Oklahoma Depression-era Road-related Resources and Bridges, 1933-1945

(revised draft)

Historic Context Study

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A Oklahoma Bridge Numbering System

1. Introduction

The Great Depression, which resulted from the 1929 stock market crash, and the subsequent New Deal programs were two of the most momentous events in twentieth-century American history. They profoundly affected all aspects of the nation's life, and Oklahoma's transportation network was no exception. Unlike many non-governmental sectors of the national economy, which suffered business failures and unemployment during the depression, the work of building and maintaining public roads and bridges was well-funded and active. New Deal programs kept the highway building boom of the 1920s alive through the 1930s.

Highways became a focus, and a direct financial beneficiary, of government efforts to combat unemployment and provide emergency relief as federal dollars flowed into road and bridge projects through the new relief programs for the jobless. Road crews worked on straightening routes, surfacing earthen roads, eliminating at-grade hazards, providing drainage, and beautifying the roadway landscape. By the early 1940s, when the New Deal programs were coming to an end, Oklahoma had almost 9,000 miles of roadway in the state highway system, a majority of which was paved or surfaced. During the era of New Deal programs, more than 6,500 bridges were constructed across the state.[1]

The following historic context presents historical background on the impact of the New Deal programs on Oklahoma's transportation network during the period 1933 to 1945. Historical themes considered include New Deal programs, from both the national and state perspectives; road construction and design during the period; and bridge construction, design, and aesthetics.

The context begins with an account of Oklahoma roads and bridges prior to 1933. This is followed by an overview of the Great Depression and its impacts on Oklahoma. The specific New Deal work relief programs are discussed next, from both a national and state perspective, with an emphasis on transportation projects and the social and economic implications that guided them. The last section details the engineering and aesthetics of Depression-era road-related resources and bridges with subtopics that include: types and features, design standards, and construction methods.

A. Background

This historic context is the first component of the statewide inventory of Depression-era bridges and road-related resources in Oklahoma. Bridges and road-related resources included in this study are those constructed between 1933 and 1945 that have a direct association with at least one of the following major Depression-era work relief programs: the Federal Emergency Relief Administration (FERA), Civilian Conservation Corps (CCC), Public Works Administration (PWA), and Works Progress/Project Administration (WPA).

This historic context report provides an understanding of the range and influence of Depression-era work relief programs in Oklahoma and presents information relevant to interpreting the significance of bridges and road-related resources dating from this period in the state's history. To develop the context,

[1] Oklahoma Department of Transportation Bridge Inspection Data. Provided to Mead & Hunt, Inc. on 8 February 2012.

historians from Mead & Hunt researched national and statewide events and trends related to the implementation of Depression-era work relief programs in Oklahoma, with an emphasis on transportation and the social and economic implications that would have driven transportation enhancement and bridge development and construction in the state. Historians also researched the events and trends in roadway development and bridge design and construction, as well as national developments that influenced work in Oklahoma. Research included primary and secondary sources at major repositories in Oklahoma.

During the current project phase, research was conducted at the Oklahoma Department of Transportation (ODOT); Oklahoma State Historic Preservation Office (SHPO); Oklahoma Historical Society; Oklahoma Department of Libraries State Archives, Government Documents, and Oklahoma Collection; University of Oklahoma Library; University of Oklahoma Carl Albert Center; and Oklahoma State University. Additional research was conducted at the University of Wisconsin's Wendt Engineering Library (for national journals) and the Wisconsin Historical Society in Madison, Wisconsin (for its collection on U.S. history).

Key sources for the contextual study included the following:

- Biennial reports of the Oklahoma State Highway Commission
- Community Improvement Appraisal Reports (CIAR) on federal relief projects from individual counties and municipalities
- National Register of Historic Places (National Register) Nominations for resources associated with Depression-era programs
- ODOT's bridge inventory database
- Administrators' reports pertaining to the specific Depression-era programs in Oklahoma
- National and state resources pertaining to the Depression-era work relief programs and projects completed under the programs
- Resources pertaining to ODOT's history

These and other sources consulted are provided in the Bibliography at the end of this report. The scope of this phase of the contextual study did not include gathering research at Oklahoma counties or cities or investigating specific bridges. Local roadway development trends and bridge design and construction sponsored by Oklahoma counties and cities through one of the work relief programs may represent important local themes. Such local developments are expected to be investigated during future data collection efforts focused on specific roadway and bridge construction projects.

Preliminary Bridge Data Analysis

Examples of bridges are provided in the context to illuminate relevant themes; the status of these bridges will be confirmed during future project tasks. To provide an overview of bridge types and materials in

Oklahoma during the subject period, a preliminary analysis of Oklahoma's bridge inventory database was conducted (2012 data). ODOT provided the inventory database in early 2012 for bridges constructed, according to their records, between 1930 and 1945. While the subject period begins in 1933, the date of construction of 1930 was used as the beginning date for bridge inventory records to account for bridges that have an estimated, rather than actual, date of construction, or to account for bridges designed before 1933 but not completed until the subject period.

In addition to the bridge inventory database, a pair of 1937 tables (1937 data) presenting data on bridge materials and types for state and county systems was used in the overview of bridge types and materials found in Section 5. The historical 1937 data and the recent 2012 data can be sorted into comparable categories of main-span type and main-span material so the two data sets can be compared.

Each data set has its own limitations. The 1937 data includes all bridges extant in the state at that time, but provides no way to separate bridges by year-built. The 2012 data only includes bridges constructed between 1930 and 1945. However, the 2012 data does not differentiate between original owner and current owner, as well as the system (on-system/state-owned or off-system/locally-owned) of which the bridges were originally a part.

The 2012 database includes both extant, in-service bridges as of 2012 and bridges that have been replaced. No background information is available regarding the inclusion of replaced bridges; therefore, the actual number of bridges replaced for any particular year-built may be larger than the number provided by the 2012 database. These limitations are incorporated into the discussions of bridge types in Section 5.

B. Purpose

The statewide inventory of Depression-era bridges and road-related resources is being completed by ODOT to meet the following objectives:

1) Identify Oklahoma's Depression-era bridges and road-related resources and evaluate their significance under National Register criteria.

2) Assist ODOT in early planning efforts for federal- and state-funded projects.

3) Support the development of a long-term management plan for significant Depression-era resources in the state.

The purpose of the statewide inventory is to assist in compliance with major federal preservation laws and regulations that affect the management of historic bridges and road-related resources. These laws and regulations include the National Historic Preservation Act (NHPA) of 1966 and the U.S. Department of Transportation Act of 1966.

The NHPA of 1966 established a national policy for the protection of historic properties and archaeological sites, and outlined responsibilities for federal and state governments to preserve our

nation's heritage. The NHPA created the National Register, which is an official list of sites, districts, buildings, structures, and objects of national, regional, or local significance. To qualify for the National Register, a property must be associated with a significant theme, and it must retain the characteristics that make it a good representative of properties associated with the past. Historic bridges and road-related resources are among the structures listed in, or eligible for listing in, the National Register.

Historic bridges and road-related resources may be afforded protection under NHPA and transportation regulations, which require agencies to take into account the effect of projects on historic properties. Section 106 of the NHPA requires federal agencies and owners seeking federal assistance to review actions that may affect a property listed in, or eligible for, the National Register. The process includes identifying historic properties, assessing the effect of proposed actions on historic properties, and developing agreements that specify measures to deal with any adverse effects. To comply with Section 106, appropriate consultation among the federal agency, the SHPO, Native American tribes, the public, and other interested parties is required. The Advisory Council on Historic Preservation (ACHP), an independent federal agency in the executive branch, oversees the Section 106 review process.

The U.S. Department of Transportation Act of 1966 created the Department of Transportation, whose role was to coordinate transportation programs and facilitate the development of coordinated transportation programs. Section 4(f) of the Act, (as set forth in Title 49, United States Code (USC), Section 1653(f) and later codified in 49 USC Section 303), applies to undertakings that require the "use" of a historic property, including a bridge and road-related resources. Under Section 4(f), a historic property is any property listed in, or eligible for listing in, the National Register, or a historic property that is locally designated or recognized. The federal agency must ensure that the provisions of Section 4(f) are met before approving a federally funded project. Projects that do not significantly alter the historic attributes that qualify a resource for NRHP eligibility or listing, including appropriate rehabilitation are not subject to Section 4(f).

The purpose of this historic context report is to identify and describe the trends and events that were significant in roadway transportation and bridge design and construction in Oklahoma between 1933 and 1945 and are associated with one of the Depression-era work relief programs. The historic context will be used to understand how bridges and road-related resources may qualify for listing in the National Register and to establish periods of significance for road-related resources and bridge types built in Oklahoma between 1933 and 1945. The significant themes identified in the historic context report will inform subsequent steps of the inventory project. Subsequent project tasks including field survey and road- and bridge-specific research will further inform these efforts and the understanding of the Depression-era work relief programs' impacts on the state's transportation networks and bridge construction programs presented in the historic context.

2. Oklahoma Roads and Bridges Prior to 1933

The story of Oklahoma's roads and bridges in the years prior to the Great Depression is the story of increasing state and federal consolidation of control over all aspects of highway transportation, particularly funding and planning. These efforts were driven by the need for a road and highway system to accommodate ever-expanding automobile usage after 1900.

Federal involvement dates to 1893 with the formation of the Office of Road Inquiry within the U.S. Department of Agriculture, the first formal federal structure to address the nation's highway needs. It would soon become the Office of Public Roads. Federal activities continued to grow and expand over the following decades, culminating in the Federal-Aid Road Act of 1916 and the Federal Highway Act of 1921. Meanwhile, automobile ownership nationally had grown from almost nothing in the 1890s to 2.3 million in 1916. By the 1920s the Office of Public Roads had evolved into the Bureau of Public Roads (BPR), a significant federal entity that continued through the Depression and most of the New Deal era, becoming the Public Roads Administration on the eve of World War II.[2]

In Oklahoma, state involvement with highway transportation began with statehood in 1907 and a four-year effort to establish a state highway department in 1911. By then, automobile usage in the state had grown to 6,500 vehicles. Oklahoma ranked last among the states in paved-road mileage, and pressure grew to improve the state's roads. In the years immediately following the creation of the highway department, Oklahoma bridges continued to be either private, profit-making investments or county-funded projects. Engineering services were provided by established bridge-building companies.[3]

With the Federal-Aid Road Act of 1916, federal and state efforts began to interact and provide the beginnings of a coordinated highway program that extended from the national level to the state highway department and continued through to counties. The federal program required a fifty-fifty funding match for federal aid to the state and project approval from the Office of Public Roads. The state, in turn, developed a state-aid program to assist counties with funding for roads with a comparable dollar match. Although the new effort was soon disrupted by World War I (particularly by steel shortages), road and bridge work moved ahead in Oklahoma. In general, the state and federal programs were designed to infuse road and bridge construction with more money and more engineering expertise down to the local levels, to ensure that the best roads and bridges were constructed where and when they were needed.[4]

A. Federal and state legislative changes in the 1920s

At the national level, the Federal Highway Act of 1921 inaugurated what historian Bruce Seely has called the "Golden Age of Highway Building, 1921-1936." In Seely's view, the states now had the responsibility of building both state and federal-aid roads, while the BPR had the responsibility for inspection of state plans, construction, and maintenance on the federal-aid system. In order to develop and maintain a

[2] Bruce E. Seely, *Building the American Highway System: Engineers as Policy Makers*, *(*Philadelphia: Temple University Press, 1987), 9, 17. In the 1960s the BPR became the Federal Highway Administration.

[3] Joseph King, *Spans of Time*, prepared for the Oklahoma Department of Transportation (1993), 5-9.

