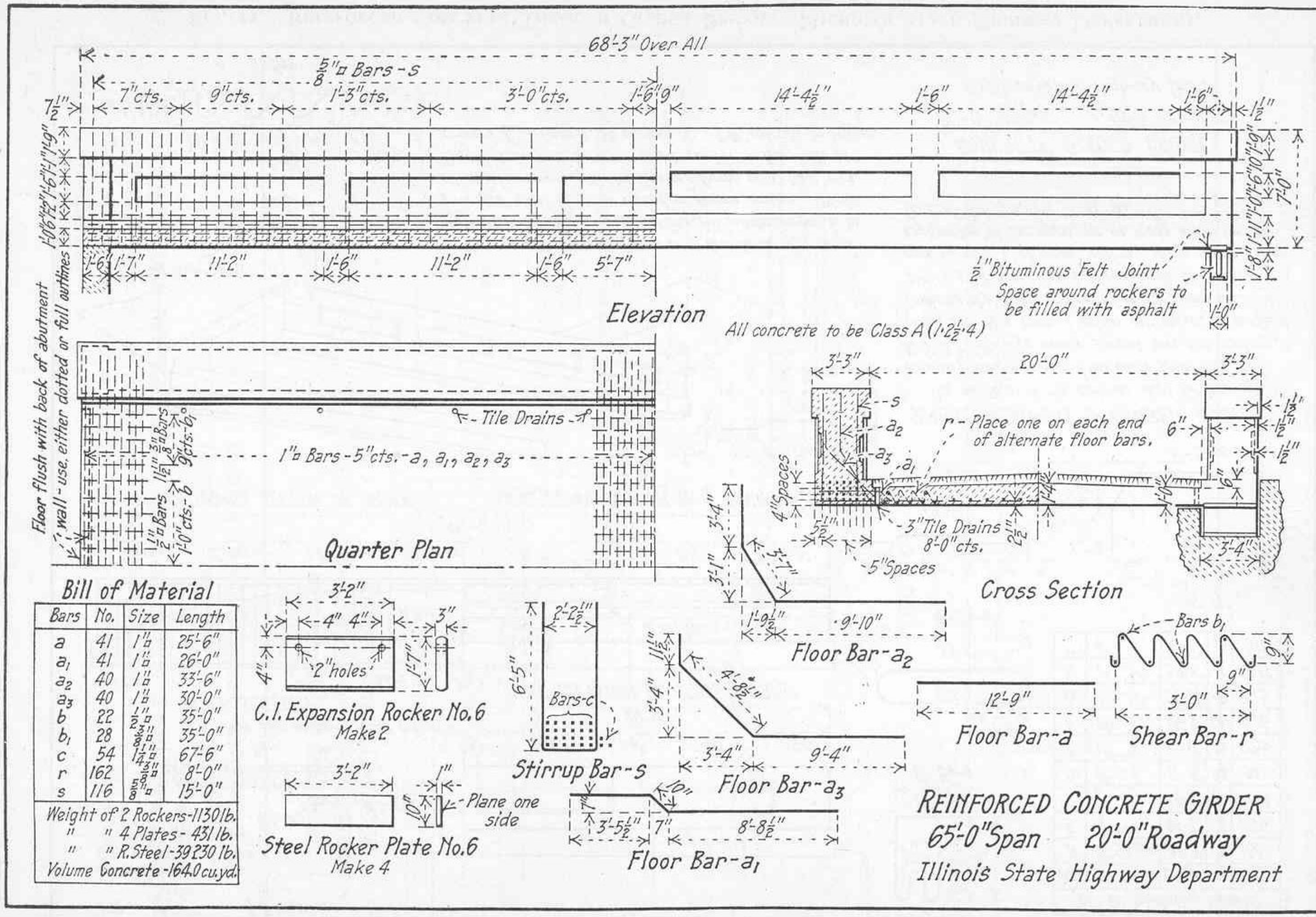

REINFORCED CONCRETE GIRDER BRIDGE 30 FOOT SPAN
NOTE
WING SHOWN SWUNG PARALLEL TO FACE OF ABUTMENT
17"
2"
½" bars 9" cts
Bend every third bar as shown
10-1" bars
½" bar.
½" bars
2-¾" bars
½" bars 12" cts
½" bars 18" cts.
½" bars 12" cts.
½" bars 18" cts.
11'-0"
¾" bars
½" bars 12" cts.
¾" bars 4" cts.
4'-7"
15'-0"
13'-0"
3'
ELEVATION OF ABUTMENT AND CROSS SECTION OF FLOOR AND GIRDERS
LONGITUDINAL ELEVATION

Fig. 17.



