HISTORIC AMERICAN ENGINEERING RECORD DOCUMENTATION OF THE INSLEY ROAD BRIDGE SPANNING ROCKY FORD CREEK SFN: 8759162

Henry Township,
Wood County,
Ohio

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Submitted to the
Ohio Historic Preservation Office
800 East 17th Street
Columbus, Ohio 43211

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HENRY TOWNSHIP, WOOD COUNTY, OHIO

February 2020

INSLEY ROAD BRIDGE (SFN: 8759162)
HAER No. OH-WOO-Insley Road Bridge (SFN: 8759162)
Spanning the Rocky Ford Creek
Henry Township
Wood County
Ohio

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

PHOTOGRAPHS

REDUCED COPIES OF HISTORIC CONSTRUCTION DRAWINGS

HISTORIC AMERICAN ENGINEERING RECORD
Ohio Historic Preservation Office
800 East 17th Avenue
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HISTORIC AMERICAN ENGINEERING RECORD

INSLEY ROAD BRIDGE OVER ROCKY FORD CREEK

Location: The Insley Road Bridge (SFN: 8759162) crosses the Rocky Ford Creek approximately 5.45 miles downstream of the Van Buren Lake State Reservoir and approximately 8.64 miles upstream of its confluence with the Middle Branch of the Portage River. It lies approximately 0.27 miles north of Quarry Road, 0.23 miles south of Needles Road in Henry Township, just northeast of the Village of North Baltimore, Wood County, Ohio.

Insley Road Bridge is located at Latitude / Longitude:
-83.65059997252304 / 41.19361220451547 (Projection: WGS 1984)
NAD_1927_UTM Coordinates: Zone 17 / 277708 / 4563424

Present Owner: Wood County, One Courthouse Square, Bowling Green, OH 43402

Present Use: Currently closed, the bridge carried 2-lane vehicular traffic.

Significance: The Insley Road Bridge is a good example of an early-twentieth century reinforced concrete bridge design, a standard design of the Ohio Department of Highways, Bureau of Bridges. This "rainbow arch" design was favored nationally, particularly within the Midwest for its functionality and aesthetic value. This bridge, built in 1930, is a later example of the type. These bridges are significant because they represent an important step in the evolution of concrete bridge technology, and surviving examples of this type are becoming less common.[1] This bridge was determined eligible for listing in the NRHP in 1994 as a result of the ODOT 1994 Concrete Arch Supplement to the Ohio Historic Bridge Inventory, Evaluation and Preservation Plan and assigned to the Reserve Pool. It is one of a few remaining examples of this once-common bridge type in the state.[2]

Project Information: "The Wood County Engineer proposes to replace the Insley Road Bridge, County Bridge Number 5-604A, Structure File Number 8759162, located in between Needles Road and Quarry Road, crossing Rocky Ford Creek. The proposed undertaking will include demolition of the 1930 95' long rainbow (through) arch Insley Road Bridge and the construction of a new, three-span, cast-in-place, concrete slab bridge. The project scope will also include

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[1] Parsons Brinckerhoff, *A Context for Common Bridge Types, NCHRP Project 25-25, Task 15*, (New York, 2005), 3-61 to 3-64.

[2] Ohio Department of Transportation (ODOT) and the Federal Highway Administration (FHWA), *The Concrete Arch Supplement to the Ohio Historic Bridge Inventory, Evaluation and Preservation Plan*, (Columbus, ODOT, 1994), Appendix A.

approach roadway work and will consist of roadway profile change and new pavement with shoulder and embankment work...Two other build alternatives were evaluated and included: reconstruction of the bridge to restore its ability to carry highway traffic; and constructing a new bridge on a bypass alignment and preserving the existing bridge. These two alternatives were found to be not feasible for the project."[3]

The Ohio Historic Preservation Office (SHPO), in concurrence with the U.S. Army Corps of Engineers (USACE) and the Wood County Engineer, has determined the replacement of the Insley Road Bridge will constitute an Adverse Effect upon a structure eligible for inclusion in the National Register of Historic Places (NRHP). USACE and the Wood County Engineer have consulted with the SHPO pursuant to Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. 470f) and it's implementing regulations, "Protection of Historic and Cultural Properties" (36 CFR Part 800). The Historic American Engineering Record (HAER) level documentation for the Insley Road Bridge is being completed in order to comply with the Memorandum of Agreement (MOA) between the three parties, and the Wood County District Public Library as a consulting party, executed December 16, 2019.[4]

Authorship: Brett A. Carmichael, M.A., Architectural Historian of Lawhon & Associates, Inc. took photographs and completed the historical documentation and David Charville, P.E., of Tetra Tech, Inc. completed the technical description.

Part I. Historical Information

A. Physical History

1. Date of Construction: July 1, 1930.[5]

2. Designer: State of Ohio, Department of Highways and Public Works, Division of Highways, Bureau of Bridges, April 1925 – Standard Plan (Specific Engineers unknown).[6]

[3] Amanda Schraner Terrell, to Raymond A. Huber, RE: Insley Road Bridge Replacement, Henry Township, Wood County, Ohio, February 29, 2016.
[4] Diana Welling, to Aaron Smith, Re: Section 106 Effect Finding, Insley Road Bridge, North Baltimore, Wood County, Ohio, March 16, 2018.
[5] ODOT Bridge Inspection Report, "Structure File Number: 8759162" (WOO-C604A-00050, WOO-T-34986-Henry Twp.), inspection Date: 11/3/2016.
[6] Ohio Department of Highways (ODOH), Bureau of Maintenance and Repair "Bowling Green-Perrysburg & Findlay-Bowling Green Roads, I.C.H. 220 Sec. E1 & F-2, I.C.H. 282 Sec. F (Bridges) Wood County," Title page, Columbus: ODOH, 1925 [hereafter ODOH, *Plansheets*].

3. Builder: Elsass-Meyer Construction Company, Anna, Ohio.[7]

4. Original Plans and Construction: Located at the Ohio Department of Transportation, 1980 West Broad Street, Columbus, OH 43223.[8]

5. Alterations and additions: None known.

B. Historical Context:

Setting

The Insley Road Bridge (SFN: 8759162) spans the Rocky Ford Creek in a sparsely developed portion of Henry Township, approximately 1.2 miles northeast of the Village of North Baltimore. The area is a typical rural setting found in northwest Ohio, with the mature riparian creek corridor surrounded by active agricultural cultivation. Insley Road is a County Route (CR 604) and travels between Eagleville Road (heading east from North Baltimore) north to Cygnet Road (CR 3) just west of Cygnet, at which intersection the road continuing north is designated SR 25, part of the Dixie Highway from the early-twentieth century. Dixie Highway connects directly to some of the most significant municipalities in northwest Ohio as it continues north, becoming Main Street in Bowling Green, further north to Perrysburg, joining US 20 to cross the Maumee River via the Fort Meigs Memorial Bridge, through Maumee on the Anthony Wayne Trail continuing northeasterly into Toledo, ultimately terminating at I-280. In the mid-twentieth century, much of the CR 604 portion of the road was altered by the route of I-75, which parallels the entirety of Insley Road immediately to the east.

Settlement History of Wood County, the Portage River Valley, and Henry Township

The first Europeans to lay claim to the area between the Allegheny and the Rocky Mountains, in a region called Louisiana, were the French. French Jesuits first explored the area during the seventeenth century.[9] At the end of the French and Indian War in 1763, the Louisiana territory was ceded to the British in the Treaty of Paris giving the British control of all lands east of the Mississippi River.[10] By the close of the Revolutionary War in 1784, the British in turn relinquished those lands to the Americans.

In 1785, Congress passed an ordinance to survey the Northwest Territory including all lands bounded on the north by the Great Lakes, west by the Mississippi River, and south by the Ohio River.[11] The Northwest Ordinance of 1787 defined the organization of the

[7] David G. Elsass, "Bridges of the Past from Anna and Shelby County," presentation to the Junto Club, Anna, Ohio, January 2002 and ODOT Archives, *Directors Journal and Index of Contract Let*, (Columbus, State Library of Ohio, 1906-1978.

[8] ODOH, *Plansheets*, sheets 1-12 of 12.

[9] Charles E. Slocum, *History of the Maumee River Basin*, (Indianapolis and Toledo, Bowen & Slocum, 1905).

[10] Nevin Otto Winter, *A History of Northwest Ohio* (Chicago, The Lewis Publishing Company, 1917).

[11] C.W. Evers, *Commemorative Historical and Biographical Record of Wood County, Ohio, Its Past and Present*, (Chicago, J.H. Beers & Co., 1897).

Northwest Territory, including lands specifically earmarked for educational and religious usage, and the entirety of the territory was to be free of slavery.[12] In 1788, Congress appointed General Arthur St. Clair the Governor of all the Northwest Territory which included the Ohio Country.

More than thirty years later, the State of Ohio would form Wood County on February 12, 1820. Much had transpired in the years since the passage of the Northwest Ordinance. The lands that would become Wood County had previously remained Native American territory as a part of two separate treaties: the Treaty of Greenville (1795) and the Treaty of Fort Industry (1805). When Ohio became a state in 1803, the northwest corner of the modern state had remained outside its boundary. This portion along Lake Erie retained some British troops, who exerted tremendous influence among the resident Native tribes toward their new American neighbors. It took another treaty, the Treaty of Ghent (1814) ending the War of 1812, to finally remove the British presence in the Ohio Country.[13] Over the next three decades, several more land deals were made with Native tribes, both individually and collectively. In the Treaty of the Maumee Rapids (1817), the Native tribes effectively ceded the territory which would encompass Wood County to the United States and ultimately to the State of Ohio. With the removal of the Wyandot to Kansas in 1843, the last official Native presence in Ohio ended.[14] Wood County was part of the territory primarily controlled by the Ottawa tribe in the mid-eighteenth century. No major Native settlements from the historic period are known from Wood County, possibly due in some part to most of the region lying within the Black Swamp.[15]

The county takes its name from Colonel Eleazer D. Wood, a War of 1812 protagonist responsible for the engineering of Fort Meigs under General Harrison.[16] Fort Meigs was constructed in 1813 along the south side of the Maumee River to protect American settlers in the region against British and Native American aggression. That year, British forces attacked the fort twice, hoping to eradicate the American presence in northwestern Ohio. The American forces repulsed the British and their Native American allies both times, firmly establishing their presence and creating a turning point in the war.[17] Brigadier General William Hull led 2,000 troops from Urbana on their way to a general campaign against the British at Detroit in June 1812 and they followed along the Rocky Ford Creek as part of "Hulls Trace," the first north-south road in the county, and the only one for several years after.[18]

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[12] Henry Howe, *Historical Collections of Ohio, Volume II*, (Columbus, H. Howe & Son, 1907).
[13] Evers, *Wood County*.
[14] Ohio History Central, "Wyandot Indians" http://www.ohiohistorycentral.org/w/Wyandot_Indians, date accessed December 4, 2018, (Columbus, Ohio History Connection, 2018c).
[15] Helen Hornbeck Tanner, *Atlas of Great Lakes Indian History*, (Norman, OK, University of Oklahoma Press, 1987).
[16] Ohio History Central, "Wood County" http://www.ohiohistorycentral.org/w/Wood_County, date accessed December 4, 2018, (Columbus, Ohio History Connection, 2018b).
[17] Winter, *Northwest Ohio*.
[18] Evers, *Wood County*, 84-86.

While there had been French and British traders and trappers in the area that would become Wood County in the late eighteenth century, the presence of the Black Swamp greatly impeded initial European settlement and stunted the early development of Wood County as much as had military unrest.[19] Amos Spafford was the first permanent, legal settler to Wood County in 1810.[20] After peace was established, families arrived and farmers began to install thousands of miles of ditches crisscrossing the county in the mid-nineteenth century, creating rich agricultural land. The dredging, tiling, and ditching of the swamp had added benefits beyond just agricultural production, as it also greatly improved health by limiting diseases linked to stagnant water such as malaria and cholera. The county built roads along the section lines in each township, increasing ease of travel, with other roads built to connect villages and towns. Communities sprung up along intersections and at railroad junctions in Wood County. Residents also discovered underlying reserves of oil and gas once the region was drained.[21]

The original extent of Wood County included Lucas County to the north, but in 1835 the state divided the land, with the Maumee River serving as the county line. Residents set up the first county seat at Perrysburg in 1822, near the old location of Fort Meigs, and named it after Commodore Perry. Joseph Wampler and William Brookfield laid out Perrysburg in 1816, due to its favorable river navigation at this point. Between 1828 and 1840, Perrysburg was the commercial center for the region, controlling nearly all shipments of goods to northern Indiana, northwest Ohio, and southern Michigan along the Maumee River. The town was the most active Lake Erie port community until 1840, and had an active shipbuilding industry.[22]

Elisha Martindale was the first settler at Bowling Green in 1832. Joseph Gordon platted the town, naming it after his hometown of Bowling Green, Kentucky. Bowling Green incorporated in 1855 and acquired the county seat 20 years later after an intense struggle with Perrysburg. One key to the town's success was the Bowling Green Railroad Company, which in 1875 laid the first rail line connecting the county seat to regional markets.[23] Residents discovered oil around Bowling Green in 1886, sparking an intense but short-lived oil boom, as drillers quickly exhausted the small oil reserves. Bowling Green reverted to an agriculturally-focused economy afterwards. In 1914, H. J. Heinz opened a tomato processing plant in the city, and Bowling Green State University opened its doors as a teaching college.[24]

Other communities in the county include Portage, North Baltimore, Grand Rapids, and Pemberville. Portage takes its name from the nearby Portage River, and was the site of an

[19] Slocum, *Maumee*.
[20] Winter, *Northwest Ohio*, 630.
[21] Howe, *Historical Collections of Ohio*.
[22] Winter, *Northwest Ohio*.
[23] Ohio History Central, "Bowling Green, Ohio" http://www.ohiohistorycentral.org/w/ Bowling_Green,_Ohio, date accessed December 4, 2018, (Columbus, Ohio History Connection, 2018a).
[24] Winter, *Northwest Ohio*.