[4] King, 17; Seely, 47

good road system among states, the 1921 statute authorized each state to designate seven percent of its total highway mileage on which all federal dollars would be spent. As a result, the Federal Aid Highway System was established to provide a network of primary roads connecting major population centers of the country, and a network of secondary roads connecting state population centers. In addition, a minimum road width of 18 feet was established for new construction on those roads receiving funding, and construction, contracts, and plans were to be under the direct supervision of the highway departments in the states. Control of engineering design and bridge construction was being removed from the counties and private bridge-building companies and systematized under the supervision of professional engineers at the state level. The state engineers, in turn, were increasingly accountable to engineers at the federal level, who were involved in establishing national standards for design. Alongside the federal-state system was the American Association of State Highway Officials (AASHO), a non-governmental nationwide organization created in 1914 that established standards and specifications for highway and bridge design and construction. The hierarchical national system of funding and standards that was emerging evolved into the structure used today.[5]

In Oklahoma during the early 1920s, the state and counties struggled to make the new funding systems work as they were intended. Because of limited county dollars for the fifty-fifty matches, better-funded local governments received more grants than poorer ones, tending to accentuate rather than alleviate poor road conditions in less-populated areas, such as the western Oklahoma counties. Some of the difficulties with the aid programs, including the interruption of World War I, plagued the very first federal-aid project in Oklahoma, Federal Aid Project (FAP) Number 1, for a bridge over the South Canadian River near Newcastle. Planned in 1917, the bridge was not finished until 1923, completely changing designs, materials, and contractors in the process. Nevertheless, federal-aid projects moved ahead, with seven of the first 20 Oklahoma projects being bridges.[6]

To eliminate some of the state transportation confusion and chaos in the early years of the new Federal Highway Act of 1921, the Oklahoma legislature passed bills reorganizing the state highway department in 1924. This was a goal promoted by the BPR, which was also encouraging states to strengthen their highway commissions. Significantly, the legislation authorized a gasoline tax to fund road projects at both the state and county levels. Not only did the Oklahoma State Highway Department now have substantial new funding to match federal aid dollars, but a three-member highway commission was installed to reduce the politicization of the program. With these changes, the state program could interact with the federal program to provide a rational system of funding and engineering review from the federal to the state to the local level. The gas tax was so vital that it was increased in 1925 and again in 1929.[7]

Major activities of the state highway department from 1924 to 1933 included the establishment of a route numbering system that was eventually coordinated with the federal highway number system, and the

[5] Seely, 71; William Paul Corbett, *Oklahoma's Highways: Indian Trails to Urban Expressways*, Ph.D. dissertation (Oklahoma State University, 1982), 214

[6] King, 19-21; Corbett, 206

[7] Corbett, 216-217, 228

construction of paved highways. Historian Bob Burke describes the following highways designated as Oklahoma's earliest official state highways:

- Oklahoma (OK)-2: Meridian Highway, from Caldwell, Kansas, to the Red River via Medford, Pond Creek, Enid, Kingfisher, El Reno, Chickasha, Marlow, Duncan, and Waurika
- OK-3: Postal Highway, from Fort Smith, Arkansas, to the Red River via Poteau, Wilburton, McAlester, Wewoka, Shawnee, Oklahoma City, Weatherford, Elk City, and Sayre
- OK-5: Lee-Bankhead Highway, from Ultima Thule, Arkansas, to the Red River at Davidson via Idabel, Hugo, Durant, Ardmore, Waurika, and Frederick
- OK-6: Jefferson Highway, from Chetopa, Kansas, to the Red River via Vinita, Pryor, Wagoner, Muskogee, Checotah, Eufaula, McAlester, Atoka, and Durant
- OK-7: Ozark Trail, from Baxter Springs, Kansas, to Altus via Miami, Afton, Vinita, Claremore, Tulsa, Bristow, Stroud, Chandler, Oklahoma City, Chickasha, and Lawton
- K-O-T: The Kansas, Oklahoma, and Texas Highway from Newkirk to the Red River via Ponca City, Perry, Guthrie, Oklahoma City, Norman, Ardmore, and Marietta
- OK-11: Albert Pike Highway, from Siloam Springs, Arkansas, to Boise City via Chouteau, Tulsa, Pawhuska, Ponca City, Cherokee, Alva, Buffalo, and Hooker[8]

According to historian William P. Corbett, the state highway system contained 227 miles of concrete and 63 miles of asphalt road by 1924.[9] Two years later, in 1926, nine routes across Oklahoma were designated as U.S. Highways as part of the national highway system established by the BPR. The designated highways included: U.S. Highway (US)-64, US-66, US-70, US-73, US-75, US-77, US-81, US-266, and US-271.[10] With designation of the U.S. Highways, the state highway department focused on surfacing the state's primary transportation network. Among the most noteworthy projects was the paving of US-66, which would soon receive great notoriety for its role in John Steinbeck's novel, *The Grapes of Wrath*, where it was the route out of Depression-era Oklahoma for displaced farmers. Another important effort of the 1920s was the elimination of Oklahoma's remaining private toll bridges through transfer to state ownership or replacement with new state-owned bridges, in either case providing free highway crossings for the expanding population of automobile owners.[11]

[8] Bob Burke, *ODOT 100: Celebrating the First 100 Years of Transportation in Oklahoma* (Oklahoma City: Oklahoma Heritage Association, 2011), 25.

[9] Corbett, 214.

[10] Burke, 29.

[11] Corbett, 233-240.

B. Roads and Bridges at the End of the 1920s

As the 1920s ended and Oklahoma entered the Depression, the state was behind the national average in miles of paved roads. The 48 states averaged 4,136 miles each, while Oklahoma had 3,368 paved miles on the state system. While some roads had concrete paving, many of them were surfaced with asphalt, water bound macadam, or gravel. Of the 77 counties, 29 still had no paved roads and 11 more had less than 25 miles of state-maintained hard-surfaced highways by 1933.[12]

The impact of the state on bridge design after 1916 and into the 1920s can be seen, in part, in the production of state standard plans for bridge design. In 1921, for example, the state highway department prepared plans for "Concrete Deck Girder Spans," later termed T-beams, for spans from 28 to 40 feet. The plans were designed for the use of county engineers, who could simply fill in blank spaces on the plan sheet title block for county, site location, engineer's name, date, and other details specific to the bridge being designed.[13]

Other standard plans from the 1920s appear to be prepared for the use of county or state engineers, and include designs for many truss bridges, along with steel I-beam and plate-girder designs. As noted in the biennial report for 1927-28, "if it were not for the standardization of plans and designs, a much augmented force of engineers would be required in the main office," the Oklahoma City office that prepared plans for all bridges on state highways.[14] Versions of these designs for common bridge types were continued in the Depression and New Deal years and are found in the standard plans of the 1930s. The standard plans from the 1920s also include some bridge types that are less common in later years, such as a concrete cantilever bridge, a "low water" bridge, and a concrete "dip bridge" (a type of concrete ford). Some plans reference "Oklahoma Standard Specifications for 1925," as approved by the BPR, reflecting both the increasing interest in standardization and the interaction of the state and federal highway offices.[15]

Few technological and engineering changes appear to have occurred in the period, or at least little that impacted bridge design and construction in Oklahoma. The biennial report of 1929-30 stated, "In the erection of structural steel nothing new has been developed in recent years."[16] Among the noteworthy changes reported in 1928 was that "steel girder bridges…have been used in place of steel truss spans of less than seventy feet in length," documenting the general impression that truss bridges were becoming less common for short and medium spans during the 1920s and into the 1930s.[17]

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[12] Corbett, 241-242.

[13] Collection of "Obsolete Bridge Standard Plans," 1921-1945, Oklahoma Department of Transportation.

[14] Oklahoma State Highway Commission biennial reports for the years 1929-1946 were referenced in the writing of this report; Biennial Report 1927-28, 40.

[15] Collection of "Obsolete Bridge Standard Plans."

[16] Biennial Report 1929-30, 54.

[17] Biennial Report 1927-28, 36.

As Oklahoma moved from the 1920s into the Depression years of the 1930s and New Deal funding, the state experienced a diversion of funds from construction projects into other areas of state need and the numbers of new bridges built, at least on the state system, declined.

3. Depression-era Work Relief Programs – National Perspective

The U.S. endured a period of severe economic collapse and depression for more than a decade following the 1929 stock market crash. When President Franklin D. Roosevelt assumed office in 1933, the national unemployment rate was 25 percent and mass poverty was firmly entrenched.[18] Roosevelt's predecessor, Herbert Hoover, had elected to offer little help at the federal level, instead contending that existing primary sources of relief—private charities and local governments—should assist the hungry and unemployed. Toward the conclusion of Hoover's presidency, his administration implemented federal relief in the form of increased public works funding to the states, including road construction projects, under the Emergency Relief and Construction Act of 1932.[19] However, the economy was essentially at a standstill and the dire needs of the general public were generally not being met.[20]

The Roosevelt administration spurred an economic upturn by implementing a series of programs to provide relief, recovery, and/or reform. The so-called "Three Rs" were aimed at the federal, state, and local levels in the economic sectors of agriculture, banking, housing, industry, labor, public utilities, and transportation. The various programs became known as the "alphabet agencies," in reference to the acronyms assigned to them, and altogether constituted Roosevelt's New Deal.[21]

A major component of the New Deal to combat widespread unemployment was "make work" transportation improvement projects. To provide employment to the greatest number of people possible, provisions established by the Emergency Relief and Construction Act of 1932 that limited workers to 30 hours per week and specified the use of hand labor rather than machines for certain types of work were continued as part of Roosevelt's New Deal programs.[22] Road-related work, including highway planning, brought employment opportunities close to the homes of the jobless, and it was estimated that for every person directly employed on roads, at least two others were working in the manufacture and transportation of roadway materials and equipment. Favoritism toward highways also kept the nationwide road building boom of the 1920s alive through the 1930s and into the 1940s, until New Deal programs began winding down at the beginning of the war effort. Besides being a leading solution to unemployment, road-related work produced physical improvements that were needed in practically every county in every state.[23]

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[18] Nancy E. Rose, *Put To Work: Relief Programs of the Great Depression* (New York: Monthly Review Press, 1994), 15-16.

[19] Seely, 89.

[20] Rose, 17, 24-25.

[21] Rose, 26; David M. Kennedy, Lizabeth Cohen, and Thomas A. Bailey, *The American Pageant, Volume II: To 1865,* 14th ed. (Boston: Wadsworth Publishing, 2010), 671.

[22] Seely, 89.

[23] Ellis L. Armstrong, ed., *History of Public Works in the United States, 1776-1976* (Chicago: American Public Works Association, 1976), 84; Seely, 88-89.

The National Industrial Recovery Act (NIRA) of June 1933, which was implemented by the National Recovery Administration and the Public Works Administration, marked the first time federal highway funds were outright grants to states. States did have to provide matching funds, but their ability to do so was greatly hampered by the depressed economy. Construction budgets for local and municipal roads had also been severely slashed. Roosevelt answered with larger appropriations using the federal-aid formula allocated by the BPR and a variety of federal relief programs. This essentially replaced the regular federal-aid program with the National Recovery highway program. The National Recovery Work Relief (NRWR) Program, a special grant funded under NIRA, provided employment and relief to the unemployed in the drought area of nine states, including Oklahoma, Texas, New Mexico, Colorado, Kansas, Nebraska, North and South Dakota, and Wisconsin. By the middle of the 1930s, federal funds had raised state and local road-building activity above pre-Depression levels everywhere, apart from in cities. Federal aid was extended to city streets in 1936 and secondary (feeder) roads in 1938. Altogether, federal highway funding during the 1930s was so extensive that almost no other area of the economy "recovered" so quickly. During the 1930s, improved (surfaced) highways in America doubled in length from 694,000 miles to 1,367,000 miles, and between 35 percent and 45 percent of all workers on federal relief projects built roads.[24]

New Deal programs that had the most direct impact during the Depression on the country's transportation infrastructure included the Federal Emergency Relief Administration (FERA), Civilian Conservation Corps (CCC), Public Works Administration (PWA), and Works Progress/Project Administration (WPA). Each program, and its role with respect to transportation improvements, is discussed in more detail below.

A. Federal Emergency Relief Administration (FERA)

FERA was created by Congress in May 1933 and administered by Harry Hopkins, a former relief administrator in New York State when Roosevelt was governor. The program was initially funded by a $500 million grant from the Reconstruction Finance Corporation (RFC), an independent federal agency established in 1932 by President Hoover with the primary objective of providing loans to banks and financing a variety of projects. The underlying principle of FERA was to empower the federal government to assist with local and state relief efforts. It was a partnership, with the federal government contributing one dollar for every three paid by the state or municipality. Most relief was provided in the form of vouchers for food, rent, coal, and heating oil. The program maintained only a small work-relief program, however, which ultimately became its biggest criticism as Americans largely preferred employment to government-sponsored welfare. In response to this disconnect, the Civil Works Administration (CWA) was created as a division of FERA in November 1933.[25]

[24] Federal Highway Administration, *America's Highways 1776-1976: A History of the Federal-Aid Program* (Washington, D.C.: United States Department of Transportation, Federal Highway Administration, 1977), 123; Seely, 88-93.

[25] Arthur E. Burns and Edward A. Williams, *Federal Work, Security, and Relief Programs* (New York: Da Capo Press, 1971), 22; Olson, *Historical Dictionary of the New Deal,* 398; T.H. Watkins, *The Great Depression: America in the 1930s* (New York: Little, Brown and Company, 2009), 126.

The CWA was a short-term public works program administered by FERA from November 1933 to March 1934, and served as Roosevelt's experimental work program for addressing the country's need for infrastructure improvements. The CWA's stated goal of increasing nationwide employment as quickly as possible was achieved, and the program became widely popular as a result. A majority of projects were associated with highway and local road improvements, and work included paving, grading, and the construction of curbs and gutters. The program overall, in less than six months, funded nearly $1 billion worth of work, employed approximately four million Americans, and built or improved over 250,000 miles of roads. The success of the CWA proved that a permanent work program could be established.[26]

As the CWA program drew to a close, a work division was organized by FERA called the Emergency Work Relief Program (EWRP). This program lasted until 1935, when the work relief mission was assigned to the WPA and FERA was discontinued. Over the course of approximately one year, 44,163 miles of roads were constructed and 209,757 miles were improved by EWRP workers across the nation. Road improvement projects most commonly consisted of grading and graveling farm-to-market roads to transform them into "all-weather" roads.[27] The national push for rural road improvement became described as "pulling the farmer out of the mud." Other EWRP road-related work included straightening dangerous curves, clearing obstructions at intersections, reducing steep grades, widening narrow stretches, and erecting retaining walls and guard rails. The EWRP was also responsible for the construction of 6,957 bridges (generally wider reconstructions to eliminate bottle-neck conditions) and 10,651 large culverts (to remove dips and prevent washouts).[28]

B. Civilian Conservation Corps (CCC)

The Emergency Conservation Work (ECW) Act was enacted in March 1933, eight days into Roosevelt's first term. Commonly called the CCC, the ECW had the objective of putting single men ages 18 to 25 to work conserving state and federal lands. As first proposed to Congress by Roosevelt, the CCC was to be "used in simple work…confining itself to forestry, the prevention of soil erosion, flood control and similar

[26] Burns and Williams, *Federal Work, Security, and Relief Programs*, 29-35; James S. Olson, ed., *Historical Dictionary of the New Deal: From Inauguration to Preparation for War* (Westport, CT: Greenwood Press, 1985), 83-84; Seely, *Building the American Highway System,* 90.