Type of Illinois Concrete Bridge

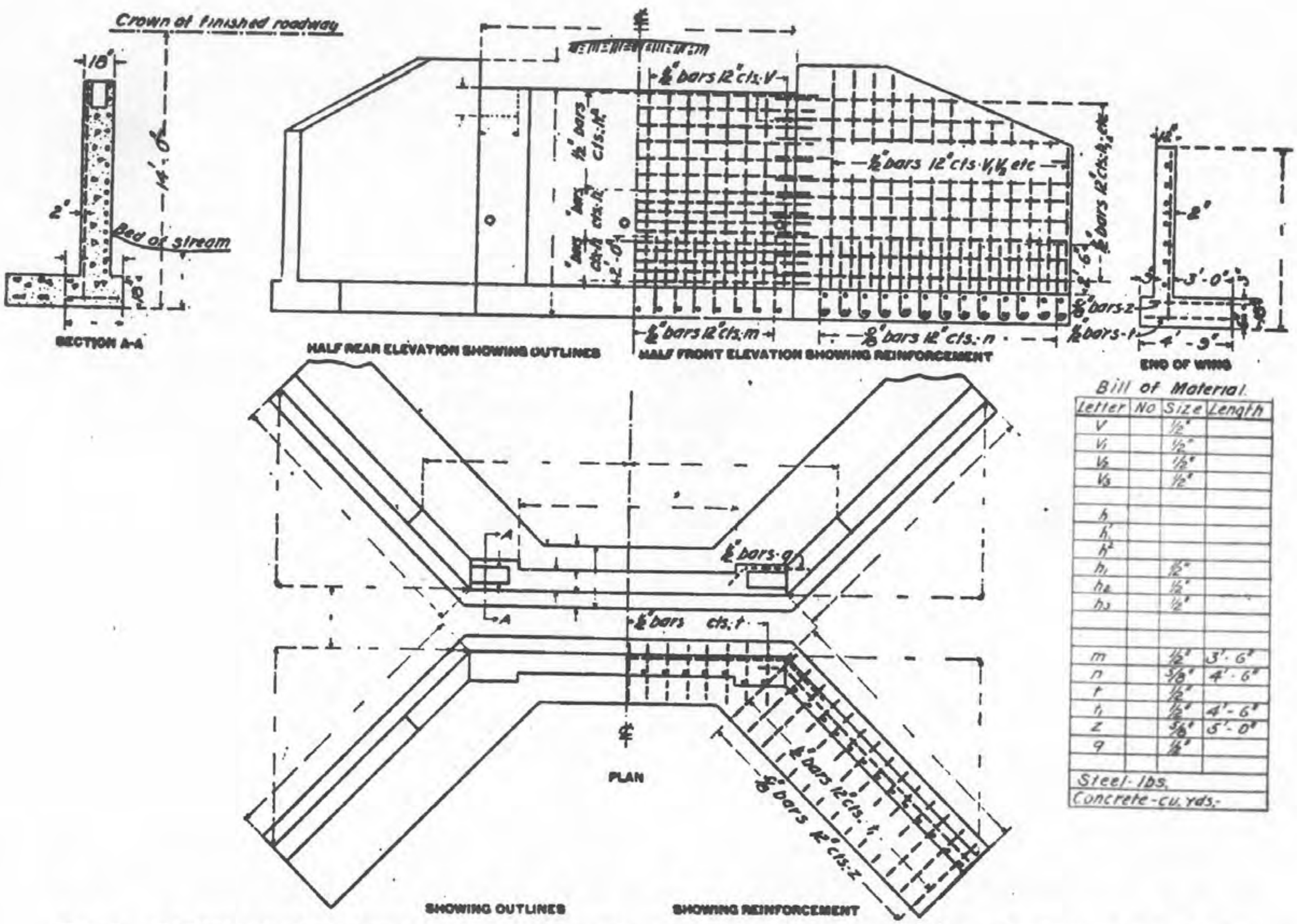


Bill of Material

Bars	No.	Size	Length
a	41	1"□	25'-6"
a_1	41	1"□	26'-0"
a_2	40	1"□	33'-6"
a_3	40	1"□	30'-0"
b	22	1/2"□	35'-0"
b_1	28	3/8"□	35'-0"
c	54	1 1/4"□	67'-6"
r	162	3/8"□	8'-0"
s	116	5/8"□	15'-0"

Weight of 2 Rockers - 1130 lb.
" " 4 Plates - 431 lb.
" " R. Steel - 39230 lb.
Volume Concrete - 164.0 cu. yd.

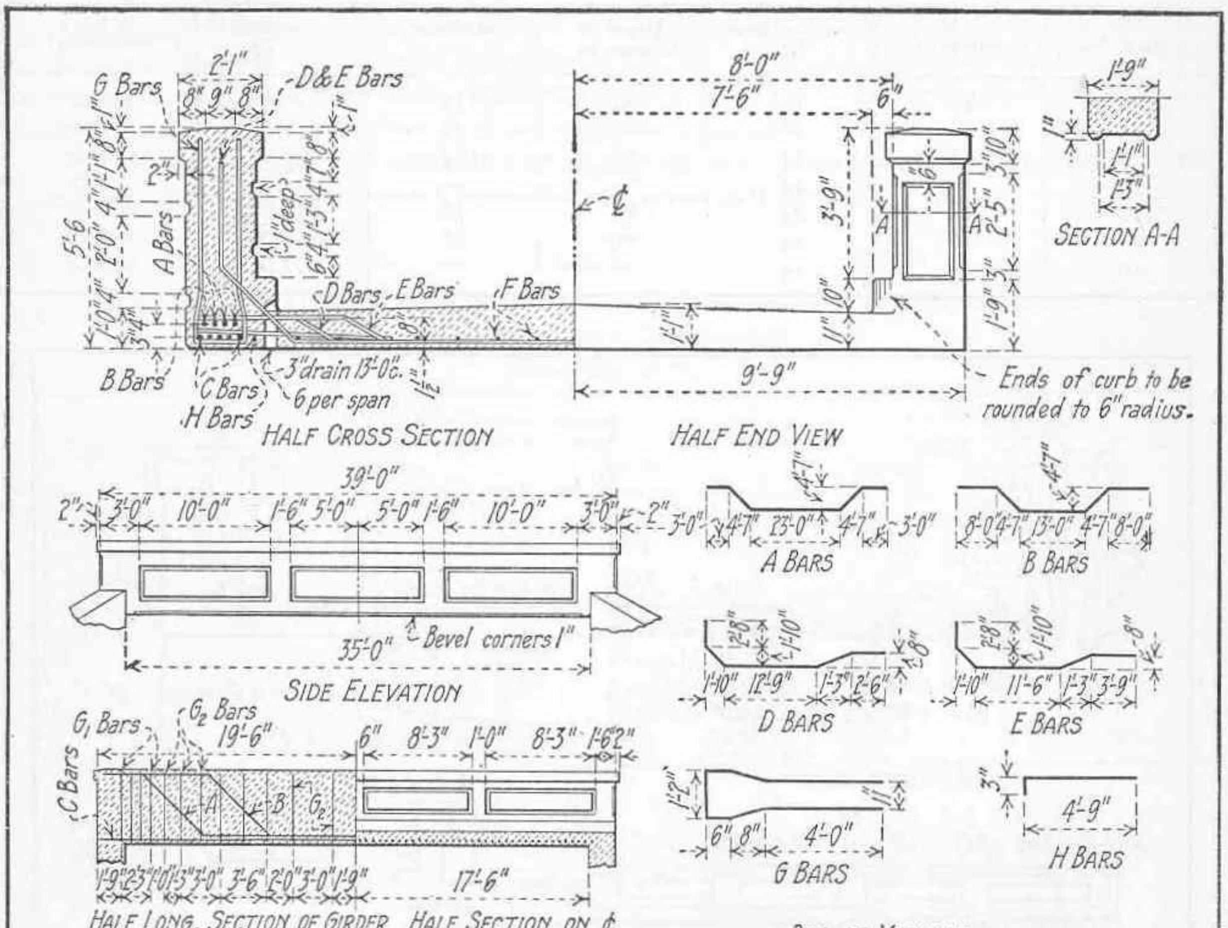
FIG. 12. REINFORCED CONCRETE THROUGH GIRDER BRIDGE. ILLINOIS HIGHWAY COMMISSION.