American stockade erected during the War of 1812. Portage began as a trading post in 1824, and saw a brief period of prosperity during the late nineteenth century oil boom. B. L. Peters platted North Baltimore in 1874 upon the introduction of the Baltimore and Ohio Railroad in the area, although a small unincorporated community was present here since 1834.[25] In 1831, J. B. Graham laid out Grand Rapids, originally called Gilead, along the Maumee River. The town acquired a side cut canal from the Miami & Ohio Canal in 1838 to boost its economy. The village was incorporated in 1855 and changed its name to Grand Rapids in 1868. S. H. Bell laid out the village of Pemberville in 1854. A small, informal community grew up here around a sawmill established in 1836, but did not become incorporated until 1876.[26]

Despite a brief period of intense development during the late nineteenth century oil boom,[27] Wood County remains largely rural in nature today. Nearly 70 percent of the county is under cultivation, with just under 14 percent developed.[28] Developed land is concentrated at Bowling Green and along the northern edge of the county, where the metropolitan area of Toledo has expanded into the county. The population of the county grew slowly until the advent of the railroads and widespread drainage programs at mid-century. Between 1850 and 1860, the population doubled from 9,000 to 18,000 people, and the county added about 10,000 people per decade to 1900. The county experienced a decline at the turn of the twentieth century, going from 51,000 people in 1900 to 45,000 in 1920, but reversed the decline and grew steadily to 1960. Between 1960 and 1990, the population grew by 40,000 people, a result of increasing suburbanization spreading from the Toledo region. The population stands at about 130,000 today and is expected to decline somewhat in the next 20 years. Housing in Wood County reflects the population boom of the late twentieth century, with a median build date of 1975 for the county. Over 40 percent of all housing units in the county postdate 1980, while fewer than 20 percent predate 1940. The economy of Wood County is still heavily dependent on agriculture, with over 1,000 active farms averaging 246 acres in size. Other important employment sectors include trade/transportation services, manufacturing, hospitality, local government, health and education services, and professional services.[29]

The rivers previously mentioned are significant parts of the landscape and history of Wood County. The Maumee, which forms the majority of the county's northern boundary, is the largest Great Lakes tributary. It flows from Fort Wayne, Indiana to Toledo, Ohio and drains 8,316 square miles in Michigan, Indiana, and Ohio, including the westernmost portion of Wood County. To the east is the Sandusky River Basin, which flows from Upper Sandusky to Fremont and Sandusky Bay, draining 1,421 square miles. Compared with its neighbors, the Portage River Basin is not large but it drains the majority of Wood County and is

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[25] Winter, *Northwest Ohio*.
[26] *Ibid*.
[27] *Ibid*, 636-637.
[28] Ohio History Central, "Wood County," 2018b).
[29] Ohio Development Services Agency, "Ohio County Profiles" https://development.ohio.gov/files/research/C1088.pdf, accessed March 15, 2018, (Columbus, ODSA, 2018).

considered one of northwest Ohio's principle rivers. With its mouth at Port Clinton, the Portage is about 60 miles long, and drains 611 square miles.[30] Aside from the main stream, it has six other major branches: the North, Middle, South and East Branches, Rocky Ford and Sugar Creeks. It was an important drainage system for drying the Great Black Swamp area, which had caused settlement and development of Northwest Ohio to lag behind the rest of the state. Much of the modern routes of the waterway are constructed or influenced in some man-made way. Most of the Portage's tributaries and large segments of its named courses are now channelized ditches.[31]

Joseph Gaspard Chaussegross deLery, a French military engineer, traced the river in 1754 and named it the "R. du Portage" undoubtedly because his exploration party was required to portage so frequently. Early English maps translated this name directly as "the Carrying River" or even "the Carrion River;" but it has since reverted to the original French term. Prehistorically, there were natural alterations of this drainage as well, mainly evident at its mouth. DeLery's 1754 map shows the Portage approaching Lake Erie from a distinctly western course, its mouth emptying into the lake near what is now the Ottawa National Wildlife Refuge in Erie Township. Geological evidence indicates that earlier the mouth of the Portage was at West Harbor, in Ottawa County. Currently, the mouth of the river is contained between two large breakwalls, the first iterations of which were built in the last part of the nineteenth century.[32]

In 1853, Ohio's General Assembly passed the first of many laws authorizing a special tax which would fund the drainage of the Great Black Swamp.[33] Hence the many drainage ditches still visible dividing the landscape of the county. The Jackson Cut Off was a major work within this ditch network, redirecting water nearly ten miles into the Maumee River drainage system. This ditch system alone drained 30,000 acres within the upper Portage Watershed.[34] There were 17 miles of the Rocky Ford Creek that were originally dredged at taxpayers' expense from 1874-1881.[35] Once drained, the area which had formerly been a hindrance to the region was transformed into some of Ohio's most tremendously rich soils. However, the drainage system, including subsurface tiling, had to be constantly monitored and maintained to prevent the swamp from reasserting itself.[36] Today, the Portage River basin remains productive agricultural ground. It is used mainly for row crop production of field corn, soybeans, and winter wheat; but also has significant production of tomatoes,

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[30] Arnie Stemen, et.al., *Portage River Watershed Restoration Action Strategy* (Hancock, Wood, Sandusky, Seneca and Ottawa Counties, Ohio, Portage River Basin Council in Cooperation with Toledo Metropolitan Area Council of Governments, 2003).
[31] *Ibid*.
[32] *Ibid*.
[33] Evers, *Wood County,* 1.
[34] Ohio Department of Natural Resources, Office of Coastal Management, "Portage River" https:// http://coastal.ohiodnr.gov/portageriver, accessed November 14, 2018 (Sandusky, OH, ODNR, 2018).
[35] Evers, *Wood County,* 1-2.
[36] ODNR, OCM, "Portage River."

other truck farm vegetables, and livestock. Agriculture, which is the backbone of the economy, still depends upon the drainage of the Portage.[37]

Henry Township was established in 1836, having been outlined originally by Samuel and Alexander Holmes' survey of 1819, which was later subdivided by I. T. Worthington two years later. The only incorporated village is North Baltimore.[38] Previous to its incorporation in 1874, it had been a small hamlet centered around Thomas Whitelock's mill on the Rocky Ford, beginning around 1834. The Baltimore and Ohio Railroad brought its first significant growth, and during the oil boom of the late nineteenth century, the village and township developed non-agricultural industry.[39] This boom began in 1875–1876 and several small communities arose and faded with the oil supply nearly a decade later.[40] Other than the flash of oil production, the early histories of the township mirror the situation of the greater region and identify the chief economic drivers of Henry Township as agriculture and transportation, with some local manufacturing. Significantly, the transportation history leans heavily on river traffic, particularly in the navigable portions of the rivers focused on Great Lakes traffic, and the railroads that facilitated access to broader markets. At the same time, the early histories hardly discuss overland roadways at all, and if they do, they tend to note the poor condition of the roads into the early twentieth century.[41] Better roads and bridges came about with the help of the Ohio Department of Highways, discussed further below. This department was established in 1904 and significantly improved overland travel throughout the state in the first two decades of the twentieth century.

Evolution of Bridge Construction

Up until the 1840s, bridges were built of timber by traveling master builders such as Lewis Wernwag, Theodore Burr, or by local craftsman who also erected factories and mills.[42] Most of the materials were obtained nearby and fabrication was done on site. Some historians have argued that "modern bridge building began in 1855 with the development of the Bessemer process of steel making, followed by the Siemens-Martin process."[43] Because of the related rail and steel industries simultaneously active in Ohio, the state produced some significant bridge builders in the years before the Civil War. These people were not only significant to the state but nationally as well. Heading into the twentieth century, bridge builders were influenced by technological advancements and aesthetic designs from several disparate sources. New patents and new designs were the result.[44]

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[37] Stemen, et.al., *Portage*.
[38] J. H. Rossback and L.H. Wismar, *An Atlas of Wood County Ohio* (Bowling Green, OH, The Maumee Valley Map Co., 1912) and Evers, *Wood County*, 279.
[39] Winter, *Northwest Ohio*, 640.
[40] Evers, *Wood County*, 283-284.
[41] Winter, *Northwest Ohio*, 631.
[42] Victor Darnell, *A Directory of American Bridge Building Companies 1840-1900*, (Washington, DC, Society of Industrial Archaeology, 1984).
[43] ODOT and FHWA, *The Second Ohio Historic Bridge Inventory, Evaluation and Preservation Plan*, (Columbus, ODOT, 1990), 18.
[44] Ibid, 18-19.

The move to industrialization began with the Howe truss, patented in 1840 and known for its use of iron designed for simplicity and strength. This feature made it popular with the rail industry for constructing new bridges and soon, they began to replace the wooden timber bridges and older wood and iron bridges along roadways with the newer steel versions. The move to industrial specialization established manufacturing firms that shipped prefabricated products to a site where they were then erected.[45] The expansion of the industry also created need for specialty architects, and other material suppliers such as rolling mills. The replacement of wood bridges by iron, then steel, as well as the development of bridge design and bridge engineering, marked the progression of bridge construction from a skilled craft to an industry.[46]

The "Good Roads Movement" of the final years of the nineteenth century was a popular movement to promote road and bridge infrastructure improvement, with many short-span wooden, pony truss bridges being built during this time.[47] The following first decade of the twentieth century was also a time of standardization in the bridge industry. At the same time, state highway departments were developing standards and practices for transportation were being established, including the precursor of the Ohio Department of Transportation, the Ohio Department of Highways in 1904. The Department of Highways created the Bureau of Bridges in 1911, which developed uniform specifications for a variety of bridge types, intending for bridge design and quality to thereafter meet the same exacting standards across the state.[48] During this time, steel almost totally replaced iron, and pin connections were replaced with riveted fastenings.[49]

Use of Concrete in Bridge Construction

By the end of the nineteenth century, engineers began to realize the potential benefits of using reinforced concrete as a construction material for bridges. Bridges using concrete instead of steel were generally less expensive to build and had lower long-term maintenance costs. Using concrete also permitted for the use of locally available materials (i.e. gravel and sand),[50] as well as local labor; thus allowing the building funds to stay within the local economy.[51] However, there was some initial reluctance to the use of concrete in bridge design. This opposition came mostly from the steel industry, which saw concrete bridges as a significant competitor to their monopoly on bridge construction. The early concrete bridges were disparagingly referred to as "mud bridges" because of their use of streambed gravel for their construction.[52] Brooklyn, New York was the site of the first

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[45] Darnell, *American Bridge Building Companies 1840-1900*.
[46] Ibid.
[47] ODOT and FHWA, *Second Inventory*, 1990, 19.
[48] Ibid.
[49] Ibid.
[50] David B. Steinman and Sara Ruth Watson, *Bridges and Their Builders*, (New York, G.P. Putnam's Sons, 1941).
[51] Darnell, *American Bridge Building Companies 1840-1900*.
[52] ODOT and FHWA, *Concrete Arch Supplement*, 5-7.

plain concrete arch bridge in the country, when the Cleft Ridge Span in Prospect Park was erected in 1870-1871.[53]

Also during this period, several patents were granted for steel-reinforced concrete. The first patent in the U.S. for steel-reinforced concrete was granted to Ernest L. Ransome in 1884. The addition of steel increased the tensile strength of concrete. Steel reinforcement allowed for bridge designers to model arches, beams, and columns in concrete. Adding steel reinforcement to bridges also required less concrete for construction and therefore was less expensive to build than plain concrete designs.[54] In 1889, the Alvord Lake Bridge in San Francisco, California was the first reinforced concrete bridge using the patented design of Ernest L. Ransome for steel reinforcement.[55] Soon after, James C. Wonders experimented with reinforced concrete in Ohio, and in 1907, he was appointed the second State Highway Commissioner. Within four years, this "father of concrete" had made significant studies of the material and the Department had collated standard specifications for its use in roadways and structures.[56]