[27] "Farm-to-market road" is a phrase commonly used in state, county, and local documents that are contemporary with the subject period. "Farm-to-market" typically was used to describe a county road connecting a rural area with a municipality. Some local documents even refer to a WPA "Farm-to-Market Road Program." "Farm-to-market road" is not an official ODOT designation. Description of ODOT's bridge numbering convention can be found in Appendix A, as adapted from the Oklahoma Department of Transportation Planning and Research Division, "A Re-Evaluation of *Spans of Time: Oklahoma Historic Highway Bridges*," (2007).

[28] Federal Emergency Relief Administration, *The Emergency Work Relief Program of the FERA, April 1, 1934 to July 1, 1935* (Washington, D.C.: U.S. Government Printing Office, 1935), 39.

projects."[29] Enrollees came from every part of the country and were sent to every part of the country. Camps were administered by the War Department, which was divided into nine regional corps areas.[30]

The CCC completed a wide variety of projects within 10 approved project classifications: structural improvement, transportation, erosion control, flood control, forest culture, forest protection, landscape and recreation, range, wildlife, and miscellaneous. With respect to transportation, the CCC built and improved roads, truck trails, and bridges in state and national parks and remote, rural areas. At its peak in 1935, the CCC employed approximately 500,000 young men, and workers were often used by other New Deal programs.[31]

Native Americans also received work relief with the establishment of the CCC Indian Division (CCC-ID) in 1933. Initially administered under the Indian Emergency Conservation Work (IECW) program, this was arguably the first Indian reform effort to bring material aid to conserve and add to tribal land resources. In 1933 Roosevelt approved close to $6 million for the CCC-ID to put approximately 15,000 Native American men living in areas of Tribal jurisdiction to work. Projects were specific to the construction of forest roads, trails, and paths; fire protection measures; erosion control; and water development. The CCC-ID flourished into the early 1940s. During its first six years, about 77,000 Native Americans had obtained work, and accomplishments included developing 6,200 springs or small reservoirs; digging 1,350 wells; constructing 1,064 impounding dams and large reservoirs; and building 896 vehicle bridges, 51 stock bridges, 7,000 miles of truck trails, 2,500 miles of firebreaks, and 6,300 miles of telephone lines.[32]

Despite marked success, the CCC did not survive long after the U.S. entered World War II. The demand for young men to enter the armed forces and the ban of non-defense uses of numerous materials (namely metals) ultimately led to the program's demise. Congress ended appropriations to the CCC in 1942.[33]

C. Public Works Administration (PWA)

In June 1933, Title II of the NIRA established the PWA. More than $3 billion was reserved to sponsor large-scale, high-profile infrastructure projects to revive the stagnant construction and transportation industries. A comprehensive public works program, as set forth by Congress, would not only employ the jobless and stimulate private business, but also improve and modernize existing infrastructure in many

[29] Calvin W. Gower, "The CCC Indian Division: Aid for Depressed Americans, 1933-1942," *Minnesota History Magazine* 43 (1972), 3.

[30] Stan Cohen, *The Tree Army: A Pictorial History of the Civilian Conservation Corps, 1933-1942* (Missoula, Mont.: Pictorial Histories Publishing Company, 1980), 28

[31] Olson, 85-87; Perry H. Merrill, *Roosevelt's Forest Army: A History of the Civilian Conservation Corps, 1933-1942* (Montpelier, Vt.: Perry H. Merrill, 1981), 9.

[32] Gower, "The CCC Indian Division," 3-12.

[33] Gower, "The CCC Indian Division," 12-13.

forms, such as new sanitary sewers, efficient water systems, and evenly surfaced, more durable roads.[34] Work proposals originated at the federal, state, or local level, and were approved by the PWA if they demonstrated "assured worth" and "hold promise of useful service to a community."[35] Once a proposal was accepted, the PWA would make allocations of federal funds for 45 percent of the cost of the project, with the remainder financed by the sponsoring public agency and/or a PWA loan. Construction contracts were then awarded to private contractors following an open, competitive bidding process, and work was overseen by the PWA to assure that satisfactory work was performed. The PWA was not a program to create direct relief employment; rather, its function was "priming the pump," so to speak, and "calling men and money back to useful activity and private enterprise."[36]

The value of the PWA became undeniable, and in 1935, 1936, 1937, and 1938 bills were passed to extend the life of the program. The most common PWA projects were related to road and highway construction and improvements, with most of the funding being disbursed from the BPR directly to state highway departments. From March 1933 to September 1936, the PWA funded the construction of 60,361 miles of roads and 2,641 grade-crossing viaducts nationally. By its end in 1943, when Roosevelt pushed industry toward war production, the PWA had financed a total of 34,508 projects nationally at a cost of more than $6 billion.[37]

Notable large-scale PWA projects on the national level included the Triborough Bridge joining Queens, Manhattan, and the Bronx in New York City; the Lincoln Tunnel under the Hudson River linking Manhattan and Weehawken, New Jersey; and the Overseas Highway connecting Key West to the mainland in Miami, Florida.[38]

D. Works Progress/Project Administration (WPA)

The WPA was created in May 1935 strictly as a work-relief program with a focus on localized labor-intensive public works projects. It supplanted the CWA and EWRP, and was intended to be a permanent program. Road and public building construction were the most common jobs undertaken by the WPA because these project types supported its mission of making long-lasting community improvements. The use of local materials and local unemployed persons was paramount to its function, served to minimize costs, and was necessary for projects to secure approval. The sponsoring public agency (a state, county, city, township, or village government and its various agencies) contributed a portion of the cost of the project, though a fixed minimum percentage was never set by the WPA. Apart from the fulfillment of

[34] Federal Emergency Administration of Public Works, *Building for Recovery: The Story of PWA* (Washington, D.C.: Government Printing Office, 1939), 1.

[35] Federal Emergency Administration of Public Works, *PWA: The First 3 Years* (Washington, D.C.: Government Printing Office, 1936), 2-3.

[36] Federal Emergency Administration of Public Works, *Building for Recovery*, 3-4.

[37] Federal Emergency Administration of Public Works, *Building for Recovery*, 1; Olson, 398; Seely, 90.

[38] Federal Emergency Administration of Public Works, *Building for Recovery*, 2.

public improvements, state and local governments benefited from sponsoring WPA projects because they did not have to finance the labor. WPA workers were classified as federal employees.[39]

A primary focus of the WPA was construction and improvement of farm-to-market roads. These were simple jobs that could be performed by workers of all skill levels, and helped to increase opportunities for farmers to sell their goods and make it easier for inhabitants of rural areas to take advantage of the social, cultural, and educational benefits of larger, more established neighboring cities. These projects were located in rural areas, and typically involved straightening and broadening roadways, reducing steep grades, surfacing with gravel or crushed stone, providing drainage, and clearing rights-of-way. In the eight-year existence of the WPA, 572,000 miles of rural roads were constructed or improved. Primary highways linking urban areas were concrete or asphalt-paved, and accounted for 57,000 miles (or 10 percent) of road work completed. This included the modernization of secondary road systems such as county highways and other roads not carrying a U.S. or state route number. Perhaps the most significant national road or highway project closely associated with the WPA was the construction of the Blue Ridge Parkway, a 469-mile National Scenic Byway and All-American Road between Shenandoah National Park in Virginia and the Great Smoky Mountains National Park in North Carolina. It was the longest planned roadway in the country at the time of its construction, and WPA crews contributed greatly to its development.[40]

Funding for the national effort to eliminate unsafe railroad grade crossings was also part of the WPA. An effort that dated back to the late 1910s, the program received appropriations specifically earmarked for railroad grade crossing elimination projects. These projects consisted of constructing grade separations (overpasses and underpasses) and installing traffic control and warning devices. Railroad crossings, including those in cities, commonly had only crossbuck signs. There were no gates, bells, lights or other devices to alert motorists that a train was approaching. Grade crossing elimination was considered a "modern-day obligation of the public," and the use of federal relief expenditure grants for these projects was widely supported.[41]

Bridges and viaducts, culverts, guardrails and guard walls, and gutters were usually constructed or improved in connection with road and highway work. In all, the WPA constructed 78,000 bridges and improved more than 46,000. Nearly two-thirds of these structures were constructed of wood for a number of reasons, namely its availability and lower skill level required to work with the material. Following the onset of World War II, timber was favored in order to conserve steel needed for defense projects. Many

[39] Federal Works Agency, *Final Report of the WPA Program* (Washington, D.C.: Government Printing Office, 1947), 7-15, 53; Federal Works Agency, *Public Roads and the WPA* (Washington, D.C.: Government Printing Office, 1940).

[40] Federal Works Agency Program, *Final Report of the WPA*, 53; Federal Works Agency Program, *Public Roads and the WPA;* Olson, 548-51; Seely, 90-91.

[41] *Proceedings of the Thirty-fourth Annual Convention of the American Road Builders' Association* (Washington, D.C.: American Road Builders' Association, 1937), 75-79; Seely, 95.

of the bridges that were constructed by the WPA were replacements of dilapidated or deficient structures (e.g., upgrading a bridge from one lane to two).[42]

In 1939 the WPA was renamed the Works Project Administration and was transferred to the Federal Works Agency, an umbrella agency that also administered the PWA, U.S. Housing Authority, and BPR. As the labor force was directed to war-related projects in the early 1940s, the WPA program was considerably reduced. By the end of 1943, liquidation of the WPA, as ordered by the President and the Federal Works Administrator, was complete.[43]

(1) National Youth Administration (NYA)

To aid Americans between the ages of 16 and 24, including women, the NYA was created as part of the WPA in June 1935. The NYA provided grants to students in need of financial support to stay in school and offered job training and part-time work to those not attending school and unable to secure employment. The work program of the NYA took on minor construction projects suitable to generally inexperienced youth labor, and had the goals of "enabling youth to receive work experience and training in the fundamentals of building crafts and practices, providing structures and equipment for youth training centers, and giving young people the opportunity to develop self confidence in their ability to do real work." Examples of suggested construction projects included picnic facilities in recreation areas and parks, small library buildings, and demolition projects to obtain construction materials.

The NYA had only a minor role with transportation improvements. Work in this area mostly consisted of construction of small wooden or concrete bridges and highway beautification.[44]

At the onset of World War II in 1939, through the Administrative Reorganization Act, the NYA was transferred to the Federal Security Agency. All NYA activities that were not contributing to the war effort were dropped in 1942, and the program officially folded in September 1943. During its eight-year run, the NYA provided more than 4.5 million jobs.[45]

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[42] Federal Works Agency, *Final Report of the WPA Program*, 53.

[43] Federal Works Agency, *Final Report of the WPA Program*, 7, 15.

[44] Roger Biles, *A New Deal for the American People* (DeKalb, Ill.: Northern Illinois University Press, 1991), 108; The Survey of Federal Archives, Division of Professional and Service Projects, Works Projects Administration, *Inventory of Federal Archives in the States,* Series XVII, Miscellaneous Agencies, No. 35, Oklahoma (Oklahoma City: The Historical Records Survey, 1940), 84; National Youth Administration for Oklahoma, *Advancing the NYA Program in Oklahoma* (Oklahoma City: National Youth Administration for Oklahoma, 1937), 3-6.

[45] Tally D. Fugate, "National Youth Administration," *Encyclopedia of Oklahoma History & Culture,* Oklahoma Historical Society, 2007, http://digital.library.okstate.edu/encyclopedia/entries/N/NA014.html (accessed 25 January 2012).

4. Depression-era Work Relief Programs in Oklahoma

Economic distress overcame Oklahoma prior to the 1929 stock market crash. During the "Roaring Twenties," the state was subjected to numerous bank failures, a decline in agricultural prices due to overproduction, and a wavering petroleum industry. Migration out of Oklahoma, particularly from the poverty-stricken farm towns in the eastern half of the state, began during this decade as foreclosures increased and major cash crops (namely wheat and cotton) in "glutted markets" were being abandoned. Unemployment increased significantly, reflecting in an income decline between 1929 and 1932 that was third highest in the nation. During that relatively short period of time, one-half of all industrial workers in Oklahoma lost their jobs.[46]

Oklahoma's efforts to provide relief before the New Deal paralleled those of many other states. The state struggled to come up with sufficient funds for such purposes, and by and large, state and local relief efforts were inadequate. Oklahomans responded by demanding a change in state government. In 1930 Democrat William H. "Alfalfa Bill" Murray successfully ran for the governorship with promises of tax reform, reduced state expenditures, and relief measures.[47]

Murray, like other governors, had to counter soaring unemployment. He urged farmers to increase production and sent Oklahoma Highway Commission (OHC) trucks filled with unemployed men to rural areas to work for farmers in exchange for produce. A relief fund of $400,000 was rapidly consumed, at which time Murray had the OHC use gasoline-tax revenue to hire unemployed men to build farm-to-market roads under the supervision of state highway engineers. Before long, however, Murray realized the state could not provide all of the funds needed to provide sufficient relief, and he pled for a federal relief program. The New Deal seemed to be just the solution he called for, but Murray instead was committed to political infighting and subsequently developed a poor relationship with Harry Hopkins, administrator of the FERA. During Murray's time in office from 1931 to 1934, federal relief programs ultimately proved to be of minimal value to Oklahoma.[48]

Oklahoma's sparring with the New Deal was rooted in the governor's administration of federal funds. Although he was forced to become more dependent on the federal government for relief funds as the depression grew worse, Murray was hesitant to expand work-relief activities under the New Deal. His "frugality" was openly criticized by Oklahomans and federal relief administrator Harry Hopkins, which was followed by charges of corruption and failure to meet employment quotas. This eventually led to Hopkins removing the FERA from Murray's control in March 1934. The state chose a new governor that year, Congressman E.W. Marland, who ran using the slogan, "Bring the New Deal to Oklahoma."[49]

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[46] Keith L. Bryant, Jr., "Oklahoma and the New Deal," in *The New Deal*, Vol. 2, ed. John Braeman et al. (Columbus, Ohio: Ohio State University Press, 1975), 167-69.