Bill of Material.

Letter	No	Size	Length
V		½"	
V1		½"	
V2		½"	
V3		½"	
h			
h'			
h²			
h1		½"	
h2		½"	
h3		½"	
m		½"	3'-6"
n		⅝"	4'-6"
t		½"	
t1		½"	4'-6"
z		⅝"	5'-0"
q		½"	
Steel-lbs.			
Concrete-cu. yds.-			

Fig. 7. Typical standard plan of reinforced concrete abutments for girder bridges. Cantilever type wings.



General Notes

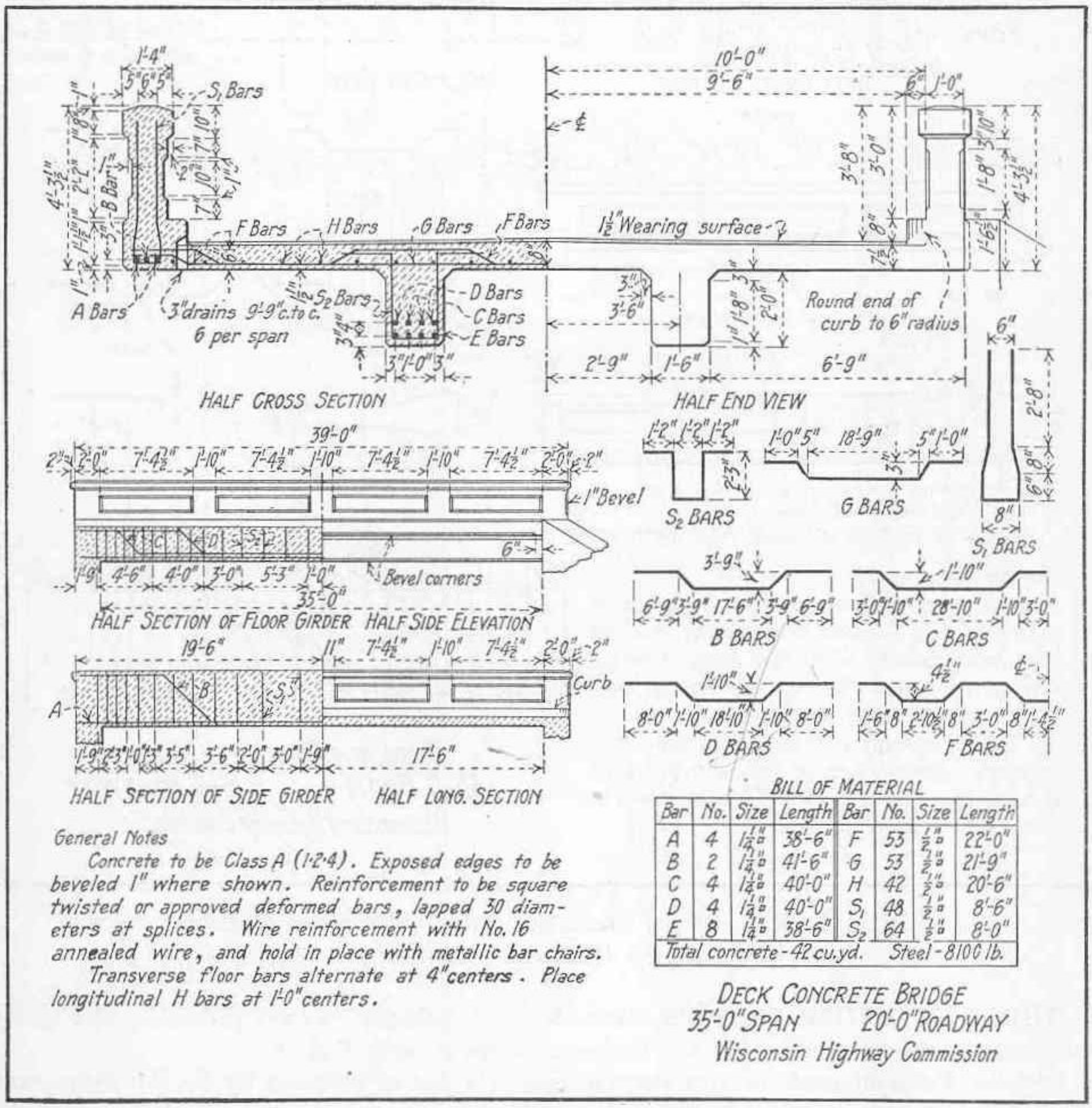
Reinforcement to be square twisted or approved deformed bars, lapped 30 diameters at splices. Wire reinforcement with No. 16 annealed wire. Arrange transverse floor bars by placing two D bars adjacent with ends reversed, – then two E bars adjacent with ends reversed, 6" spacing. Space H bars at 2'-0" centers. Bevel exposed edges of concrete 1" where shown. Space F bars at 1'-0" centers.

BILL OF MATERIAL

Bar	No.	Size	Length	Bar	No.	Size	Length	Bar	No.	Size	Length
A	4	$1\frac{1}{8}$" □	42'-0"	D	36	$\frac{3}{4}$" □	22'-0"	G_1	16	$\frac{3}{4}$" □	11'-6"
B	4	$1\frac{1}{8}$" □	42'-0"	E	36	$\frac{3}{4}$" □	22'-0"	G_2	32	$\frac{1}{2}$" □	11'-6"
C	10	$1\frac{1}{8}$" □	38'-6"	F	34	$\frac{1}{2}$" □	20'-6"	H	40	$\frac{3}{4}$" □	5'-0"
Class A (1·2·4) concrete – 52.5 cu. yd.						Steel – 7780 lb.					

THROUGH CONCRETE GIRDER
35'-0" SPAN 16'-0" ROADWAY
Wisconsin Highway Commission

FIG. 10. REINFORCED CONCRETE THROUGH GIRDER BRIDGE. WISCONSIN HIGHWAY COMMISSION.