The earliest reinforced concrete arch bridge in Ohio was the Eden Park Bridge, erected in 1895 in Cincinnati.[57] Between 1900 and 1902, the timber covered Y Bridge in Zanesville, Ohio was replaced with an unreinforced concrete structure, marking a turning point in the use of concrete bridges in the state. A group brought a lawsuit against the Muskingum County Commissioners claiming a violation of an 1888 statute requiring separate contracts for the construction of a bridge's substructures and superstructures. The presiding judge ruled that due to the unique nature of concrete bridges; the statute was not violated. This landmark case in 1902 brought concrete bridge construction to the forefront of engineers' attention and consequently, with no further legal impediment, the new technology began to predominate new bridge building throughout the state.[58] There had been reinforced concrete arch bridges built within the state in the years between 1895 and 1902. In fact, it seems that during this experimental period, there was a significant concentration in Hamilton County due to the success of the Eden Park Bridge.[59]

"The first forty years of the twentieth century saw great improvements in concrete as a bridge construction material. Design innovations included concrete slab and girder (both 1898), continuous slab (1909), rigid frame (1922), T-Beam and pre-stressed concrete (1937)."[60] Besides these technological improvements, many designers also considered reinforced concrete bridges more visually attractive than steel trusses and they were often chosen for picturesque locations.[61] Therefore, concrete bridges became a useful alternative

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[53] Donald Jackson, *Great American Bridges and Dams*, (Washington, DC, The Preservation Press, 1988), 133.
[54] ODOT and FHWA, *Concrete Arch Supplement*, 4-5.
[55] Ibid, 277.
[56] ODOT and FHWA, *Concrete Arch Supplement*, 43.
[57] Jackson, *Bridges and Dams*, 227-228.
[58] ODOT and FHWA, *Concrete Arch Supplement*, 6.
[59] Ibid, 43 and 55.
[60] Parsons Brinckerhoff, *A Context for Common Bridge Types*, 2-26.
[61] Jackson, *Bridges and Dams*.

for locations with an aesthetic priority, which expanded their popularity as much as their functionality. This priority arose from the influence of the City Beautiful Movement at the turn of the twentieth century. This design movement, which focused on urban design and planning, grew out of the White City of the World's Columbian Exhibition of 1893 in Chicago and sought to combine "social reform with public aesthetic improvements creating a new sense of civic grandeur."[62] As the White City featured architectural elements derived from the Classical Roman and Italian Renaissance eras, including arcades, columns, elaborate entablature, decorative moldings and railings, and recessed panels, these Neoclassical elements were adopted by bridge designers and can been seen in many examples through the 1930s.[63]

The rise of the age of the personal automobile increased the need for overland road work of all kinds. The growth of the ubiquity of these vehicles and their ever-increasing size required new bridges that could withstand larger and more constant traffic. Fortunately, the advances of new materials and designs in bridge building were able to cater to the growing demand. In the 1920s and 1930s, an example of this innovation was the reinforced concrete bridge, and those in charge of selecting new bridge designs increasingly utilized this type. More than a novelty, these bridges were economical because they were efficient in their use of materials, engineering strengths, ease of erection, and low maintenance cost. State transportation departments, including Ohio's, implemented standardized designs making use of the new technology. These standard plans included both concrete and metal bridges, as well as road surface materials. "The selling points for concrete bridges were; durability, minimal maintenance, as well as being less visually intrusive than metal truss bridges."[64]

The collective understanding of technological engineering led to improvements in bridge design that enabling concrete bridges to be built without the necessity of relying on arch technology. However, the arch was still a sought-after aesthetic element, familiar in the lexicon of bridge building.[65] Concrete arch bridges can be separated into two categories, deck arch and rainbow arch. Deck arch bridges contain the arches below the roadway, while rainbow arch bridges place the arch above the roadway; these are potentially more accurately described as through arch bridges as "rainbow arch" is more of a vernacular appellation than a technical engineering term.[66] Rainbow arch bridges were popular because they were considered visually pleasing, especially between 1915 and 1930 with designs from James Marsh.[67]

The following text describing the Rainbow Arch type is reproduced from *A Context for Common Historic Bridge Types* prepared by Parsons Brinckerhoff and Engineering and

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[62] ODOT and FHWA, *Concrete Arch Supplement*, 6.
[63] Ibid, 6-7.
[64] Parsons Brinckerhoff, *A Context for Common Bridge Types*, 3-25 and 2-25 to 2-26.
[65] Ibid, 2-26.
[66] Jackson, *Bridges and Dams*, 37.
[67] Parsons Brinckerhoff, *A Context for Common Bridge Types*, 2-26.

Industrial Heritage in 2005 for the National Cooperative Highway Research Program (NCHRP). This work is the National Standard for establishing the significance of a bridge type.

> "Another type of reinforced concrete arch bridge that was built in considerable numbers throughout the United States is the through arch, which was developed in the 1910s. In this type, the crown of the arch is above the deck and the foundations of the arch are below the deck, and hangers suspend the deck from the arch. The best known patented design of this type was developed by James Barney Marsh (1856-1936), an engineer from Des Moines, Iowa. After graduating with a Bachelor of Mechanical Engineering in 1882 from the Iowa State College of Agriculture and Mechanical Arts (now Iowa State University) in Ames, Iowa, Marsh moved to nearby Des Moines to become a contracting agent for the King Bridge Company of Cleveland, Ohio. Through the end of the century, Marsh sold and supervised the erection of iron, and then steel truss bridges in Iowa, Montana, South Dakota, Minnesota, Colorado, and five other western states (*21*, p. 5).
>
> "By 1896, Marsh had decided to turn the skills he had learned working for others to his own advantage, and he founded the Marsh Bridge Company. Marsh built both steel and reinforced concrete bridges for city and county governments, including a Melan arch at Waterloo, Iowa, in 1903, and an eight-span Melan arch for Second Avenue in Cedar Rapids, Iowa, in 1906. In 1909, the company was put in the hands of a receiver, and Marsh reorganized his business as the Marsh Engineering Company. Late that year, he completed a non-Melan style, three-span arch bridge in Dunkerton, Iowa, which still stands. The royalties that Marsh had to pay to American holders of the Melan patent were becoming increasingly onerous, and soon after being sued by Daniel Luten in 1911 over a bridge built by Marsh's company in Minnesota, Marsh began experimenting with his own designs for reinforced concrete bridges. In 1912 he received patent number 1,035,026, which covered the basic design for which he would be best known, the Marsh arch. The deck of a Marsh arch is supported by vertical ties between the crown of the arch and the floor beams, and all forces in tension are exerted on the vertical members. Most Marsh arches were small highway bridges with span lengths from 40 to 100 feet. Although most bridge historians have tended to assert that the Marsh arch was, like many other reinforced concrete arch designs of the time, somewhat wasteful of materials, Hippen (*21*, p. 6) has argued that the design is "more sophisticated, both structurally and economically, than has been thought in the past."
>
> "Commonly called a "rainbow" arch, the Marsh design was not constructed in large numbers outside the Midwest, but scattered examples still survive in other regions. One of his earliest bridges, built the same year that he filed his first patent application (1911), is the bridge over the Little Cottonwood River in Blue Earth County, Minnesota. Oklahoma still has an example across Squirrel Creek in Pottawatomie County (1917); one of two built in that state. Possibly the largest Marsh arch is a five-span bridge built at Cotter, Arkansas, in 1930. Each span of this National Historic Civil Engineering Landmark is 190 feet in length. It is similar in many respects to the only remaining multi-span Marsh Arch Bridge in Iowa, the Lake City Bridge (1914), which has three spans of 80 feet each. Another multi-span Marsh Arch Bridge listed in the NRHP is located at Fort Morgan, Colorado. Other multi-span Marsh Arch Bridges, now demolished, have been documented across the Little Wabash River at Carmi, Illinois (1917); and across the Cannonball River at Mott, North Dakota (1921). The greatest number of extant Marsh Arch Bridges, however, may be found in Kansas, Iowa and Ohio.
>
> "The Marsh arch design covered by his 1912 patent is not a tied arch because the floor system did not serve as a tie between the ends of the arch ribs. According to Hippen (*21*, p. 7), the Marsh patented design allowed the floor to slide independently of the arches so that longitudinal expansion and contraction would be transmitted between the floor system and the arches only through the hangers, which were flexible enough to bend slightly. This was achieved through use of a slip joint between the deck and the arch where they intersect (*20*, p. 27). Marsh secured another patent in 1921 (#1,388,584)

for a supposedly flexible short hanger to be used as a modification of the 1912 design, and this modification assumes a continuance of the sliding deck concept. Marsh was known to have produced both a fixed arch design and a tied arch design, and his company built both types. Apparently, he did not have a patent for the fixed arch design (*21*, p. 9).

“Many tied arch spans are called “rainbow” arches, but a clear distinction should be made between those spans based on the 1912 Marsh patent and true tied-arch designs. Occasionally, confusion has arisen in the literature of bridge history due to the tendency to characterize both Marsh patented designs and non-Marsh designs as “rainbow arches.” As an example, in *Historic Highway Bridges in Pennsylvania*, the Second Street Bridge in Delaware County is referred to as a “bowstring arch,” and it is stated that concrete bowstring arch bridges are sometimes known as “Rainbow” and “Marsh” arches. However, a bowstring span, whether expressed as a metal truss or a reinforced concrete arch, is by definition a tied-arch design, whereas the Marsh arch, as covered by the 1912 patent, is not. Care should be taken in identification and evaluation of reinforced concrete through “rainbow” arches to differentiate between fixed and tied arch designs.

“Significance Assessment: The Marsh arch is another example of the early proprietary patented reinforced concrete arch form built during the first few decades of the 20th century (1910-1920). A technological characteristic of the Marsh arch was its ability to be fabricated without the use of falsework. All concrete arches need a temporary wooden scaffolding to support the formwork until the concrete is cured and structurally stable. March arches essentially are a steel armature around which concrete is formed – a steel framework incased in concrete. Hence, the formwork for the concrete could be hung from the reinforcing armature without the need for scaffolding in the bed of the river.

“Marsh arches are an aesthetic and pleasing form contributing to the cultural landscape, especially in the Midwest. Bridges documented to have been built by Marsh or under his patent are significant within the context of this study if they retain their character-defining features, which include the arch (from below to above the deck) end posts, suspenders (vertical ties), lower chord, floor beams, railing and piers or abutments. Documentation might be found in the form of a bridge plaque or local government records. Kansas has completed a study of its Marsh arches, which can be found at http://midwestbridges.com/marsharch.html.

“In addition to the documented Marsh arches found in the mid-western states, there are other rainbow type arches built in other parts of the country. Examples that visually resemble Marsh arches but cannot be documented, possess less significance within the context of this study than the documented Marsh arch, but are still considered significant if they retain their character-defining features.

“Examples Reinforced Concrete Marsh or Rainbow (Through) Arch

1. Marsh Concrete Rainbow Arch Bridge (1911), Blue Earth County, MN. NRHP listed 1980 in Blue Earth County MRA.
2. Lake City Bridge (1914), Calhoun County, IA. NRHP listed 1989.
3. Marsh Rainbow Arch Bridge (Spring Street Bridge) (1916), Chippewa County, WI. NRHP listed 1982.
4. Cotter Bridge (1930), Baxter County, AR. NRHP listed 1990 in Historic Bridges of Arkansas MPS.
5. Blacksmith Creek Bridge (1930), Topeka, Shawnee County, KS. NRHP listed 1983 in Rainbow Marsh Arch Bridges of Kansas Thematic Resource Nomination.
6. Mott Rainbow Arch Bridge (1921), spanning Cannonball River, Mott, Hettinger County, ND. HAER ND-1.
7. Spring Street Bridge (1916), spanning Duncan Creek, Chippewa Falls, Chippewa County, WI. HAER WI-37. “[68]

[68] Parsons Brinckerhoff, *A Context for Common Bridge Types*, 3-61 to 3-64.