[47] Bryant, "Oklahoma and the New Deal," 169-70, 172; Keith L. Bryant, Jr., *Alfalfa Bill Murray* (Norman, Okla.: University of Oklahoma Press, 1968), 191.

[48] Bryant, "Oklahoma and the New Deal," 166, 172-73; Bryant, *Alfalfa Bill Murray*, 205-06.

[49] Bryant, "Oklahoma and the New Deal," 166, 173-74, 181; Biles, *A New Deal for the American People*, 100.

Once under federal control, relief projects in Oklahoma were somewhat expanded. Highway construction benefited from $13.9 million in NIRA National Recovery Highway funds during the 1933-34 biennium. The CWA and PWA also began building airports, college dormitories, and county courthouses. However, as of November 1937, after approximately four years, the latter had only 208 projects completed or underway in the entire state, with 12 counties having none. With a population that mostly had only farming experience, Oklahoma lacked the skilled labor needed for most PWA projects, which were more demanding and larger in scale. Many projects of the CWA, a division of the FERA, were relatively simple jobs (e.g., grading new roads or spreading gravel on existing ones) and thus better suited to the more unskilled work force. Cimarron County, for instance, spent $300,000 on its roads in 1933, twice as much as the previous nine years. Still, fewer relief projects were undertaken in Oklahoma during Roosevelt's first term than in most other states. This was additionally a consequence of counties, cities, and small towns not having the money or resources to initiate projects. In fact, the state's inability to provide matching funds proved to be as great of an obstacle as Murray's sternness. Oklahoma's constitution set limits on taxes and borrowing, and in the four years following Roosevelt's presidential inauguration, the state government spent only $1.2 million on relief.[50]

The economic depression was compounded in Oklahoma by the severe dust storms and drought of the mid-1930s. During this time, the entire state was designated a drought area, and an extensive migration of farmers out of the state began. Drinking water was polluted, dust filled houses, and wind "sandblasted paint off cars."[51] In an effort to alleviate the desperate situation, Roosevelt initiated a project, carried out in large part by the CCC, to create a massive shelterbelt, or windbreak, of trees and shrubs from Canada to Texas, including in Oklahoma.

The NRWR program, a special grant program funded by the NIRA, directly impacted roadway construction by providing unemployment relief in the Oklahoma counties of Cimarron, Texas, Beaver, Harper, Ellis, and Woods. An allotment of $570,000 was made to Oklahoma to cover supervision, equipment, and materials for projects the highway commission designated and the BPR approved. Affected counties furnished some materials and equipment where possible, and by the late 1930s the WPA was also furnishing materials. As with other types of work-relief roadway projects, the work under this program consisted of grading, drainage, bridge construction, and gravel or caliche surfacing. The Dust Bowl, as the period of severe dust storms and drought became known, ended only when regular rainfall returned after nearly a decade.[52]

The FERA, CCC, PWA, and WPA all left at least some impression on Oklahoma. The latter proved to have the most impact in the state. By 1937 the WPA spent more than $43 million in Oklahoma while generating almost $10 million in matching contributions. Over 40 percent of all WPA money in Oklahoma went to highway and road building. The achievements of the CCC were also significant in Oklahoma.

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[50] Bryant, "Oklahoma and the New Deal," 173-75; Donald Worster, *Dust Bowl: The Southern Plains in the 1930s* (New York: Oxford University Press, 1979), 132-33.

[51] Bryant, "Oklahoma and the New Deal," 176.

[52] Bryant, "Oklahoma and the New Deal," 176-77.

Camps were generally located in national forests, especially in the eastern part of the state, and contributed mostly to soil conservation work. In 1942 Oklahoma had more CCC camps than any other state.[53] The key programs that contributed to the state, particularly with respect to bridges and road-related resources, are discussed below, though other federal relief programs also provided funding aid to the state.

A. FERA

As noted earlier, "Alfalfa Bill" Murray's obstructionism and the lack of state matching funds limited the number of FERA projects in Oklahoma. The CWA, a short-term supplement to the FERA, did manage to expend approximately $14.5 million in the state during its five months of operation, an average amount in comparison to other states.[54] The majority of CWA work was associated with highway and local road improvements, ranging from surfacing and grading roads to constructing bridges to laying sewer pipes.

Projects that required advance planning were generally omitted, since the primary objective of the CWA was to increase employment nationwide as quickly as possible.[55]

Table 1 lists the types and quantity of road-related FERA projects across approximately two years, including those of the CWA, approved in Oklahoma prior to January 1, 1935. Following termination of the FERA in 1935, any unfinished work was taken over by the WPA.

Table 1. Road-related FERA Projects in Oklahoma

Project Type	Unit Number
New Road Surfacing (miles):	
Gravel	1,302
Asphalt	66
Other	428
TOTAL	1,796
Road Surfacing Repaired (miles):	
Gravel	3,380
Dirt	37
Clay and Sand	149
Asphalt	26
TOTAL	3,592
Road Grading (miles):	
New	2,079
Repaired	21,504

[53] Bryant, "Oklahoma and the New Deal," 186-87.

[54] Division of State Planning, Oklahoma Planning and Resources Board, *Public Works Planning in Oklahoma: Principles, Problems, and Results of Inventory* (Oklahoma City: Division of State Planning, 1938), 22.

[55] Division of State Planning, Oklahoma Planning and Resources Board, 22.

Table 1. Road-related FERA Projects in Oklahoma

Project Type	Unit Number
New Bridges:	
Steel	24
Timber	179
Stone or Concrete	22
TOTAL	225
Bridges Repaired	747
Bridges Painted	25
New Culverts	251
Culverts Repaired	3,407
New Gutters and Curbs (linear feet)	49,167

Source: H.C. Stallings, *Report of Analysis of Approved Projects, FERA, State of Oklahoma 1934 & 1935* (Oklahoma City: Works Division, 1935).

At the local level of county and municipality sponsorship of projects, the CWA and FERA were identified sequentially rather than hierarchically; that is, CWA projects came first, followed by FERA projects, and subsequently by WPA projects. In the individual CIARs, for example, both Custer County and the City of Clinton provided specific beginning and ending dates for their participation in each program. [56]

For some sponsors, the projects from all the main programs (CWA, FERA, and WPA) were lumped together in terms of work accomplished. Often, as with the City of Tulsa's "paving, widening, and improving of streets in every portion of the city," the work begun by the CWA and FERA was completed by WPA, making it seem like one continuous project from the city's perspective. The same thing occurred in Enid, where a street gravelling effort was simply quantified as 99 blocks under the CWA; 72 more blocks under the CWA, FERA, and Oklahoma Emergency Relief Administration (OERA); and finally, 55 blocks under the WPA.[57] Although road projects seemed much the same, CWA reports did not specifically mention the "farm to market" road projects or programs that were regularly cited in reports on

[56] Unless otherwise referenced, observations about federal relief projects at the county and municipal levels are based on reviews of the individual original reports and letters submitted to the State Appraisal Committee as part of the U.S. Community Improvement Appraisal Reports (CIAR) process conducted in 1938. Participating counties and municipalities that sponsored projects submitted typewritten, signed letters and memoranda summarizing efforts in their own localities. The reports include a wide variety of localized details, comments, and opinions about federal relief efforts, primarily CWA, FERA, OERA, and WPA, but also occasional references to other programs. No report from the State Highway Commission was found in the collection, although several other state agency reports are included; therefore, background and contextual details about Commission-sponsored projects are not available. The collection of original reports is identified as CIAR, State of Oklahoma, Department of Government, 1938, Documents Section, Edmon Low Library, Oklahoma State University, Stillwater, Oklahoma. See appraisal reports for City of Tulsa, Custer County, and Town of Clinton, CIAR.

[57] Appraisal reports for City of Tulsa and City of Enid, CIAR.

WPA road work. For CWA or FERA projects, the work was simply county roads or city streets, graded, drained, and graveled or shaled, with culverts and bridges where needed.

CWA and FERA projects were considered by the county and local sponsors to be similar in concept to subsequent WPA projects for road work, but of a far lesser quality, completeness, and level of organization. As Grant County reported, "the first relief programs as operated under CWA, FERA and OERA were of an emergency nature, and not so well planned as the WPA program now in operation [1938]. Consequently the work done under these programs was not as economically accomplished, nor was most of it as permanent a nature as that done by the WPA…." The Town of Gould explained, "Through CWA, even though the Federal grant was practically the same as WPA, the benefit was not anything like as great which we believe was directly caused by more definite and comprehensive supervision from WPA officials from the director on down." The Cushing report criticized the CWA and FERA by praising the WPA: "It is our conclusion that the present Works Progress Administration program is far superior to any of the preceding relief work organizations."[58]

B. CCC

Oklahoma's CCC program began almost immediately after federal appropriation was allotted for the ECW program. In May 1933 Representative Jed Johnson received news from Robert Fechner, Director of the ECW (later CCC), that Oklahoma would immediately open 11 camps. Location of the camps would be spread over the state and be determined by availability of work, need for conservation efforts, suitability for camp life, and proximity to communities. Oklahoma was part of the Eighth Corps area that included Colorado, Arizona, New Mexico, and Texas. Potential enrollees met at Fort Sill beginning in 1933 for examination and assignment. By December 1933 more than 5,000 Oklahomans enrolled in the CCC, more than any other district in the Eight Corps area.[59]

The number of camps steadily grew over the next few years, peaking in 1937 and again in 1941, as shown in Table 2. In 1941 Oklahoma boasted the most number of CCC camps of any state.[60] Each camp had at least one company of up to 200 men. The CCC was segregated in Oklahoma, with separate white and African American companies. African American CCC companies worked alongside other CCC companies on state park, forestation, and other conservation projects. An Indian Division of the CCC was also established in Oklahoma's western counties and in the Ouachita Mountains of southeastern Oklahoma. Indian Division companies worked on projects alone or in cooperation with other federal relief programs, and the CCC.[61]

[58] Appraisal report for Grant County, Town of Gould, and City of Cushing, CIAR.

[59] Reid Holland, "The Civilian Conservation Corps in Oklahoma, 1933-1942" (Master's thesis, Oklahoma State University, 1969), 12-13.

[60] Holland, "The Civilian Conservation Corps in Oklahoma, 1933-1942," 34.

[61] John Braeman, Robert Bremner, and David Brody, eds., *The New Deal*: *The State and Local Levels* (Columbus, Ohio: Ohio State University Press, 1975), 187.

Table 2. Total number of CCC camps in Oklahoma 1933-1942

Year	Camps
April 1933 to September 1933	18
October 1933 to March 1934	28
April 1934 to September 1934	37
October 1934 to June 1935	26
1936	49
1937	50
1938	38
1939	35
1940	33
1941	64

Source: See Table IV in Reid Holland, "The Civilian Conservation Corps in Oklahoma, 1933-1942" (Master's thesis, Oklahoma State University, 1969), 34.

Water, forest, and soil conservation efforts were the Oklahoma CCC program's primary focus. Oklahoma's enrollees followed a strict daily routine and spent the day "making trails, building fire breaks, building lookout towers, destroying tree pests, fighting tree diseases, improving parks, building roads, planting trees, landscaping, improving timber stands, building dams, and preventing soil erosion."[62] Of these efforts, soil conservation was the state's foremost concern, with over half of the camps dedicated to soil conservation work.[63] These conservation projects often involved the construction of check dams, (small dams that provide a build-up of water behind the structure to control the velocity). This was the case for Company 812 out of Fort Sill, Oklahoma, who erected concrete dams on Post Oak, Cow, Panther, Cut Throat, and Deer Creeks as part of an erosion conservation project in 1933.[64]

The CCC also constructed many transportation-related resources such as roads, bridges, and culverts in an effort to connect communities or create scenic highways. One example of this type of work is Company 849's efforts in 1933 to create a scenic highway near Price Falls, in the Arbuckle Mountain Range of Murray County. The CCC's roadwork included blasting, shoveling, and grading.[65]
In 1935 the relief program was expanded to include construction of municipal, state, and national parks.[66] The Oklahoma CCC planned and developed eight new state parks, one national park, and four municipal

[62] The National Emergency Council, "Report of the Proceedings of the Statewide Coordination meeting of Federal Agencies Operating in Oklahoma," 22 April 1936 (Oklahoma City: National Emergency Council), 14-H.

[63] Holland, "The Civilian Conservation Corps in Oklahoma, 1933-1942," 15, 35.

[64] "CCC May-June 1933" scrapbook, page 67. Folder 4, "Civilian Conservation Corps booklet," Box 1, Woodrow O'Dell Collection, Oklahoma History Center, Oklahoma City, Oklahoma.

[65] "CCC May-June 1933" scrapbook, page 23. Folder 4, "Civilian Conservation Corps booklet," Box 1, Woodrow O'Dell Collection, Oklahoma History Center, Oklahoma City, Oklahoma.

[66] Suzanne Schrems, "A Lasting New Deal Legacy: The Civilian Conservation Corps, the National Park Service, and the Development of the Oklahoma State Park System," *The Chronicles of Oklahoma* LXXII, no. 4 (1994-1995): 370.

parks between 1933 and 1941 in collaboration with other federal relief programs, the Oklahoma State Park Commission, and the National Park Service (NPS).[67] Table 3 shows the parks constructed in whole, or in part, by Oklahoman CCC labor.