Bar	No.	Size	Length	Bar	No.	Size	Length
A	4	$1\frac{1}{4}$" □	38'-6"	F	53	$\frac{1}{2}$" □	22'-0"
B	2	$1\frac{1}{4}$" □	41'-6"	G	53	$\frac{1}{2}$" □	21'-9"
C	4	$1\frac{1}{4}$" □	40'-0"	H	42	$\frac{1}{2}$" □	20'-6"
D	4	$1\frac{1}{4}$" □	40'-0"	S_1	48	$\frac{1}{2}$" □	8'-6"
E	8	$1\frac{1}{4}$" □	38'-6"	S_2	64	$\frac{1}{2}$" □	8'-0"
Total concrete - 42 cu. yd.				Steel - 8100 lb.			

FIG. 9. REINFORCED CONCRETE THROUGH-DECK GIRDER BRIDGE.
WISCONSIN HIGHWAY COMMISSION.

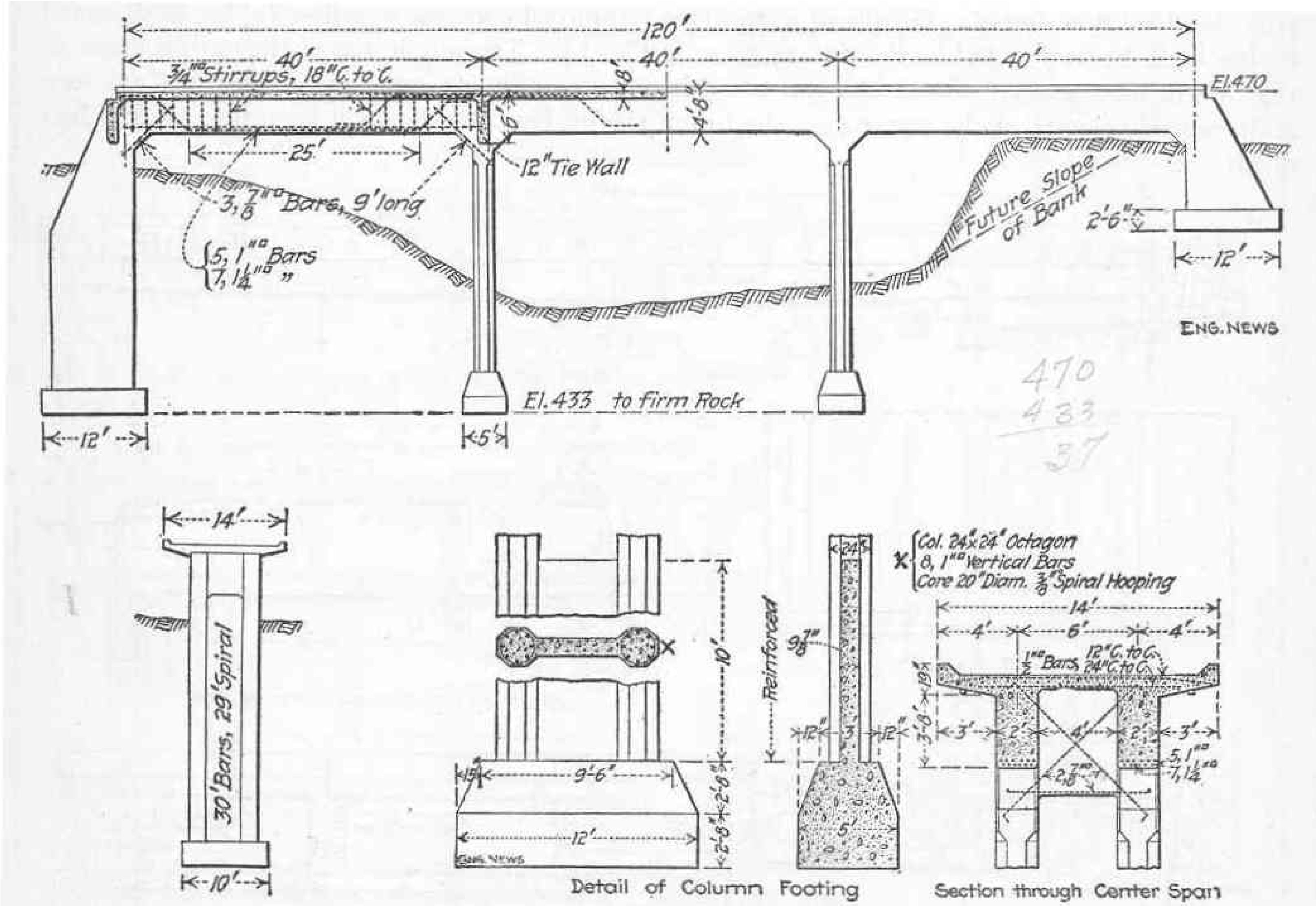
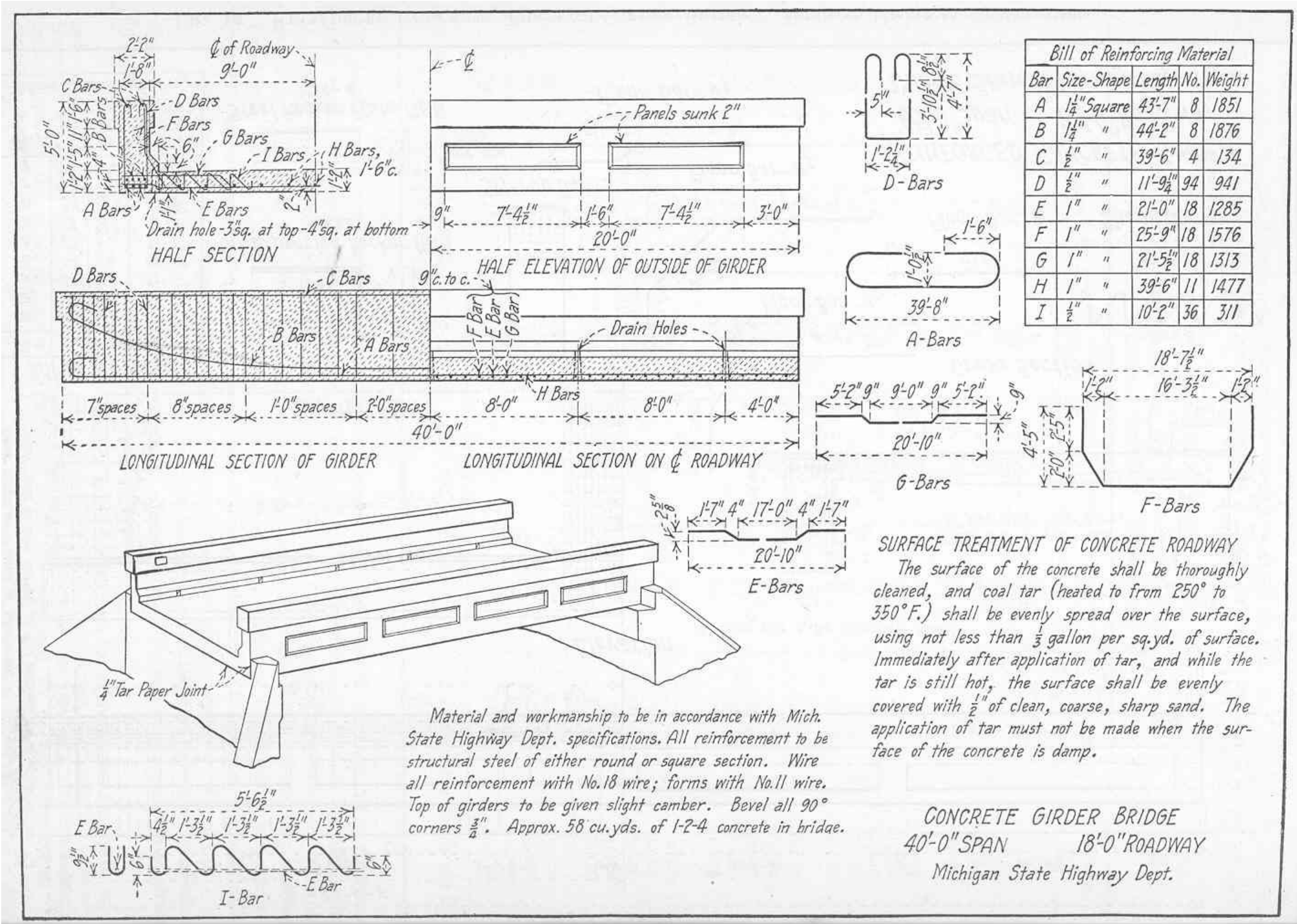