The 2005 ***Context*** focusses on James Barney Marsh within their definition of the Rainbow Arch type. It helpfully distinguishes between vernacular terminology concerning through-arch designs. For example, Bowstring Arches, a tied arch by definition, as they are a more-specific design type, should not be confused with Marsh Arches because Marsh did not design any Bowstring Arches; he designed within the Rainbow Arch type, which more generally, can be fixed or tied, or following his 1912 patent which was neither fixed nor tied, but rather had vertical members in tension supporting a sliding deck within the structure of the arch ribs and floor beams. It further distinguishes between different designs which bear Marsh's name and similarly distinguishes between Marsh's 1912 patented arch and other Rainbow Arch types. While these distinctions are helpful, there is very little discussion of other influences or individual developers of reinforced concrete through-arch bridges and therefore little disambiguation of the specific examples within these types. Certainly, on a national scale, the Marsh Arch is the foremost example of the Rainbow Arch design type, concerning total number and geographical reach. However, in Ohio in particular, there were other examples of Rainbow Arches from designers which were equally if not more influential. Adjacently, an argument could be made that the Marsh designs are in fact steel arches encased in concrete rather than what is typically considered a reinforced concrete structure, and more properly therefore, a subtype of its own within metal arched bridge design.[69] E. A. Gast of Cincinnati designed and built two reinforced concrete through arches in Hamilton County before Marsh's patent (SFN: 3137600 in 1909 and SFN: 3130622 in 1911). Certainly both of these prominent practitioners were studied by the designers within the Ohio Department of Highways' Bureau of Bridges in 1925 when they developed the Standard Design which the Insley Road Bridge would follow.

Ohio Department of Highways, Bureau of Bridges and the Development of Reinforced Concrete Rainbow (Through) Arch Bridges

The Ohio Department of Highways began in 1904 to study the state's poor roadways and to develop plans for improvement and maintenance.[70] In establishing this department, the state took responsibility for design plans and construction costs which to that point had been the sole responsibility of local governments.[71] By 1910, uniformity between counties would begin as the department implemented a state highway system.[72] In the middle of that decade, the Federal Aid Road Act facilitated federal funding to match state-funded highway projects, which significantly aided the expansion of the state highway system. At the end of that decade, the highway program continued to expand due in large part to the abundance of personal automobiles as well as the need for rapid and reliable overland troop transportation experienced nationally during the few years of World War I.[73]

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[69] ODOT, Historic Bridge Inventory Report (SFN: 8759162), 12/20/2009.
[70] Ohio Department of Highways (ODOH), *An Outline of the History of Ohio's Roads and Related Transportation Development*, (Columbus, ODOH, 1949).
[71] Roy Hampton and Christine Trebellas, *Historic Context Report for the Ohio Department of Highways, Bureau of Bridges 1911-1945*, (Columbus, Ohio Department of Transportation, Office of Environmental Services, 2012), 6-8.
[72] Ohio Department of Highways (ODOH), *Report of Department of Highways: Years 1917 to 1928 Inclusive*, (Columbus, F.J. Heer Printing Co., 1928), 10.
[73] ODOT and FHWA, *The Ohio Historic Bridge Inventory, Evaluation and Preservation Plan*, (Columbus, ODOT, 1983).

The 1920s brought several other Federal aides to highway development. The Federal Highway Act of 1921 established a "classification designating primary and secondary routes for a federal highway system."[74] Also in 1921, the Federal Aid Program was created to "help fund the expansion of the new federal highway system."[75] These programs and laws were funded by Federal gasoline taxes (1925 and 1927) which were dedicated to "bridge and highway construction, maintenance, and repair."[76] By 1928, the old inter-county road system was abandoned and ODOH would begin to implement a new statewide roadway design, construction, and maintenance system, which would include bridge building.[77]

ODOH established the Bureau of Bridges as one of its five engineering divisions in 1911. The purpose of the bureau was to design, construct, and maintain all bridges on state roadways. The Bureau of Bridges saw the utility of standardization within their designs, which would bring about efficiency, economy, and consistency. "In many cases these designs favored concrete construction. In particular, rainbow arch bridge designs gained popularity with state engineers. These designs were inherently adaptable, aesthetically pleasing, and well-suited to shorter span projects."[78] During this time of increased state involvement in bridge building, the advantages of using reinforced concrete as a construction material were realized and promoted. "Reinforced concrete was fully accepted as an alternative to, or even preferred material over, steel. Figures published for the Department's work in 1925 showed that of the 164 highway bridges built that year, over eighty percent were concrete."[79] In 1925, the bureau updated their standards for bridges because of the increasing size and volume of vehicles on Ohio roadways and their impact to the earlier-designed bridges.[80] It was this 1925 standard design from which the Bureau built the Insley Road Bridge (SFN: 8759162) and several other Wood County reinforced concrete rainbow through arches.[81]

Rainbow (Through) Arch Bridges in Ohio

The open spandrel concrete arch in bridge design has a European ancestry as M. A. Considere built the earliest example in France in 1904. It was a "bowstring" example, which is a tied version. This bridge essentially executed a previous steel bowstring structure with the new material. In 1908, Howard M. Jones designed and built the first open spandrel concrete arch bridge in the United States. Jones was the engineer for the Cumberland River Bridge Committee and used the reinforced concrete arches as support structure for the

[74] ODOH, *Report 1917 to 1928*, 60 and 69.
[75] Ibid.
[76] Ibid.
[77] ODOH, *Outline History*, 35.
[78] ODOT and FHWA, *Concrete Arch Supplement*, 55.
[79] *Ibid*, 9.
[80] ODOH, *Report 1917 to 1928*, 158.
[81] ODOH, *Plansheets*, sheets 1-12 of 12.

deck truss of the Sparkman Street Viaduct.[82] The bridge was constructed in Nashville, Tennessee and was still standing as of 1994.[83] These are merely early examples of executing open spandrel arches in reinforced concrete. The Insley Road Bridge (SFN: 8759162) differs from the bowstring type in that it is a fixed design. It also differs from the deck truss; while that type carries the roadway above the arch, the rainbow is an open spandrel arch type which allows the tops of the concrete arch to pass above the deck, flanking the roadway which is carried "through" the arched ribs.[84] From these differences, it is a more proper example of what would become known as the Rainbow type. The rainbow nomenclature would come with the expanding popularity of the type, the term likely coined by motorists in the 1920s.

Though James Marsh has been shown to be the most widespread builder of this type, E. A. Gast built the Benson Street Bridge over Mill Creek in Hamilton County, the first rainbow arch bridge in Ohio, in 1909-1910, before Marsh had secured his 1912 patent. Gast described the choice of reinforced concrete through arch bridge at Benson Street in an article for *Engineering News* in 1911. Within the article he mentions: "The design chosen, using hingeless arch ribs above the floor line, is an unusual one and possibly the first of its kind in this country, although several like it have been built in Europe."[85] Concrete was accepted early as a building material in Hamilton County, largely due to the influence of Gast who was the County Deputy Surveyor at the time. He had observed early successes using reinforced concrete, like the 16-story Ingalls Building in Cincinnati (1902), which was the first reinforced concrete skyscraper in the nation,[86] and began experimenting with the material himself. Similarly he had observed the utility of concrete as a bridge material within the county. In Cincinnati's Eden Park, Austrian engineer Fritz Von Empergen designed a closed-spandrel arch bridge, the Melan Arch Bridge, which carried Cliff Drive over Eden Park Drive in 1894-95. This was the first reinforced concrete arch span in Ohio and one of the first in the nation.[87]

As previously mentioned, due in large part to the success of Gast's first example, as well as the influence of the prolific and popular work of James Marsh, the reinforced concrete rainbow arch bridge garnered popularity from engineers and the public. While both the public and the professionals appreciated its aesthetically pleasing design, state engineers continued to favor the broad utility of the design, into the 1920s.[88] An amalgamation of the Gast and Marsh designs, the Bureau of Bridges established their own concrete through arch as a standard design type between 1921-1923. A short technical definition of the bureau's

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[82] Howard M. Jones, "Reinforced Concrete Viaducts," *Engineering News*, 25 February 1909 (New York, The Engineering News Publishing Company, Vol. LXI, No. 8, February 25, 1909), 201.
[83] ODOT and FHWA, *Concrete Arch Supplement*, 55.
[84] Hampton and Trebellas, *Historic Context for ODOH, BOB 1911-1945*, 16.
[85] E. A. Gast, "A Through Reinforced Concrete Arch Bridge," *Engineering News*, 16 February 1911 (New York, The Engineering News Publishing Company, Vol. LXV, January-June 1911), 196-197.
[86] ODOT, 2007-2008 Ohio Historic Bridge Inventory Update, *Historic Context and Phase 1A Recommendations for Previously Excluded and Re-evaluated Bridge Types*, 16.
[87] ODOT and FHWA, *Concrete Arch Supplement*, 38.
[88] Hampton and Trebellas, *Historic Context for ODOH, BOB 1911-1945*, 16.

type is provided in the Insley Road Bridge Historic Bridge Inventory Report: "In the basic design the deck is supported by vertical hangers between the arch ribs and the floor beams. The arch ribs, like Marsh's can have patented steel systems within them, or they can be un-patented systems of conventional reinforced concrete."[89] Significant bureau leaders J. R. Burkey and W. H. Rabe promoted the efficacy of the type.[90] As noted, the Insley Road Bridge was built in 1930 from the updated standard plans for concrete through arch bridges drawn in 1925.[91] Inevitably, traffic volume continually increased as did the size of vehicles and the 1925 designs would eventually become outdated. The rainbow arch bridge design, so useful within its own time, lost favor with state bridge engineers because they were difficult to alter (i.e. widen) without major demolition. Furthermore, when one of these bridges was slated to be altered, there was little re-usable material to be gained from a salvage effort. It was soon realized that replacement of these bridges was the most practical means of expanding them to fit later-twentieth century roadway needs.[92]

History of the Insley Road Bridge (SFN: 8759162)
Built in 1930, this example of a reinforced concrete through arch (or "rainbow") bridge is complete and mostly original. Built from the state bridge bureau's 1925 standard plans, this specific bridge is a somewhat later example of the type.[93] The plans for this bridge share sheets detailing three other bridges which were to be built in Wood County. The Insley Road Bridge (SFN 8759162) is noted as the "Bridge over Rocky Ford" and along with the Title (sheet 1) is detailed on sheets 2-4 of the total 12 sheet drawings for the four bridges.[94] It is drawn as 94'-0" long and 35'-8" wide, a single span with a total peak height of 31'-0" and six posts with hangers terminating below the deck. The next example was the rainbow arch to be built as the "Bridge over Middle Branch Portage River" (SFN 8701741), built 1925.[95] It is drawn as 104'-6" long and 28'-0" wide from curb-to-curb; it too is a single span with a height of 18'-5-3/4" from the spring line and ten posts with hangers terminating below the deck. The third bridge in the package was to be the "Bridge over North Branch Portage River" (SFN 8701830), also built 1925.[96] It is drawn as 89'-0" long and 28'-0" wide from curb-to-curb; again a single span with a height of 21'-10" from the spring line and six posts with hangers terminating below the deck. Those two bridges which had carried US25 were replaced in 2002-03. The final sheet shows the "Grassy Creek Bridge" (SFN 8700788), built 1927.[97] This location was actually spanning State Route 18 over Rocky Ford Creek, just south of North Baltimore. It is drawn as 92'-5" long and 28'-0" wide from curb-to-curb, 33'-4" outside-to-outside, another single span with a total height of 32'-4" and six posts with hangers terminating below the deck. The bridge

[89] ODOT, Historic Bridge Inventory Report (SFN: 8759162), 12/20/2009.
[90] ODOT and FHWA, *Concrete Arch Supplement*, 54-55 and 82.
[91] ODOH, *Plansheets*, sheets 1-12 of 12.
[92] ODOT and FHWA, *Concrete Arch Supplement*, 87.
[93] ODOT, Historic Bridge Inventory Report (SFN: 8759162), 12/20/2009.
[94] ODOH, *Plansheets*, sheets 1-4 of 12.
[95] Ibid, sheets 1,5-7 of 12.
[96] ODOH, *Plansheets*, sheets 1,8-11 of 12.
[97] *Ibid*, sheets 1 and 12 of 12.

underwent major reconstruction in 1961 and appears to have been entirely replaced since then.

Elsass-Meyer Construction Company

In 1922, Fred P. Elsass partnered with Oscar Meyer and formed the Elsass-Meyer Construction Company.[98] Based in Anna, Ohio, the small company operated fairly locally, in northwest Ohio and northeast Indiana filling orders for the state highway departments between 1922 and 1942. They specialized in small span concrete bridges and built over forty during their tenure.[99] They were responsible for at least three of the four Wood County reinforced concrete rainbow arch through bridges in the 1925 plans: the first carrying US 25 over the Middle Branch of the Portage River (SFN 8701741), the second spanning the North Branch of the Portage River (SFN 8701830), and the subject bridge spanning Rocky Ford Creek on Insley Road.[100] Though the sources fail to specifically name the “Grassy Creek Bridge” (SFN 8700788), as it was built in 1927, between the outside construction dates for the other three bridges (1925-1930), it can be assumed that Elsass-Meyer likely built that bridge as well.