Table 3. CCC planned and designed parks in Oklahoma 1933-1941

Park Name	Park Ownership
Platt National Park (today part of Chickasaw National Recreation Area)	National
Boiling Springs	State
Robber's Cave	State
Spavinaw Hills	State (withdrawn in 1938 due to "land acquisition and administrative difficulties"
Lake Murray	State
Roman Nose	State
Osage Hills	State
Quartz Mountain	State
Beaver's Bend	State
Lincoln Park, Oklahoma City	Municipal
Northwest Oklahoma City Park (formerly Will Roger's Park), Oklahoma City	Municipal
Mohawk Park, Tulsa	Municipal
Wintersmith Park, Ada	Municipal
Perry Lake Park, Perry	Municipal
Nichols Park, Henryetta	Municipal

Sources: State listed parks from Suzanne Schrems, "A Lasting New Deal Legacy: The Civilian Conservation Corps, the National Park Service, and the Development of the Oklahoma State Park System," *The Chronicles of Oklahoma* LXXII, no. 4 (1994-1995): 373. Urban and National park information from Reid Holland, "Life in Oklahoma's Civilian Conservation Corps," *The Chronicles of Oklahoma* XLVII, no.2 (1970): 225 and Reid Holland, "Civilian Conservation corps in the City," *The Chronicles of Oklahoma* LII, no. 3 (1975): 371-373.

CCC projects were almost never mentioned in the county and local reports of the 1938 Community Improvement Appraisal project, with reporters limiting their discussions almost exclusively to the CWA, FERA, OERA, and WPA. The CCC is noteworthy for its absence in the report for Grant County, which states that "Grant County is not fortunate enough to have a CCC camp, however, they have sent about

[67] Oklahoma's state parks have been previously evaluated under individual National Register nominations or as part of the New Deal-Era State Parks Thematic Study. Robber's Cave and Lake Murray State Parks are listed in the National Register. National Register-listed municipal parks include Wintersmith Park, Perry Lake Park, and Nichols Park. The Platt National Park was joined with the Arbuckle Recreation Area to become the Chickasaw National Recreation Area in 1976. The former national park lands were designated as the Travertine District, later renamed the Platt District.

120 boys to various camps in our State and out of the State, from families who are needy."[68] One of the rare references to local CCC work, including road projects, came in the report of the Town of Talihina, Le Flore County:

> Living in a mountainous and wooded area we have received a large portion of CCC work. Besides providing much of the livelihood of their respective families, reforesting our mountain area and building scenic drives through mountain areas that were inaccessible…prior to their institution [relief agencies activities], we were a small isolated community with poor facilities for travel and a great portion of the surrounding territory inaccessible…This condition is relieved by the activity of the CCC.[69]

Park development in Oklahoma followed the NPS master plans, which favored rustic design styles and the use of native materials.[70] CCC and NPS labor constructed roads, bridges, and culverts, and "built dams and lakes on unproductive land, planted trees and shrubs, and quarried stone to establish the state's first park system."[71] For example, three CCC camps constructed park amenities, landscaping, shoreline drive and road, bridges, and a dam at Lake Murray State Park in 1935.[72] Park bridges and culverts were constructed with a variety of materials, including stone, steel, timber, and concrete.

The Oklahoma CCC also extended the NPS park design to municipal park development. For example, the CCC constructed Wintersmith Park in Ada, Oklahoma, following the planned landscape guidelines set by the NPS and 1933 CCC park plan to create a "rustic, scenic park with the lake and creek's ravine as the focal point."[73] The park features a stone entry gate, a circular scenic parkway drive around the lake, bridges and culverts, trail, dams, amphitheater, and other park amenities constructed by the CCC.[74]

Between 1933 and 1940 the federal government expended $51 million on all Oklahoma CCC projects, including the construction of 668 bridges; 657,641 rods of fencing; 2,233 miles of truck trails or minor

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[68] Appraisal report for Grant County, CIAR.

[69] Appraisal report for Town of Talihina, Le Flore County, CIAR.

[70] Reid Holland, "Life in Oklahoma's Civilian Conservation Corps," *The Chronicles of Oklahoma* XLVII, no.2 (1970): 288-289.

[71] Oklahoma State Historic Preservation Office, "Final Survey Report: Intensive-level Survey of New Deal-Era State Parks in Oklahoma," prepared for the Oklahoma Tourism and Recreation Department (June 1993), 11.

[72] Neysa Clark, *Lake Murray State Park* (Washington, D.C..: National Register of Historic Places, National Park Service, 12 February 1995), Section 7, page 9; "Lake Murray Work Rushed," *The Oklahoman*, 3 February 1935, pg. 53.

[73] Jim Gabbert, *Wintersmith Park Historic District,* (Washington, D.C.: National Register of Historic Places, National Park Service, 2 June 2000), Section 7, page 9.

[74] Wintersmith Park was also constructed using WPA funds and labor. A few road and trail bridges and recreational buildings and structures can be attributed to the WPA. However, the majority of the resources found within the park were built with CCC labor. Gabbert, *Wintersmith Park Historic District,* Section 7, pages 10-18.

roads; and 78,987 check dams. Oklahoma had 73,745 enrollees during these years who worked on a variety of transportation-related projects in Oklahoma and surrounding states.[75]

(1) CCC Indian Division

Oklahoma's CCC also included an Indian Division (CCC-ID), begun in December 1933.[76] Under modified administrative rules, the Oklahoma Indian Service Office (later known as the Bureau of Indian Affairs) supervised work projects funded from a federal appropriation, mostly on Native American land.[77] It is important to note that not every project undertaken with Native American labor in Oklahoma's areas of Tribal jurisdiction was funded through the CCC. Oklahoma's PWA, WPA, and Indian Road Service, the road division of the state's Indian Service, also completed transportation-related projects during this time using Native American workers.[78]

Between 1933 and 1941, 29 CCC-ID camps were established in Oklahoma.[79] The limited number of CCC-ID camps in Oklahoma can be attributed to the number of Native American companies that were then assigned to other camps with junior enrollees.[80] Due to regulatory differences between CCC-ID and CCC allowing Native American enrollees to live with their families in their own communities, not every county or Tribal jurisdiction in the state had a CCC-ID camp.[81] As a result, laborers traveled in groups to a project location and returned home in the evenings.[82] Enrollees were trained in carpentry, vehicle operation, radio operation, mechanics, and other specialized trades.[83]

The CCC-ID completed a number of transportation-related projects during the life of the program, including road grading and paving, bridge and culvert construction, and dam erection. The purpose of the projects was to make unreachable areas accessible and to connect Native American communities

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[75] The number of enrollees, projects performed, and allocations include CCC-ID projects. James J McEntee, Director, "A Brief Summary of Certain Phases of the C.C.C. Program in Oklahoma," c.1940. Folder 26, Box 13, Wilburn Cartwright Collection, Carl Albert Center, Oklahoma University, Norman, Oklahoma.

[76] The National Emergency Council, "Report of the Proceedings of the Statewide Coordination meeting of Federal Agencies Operating in Oklahoma," 22 April 1936 (Oklahoma City: National Emergency Council), 18-A.

[77] Holland, "The Civilian Conservation Corps in Oklahoma, 1933-1942," 22.

[78] The National Emergency Council, "Report of the Proceedings of the Statewide Coordination meeting of Federal Agencies Operating in Oklahoma," 18-B, C, E; A.M. Landman, Office of Indian Affairs Superintendent, letter to House Representative Wilburn Cartwright, 13 May 1942, Folder 28, Box 11, Wilburn Cartwright Collection, Carl Albert Congressional Research and Studies Center Congressional Archives, University of Oklahoma, Norman, Okla.

[79] See Table III in Holland, "The Civilian Conservation Corps in Oklahoma, 1933-1942," 33.

[80] Holland, "The Civilian Conservation Corps in Oklahoma, 1933-1942," 22.

[81] In 1933 there were eight Indian jurisdictions, including Cheyenne and Arapaho, Five Civilized Tribes, Kiowa, Osage, Pawnee, Potawatomi (Kansas), Quapaw, and Shawnee.

[82] H.G. Funkhouser, "Pampered Sons Put to Work," *The Daily Oklahoman,* 24 March 1935, page 16-C.

[83] "Putting Oklahoma Back to Work," *New Deal Exhibit*, Oklahoma University, Carl Albert Center, http://www.ou.edu/special/aobertctr/archives/exhibit/NewDeal/NewDealexhibit.htm (accessed 24 August 2011).

together. For example, Ed. Foster, Secretary of the Talihina Lions Club in a letter to Honorable Wilburn Cartwright describes:

> Southeastern Oklahoma with its beautiful scenery has been practically inaccessible until the Indian service and the CCC started their road projects. The highway built from the top of Kiamichi mountain south of Honobia this last year opened southern Le Flore county to the rest of the county for the first time. There is more work to be done on this road. The Indians in the Little River country want to get out as is indicated by the numbers who flock to Talihina from Honobia at this time.[84]

According to the Community Improvement Appraisal report for Talihina, "This type of relief work has taken care of the most of the Indian relief situation in this area."[85]

In the same year, Native American labor also constructed 10 other truck trail projects in eastern Oklahoma. Nine of the trails were located in the Cherokee hills in Mayes, Delaware, Cherokee, Adair, and Sequoyah Counties. According to A.M. Landman, the Superintendent of the Five Civilized Tribes, the CCC-ID constructed these trails "to make Indian communities accessible."[86]

Road construction projects on Native American lands not only improved accessibility, but also opened new trade and transportation routes, improved transportation of agricultural goods, and provided access to churches, cemeteries, schools, and community centers.[87] Additional benefits of transportation-related projects were explained by Landman: "These [road] projects have been a source of great benefit to the Indians of the Five Civilized Tribes by furnishing them employment as well as improving government owned reserves and tribal reserves. The truck trails have made many Indian homes accessible as well as being the means of forest protection."[88]

In the early years of the program, between 1933 and 1936, all CCC-ID work was undertaken in conjunction with other federal work relief programs. However, beginning in 1936, the CCC-ID became more independent, completing road projects with only Native American labor. The first road project undertaken solely by CCC-ID enrollees was the construction of the Choctaw Indian Truck Trail. The road, beginning near Weathers in Pittsburg County, extended to the Hartshorne-Tuskahoma Road (also known

[84] Ed. Foster, Secretary Talihina Lions Club, letter to Wilburn Cartwright, Chairman of the Roads Committee, 25 May 1937, Folder 20, Box 9, Wilburn Cartwright Collection, Carl Albert Congressional Research and Studies Center Congressional Archives, University of Oklahoma, Norman, Okla.

[85] Appraisal Report for Talihina, CIAR.

[86] The National Emergency Council, "Report of the Proceedings of the Statewide Coordination meeting of Federal Agencies Operating in Oklahoma,"17-A; Appraisal Report for Talihina, CIAR.

[87] R.L. Whitcomb, District Highway Engineer, letter to the Commissioner of Indian Affairs, 20 January 1939, Folder 28, Box 10, Wilburn Cartwright Collection, Carl Albert Congressional Research and Studies Center Congressional Archives, University of Oklahoma, Norman, Okla.

[88] The National Emergency Council, "Report of the Proceedings of the Statewide Coordination meeting of Federal Agencies Operating in Oklahoma," 18-A.

as Savage Highway) over the densely forested Jack Forks Valley and over the Ball Mountain range in western Oklahoma.[89] Other CCC-ID road projects constructed entirely by Native Americans included:

- The road from Hartshorne, Oklahoma, to State Highway 2 in 1937
- A road and bridge over the Clear Boggy Creek in Atoka County in 1938
- Culvert, bridge, and road construction on the "Pittsburg County Road from Kiowa to Pittsburg" in 1938
- Road construction from Pushmataha County to Jumbo, Oklahoma, to meet a WPA-constructed road in 1938.[90]

Like the national CCC program, most of the work performed by Native American labor related to soil conservation efforts. Conservation projects included terracing, grading, planting, and dam construction. Soil conservation efforts were tremendous in size and effort. For example, by 1935, in Osage County alone, laborers constructed more than 5,000 dams in an effort to reduce soil erosion and to create stock ponds to water livestock.[91]

Between 1936 and 1937, federal appropriation for Indian work relief projects nationally totaled $4 million.[92] The House Appropriations Committee reduced funding over the coming years, though R.L. Whitcomb, Oklahoma District Highway Engineer, exclaimed, "It can be truthfully stated that we have hardly scratched this area for needed roads."[93]

By the 1940s the war effort consumed the majority of federally appropriated funds and CCC-ID funding was officially terminated, along with other New Deal Era programs in 1942. The CCC-ID program had a lasting effect for Native Americans by providing skills training and employment for 21,345 people from the

[89] Bennett Sittel, "Choctaw Indian Truck Trail," *Indians At Work* 3, no. 17 (1936), 16.

[90] Foster letter to Cartwright, 25 May 1937; William Zimmerman, Jr., Assistant Commissioner, letter to Wilburn Cartwright, 27 May 1937, Folder 13, Box 10, Wilburn Cartwright Collection, Carl Albert Congressional Research and Studies Center Congressional Archives, University of Oklahoma, Norman, Okla.; Gould Bryan, Manager [unspecified], letter to Mr. Eugene Wheeler, Road Engineer and Mr. H.C. Miller, Project Manager CCC Indian Division, 22 October 1938, Folder 13, Box 10, Wilburn Cartwright Collection, Carl Albert Congressional Research and Studies Center Congressional Archives, University of Oklahoma, Norman, Okla.

[91] Osage County did not have a CCC-ID camp. However, the work performed on dam construction was funded out of the Indian Emergency Conservation Act.

[92] Wilburn Cartwright, Chairman of the Roads Committee, letter to Senator Elmer Thomas, 27 May 1937, Folder 20, Box 9, Wilburn Cartwright Collection, Carl Albert Congressional Research and Studies Center Congressional Archives, University of Oklahoma, Norman, Okla.