FIG. 16. CONTINUOUS REINFORCED CONCRETE GIRDER BRIDGE.


HALF SECTION
Drain hole-3"sq. at top-4"sq. at bottom
HALF ELEVATION OF OUTSIDE OF GIRDER
Panels sunk 2"
LONGITUDINAL SECTION OF GIRDER
LONGITUDINAL SECTION ON ℄ ROADWAY
Drain Holes
D-Bars
A-Bars
G-Bars
F-Bars
E-Bars
I-Bar
¼" Tar Paper Joint
Bill of Reinforcing Material

Bar	Size-Shape	Length	No.	Weight
A	1¼" Square	43'-7"	8	1851
B	1¼" "	44'-2"	8	1876
C	½" "	39'-6"	4	134
D	½" "	11'-9¼"	94	941
E	1" "	21'-0"	18	1285
F	1" "	25'-9"	18	1576
G	1" "	21'-5½"	18	1313
H	1" "	39'-6"	11	1477
I	½" "	10'-2"	36	311

SURFACE TREATMENT OF CONCRETE ROADWAY
The surface of the concrete shall be thoroughly cleaned, and coal tar (heated to from 250° to 350°F.) shall be evenly spread over the surface, using not less than ⅓ gallon per sq.yd. of surface. Immediately after application of tar, and while the tar is still hot, the surface shall be evenly covered with ½" of clean, coarse, sharp sand. The application of tar must not be made when the surface of the concrete is damp.
Material and workmanship to be in accordance with Mich. State Highway Dept. specifications. All reinforcement to be structural steel of either round or square section. Wire all reinforcement with No. 18 wire; forms with No. 11 wire. Top of girders to be given slight camber. Bevel all 90° corners ¾". Approx. 58 cu.yds. of 1-2-4 concrete in bridge.
CONCRETE GIRDER BRIDGE
40'-0" SPAN 18'-0" ROADWAY
Michigan State Highway Dept.

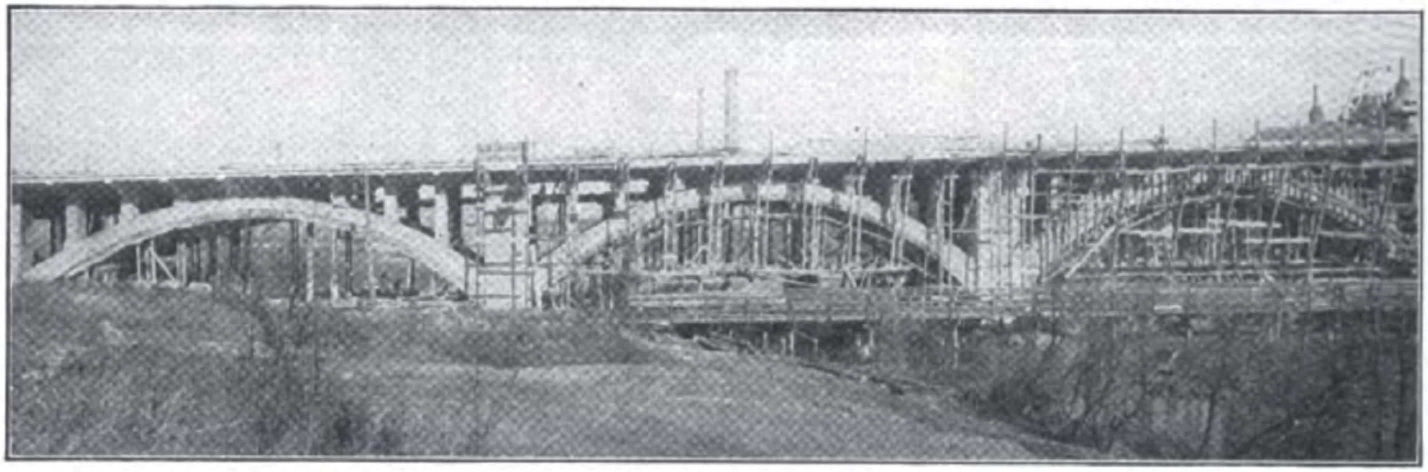


FIG. 1. CONSTRUCTION OF MORGAN ST. REINFORCED-CONCRETE BRIDGE AT ROCKFORD, ILL.