Because of shifting ownership of bridges, it is difficult to determine how many of this type was constructed in Ohio. ODOT has information on 41 distinct concrete rainbow arch bridges, but the most recent total of the type within the ODOT historic bridge inventory lists seven SFNs pertaining to the type. These examples range in date from 1909 to 1930, with the subject bridge being the latest built.[101] In 1994, ODOT performed a survey of bridges owned by the state specifically focused on concrete arch types. According to the Historic Bridge Inventory Report for the Insley Road Bridge (SFN: 8759162), as a result of that survey, given their limited numbers and importance within the context as the aesthetic alternative to the through truss bridge, ODOT determined the significance of each of the remaining examples of this type was high.[102] Of the four Wood County bridges assessed for the 1994 concrete arch publication, SFN 8701830 carrying CR 25 over the North Branch of the Portage River was categorized as a “Select Bridge.” It is a near twin of the Insley Road Bridge, also having six stringer posts. The Insley Road Bridge (SFN: 8759162) was categorized as a “Reserve Pool Bridge” by the 1994 Concrete Arch Supplement (along with another Concrete Rainbow Arch – a 10-stringer near twin SFN: 8701741 and a Parker Through Arch SFN: 8750513).[103] The Insley Road Bridge was recommended for closure in 2009 because of an inspection returning a Critical rating and was formally closed January 11, 2013.

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[98] James A. Goodman, “Historic American Engineering Record Document of Middle Branch Portage River Bridge in Bowling Green Vicinity, Wood County, Ohio,” submitted to Ohio Department of Transportation, Office of Environmental Services, Columbus, Ohio, March 2002.

[99] Elsass, “Bridges of the Past from Anna and Shelby County.”

[100] Ken Kinney, “Bridges to the Past,” *(Bowling Green) Sentinel-Tribune*, 5 November 2001 and Goodman 2002.

[101] ODOT, 2007-2008 Ohio Historic Bridge Inventory Update.

[102] ODOT, Historic Bridge Inventory Report (SFN: 8759162), 12/20/2009 and ODOT and FHWA, *Concrete Arch Supplement*.

[103] ODOT and FHWA, *Concrete Arch Supplement*, Appendix A: pg. 150.

Part II. Structural/Design Information

A. General Statement:

1. **Character:** The single span bridge carrying Insley Road over Rocky Ford Creek was built in 1930. The bridge consists of rainbow (through) arches with flat-paneled arch ribs with floorbeam hangers and articulated floorbeams, all composed of reinforced concrete.

   According to ODOT's Historic Bridge Inventory Report for this bridge, it was constructed following the state bridge bureau's standard design for Concrete Thru Arch Bridges which was developed in 1923 and used through the 1930s.[104] As the bureau constructed this bridge in 1930, it is a later example of the type. This standard design relied heavily on the innovative designs of James B. Marsh of Iowa who was nationally prominent and E. A. Gast of Hamilton County, Ohio. This bridge follows the basic design in that "the deck is supported by vertical hangers between the arch ribs and the floorbeams."[105] According to the Concrete Bridge Supplement, Rainbow Arches are Through Open Spandrel Rib Arches: "…similar to the open spandrel rib arch except that the bridge roadway passes between or 'through' the arch ribs and is suspended from the ribs by means of column type hangers. There are two types of rainbow arches; fixed and tied. In the fixed design, the arch thrust is resisted by massive abutments founded on piling or rock."[106] The Insley Road Bridge (SFN: 8759162) is a fixed design. "In the tied design, the ends of the arch ribs are tied together either at the level of the deck slab or below the stream bed."[107]

2. **Condition of Fabric:** ODOT Bridge Inspection Report Form BR-86 records the cast-in-place concrete deck and superstructure as being in Critical Condition. This classifies the bridge as "Structurally Deficient."

B. Description

The bridge carries two traffic lanes of Insley Road over the Rocky Ford Creek. The area surrounding the structure is predominately agricultural in nature. The bridge was constructed by the State of Ohio, Department of Highways and Public Works, Division of Highways along what was then known as Findlay - Bowling Green Road or Inter-County Highway No. 220, Section F-2.

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[104] ODOT, Historic Bridge Inventory Report (SFN: 8759162), 12/20/2009.
[105] Ibid.
[106] ODOT and FHWA, *Concrete Arch Supplement*, 14.
[107] Ibid, 14.

The single span rainbow (through) arch bridge has flat-paneled arch ribs with floorbeam hangers and articulated floorbeams. Concrete balustrades fill between the hangers, and flat-panel parapets extend between the arch ribs and the wingwalls.

This reinforced concrete bridge is a rainbow arch, or through arch design with an overall length, from end to end of abutment wing walls, of 95'-0". Construction involved the use of 383 cubic yards of concrete, and a total of 47,670 pounds of steel reinforcement. All exposed edges are detailed with a bevel. With the exception of the bottom and sides of the floor beams and the bottom of the floor slab, the bridge is detailed with a rubbed surface. This is a process where the wet concrete surface is "rubbed" with an abrasive to remove traces of the framework and other irregularities.

The reinforced concrete abutments consist of an end wall, two wing walls oriented 90 degrees to the end wall and an end strut spanning from wing wall to wing wall. The end strut both supports an 11" reinforced concrete abutment top slab and an 11" thick, 16'-0" wide and 15'-0" long reinforced concrete approach slab. The concrete footers of the abutments are founded on undisturbed hard pan soil. The reinforced concrete wing walls are 17'-0" long measured from the face of abutment and each contains two 2" recessed panels.

The bridge arch spans 60'-0" from face to face of abutment, has a height of 21'-8" from the spring line to the top of the arch, and measures 28'-0" wide from inside faces of the arches. The arches narrow at the crown and flair at the ends. Each arch is 2'-8" wide, has six concrete hangers, and is decorated by seven recessed panels on the outside and inside faces. These panels are 1" deep and are spaced 10" apart. They are centered on the arch ribs with a top and bottom margin that ranges between 9" at the flared ends and 6" at the narrowed center of the arches.

The hangers connect to the concrete floor beams that support the 11" deep floor slab and are secured with reinforcing steel sleeved in 2" copper pipe. These beams vary in width and depth depending on their placement along the span, and they span the width of the bridge.

The structure features four solid and five spindled reinforced concrete railings per side. The solid railings are located on the abutment wing walls and are 3'-0" tall, and 10" wide. These dimensions change at the post sections, where the height is 3'-2" and the width is 1'-6". The lengths of the posts vary between 2'-3" and 2'-6". The solid rails are decorated with 5'-0 ½" x 1'-0" recessed panels 1" deep. The spindled railings are within the arch span and have eleven hourglass shaped spindles per section defined by the arch hangers. The spindles are each 2'-5 ½" tall, 4" thick, and flair from the narrow 4" center to the 7 ¾" ends. These spindles are secured with 10" wide top and bottom rails.

Maintenance: The bridge appears to have received minimal maintenance through its lifetime. The reinforced concrete is exhibiting severe deterioration including cracking, spalling and efflorescence, with the deck, floor beams and abutment end walls in the worst condition. Asphalt resurfacing has been performed and altered the surface of the deck. The bridge has been closed to traffic since January 11, 2013 following a Critical Condition rating in 2009.

C. Site Information: The Insley Road Bridge (SFN: 8759162) spans Rocky Ford Creek near Interstate 75 in Henry Township, Wood County, Ohio.

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HISTORIC AMERICAN ENGINEERING RECORD

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INSLEY ROAD BRIDGE REPALCEMENT (NON-ODOT)
HAER No. OH-WOO-Insley Road Bridge (SFN: 8759162)
Spanning the Rocky Ford Creek
Henry Township
Wood County
Ohio

INDEX TO DIGITAL PHOTOGRAPHS

Brett A. Carmichael, Photographer, July 20, 2018

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OH- WOO-INSLEY ROAD BRIDGE -03:	VIEW EAST (UNDER WEST EDGE): FLOOR BEAMS, UNDERSIDE OF FLOOR SLABS DETAIL (CONCRETE FINISH/CONDITION)
OH- WOO-INSLEY ROAD BRIDGE -04:	WEST ELEVATION (UNDER WEST EDGE), FLOOR BEAMS, UNDERSIDE OF FLOOR SLABS, CROSSWALL OF NORTH ABUTMENT, LOOKING NORTH
OH- WOO-INSLEY ROAD BRIDGE -05:	VIEW EAST: ALONG CROSSWALL OF SOUTH ABUTMENT, UNDERSIDE OF FLOOR SLABS, FLOOR BEAMS, FOOTERS OF WOODEN BENTS
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OH- WOO-INSLEY ROAD BRIDGE -08:	VIEW SOUTHEAST: WEST ELEVATION, WEST ARCH FROM NORTH ABUTMENT/SPRINGPOINT

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OH- WOO-INSLEY ROAD BRIDGE -18:	VIEW EAST: ALONG CROSSWALL OF NORTH ABUTMENT, UNDERSIDE OF FLOOR SLABS, HOLE IN SLAB SHOWING REINFORCING REBAR, EAST ARCH SPRINGPOINT (CONCRETE FINISH/CONDITION), BRIDGE FOR I-75 IN BACKGROUND
OH- WOO-INSLEY ROAD BRIDGE -19:	UNDER CENTER, SOUTH ABUTMENT CROSSWALL, FLOOR BEAMS, FLOOR SLABS, FOOTERS OF WOODEN BENTS, LOOKING SOUTH
OH- WOO-INSLEY ROAD BRIDGE -20:	VIEW NORTH: OF NORTH ABUTMENT CROSSWALL, EAST ARCH SPRINGPOINT DETAIL (CONCRETE FINISH/CONDITION), FOOTERS OF WOODEN BENTS
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HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTIONS
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HISTORIC AMERICAN ENGINEERING RECORD

REDUCED HISTORIC CONSTRUCTION DRAWINGS

INSLEY ROAD BRIDGE REPALCEMENT (NON-ODOT)
HAER No. OH-WOO-Insley Road Bridge (SFN: 8759162)
Spanning the Rocky Ford Creek
Henry Township
Wood County
Ohio

<u>CITATION</u>:
State of Ohio, Department of Highways, Bureau of Maintenance and Repair, "Bowling Green-Perrysburg & Findlay-Bowling Green Roads, I.C.H. 220 Sec. E1 & F-2, I.C.H. 282 Sec. F (Bridges) Wood County," Sheets: 1/12 – 4/12. Columbus, Ohio: ODOH, April 1925.

#8027

1/12

STATE OF OHIO

DEPARTMENT OF HIGHWAYS AND PUBLIC WORKS

DIVISION OF HIGHWAYS

BUREAU OF MAINTENANCE AND REPAIR

BOWLING GREEN-PERRYSBURG & FINDLAY-BOWLING GREEN ROADS

I.C.H. 220 SEC. E1 & F-2 I.C.H. 282 SEC. F (BRIDGES)

WOOD COUNTY

CONVENTIONAL SIGNS

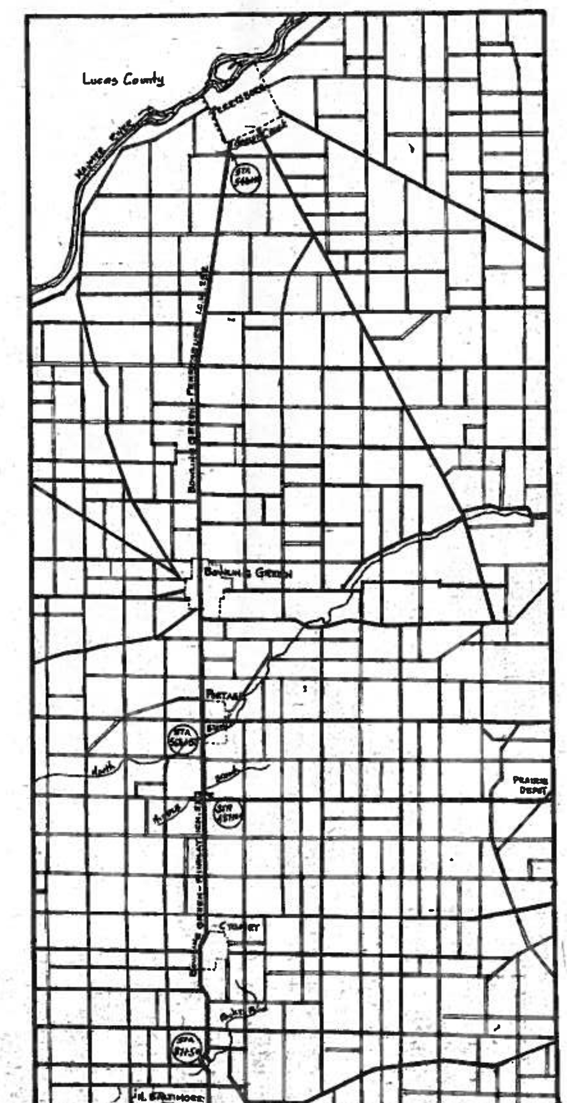
- Township Line
- Section Line
- Center Line
- City or Village Line
- Guard Rail
- Telephone Poles
- Steam Railroad

The Standard Specifications of the State of Ohio-Division of Highways in force on date of contract will govern this improvement.