[93] Whitcomb letter to the Commissioner of Indian Affairs, 20 January 1939.

eight Indian jurisdictions.[94] The construction of 269 miles of new roads and 113 bridges/culverts also allowed for greater transportation of agricultural goods, materials, and supplies to markets and a connection between towns and state highways in the state.[95]

(2) CCC and CCC-ID's legacy in Oklahoma

Oklahoma's CCC and CCC-ID programs worked on a number of conservation-based programs from 1933 to the early 1940s. However, beginning in 1940, due to preparation for World War II, more than 48,000 enrolled CCC members were discharged from the program. The reduction of enrolled members and funding cutbacks effectively ended the CCC in Oklahoma by 1942, and camps were abandoned or taken over by the U.S. Army.[96]

The CCC's initial goal was to provide employment to Oklahoma's unemployed. The aggregated total of Oklahomans employed in the nine years of the program totaled 107,676. This figure includes 80,718 junior and veteran enrollees, 21,345 Native Americans, and 5,605 non-enrolled personnel (camp officers and supervisory workers). Over the course of the program, the federal government expended $63.8 million in CCC programming in Oklahoma alone.[97]

According to historian Reid Holland, the most "noteworthy accomplishment" of the CCC was in soil conservation efforts. Between 1936 and 1938, the state ranked third nationally for the number of active soil erosion camps.[98] A total of 655,113 check dams were erected throughout the state as part of erosion control efforts.[99]

In addition, the construction of roads, bridges, and culverts within the state played an important role in the connection of communities and Oklahoma's overall transportation system. This idea is especially true in Native American tribal lands where federal relief efforts brought new roads to otherwise inaccessible areas. In total, CCC labor constructed 2,400 miles of truck trails and minor roads statewide over the length of the program.[100]

The final legacy of the CCC was the number of parks that were created. No state parks existed in Oklahoma prior to 1930, but by the end of the program the CCC had constructed eight parks, either full or in part. The parks contain CCC-constructed roads, bridges, culverts, dams, retaining walls, and other amenities that are still enjoyed today.[101]

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[94] Merrill, 164.

[95] Whitcomb letter to the Commissioner of Indian Affairs, 20 January 1939.

[96] Holland, "Life in Oklahoma's Civilian Conservation Corps," 234.

[97] Merrill, 164-165.

[98] Holland, "Life in Oklahoma's Civilian Conservation Corps," 228.

[99] Merrill, 164-165.

[100] Merrill, 164-165.

[101] Holland, "The Civilian Conservation Corps in Oklahoma, 1933-1942," 37.

C. PWA

Between 1933 and 1937 only 208 PWA projects were completed or started in Oklahoma. With a population that predominantly had only farming experience, the state lacked the skilled private labor needed for most PWA projects, which were more demanding and larger in scale. The most prominent PWA projects were the construction of a hydroelectric dam on the Grand River and Oklahoma City's Civic Center, which included a municipal auditorium, county courthouse, city jail, and city hall. Neither project resulted in the construction of bridges or road-related resources directly associated with the PWA. By November 1937 only four of the PWA projects involving roads and bridges were completed or underway in Oklahoma, at a total estimated expenditure of $277,875. That equated to only 0.6 percent of the total cost of PWA projects in the state by that time.[102]

The 1938 CIARs include a small number of references to PWA projects, all in municipalities. In the City of Tulsa, for example, the PWA rebuilt and widened the Eleventh Street Bridge over the Arkansas River and constructed new streets leading to the bridge, including the reconstruction of the West Tulsa Trafficway. Roads and streets were paved in several other municipalities, including Loyal, Gracemont, Union, and Talihina. The Talihina report noted that the PWA project had the advantage of incurring no local cost, unlike other federal relief program projects in which the sponsor was required to provide materials and equipment. The City of Cushing, while not identifying a specific project, commented that the "Public Works Administration required highly skilled workers, was rigidly inspected, and excellent work was performed."[103]

D. WPA

As was the case in many states, the WPA was very active in Oklahoma. The Oklahoma State Highway Commission, specifically, sponsored numerous WPA projects on highways and secondary or feeder roads, including farm-to-market roads. The underlying purpose of the WPA was to bring relief in the form of work; thus, project locations were often those areas of the state bearing the heaviest burden of unemployment. Locations able to produce local materials also garnered greater attention. In general, the WPA's responsibility was to provide labor while the state supplied supervisors, engineers, materials, and equipment. The WPA used unskilled workers, and the majority of its transportation-related projects simply consisted of grading, draining, and surfacing roads. Road projects were often supplied with gravel produced by nearby pits that were operated as WPA projects. Bridges and culverts were also constructed, reconstructed, or improved, and WPA-operated quarries supplied thousands of tons of stone for these projects.[104]

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[102] Division of State Planning, Oklahoma Planning and Resources Board, 19-20; Public Works Administration, *America Builds: The Record of PWA* (Washington, D.C.: Government Printing Office, 1939), 119, 200-01.

[103] Appraisal reports for municipalities of Tulsa, Loyal, Gracemont, Union, Talihina, and Cushing, CIAR.

[104] W.S. Key, Administrator, *Accomplishments of the Works Progress Administration for Oklahoma: July 1, 1935-March 1, 1937* (Department of Information, 1937), 23-25; Biennial Report 1937-1938, 53; Biennial Report 1941-1942, 98; Division of State Planning, Oklahoma Planning and Resources Board, 22-23.

The achievements of the WPA in Oklahoma between 1936 and 1943 were quantified in its final report. With respect to bridges and road-related resources, they were:

- 29,324 miles of roads constructed, reconstructed, or improved
- 2,712 bridges and viaducts constructed
- 1,017 bridges and viaducts reconstructed or improved
- 50,306 culverts constructed
- 2,206 culverts improved[105]

The WPA garnered widespread support with such tangible production and employment. In a 1939 report of the National Appraisal Committee of the U.S. CIAR process, Oklahomans were acknowledged as "outspokenly in favor of the WPA" and similar forms of federally financed and controlled work programs.[106] Oklahoma's committee recommended that the WPA "be made a permanent governmental function," adding that "Oklahoma is convinced that the present Works Progress Administration operates under the most effective and the most constructive method of administering relief to the needy of this State."[107] The state committee also declared that workmanship on WPA projects was "equal to or above the high standards of the best contract work" and WPA workers produced "an honest day's labor for every dollar they cost."[108]

The process for establishing WPA projects was basically the same for the three areas or levels of WPA work: state, county, and municipal (towns and cities). In each case the sponsor (the state, county, or municipality) outlined a project that was needed, submitted the project request, and received approval. The WPA would fund the project labor and the sponsor would provide the materials and equipment. Although the source of supervision and overall project engineering seems to vary by project, in general the WPA provided overall supervision and engineering. As will be seen below, the level and effectiveness of supervision and administration varied, but was considered adequate for the most part.

The CIARs include all federal relief projects, so transportation projects were discussed in the overall relief-effort context. Typically, road-related projects were the largest and most significant WPA efforts for both counties and municipalities. In addition to road projects were water-related projects (dams, water supply, and sewage treatment), airports, and public buildings (libraries and municipal buildings). These were considered "construction" projects. Non-construction projects included processing of public records, sewing rooms, and library administrative work.

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[105] United States Work Projects Administration, Oklahoma, *Final Report of Activities and Accomplishments* (Washington, D.C.: Government Printing Office, 1943), 3-5.

[106] The National Appraisal Committee was appointed to analyze reports of state and local officials who administer WPA projects and make recommendations for improvement of the program.

[107] National Appraisal Committee, *U.S. Community Improvement Appraisal: A Report on the Work Program of the Works Progress Administration* (Washington, D.C.: 1939), 23-24.

[108] National Appraisal Committee, *U.S. Community Improvement Appraisal*, 59.

The CIARs, varying greatly in the level of project detail, rarely explain the process used in the development of projects. Some reports describe projects as the result of careful planning efforts. For example, Haskell County stated that it was following "a five-year work program…It was started about two years ago [1936] and so far it has been working out very nicely in connection with the Federal Work Relief program." Nowata County reported that all the WPA road work was related to the county's "long-time planning program…that of properly surfacing and draining all farm to market roads in the county." In the case of Clustke, the WPA provided the impetus for planning and the community created its own "Home to Market idea." This idea, the report said, "gave rise to road construction and the erection of small bridges…[because] to my knowledge no community plan of construction has been used in the past." A farm-to-market road in Blaine County was constructed along a new alignment with a very specific goal: "The purpose of the project was to give a better farm to market outlet for the rich upland agricultural district to the west and north."[109]

Some communities were so eager to begin work that they had their own representatives in Washington D.C.: "The City of Blackwell and the Chamber of Commerce of Blackwell were interested in a Federal relief program to the extent that at that time, June 1933, they had a committee in Washington D.C. to get any possible information and data. This Committee was in Washington when the N.I.R.A. went into effect."[110]

For the most part, the counties considered their projects to involve farm-to-market roads and often described them as formal WPA "Farm to Market Road Programs" or systems. Pushmataha County stated that its "Farm to Market Road Project" started in November 1935 and resulted in "several hundred miles of feeder roads representing a network throughout the entire County," at a cost of $1 million in WPA funds, one of the larger Oklahoma projects reported. The Kiowa County report stated that "The Farm to Market Road project, we think, is the most appreciated improvement, as it accommodates more people, helps the mail and bus routes, and enables the County to build a large number of permanent bridge structures, also gravel surfacing several miles of roads."[111]

As noted in the Kiowa County report, some counties and municipalities also identified project-related roads as being essential for U.S. mail routes and for school bus routes. According to the Tulsa County report, "Tulsa county has cooperated with the officials of WPA to its fullest extent and there has been constructed and maintained highways that were covered by mail routes and school bus routes."[112] Similar statements were included in reports for Noble, Osage, Kiowa, Caddo, and Le Flore Counties, among others.[113]

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[109] Appraisal reports for Town of Clustke, Haskell County, Nowata County, and Blaine County, CIAR.

[110] Appraisal report for Blackwell, CIAR.

[111] Appraisal report for Pushmataha County and Kiowa County, CIAR.

[112] Appraisal report for Tulsa County, CIAR.

[113] See appraisal reports for Noble, Osage, Kiowa, Caddo, and Le Flore Counties, CIAR.

County-sponsored projects for roads were similar to state road projects and usually involved upgrading of existing roads to all-weather status. Prior to federal-relief efforts, and largely WPA efforts, county roads and city streets suffered from dust in dry seasons and mud in wet seasons, making travel difficult and occasionally impossible. The City of Billings reported: "In the dry season, everything is covered with dust and it is impossible to keep up the sanitary conditions. In the wet season it is swampy and it is impossible to drive down the streets without sliding into a ditch. The only street that is travelable is the street that leads in from the Highway, which is paved." The road projects involved new grading and installation of drainage features, usually culverts and occasionally bridges. Following grading and drainage, the road surfaces would be graveled. As reported by the City of Cheyenne, the WPA project "has picked our main street out of our alternate extremes of mud and dust…"[114]

Municipal projects for city streets were similar to county road projects, but required fewer culverts and bridges. Grading and graveling normally sufficed. While county projects were described in miles of roads graded, city projects were described in numbers of city blocks graded and graveled. In addition to gravel, some county and city roads were surfaced with shale or caliche, or simply oiled. In rare circumstances, city streets were paved with concrete or bituminous topping. City street projects also included new curbs and sidewalks in some projects. In some cases, street improvements were coupled with water projects that involved initial street disruption. The City of Blackwell described the city's method of analyzing and combining nine separate projects into a complete system for city streets that involved widening, curbs, graveling, oiling, and bridge work. The Town of Hunter reported that "…the streets all over the town were graded and graveled at an approximate cost of $100.00 to the town," but the work was necessary because "our streets were torn up during the installing of the water system," another relief project.[115]

With few exceptions, bridges and culverts were considered as integral parts of road projects and not as individual bridge projects. For example, a WPA project would be established to improve a designated segment of miles on a county road, and culverts and the occasional bridge would be part of the work to provide needed drainage for that road segment. Such culverts and bridges would be identified with roadwork in the aggregate, and not individually. Caddo County reported cleaning, grading, and draining 265 miles of farm-to-market, school bus, and mail roads, which included: 80 miles of gravel, 10 miles of blacktop, 90 reinforced-concrete and stone culverts, 105 iron pipe bridges, five steel bridges, 28 timber bridges, and masonry retaining walls.[116] This method of quantifying various culverts and bridges is typical, if extensive, making it difficult to identify and locate individual structures within the larger road system without more intensive research in a subsequent project phase.

Occasionally, an individual bridge project, apparently not a subset of a larger road project, is identified, but these instances are uncommon. The Major County report identified two bridges: the Ames Bridge over the Cimmaron River and the El Crossing Bridge between Major and Woods Counties. Concerning the Ames bridge, the report stated, "The completion of this bridge linked two of the best trade territories in

[114] Appraisal report for City of Billings and City of Cheyenne, CIAR.

[115] Appraisal report for Blackwell and Hunter, CIAR.