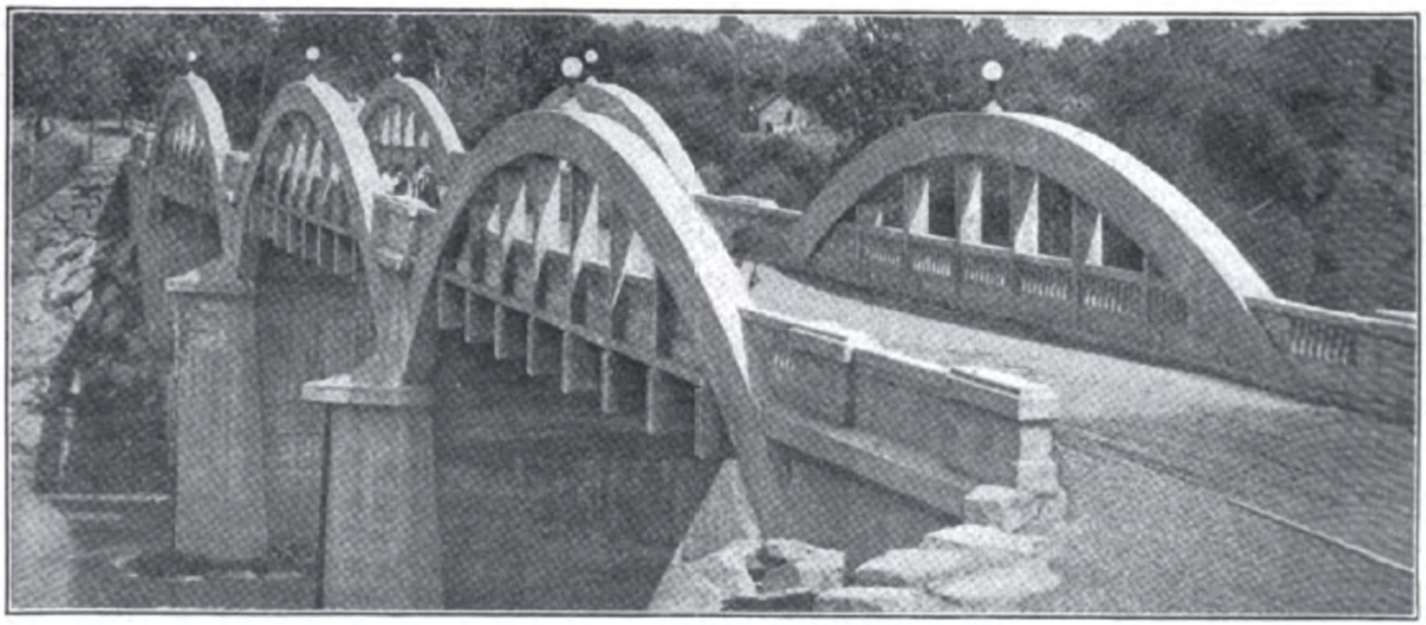
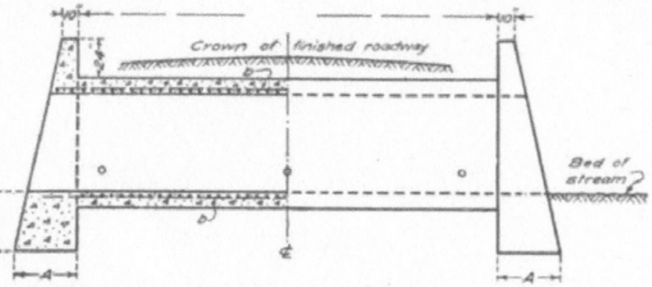


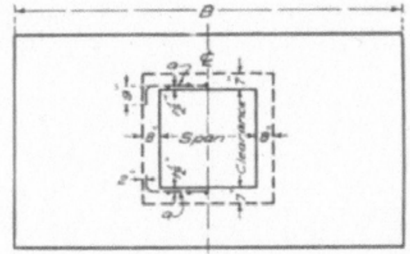
FIG. 1. RAINBOW-ARCH CONCRETE BRIDGE AT CARMI, ILL.

FRONT VIEW OF COMBINED BRIDGE AND DAM, SHOWING IMITATION OF STRATIFIED ROCK IN CONCRETE

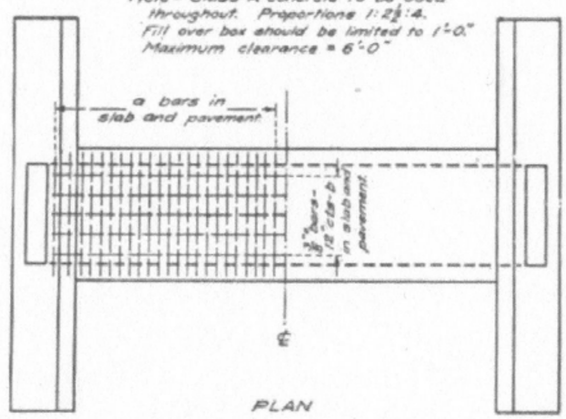
STATE OF ILLINOIS
STATE HIGHWAY DEPARTMENT

CONCRETE BOX CULVERT.

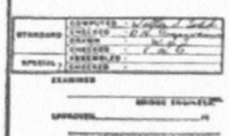




Note - Class A concrete to be used throughout. Proportions 1:2½:4.
Fill over box should be limited to 1'-0".
Maximum clearance = 6'-0"



PLAN
SHOWING REINFORCEMENT. SHOWING OUTLINES.