We the Commissioners of Wood County hereby approve these plans and certify that the right-of-way is available for the construction, maintenance and repair of the above highway.

Ed L. Leathers
D. J. Petteys
F. E. Fox

DATE ________ 1925 COUNTY COMMISSIONERS



LOCATION MAP

SCALE OF MILES

BRIDGE SITE SHOWN THUS (STA)

I hereby approve these plans and declare that the making of this improvement will require the closing to traffic of the highway at the bridge site and that a temporary bridge will be provided as shown on the plan.

APPROVED N.W. Locke RESIDENT ENGINEER
DATE 8-26 1925

APPROVED M. J. Hanahan DIVISION ENGINEER
DATE 9-5- 1925

APPROVED J. R. Burkey CHIEF ENGINEER BUREAU OF BRIDGES
DATE 9-14- 1925

APPROVED Geo. E. Carr CHIEF ENGINEER BUREAU OF MAINTENANCE
DATE 9/23 1925

APPROVED Harry J. Kirk STATE HIGHWAY ENGINEER
DATE 10-1- 1925

APPROVED G. F. Schlesinger DIRECTOR OF HIGHWAYS AND PUBLIC WORKS
DATE Oct. 1, 1925

INDEX OF SHEETS

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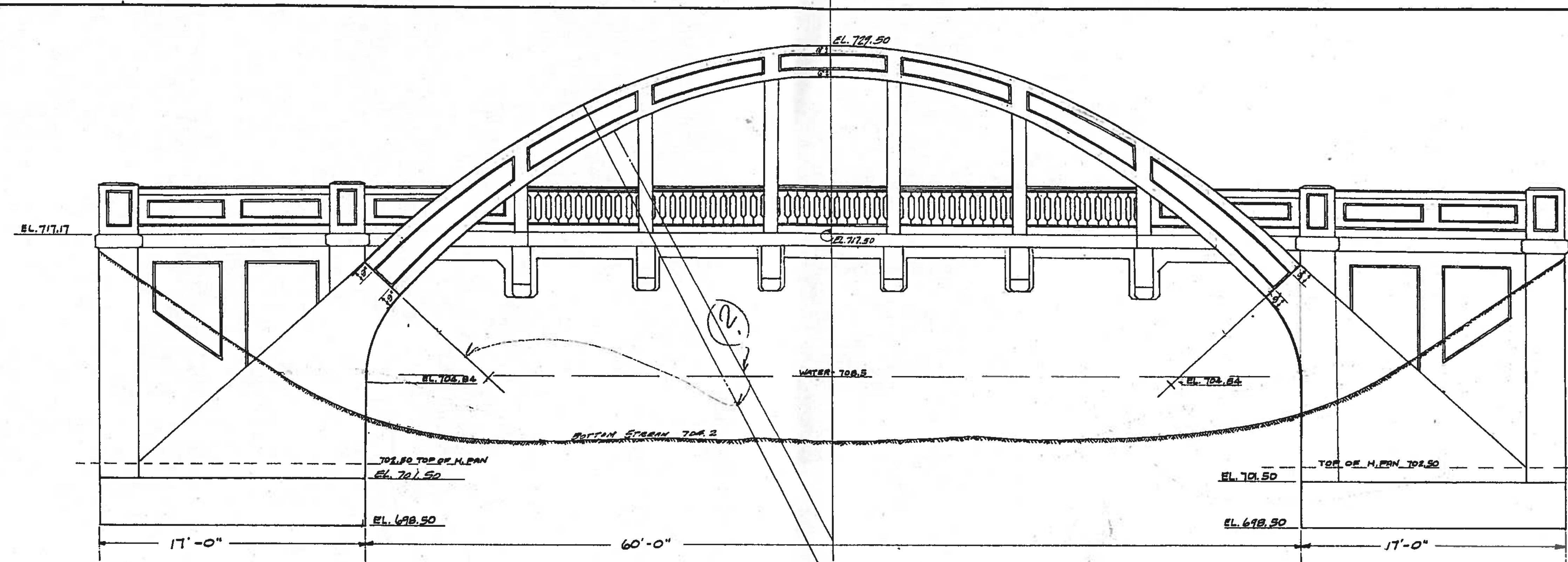
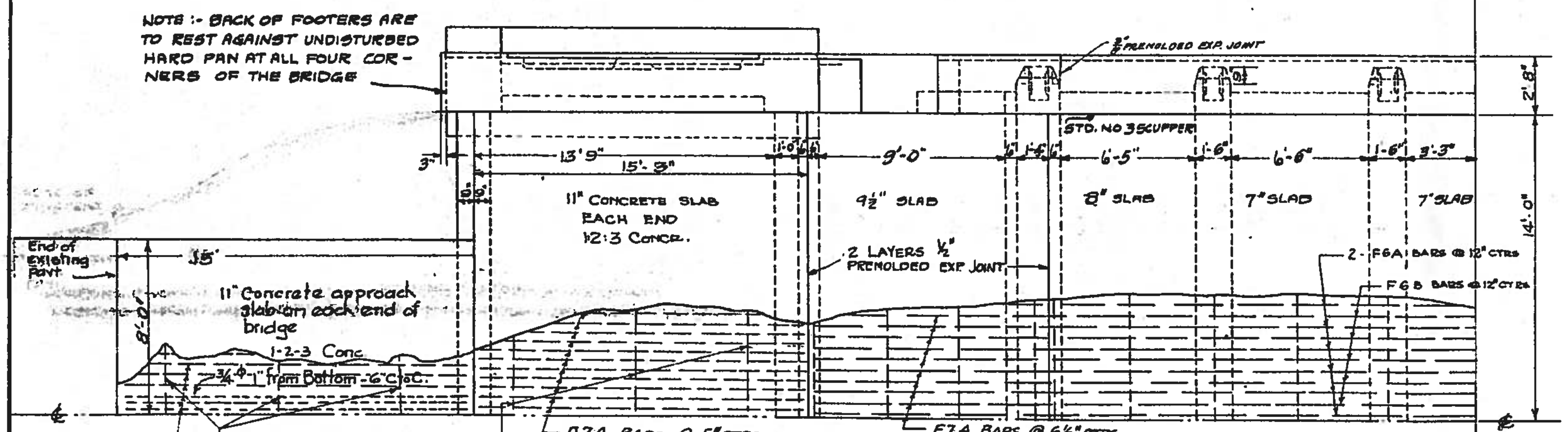
WOOD - 220 - E-1 & F-2 & 282 - F-Bridges

1925



SIDE ELEVATION



QUARTER PLAN VIEW

NOTES :- ALL CONCRETE IN FOOTERS IS TO BE 1:2½:4 MIX. ALL REMAINING CONCRETE IS TO BE 1:2:3, EXCEPT ABUTMENTS WHICH ARE TO BE 1:2:3½ (INCLUDING END STRUTS)

STANDARD NO. 3 CONCRETE CURB SCUPPERS ARE TO BE PLACED AT ALL FOUR CORNERS OF THE BRIDGE AS SHOWN ON THE QUARTER PLAN VIEW.

NEW BRIDGE IS TO BE CENTERED ON THE CENTER LINE OF THE PRESENT PAVEMENT FACE LINE OF NEW NORTH ABUTMENT IS TO COINCIDE WITH THE FACE LINE OF THE PRESENT NORTH ABUTMENT.

ELEVATIONS ARE REFERED TO THE ELEVATION OF THE PRESENT CENTERLINE OF THE PAVEMENT AT THE NORTH END OF PRESENT BRIDGE AND AT A POINT 100' NORTH OF PRESENT BRIDGE. THE ELEVATIONS OF THSSE TWO POINTS ARE THE SAME AND WERE USED AS EL. 716.80 AS SHOWN ON OLD PLAN FOR PAVEMENT OF THIS SECTION OF THE HIGHWAY.

ELEVATION OF TOP OF HARD PAN IS EL. 702.5

EXCAVATION AS LISTED INCLUDES THE REMOVAL OF THE PRESENT ABUTMENTS AND WINGS. SUCH OF THE SOUTH ABUTMENT AND WINGS AS DO NOT INTERFERE WITH THE NEW CONSTRUCTION NEED ONLY TO BE REMOVED DOWN TO LOW WATER LINE.

STONE FROM THE OLD ABUTMENTS IS TO BE DISPOSED OF AS RIPRAP ON THE SLOPE AT THE SOUTH EAST WING TO PREVENT WASH FROM THE DITCH WATER.

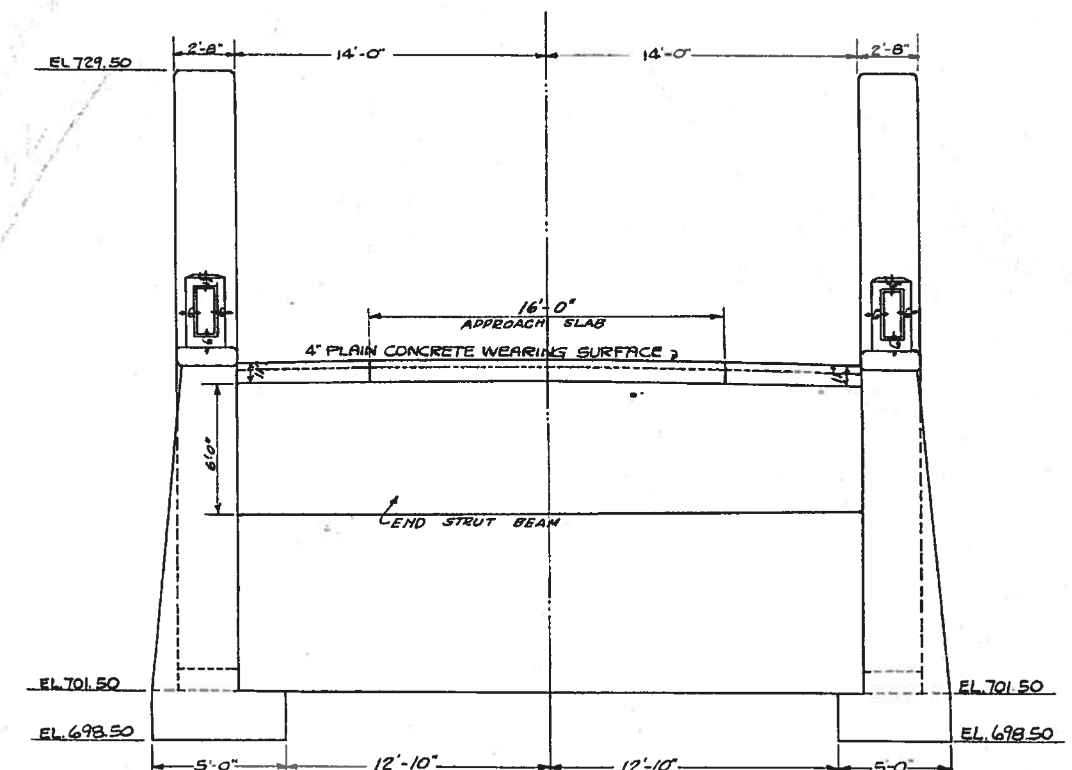
ALL EXPOSED EDGES OF CONCRETE ARE TO BE BEVELED 1" UNLESS OTHERWISE NOTED ON PLANS AND ALL EXPOSED FACES OF CONCRETE ARE TO HAVE A RUBBED FINISH EXCEPT AS FOLLOWS THE FACES OF THE CROSSWALLS AT THE ABUTMENTS, THE TOP AND BOTTOM OF THE ARCH RIBS BELOW THE CURB LINE, THE INSIDE FACE OF ARCH RIBS BELOW THE CURB LINE, THE SIDES AND BOTTOM OF THE FLOOR BEAMS AND THE BOTTOM OF THE FLOOR SLAB.

THE INSIDE FACE OF THE CROSSWALLS, INSIDE OF ABUTMENTS AND INSIDE OF THE WING WALLS ARE TO BE WATERPROOFED.

BOTH THE WATERPROOFING AND THE RUBBED FINISH NEED ONLY EXTEND DOWN TO LINE 1 FT. BELOW THE FINISHED GROUND SURFACE AS SHOWN ON PLANS.