[116] Appraisal report for Caddo County, CIAR.

the county." Le Flore County reported a 150-foot steel bridge over the Kiamichi River and the 200-foot Cache Creek Bridge, which was 40 feet above the water."[117]

Not all counties and cities were happy with the WPA program, even though they generally were far happier with the WPA than with its predecessors. Areas in the Panhandle were particularly displeased, and the mayor of Cuymon was especially upset:

> "WPA did not do the things they agreed and signed to do, particularly as to furnishing labor and equipment. No unit of the project was completed without the City employing extra labor and furnishing equipment."
>
> "The engineering and supervision was almost nil, a nongraduate, unlicensed Engineer was employed by WPA, occasionally appearing on this job; blue prints, plans were inadequate and most of the time lacking entirely. We were compelled to use our City Engineer and go ahead or just let the job lay and drag."
>
> "District officials assume the attitude that if a Sponsor complained of lack of progress he was just a natural griper and they were mighty Govt. officials not to be bothered with such things as actually getting the job done on time and in a workmanlike manner."
>
> "…Now the project is about completed after more than two years battle, WPA struts the credit for the job…a lasting monument to the untiring work of local people, a generous City, and not to any efficiency of the WPA."
>
> "…We do not know of a single WPA job in this district where the sponsor would be willing to try again under the same set up as original."[118]

The Cuymon mayor's sentiments were echoed, with less detail, by others. Harper County complained about too much red tape and the fact that the county could not afford to buy the needed project materials. Texas County said the WPA failed to meet the county's needs because the pay rate was too low, and that the Panhandle area was being penalized. In their case, bridge material was waiting for WPA labor that did not arrive. The lack of funds was cited by others; the WPA could supply labor but not money, which was needed for the materials. The Town of Jet had problems with the labor itself, reporting that "the general feeling has been that the relief program didn't amount to much."[119]

For the most part, counties and cities were very pleased with the results of the WPA work in their areas, such as this example: "With the help and encouragement given by the WPA the citizens of Keota have snapped out of their lethargy and have set themselves to the solution of their various problems." Or this statement from Roger Mills County: "To be candid it [the WPA] has given us a new start as our rural roads and bridges were in a deplorable condition at the beginning of WPA." Or, as Harmon County put it: "We have culverts and bridges that will last long after WPA is forgotten about." [120]

[117] Appraisal reports for Major County and Le Flore County, CIAR.

[118] Appraisal report for City of Cuymon, CIAR.

[119] Appraisal reports for City of Cuymon, Town of Jet, Texas County, and Harper County, CIAR.

[120] Appraisal reports for City of Keota, Roger Mills County, and Harmon County, CIAR.

(1) National Youth Administration

The NYA, a division of the WPA, implemented a work program in Oklahoma for out-of-school youth. Projects were in communities all over the state, and first concentrated on park and school beautification. A second phase of the program steered the focus toward construction projects. The emphasis was initially on simple repairs to roads, but later broadened to include building youth centers and workshops. The final years of the NYA in the early 1940s were dedicated to national defense training in workshop settings.[121] Research did not attribute specific road or bridge construction projects to the NYA, but future investigations in subsequent project phases may reveal projects associated with the program.

[121] Houston A. Wright, *National Youth Administration for Oklahoma, Summary of Accomplishments* (Oklahoma City: 1936), 30; Kenneth E. Hendrickson, Jr., "Jobs for Students: The National Youth Administration in Oklahoma," *Hard Times in Oklahoma: The Depression Years,* ed. Kenneth E. Hendrickson, Jr. (Oklahoma City: Oklahoma Historical Society, 1983), 121-125.

5. Road-related Resources and Bridges, Engineering, and Aesthetics

Although the nation was deep in the Depression by the beginning of the subject period in 1933, road and bridge building was a direct financial beneficiary of government efforts to put Oklahomans back to work. Implementation of the federal emergency relief funding and New Deal programs kept the highway building boom of the 1920s alive through the 1930s. With the continued emphasis on road and bridge construction during the Depression era, the work completed on the state's road network during this time became one of the most important initiatives under the federal relief programs.[122]

To employ the greatest number of people possible, the OHC and the state highway department focused on developing projects that entailed labor-intensive, rather than machine-intensive, activities. After passage of NIRA in 1933, special provisions, entitled "Special Provisions for Highway Projects financed in whole or in part under Section 204 of the National Industrial Recovery Act," were promulgated for highway projects funded through the Act. The special provisions made clear the labor-intensive nature of the work by contractors on NIRA-funded projects, and particularly the intentional use of hand labor.[123] As a result, grading and drainage projects and bridge construction became some of the primary undertakings during this period. Projects also often included paving or roadway surfacing.[124] The document made clear that any contractor violating the provisions would be ineligible to bid on additional work funded by NIRA. These provisions for the intentional use of hand labor methods were also carried through to other New Deal programs.

The following Special Provisions, set forth in a subsection of, "Culverts and Masonry Structures and Small Bridges Up to 50-foot Span," exemplify the stipulations for hand-labor methods:

- "Cement and reinforcing steel shall be unloaded by hand labor methods."
- "Finishing of structural concrete surfaces shall be done by hand rubbing, or other hand labor methods."

Similarly, the following were found in the subsection for "Large Bridges":

- "All painting of steel work shall be done without the use of mechanical equipment."
- "Carpenter work and form work shall be done by hand labor methods and the use of mechanical saws will not be permitted at the bridge site. Electrical or mechanical drills shall not be used for boring holes in piles and forms at the bridge site."

[122] Burke, 46.

[123] Thomas H. MacDonald, "Special Provisions for Highway Projects Financed in Whole or in Part under Section 204 of The National Industrial Recovery Act," 29 June 1933, Folder 42, Box 8, Wilburn Cartwright, Carl Albert Congressional Research and Studies Center, Congressional Archives, University of Oklahoma, Norman, Okla.

[124] Corbett, 241; Biennial Report 1931-1932, 13.

The intense and total emphasis on hand labor, forbidding the use of electrical and mechanical equipment, was designed to maximize employment of as many individuals as possible and minimize the efficiencies achieved through mechanization. Taking more time and utilizing more labor was the goal, not accomplishing more work with fewer workers in a shorter time. It seems counterintuitive for a nation whose success was based on the industrial revolution with its time-saving mechanization, and it had unintended consequences. A 1938 article discussing "Some Effects of the WPA on the Engineering Profession," observed that "many first-rate public works contractors have gone out of business."[125] Because construction machinery was prohibited, machinery manufacturers suffered. In engineering, one effect was "to lower general standards of engineering by placing undue emphasis on its cost." Because the intent of the programs was to keep many employed, there was "little incentive for efficiency," and therefore little incentive for invention and innovation.[126]

At the end of the subject period in the early 1940s, the war effort limited the availability of construction materials, particularly steel. Wartime restrictions forced engineers and contractors to build with as little steel as possible, eliminating bridge construction except in cases of necessity.

This section begins with an overview of roadway design and construction during the Depression era, including incorporation of roadside improvements and landscaping into the transportation network. The remainder of the section focuses on bridges, including bridge-building trends during the subject period, use of standard plans, and aesthetics and the role of the New Deal programs in bridge construction.

A. Roads and road-related resources

As a result of the 1930s New Deal programs, federal funding increased for highway construction, which in turn increased the pace of construction. In the 1933-34 biennium, Oklahoma received $13.9 million in National Recovery Highway aid under NIRA. Of the total allotment, $6.4 million was expended on roadways that were part of the Federal Aid Highway System; $2.9 million was expended on highways not on the Federal Aid Highway System; and $2.7 was expended on municipal roadways.[127] These expenditures represent completion of the following work:

- 590,120 miles of grade and drainage
- 138,767 miles of concrete paving
- 5,446 miles of brick paving
- 80,082 miles of cold rolled asphalt

[125] Samuel M. Ellsworth, "Bargains in Engineering: Some Effects of the WPA on the Engineering Profession," *Civil Engineering* 8, no. 7 (July 1938), 442.

[126] Ellsworth, 441-442.

[127] Biennial Report 1933-1934, 180.

- 226,384 miles of gravel
- 18,441 miles of caliche surfacing[128],[129]

By the end of 1936 the Oklahoma State Highway System (U.S. and State Highways) had a total mileage of 8,446. Table 4 summarizes the mileage by road surface type:[130]

Table 4. Mileage of Oklahoma Roads by Surface Type, 1936

Road Surface Type	Mileage
Concrete; asphalt on concrete; brick	2,151
Asphaltic surface on gravel base	565
Treated gravel or earth	794
Untreated gravel	3,138
Improved earth	378
Unimproved earth	1,420

In 1936 a new federally-funded program, the Federal Aid Secondary Road System, and the Statewide Highway Planning Studies were implemented. The former added 4,600 miles of roadway to the work-relief projects being constructed in the state, whereas the latter was the first step in the state's preparations for a comprehensive highway improvement program. The Federal Highway Act of 1916 was amended in 1936 to authorize funds to be used for secondary or feeder roads, called the Federal Aid Secondary Road System. Secondary roads included farm-to-market roads, rural free delivery mail routes, and public bus routes.[131] Grants for projects on the secondary road system were funneled through the WPA. In general, WPA projects on the secondary road system included grading, drainage, and surfacing. According to the 1937-1938 Biennial Report of the OHC, oil mat or inverted emulsion surfacing, rock asphalt surfacing on gravel, rock or red bed base, and water bound macadam were the primary surfacing types used on WPA projects. All roadway work completed under the WPA program was performed under the Oklahoma Standard Specifications (discussed in more detail below) and incorporated the special provisions developed for work relief highway projects, particularly the stipulations for intentional use of hand labor.[132]

[128] According to Charles N. Gould, caliche is a soft secondary limestone that is formed by leaching of water carrying lime. In Oklahoma, caliche deposits are found in the Panhandle region. Use of caliche as a surfacing material on Oklahoma roads began in the late 1920s or early 1930s. The material is spread over the road in two layers. Each course is spread evenly, saturated with water to set it, and rolled to a smooth surface. In some instances, it is then covered by asphalt or other heavy oil to make the road more durable. Charles N. Gould, "Caliche – A Neglected Oklahoma Resource," *Proceedings of the Oklahoma Academy of Science for 1934*, http://digital.library.okstate.edu/OAS/oas_pdf/v15/p82_84.pdf (accessed 19 March 2012).

[129] Biennial Report 1933-1934, 17, 29.

[130] Biennial Report 1935-1936, 112.

[131] Burke, 62.

[132] Biennial Report 1937-1938, 53.

The Statewide Highway Planning Survey was a comparative study of highway building programs and consisted of three main phases: inventory, traffic, and financial. The survey was conducted by state departments of transportation in cooperation with the BPR to "develop facts and figures that will enable highway administrators, economists, and engineers to view the future correlated systems and to scientifically plan for achievement of systems of roads and streets that will best serve the transportation needs."[133] As outlined in OHC's 1939-1940 Biennial Report, the Statewide Highway Planning Survey revealed the following facts about Oklahoma's roadway network:

- The state highway system carries 52% of all traffic; county roads, 18.6%; and city streets, 29.4%.
- Rural residents contribute 37.3% of the total travel and city residents contribute 62.7%.
- There is more rural road mileage in the state than could ever be improved and maintained with road-user revenues.
- There are more than 101,000 miles of rural roads, of which 45,200 miles carry less than 10 vehicles per day.
- Only 11.6% of the total rural road mileage carries 100 or more vehicles per day, and this mileage serves 85% of the total travel in rural areas.
- The State Highway System, representing 8.4% of the total rural road mileage, serves 72% of the total travel in rural areas.[134]

Among others, these survey results indicated that a well-planned and coordinated system of secondary roads had not yet been achieved in Oklahoma by the mid-1930s. The survey also showed that the state highway department was needed to improve and maintain primary routes through and around cities and towns because municipalities could not take care of them to the desirable standards.[135] Despite only three years of work relief efforts, the work of the state highway department and that completed under the purview of the various work-relief programs, the state's roadway network needed improvement to accommodate the ever-increasing volume and speed of traffic.

As the 1930s came to a close, the OHC and the state highway department controlled 8,507 miles of U.S. and state highways. Representing a small increase over the total number of miles in 1936, the U.S. and state highway system had 3,027 miles of paved roads, 1,777 miles of roads that were oiled, 2,479 miles of untreated gravel roads, and 1,224 dirt roads.[136] Oklahoma's total federal apportionments, including

[133] Biennial Report 1937-1938, 106.

[134] Biennial Report 1939-1940, 15.

[135] Biennial Report 1939 -1940, 16.

[136] Burke, 63.

federal relief funding, for transportation projects began to decrease, from a total of $4.6 million in 1939 to $3.1 million in 1940.[137] During the 1939-1940 biennium, the OHC appropriated $1.4 million to sponsor or co-sponsor WPA projects. The appropriations were distributed as shown in Table 5.[138]

Table 5. OHC Appropriations During 1939-1940 Biennium

Type of road	Appropriation
Improvements to the state system	$928,397
Farm-to-market roads not on state system	$354,439
Improvements within city or town limits	$160,585

After the U.S. became involved in World War II, road construction activities in general stopped, with the exception of roads needed for military purposes. For national security, the War Department and Public Roads Administration identified a system of roads known as the Strategic Network of Highways to access military bases, defense manufacturing plants, and other strategic sites. The Defense Highway Act of 1941 further restricted the activities of state highway departments. As a result, the focus of roadway construction quickly began to shift away from projects associated with work relief programs to those associated with the Defense Highway Act, such as an access road constructed to the Tulsa bomber plant.

In the 1941-1942 biennium, the OHC sponsored approximately $1.8 million in WPA projects.[139] However, when the U.S. entered World War II, the focus quickly shifted from work-relief programs to funding the war efforts, and all federal projects associated with one of the New Deal programs not already under construction were cancelled as of December 2, 1941. This effectively ended work-relief construction in Oklahoma. Although research did not reveal the status of the state's entire roadway network by 1941, OHC's 1943-1944 Biennial Report indicates that as of January 1, 1942, Oklahoma's rural primary state highway system had a total of 8,626 miles. The surface types for those roads are shown in Table 6.[140]

Table 6. Surface Types for Oklahoma's Primary State Highway System as of January 1, 1942

Surface type	Mileage	Percentage of Total Mileage
Paved roads (concrete, brick, or other types of surfaces)	3,140	36.4%
Surfaced roads (bituminous, gravel or stone, or soil)	4,772	55.32%
Unsurfaced roads	714	8.28%

While roadway statistics indicate that only 179 miles were added to the state's highway system in the six-year period between 1936 and 1942, there was a much higher number of miles on the state system (more than 1,000 miles) of formerly earthen roads paved or surfaced during the period. In addition, a

[137] Biennial Report 1939-1940, 156.