BILL OF MATERIAL

Design	Span	Clearance	Width of Footing A	Length of Head Walls B	Reinforcing Steel					Steel Lbs.	Concrete Cu. Yds.
					Bars	No.	Size	Cts.	Length		
1	5'-0"	1'-6"	2'-0"	11'-0"	a		½"	5½"			
					b		⅜"	12"			
2	5'-0"	2'-0"	2'-3"	12'-6"	a		½"	5½"			
					b		⅜"	12"			
3	5'-0"	2'-6"	2'-3"	14'-0"	a		½"	5½"			
					b		⅜"	12"			
4	5'-0"	3'-0"	2'-6"	15'-6"	a		½"	5½"			
					b		⅜"	12"			
5	5'-0"	3'-6"	2'-9"	17'-0"	a		½"	5½"			
					b		⅜"	12"			
6	5'-0"	4'-0"	2'-9"	18'-6"	a		½"	5½"			
					b		⅜"	12"			
7	5'-0"	4'-6"	3'-0"	20'-0"	a		½"	5½"			
					b		⅜"	12"			
8	5'-0"	5'-0"	3'-3"	21'-6"	a		½"	5½"			
					b		⅜"	12"			
9	6'-0"	1'-6"	2'-0"	12'-0"	a		⅝"	6"			
					b		⅜"	12"			
10	6'-0"	2'-0"	2'-3"	13'-6"	a		⅝"	6"			
					b		⅜"	12"			
11	6'-0"	2'-6"	2'-3"	15'-0"	a		⅝"	6"			
					b		⅜"	12"			
12	6'-0"	3'-0"	2'-6"	16'-6"	a		⅝"	6"			
					b		⅜"	12"			
13	6'-0"	3'-6"	2'-9"	18'-0"	a		⅝"	6"			
					b		⅜"	12"			
14	6'-0"	4'-0"	2'-9"	19'-6"	a		⅝"	6"			
					b		⅜"	12"			
15	6'-0"	4'-6"	3'-0"	21'-0"	a		⅝"	6"			
					b		⅜"	12"			
16	6'-0"	5'-0"	3'-3"	22'-6"	a		⅝"	6"			
					b		⅜"	12"			
17	6'-0"	5'-6"	3'-3"	24'-0"	a		⅝"	6"			
					b		⅜"	12"			
18	6'-0"	6'-0"	3'-6"	25'-6"	a		⅝"	6"			
					b		⅜"	12"			

749

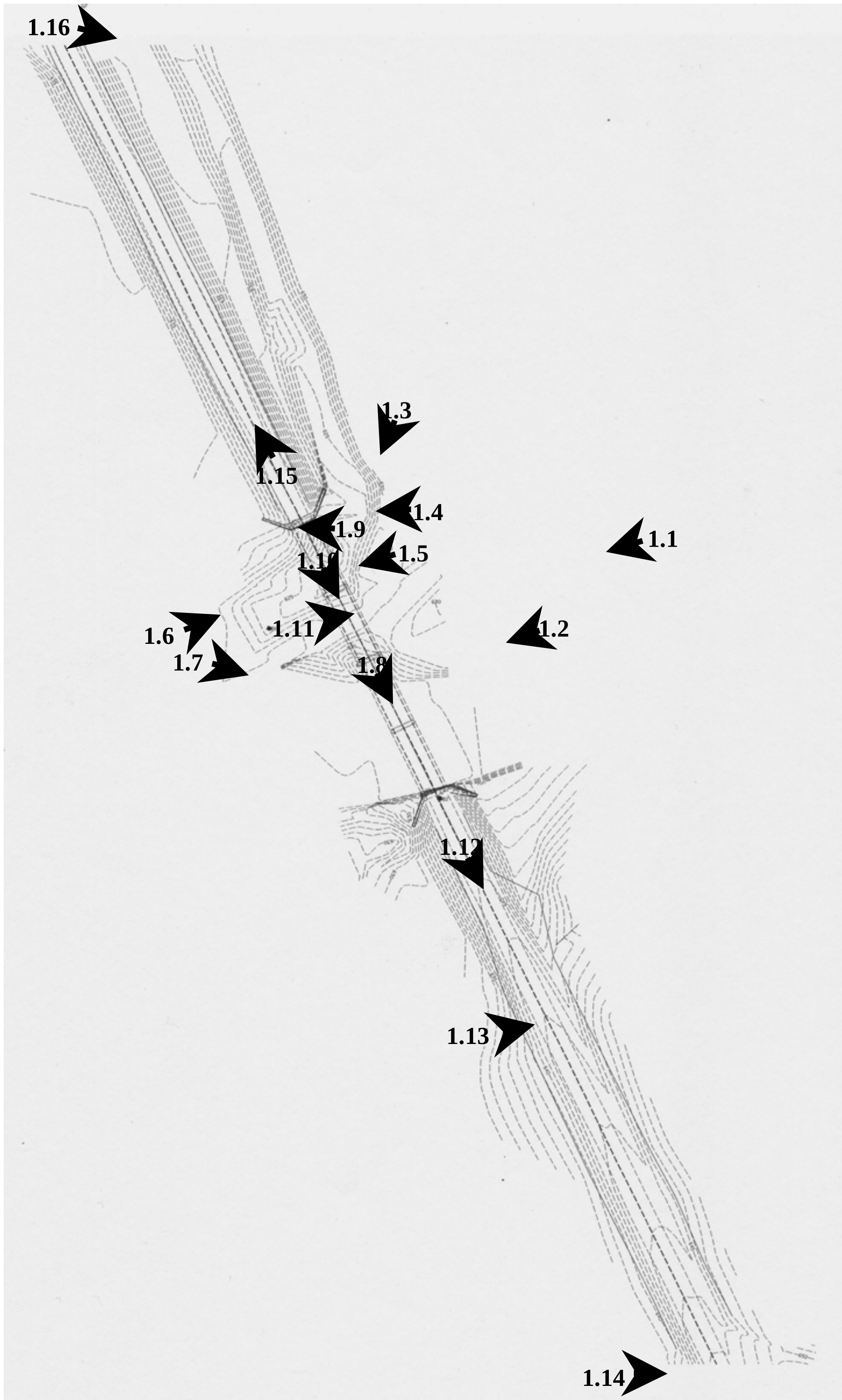
INDEX TO PHOTOGRAPHS

Allerton Park Sangamon River Bridge IL HAER No. PI-2009-1
Robert Allerton Park
Section 21
Township 18 North, Range 5 East
Willow Branch Township
Piatt County
Illinois