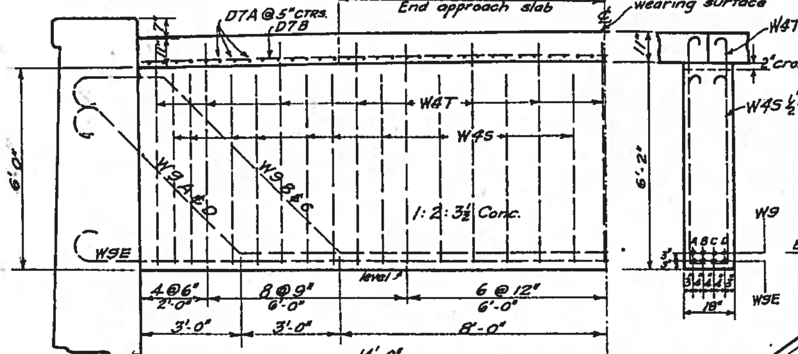
ESTIMATE OF QUANTITIES

1:2:3 Concrete	163.4	Cu. Yds
1:2:3½ Concrete -	181.0	Cu. Yds
1:2½:4 Concrete -	38	Cu. Yds
Reinforcing Steel -	47670 ~~47610~~	Lbs
Concrete Rail -	180	Lin. Ft.
Excavation - including backfill -	300	Cu. Yds
Rubbed Surface -	325	Sq. Yds
Waterproofing -	115	Sq. Yds
2" Copper Pipes - 12" Long -	80	Pieces
Temporary Bridge and Approaches - And Removal of Same		
4" Plain Concrete Wearing Course -	140	Sq. Yds
¼" Premolded Expansion Joint	20	Sq. Ft.
⅜" " " "	20	Sq. Ft.
½" " " "	120	Sq. Ft.

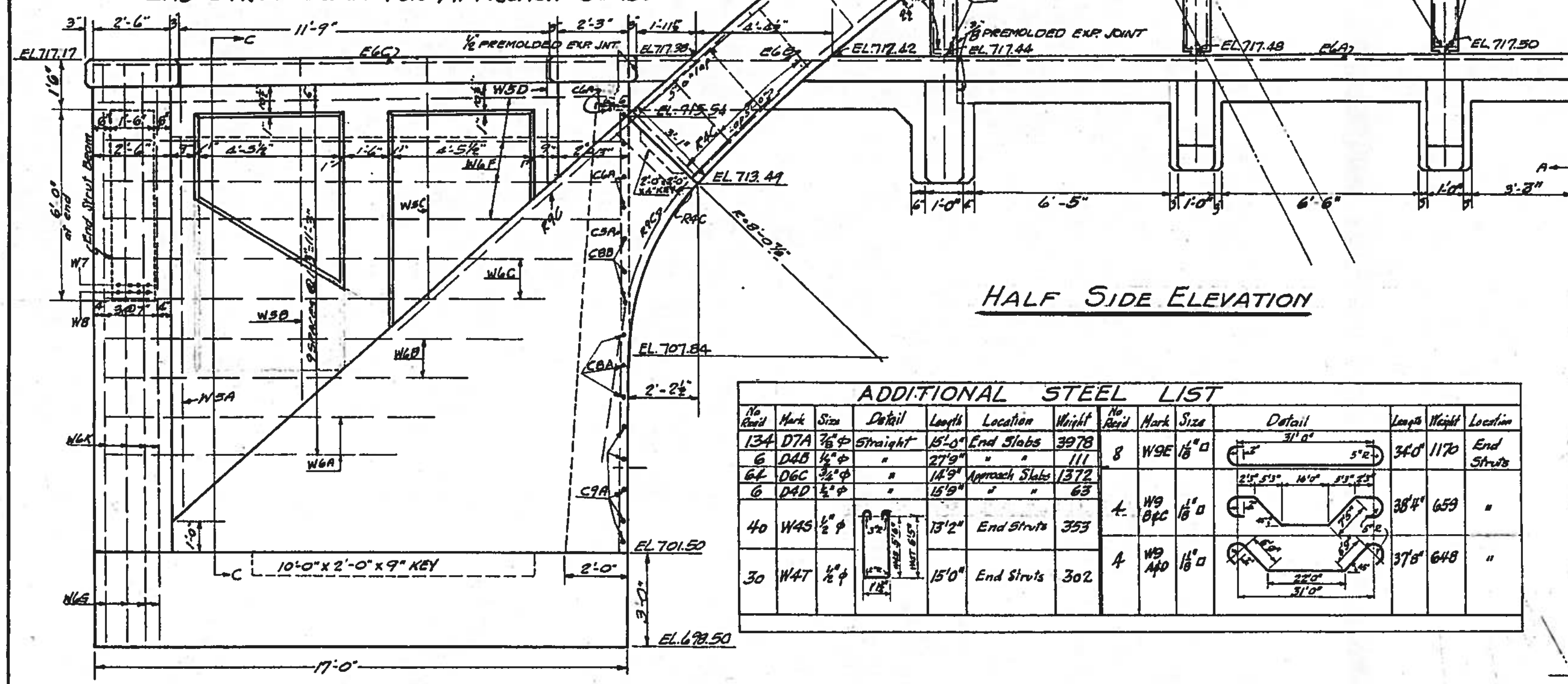


END ELEVATION

BRIDGE OVER ROCKY FORD
T-15 LOADING
DIXIE HIGHWAY
I.C.H. No. 220 SEC. F-2 WOOD COUNTY
STATE OF OHIO
DEPARTMENT OF HIGHWAYS AND PUBLIC WORKS
DIVISION OF HIGHWAYS
APRIL 1925 STA. 87+50 SHEET 1 OF 3 SHEETS



END STRUT BEAM FOR APPROACH SLABS

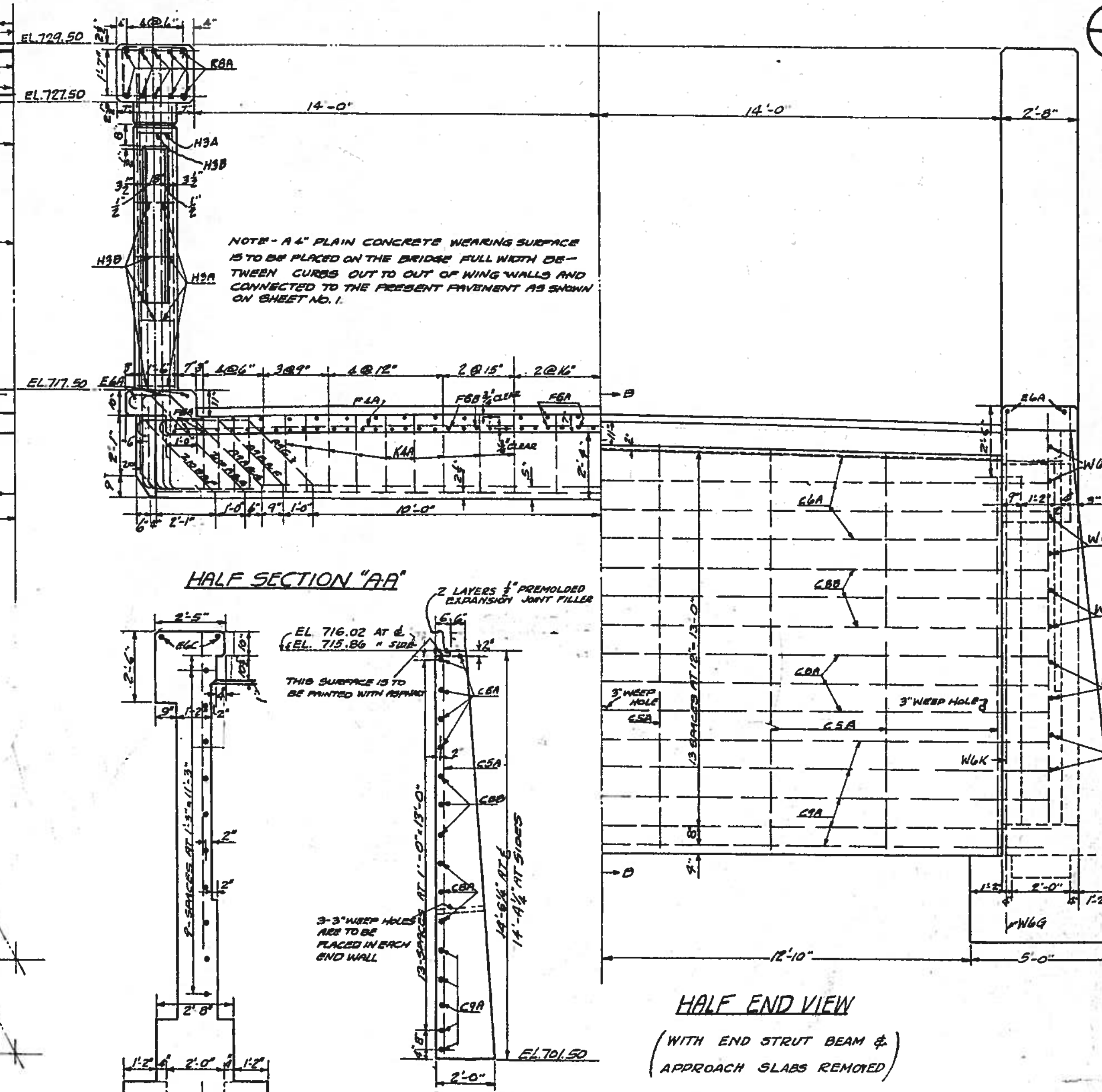


HALF SIDE ELEVATION

ADDITIONAL STEEL LIST

No Req'd	Mark	Size	Detail	Length	Location	Weight
134	D7A	7/8" φ	Straight	15'-0"	End Slabs	3978
6	D4B	1/2" φ	"	27'9"	" "	111
64	D6C	3/4" φ	"	14'9"	Approach Slabs	1372
6	D4D	1/2" φ	"	15'9"	" "	63
40	W4S	1/2" φ		13'2"	End Struts	353
30	W4T	1/2" φ		15'0"	End Struts	302

No Req'd	Mark	Size	Detail	Length	Weight	Location
8	W9E	1 1/8" □		34'0"	1170	End Struts
4	W9 B&C	1 1/8" □		38'4"	659	"
4	W9 A&D	1 1/8" □		37'8"	648	"



NOTE - A 4" PLAIN CONCRETE WEARING SURFACE IS TO BE PLACED ON THE BRIDGE FULL WIDTH BETWEEN CURBS OUT TO OUT OF WING WALLS AND CONNECTED TO THE PRESENT PAVEMENT AS SHOWN ON SHEET NO. 1.

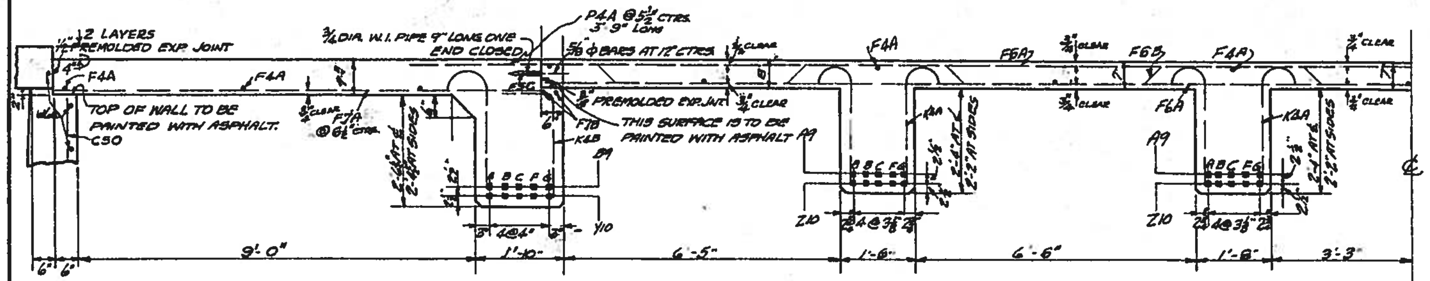
HALF SECTION "AA"

SECTION "C-C" THRU WING WALL

SECTION "B-B" THRU END WALL

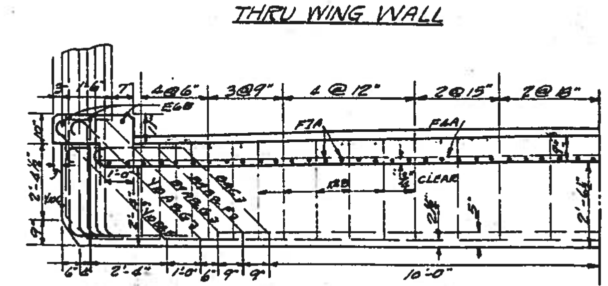
HALF END VIEW

(WITH END STRUT BEAM & APPROACH SLABS REMOVED)



HALF LONGITUDINAL SECTION ON CENTER LINE

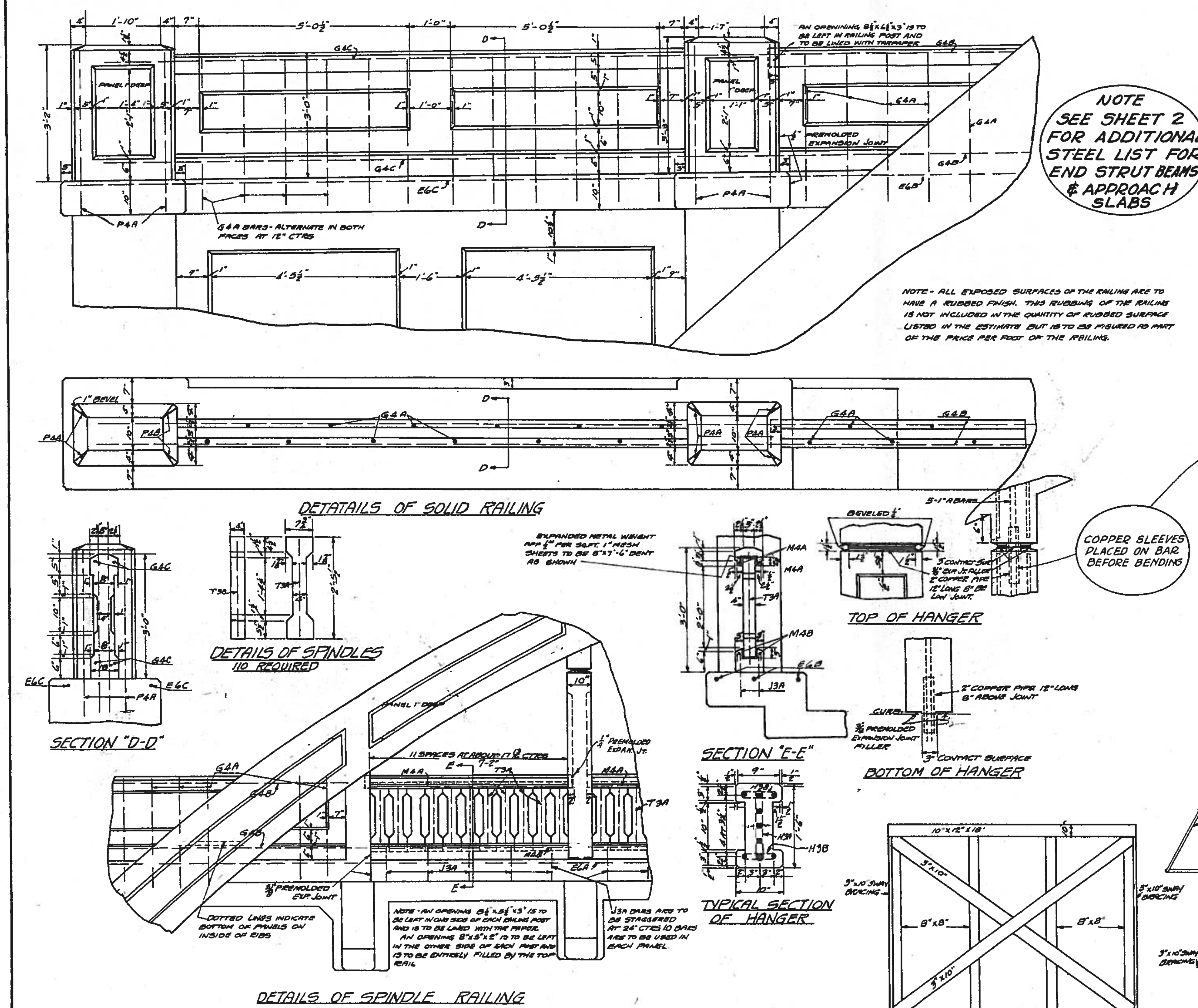
NOTE :- THE SLAB STEEL IS TO BE PLACED AS FOLLOWS :- IN THE CENTRAL PORTION OF THE BRIDGE BETWEEN EXPANSION JOINTS, THE STRAIGHT BARS ARE TO BE PLACED OVER EACH OTHER 1" FROM TOP AND BOTTOM OF SLAB RESPECTIVELY AND ARE TO ALTERNATE WITH THE BENT BARS AT 6" CENTERS. THE END SLABS ARE TO BE REINFORCED WITH 7/8" ROUND RODS AT 6 1/2" CENTERS 1" FROM BOTTOM OF SLAB ONLY.



SECTION SHOWING EXP'N BEAM

BRIDGE OVER ROCKY FORD
WOOD COUNTY I.C.H-220 SEC.F-2
STA. 87+50

APRIL 1925



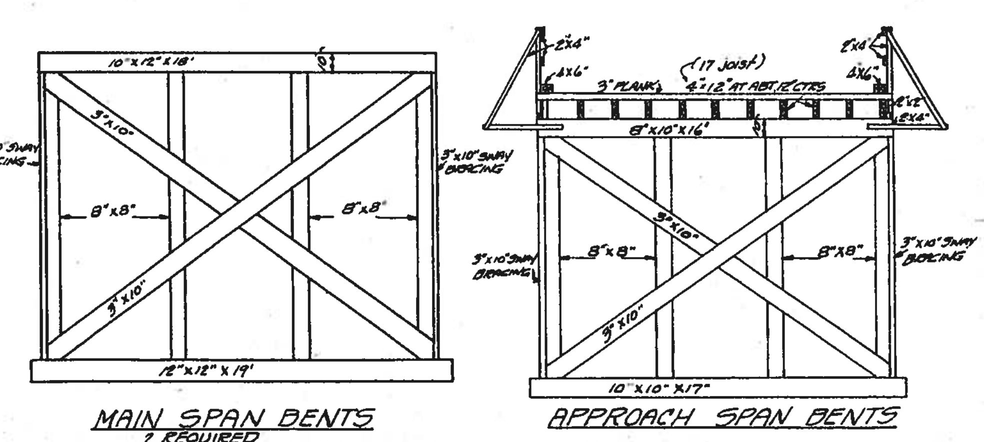
NOTE
SEE SHEET 2 FOR ADDITIONAL STEEL LIST FOR END STRUT BEAMS & APPROACH SLABS

NOTE - ALL EXPOSED SURFACES OF THE RAILING ARE TO HAVE A RUBBED FINISH. THIS RUBBING OF THE RAILING IS NOT INCLUDED IN THE QUANTITY OF RUBBED SURFACE LISTED IN THE ESTIMATE BUT IS TO BE FIGURED AS PART OF THE PRICE PER FOOT OF THE RAILING.

NOTE - DIMENSIONS SHOWN FOR BENDS OF REINFORCING STEEL ARE CENTER TO CENTER OF BARS NOT OUT TO OUT.

BENDS	MARK	SIZE	LENGTH	NUMBER	WEIGHT	LOCATION
STRAIGHT	R8A	1" □	23' 9"	40	3238	ARCH RIBS EXT & INT.
"	R9A	1⅛" □	17'-6"	20	1506	" " EXT.
"	R9B	"	17'-3"	20	1486	" " INT.
"	R9C	"	14'-0	40	2408	" " DOWELS
	R4A	½" Φ	5'-7"	60	225	HOOPS IN ARCH RIBS
	R4B	"	6'-5"	48	206	" " " "
	R4C	"	7'-3"	32	156	" " " "
STRAIGHT	W6A	¾" Φ	8'-0"	8	96	WING WALLS
"	W6B	"	10'-6"	8	126	" "
"	W6C	"	14'-0"	8	168	" "
"	W6F	"	16'-0"	16	385	" "
"	W5A	⅝" Φ	16'-0"	4	58	" "
"	W5B	"	11'-0"	4	46	" "
"	W5C	"	7'-3"	4	30	" "
"	W6G	¾" Φ	6'-0"	16	144	BUTTRESSES
"	W6K	"	15'-0"	16	360	"
	C9A	1⅛" □	34'-3"	10	1473	CROSS WALLS AT ATBUTMENTS
	C8A	1" □	34'-3"	6	690	" " " "
	C8B	1" Φ	34'-3"	6	549	" " " "
	C6A	¾" Φ	34'-3"	10	514	" " " "
STRAIGHT	F6A	¾" Φ	38'-9"	60	3488	SLAB BARS TOP & BOTT. C. SPAN
	F6B	¾" Φ	40'-9"	28	1710	" " BENT " "
STRAIGT	F4A	½" Φ	29'-6"	17	336	SPACER BARS IN SLABS
"	F7A	⅞" Φ	10'10"	102	2259	SLAB BARS END SLABS
"	F7B	"	29'-6"	4	177	LONGITUDINAL BARS AT EXP. JTS
"	F5C	⅝" Φ	1'-0"	60	63	BARS AT EXP. JOINTS
"	E6A	¾" Φ	38'-9"	6	349	BARS IN CURBS
"	E6B	"	10'-0"	12	180	" " "
"	E6C	"	17'-0"	8	204	" " "
"	T3A	⅜" Φ	2'-4"	110	97	BARS IN SPINDLES
"	M4A	½" Φ	7'-3"	20	55	" IN TOP OF SPINDLE RAIL
"	M4B	"	7'-8"	20	94	" " BOTT. OF " "
	J3A	⅜" Φ	1'-6"	100	57	" " " " " "
STRAIGHT	G4A	½" Φ	3'-6"	76	178	" " SOLID RAIL
"	G4B	½" Φ	10'-0"	16	107	" " " "
"	G4C	"	14'-6"	16	155	" " " "
"	P4A	½" □	3'-9"	149	495	" " RAILING POST
"	C5A	⅝" Φ	13'-9"	16	229	VERTICAL BARS IN CROSS WALLS
	H8A	1" □	19'-6"	12	796	BARS IN HANGERS
	H8B	"	17'-6"	12	714	" " "
	H8C	"	13'-9"	12	561	" " "
SAME AS H8A EXCEPT TOP HOOK TURNED OPP. WAY	H8F	"	19'-6"	8	530	" " "
" " H8B " " " " " "	H8G	"	17'-6"	8	476	" " "
" " H8C " " " " " "	H8K	"	13'-9"	8	374	" " "
	H3A	⅜" Φ	3'-0"	44	50	HOOPS IN HANGERS
	H3B	"	2'-0"	88	66	" " "
	A9B	1⅛" □	35'-6"	4	611	BARS IN CENTER BEAMS
	A9F	"	35'-6"	4	611	" " " "
	A9C	"	35-0"	4	602	" " " "
	B9B	"	35-0"	2	301	" " EXPN. "
	B9F	"	35-0"	2	301	" " " "
	B9C	"	35'-0"	2	301	" " " "
	A9A	"	36'-0"	4	620	" " CENTER "
	A9G	"	36'-0"	4	620	" " " "
	B9A	"	36'-0"	2	310	" " EXPN. "
	B9G	"	36'-0"	2	310	" " " "
	Z10A	1¼" □	35'-0"	4	744	" " CENTER "
	Z10G	"	35'-0"	4	744	" " " "
	Y10A	"	35'-0"	2	372	" " EXPN. "
	Y10G	"	35'-0"	2	372	" " " "
	Z10B	"	35'-6"	4	754	" " CENTER "
	Z10F	"	35'-6"	4	754	" " " "
	Z10C	"	38'-0"	4	808	" " " "
	Y10B	"	35'-6"	2	377	" " EXPN. "
	Y10F	"	35'-6"	2	377	" " " "
	Y10C	"	38'-6"	2	409	" " " "
	K4A	½" Φ	7'-4"	124	609	STIRRUPS IN CENTER BEAMS
	K4B	"	8'-6"	62	352	" " EXPN. "
STRAIGHT	W5D	⅝" Φ	4'-0"	4	17	WING WALLS
10 SHEETS - 1" MESH EXPANDED METAL - WT. APP. ½#/□' - SIZE OF SHEETS 7'-6"x8"					25	TOP OF SPINDLE RAILING
60 PIECES - ¾" DIA. W.I. PIPE 9" LONG					54	SLABS AT EXPN. JOINTS
WITH EXTRA STEEL ADDED			TOTAL WEIGHT		47,670	

47,690



DETAILS OF TEMPORARY BRIDGE

NOTE - PRESENT 32'6" CLEAR SPAN IS TO BE MOVED FAR ENOUGH WEST TO CLEAR THE NEW WORK AND PLACED ON TIMBER BENT, BUILT AS SHOWN ON THIS SHEET. THESE BENTS ARE TO BE HIGH ENOUGH TO ALLOW THE BOTTOM SILLS TO BE PLACED DOWN ON FOUNDATION SOLID ENOUGH TO SUPPORT THE LOAD AND TO KEEP THE BRIDGE FLOOR AT APPROXIMATELY ITS PRESENT ELEVATION. TWO TIMBER APPROACH SPANS 15'-0" IN THE CLEAR BETWEEN BENTS ARE TO BE BUILT AT EACH END OF THE MAIN SPAN AND ARE TO BE CONNECTED TO THE PRESENT ROAD BY A TEMPORARY ROAD PAVED WITH TRAFFIC BOUND MACADAM. THE CONTRACTOR IS TO PLACE AND MAINTAIN SUFFICIENT STONE ON THIS ROAD TO MAKE A ROADWAY 16' WIDE SAFE FOR TRAFFIC AT ALL TIMES UNTIL THE NEW BRIDGE IS OPEN FOR TRAVEL

BRIDGE OVER ROCKY FORD
WOOD COUNTY I.C.H. 220-SEC. E-2
APRIL 1925 STA. 87+50 SHEET 3 OF 3 SHEETS