Documentation:	15 photographs. Floyd Mansberger, photographer, 2 December 2010.
PI-2009-1.1	View of the bridge at a distance, looking west (downstream) from the bottomlands on the north bank of the Sangamon River.
PI-2009-1.2	View of the southern half of the bridge, looking west down the channel of the Sangamon.
PI-2009-1.3	View of the bridge looking southwest from its northern end. A secondary channel of Wildcat Creek appears in the foreground. This drainage joins the Sangamon immediately west of the bridge site.
PI-2009-1.4	View of the abutment at the northern end of the bridge, looking northwest.
PI-2009-1.5	View of the east side of the bridge's northern span, looking west. This span crosses the secondary channel of Wildcat Creek, whose confluence with the Sangamon River can be seen in the background.
PI-2009-1.6	View of the northern end of the bridge, looking east up the secondary channel of Wildcat Creek.
PI-2009-1.7	View of the southern half of the bridge, spanning the Sangamon, looking southeast.
PI-2009-1.8	View underneath the bridge showing the underside of deck, girders, and support pier (looking south). Note the re-bar on the girders, which have become exposed due to the deterioration of the concrete.
PI-2009-1.9	View of the western railing post at the northern end of the bridge.

PI-2009-1.10	View down the length of the bridge deck, looking south.
PI-2009-1.11	Detail of railing, curb, and wearing surfacing on the bridge deck. Note the incisions on the wearing surface for traction.
PI-2009-1.12	View of the roadway leading south of the bridge, showing allée of Norway spruce.
PI-2009-1.13	Detail of the roadway leading to the bridge, showing original brick surface still intact beneath current layer of asphalt.
PI-2009-1.14	View of the western end of a large concrete culvert that bisects the roadway leading south of the bridge.
PI-2009-1.15	View of the roadway and causeway leading north of the bridge. The causeway elevates the road above the flood-prone river bottoms.
PI-2009-1.16	View of the control dam spanning the secondary channel of Wildcat Creek a short distance north of the bridge, looking southeast.

PHOTOGRAPHIC VIEW SHEET
IL HAER No. PI-2009-1



[DSC_0707]

[DSC_0703]

[DSC_0678]

[DSC_0679]

[DSC_0682]

[DSC_0694]

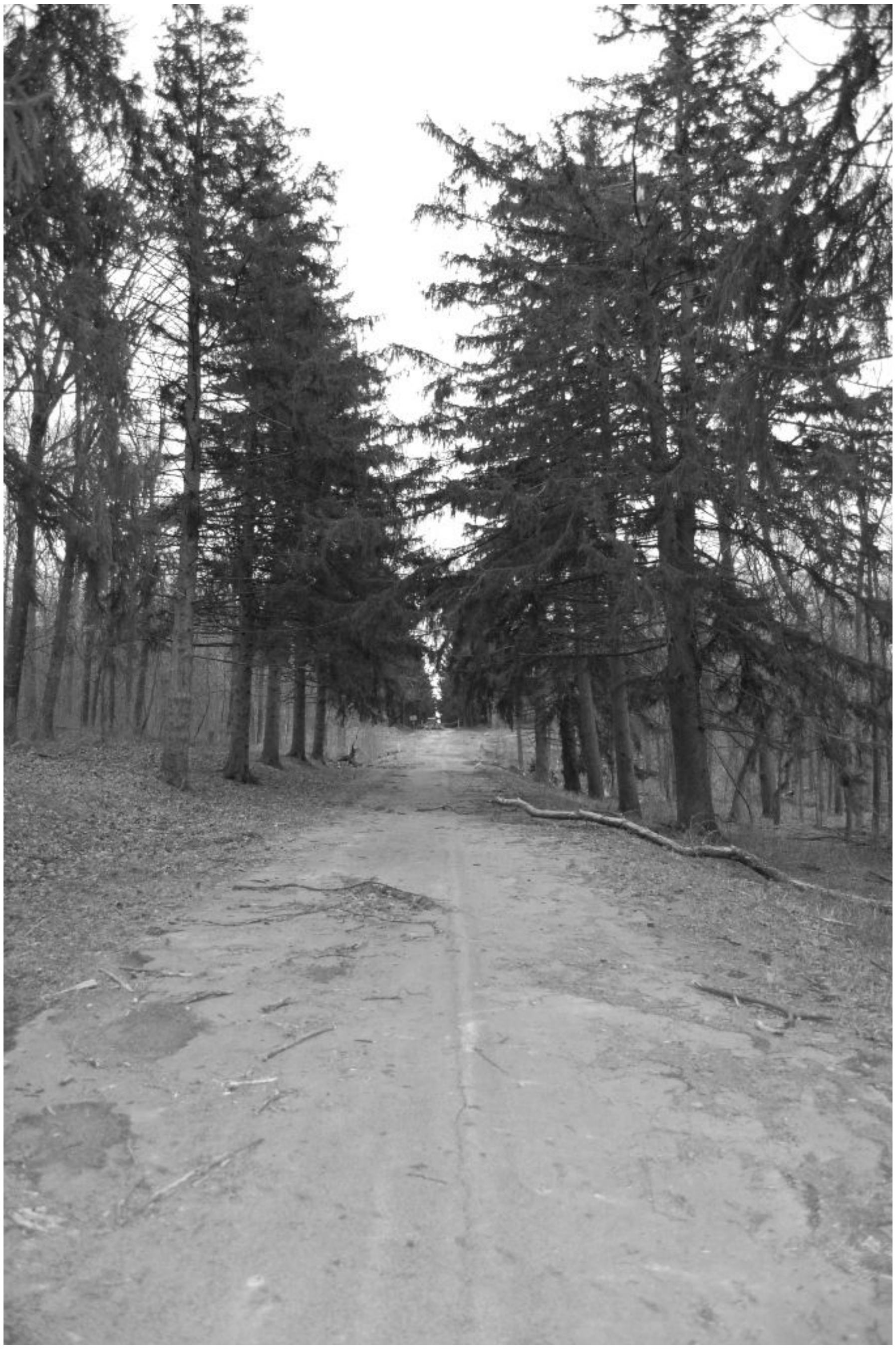
[DSC_0695]

[DSC_0697]

[DSC_0719]

[DSC_0716]

[DSC_0721]



[DSC_0739]

[DSC_0714]

[DSC_0742]

[DSC_0713]

[DSC_0710]