[138] Biennial Report 1939 -1940, 110.

[139] Biennial Report 1941-1942, 98.

[140] Biennial Report 1943-1944, 50.

substantial number of miles of secondary roads were also upgraded and surfaced during the subject period. This illustrates the emphasis during the period the New Deal programs had in Oklahoma on upgrading the existing roadways across the state. Almost without exception, every county and municipality that had a federal relief project of any kind, and especially WPA projects, had a road improvement project (for counties) or a street improvement project (for municipalities). An exception to the general rule was a farm-to-market road "improvement" in Blaine County, which was "to grade a new road" on "a new right of way…to be surveyed and purchased" before work could begin. It was not uncommon for a county to have projects totaling 100 or more miles of roads (often farm-to-market roads) graded, drained, and finished with gravel, shale, clay, or caliche, with gravel being the most common. Mayes County reported 170 miles of road graded and drained, with local materials—sandstone and limestone—used for surfacing and for bridge and culvert construction. Caddo County completed 265 miles of road.[141] Towns and cities completed similar projects for dozens of blocks of local streets. In a few circumstances, cities paved several blocks with bituminous ("black top") or concrete, both of which, but especially concrete, were considered far superior to the other materials. City projects occasionally included sidewalks and curbs as well. Hartshorne reported that "the largest project carried on under this program [WPA] giving the most men employment has been a curb and gutter project…"[142]

(1) Roadway design standards and specifications

In the first part of the 1930s, the state highway department's Engineering Division had the principal role in all road construction projects. The Assistant State Engineer, under direct supervision of the State Engineer, supervised preparation of plans and specifications, preparation of bidding notices, tabulation of bids, and general operation of the Engineering Division divided into six departments: Construction, Bridge, Maintenance, Locating, Right-of-Way, and Drafting.[143]

During the 1931-1932 biennium, the state highway department revised the Oklahoma Standard Road and Bridge Specifications to "keep abreast of the best current practice." A standard 20-foot roadway width with eight-foot earthen shoulders on each side was adopted for two-lane highways. The standard right-of-way for state highways was also increased from 80 to 100 feet.[144]

To supplement the state's specifications, special provisions developed in 1933 for highway projects financed in whole or in part under NIRA were incorporated into construction projects. Of particular concern to roadway construction were the special provisions requiring the use of hand labor methods on projects. Hand labor methods were required for a variety of construction activities, including grubbing and clearing, grading, digging trenches for piping, loading and unloading construction materials, and roadside production of gravel and stone.[145]

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[141] Appraisal report for Blaine County, Mayes County, and Caddo County, CIAR.

[142] Appraisal report for City of Hartshoren, CIAR.

[143] Biennial Report 1931-1932, 37.

[144] Biennial Report 1931-1932, 37; Burke, 46.

[145] MacDonald, 7-10.

The state highway department's organizational structure was maintained until 1936, when the Engineering Division was reorganized "with the idea of obtaining closer supervision and more efficient operation." Under the new organizational structure, a Department of Design was established to coordinate preliminary field work, survey information, and preparation of final plans in order to eliminate the necessity of plan changes after contract award.[146]

It was the Department of Design's duty to determine design standards, classification of roadways, the proper design for such classifications, and to check the plans after their completion and before submission to the BPR. After the department was established in 1936, a new specification was written and a revision to the same was completed and was awaiting publication by the end of 1938.[147]

In at least one documented instance, a county-sponsored WPA project upgraded a county road to state specifications and then turned the road over to the state. The case was described in the 1938 Community Improvement Appraisal Report for Haskell County in eastern Oklahoma: "One of the outstanding improvements in our county has been the construction of what is now Oklahoma State Highway No. 26. Before WPA started, this was just an ordinary narrow earth county road. Now it is a standard grade and drainage highway. This road was constructed and surfaced by the county and WPA and has been turned over to the State for maintenance."[148]

(2) Roadside improvements and landscaping

By the mid-1930s, increased attention was being paid to improving the "sightliness and utility along the entire state highway system."[149] NIRA and other federal funding required that a minimum of 0.5 to 1 percent be applied to landscaping and other roadside improvements. The OHC and state highway department adopted policies to incorporate safety features and roadside amenities into new construction projects and to upgrade older roads. Roadside improvement projects ranged from erosion control measures and safety improvements to roadside plantings and parks. A review of Road Life Study-Construction Project Log Records (also known as "long cards") from the period indicates that roadside improvements were primarily included with WPA- or NIRA-funded projects.

To facilitate erosion control, ditch checks, typically constructed of masonry or concrete, were installed in ditches to reduce the velocity of water flow in the channels. Flattening and rounding ditch slopes, as well as seeding and sodding newly graded sections, also facilitated erosion control. In the 1939-1940 biennium, 6,559 trees and shrubs, 804,815 square yards of Bermuda grass, and 1,635,920 square yards of various leguminous and mixed native grass seed were planted.[150] In addition to incorporating roadside

[146] Biennial Report 1935-1936, 9.

[147] Biennial Report 1937-1938, 92.

[148] Appraisal report for Haskell County, CIAR.

[149] Biennial Report 1937-1938, 99.

[150] Biennial Report 1939-1940, 145.

plantings into construction projects to improve "sightliness," the state highway department adopted a policy to allow more trees to be retained than previously allowed.[151]

Roadside parks developed by the state highway department along U.S. and state highways provided respite for travelers. Roadside parks were constructed with funding from the NIRA, as well as non-work relief program funding sources.[152] Fixtures within the roadside parks included tables with benches, fireplaces or ovens, and trash receptacles. Stairs, retaining walls, and wrought-iron chain guard rail were incorporated as needed to address site conditions and safety considerations. The state highway department developed standard plans, dated 1937 and 1940, for roadside park fixtures that provided flexibility in the construction materials to be used. The plans featured tables constructed of masonry, concrete, or wood; fireplaces or ovens in masonry and concrete; and trash receptacles detailed in masonry.[153]

B. Bridges and culverts

Bridges serve as critical links in road networks on state and county road systems, providing crossings over waterways and grade separations over railroad tracks and highways. As road systems were upgraded, constructed, and expanded, bridges were built, reconstructed, or replaced to complete the networks. Design and construction practices established by the end of the 1920s were continued during the Depression era, and little change in innovation or technological improvements was evident.

As the subject period opened in 1933, however, the OHC and the state highway department had just completed a biennium in which it reported that, after road paving, grading, and drainage, "the next most important progress of the past two years has been in bridge construction." According to the OHC's biennial report issued in 1932, 368 bridges had been contracted that year on the state system.[154] Annual bridge construction on the state system would never again reach half that total until the years after World War II (see Table 7). In fact, the annual number of contracts would only come close to half in 1936, when contracts were let for 149 bridges. Construction bottomed out in 1940, with 52 contracts, and in the 1943-44 biennium, with a two-year total of only 65 contracts.

[151] Biennial Report 1937-1938, 99.

[152] Oklahoma Department of Transportation, "Statewide Highway Planning Survey Road Life Study, Construction Project Log Records," Oklahoma Department of Transportation Planning and Research Division.

[153] Biennial Report 1937-1938, 99; Oklahoma Department of Transportation, "Details of Trash Receptacle, Park Table & Fireplace, 1937, Oklahoma Department of Transportation Collection of Obsolete Standards; Oklahoma Department of Transportation, "Details of Roadside Park Fixtures, dated 17 August 1937; Roadside Park Fixtures," 1940, Oklahoma Department of Transportation Collection of Obsolete Standards.

[154] Biennial Report 1932-32, 39; grade-separation structures listed separately in OHC tables.

Table 7 provides statistics on bridges built annually in Oklahoma on both state and county systems from 1933 through 1945. The statistics are compiled from the 2012 ODOT database, which includes numbers of bridges remaining in service in 2012 and the number of bridges that have been replaced by 2012.[155]

Table 8 provides statistics on bridges built annually (biennially in two cases) on the state system only, not including county bridges. The statistics are compiled from the OHC biennial reports, which provide separate numbers for bridges and for grade separation structures (now considered to be bridges). In this table, the total number of bridges for each year combines bridges with grade separation structures. In most cases, the biennial reports also included separate numbers for grade separation overpasses and underpasses. Where available, these numbers are included in the table.

These tables provide two perspectives on bridges built in Oklahoma from 1933 through 1945, one perspective from 2012 and one perspective from contemporary official documents. The basic difference between the two sets of data is extent of coverage. The 2012 data include both state and county bridges—essentially all bridges built in the state for each year. The historical data include only bridges built on the state system as compiled from OHC biennial reports. Because the historical data also include specific information on grade-separation structures, the information is relevant for the discussion of grade separations below.

Table 7. Bridges Contracted/constructed in Oklahoma 1933-1945, Compiled from ODOT 2012 database.

Year	2012 ODOT Summary data Bridges built 1933-1945 on state and county systems combined.		
	Total	**In-service**	**Replaced**
1933	267	203	64
1934	158	116	42
1935	371	231	140
1936	443	352	91
1937	471	391	80
1938	1065	875	190
1939	751	613	138
1940	2196	1350	846

[155] The 2012 ODOT data in Table 7 indicates that bridge construction experienced a large and unexplained surge in 1938, 1939, and especially in 1940. One explanation might be in the increasing OHC and the state highway department concerns with bridge widths and the campaign during the 1930s to replace older bridges with narrow decks (see discussion in section on bridge-deck width below). Bridges identified with year-built dates during this time period that have roadways of 22 feet or more may turn out to be rebuilt or widened and not new construction, accounting for part of the very large increase in numbers of bridges with year-built dates of 1938, 1939, and 1940. Further research may provide additional information to explain the much higher numbers of bridges built in each of the three years.

Table 7. Bridges Contracted/constructed in Oklahoma 1933-1945, Compiled from ODOT 2012 database.

Year	2012 ODOT Summary data Bridges built 1933-1945 on state and county systems combined.		
1941	294	236	58
1942	171	121	50
1943	70	58	12
1944	46	33	13
1945	231	147	84
Total	**6534**	**4726**	**1808**

Table 8. Bridges on state system contracted/constructed in Oklahoma 1933-1946, Compiled from OHC biennial reports

Year	Biennial Report Data 1933-1945 State System Bridges			
	Bridge contracts	Grade separation contracts		
		Overpass + Underpass	Overpass	Underpass
1933[156]	132	2	1	1
1934[157]	134	7	Not available	Not available
1935[158]	94	20	16	4
1936[159]	149	38	25	13
1937[160]	121	17	13	4
1938[161]	98	0	0	0
1939[162]	82	5	1	4

[156] Biennial Report 1933-34, 17 (includes both bridges and grade separation structures, overpasses and underpasses.)

[157] Biennial Report 1933-34, 29 (includes both bridges and grade separation structures; grade separation number combines overpasses and underpasses.)

[158] Biennial Report 1935-36, 30 (includes both bridges and grade separation structures, overpasses and underpasses.)

[159] Biennial Report 1935-36, 46 (includes both bridges and grade separation structures, overpasses and underpasses.)

[160] Biennial Report 1937-39, compiled from Table of State Highway Construction and Special Maintenance Projects (1937-1938), 12-43 (table includes fractional numbers of bridges, e.g. ½ and ¾, which have been rounded up in the compilation).

[161] Biennial Report 1937-39, compiled from Table of State Highway Construction and Special Maintenance Projects (1937-1938), 12-43 (table includes fractional numbers of bridges, e.g. ½ and ¾, which have been rounded up in the compilation.)

[162] Biennial Report 1939-40, compiled from Table of State Highway Construction and Special Maintenance Projects (1938-40), 47-82 (table includes fractional numbers of bridges, e.g. ½ and ¾, which have been rounded up in the compilation.)

Table 8. Bridges on state system contracted/constructed in Oklahoma 1933-1946, Compiled from OHC biennial reports

Year	Biennial Report Data 1933-1945 State System Bridges			
	Bridge contracts	Grade separation contracts		
1940[163]	52	7	4	3
1941[164] 1942	129	10	Not available	Not available
1943[165] 1944	65	0	0	0
1945[166] 1946	145	2	Not available	Not available
Total	**1201**	**108**		

Note: Biennial reports included separate statistics for bridge contracts and grade-separation contracts, although both should be combined to establish the total number of bridge contracts for a specific year. In some years, the biennial reports also included separate statistics for overpasses and underpasses.

(1) Oklahoma bridge materials and types

(a) Bridge materials and types – national perspective

Bridge materials and types used in Oklahoma in the 1930s and early 1940s reflected the materials and types used nationally during the same period. The primary materials of stone, steel, concrete, and wood were established since the beginning of the automobile era. The designs for bridges utilizing these materials were developed and largely standardized for highway service by the end of the 1920s. Smaller span types in particular were well established, with more specialized engineering used for larger- and longer-span bridges.

Reinforced concrete, introduced nationally at the very end of the nineteenth century, had expanded dramatically in use from the arch form of the early years to include slab spans, beam and girder spans,

[163] Biennial Report 1939-40, compiled from Table of State Highway Construction and Special Maintenance Projects (1938-40), 47-82 (table includes fractional numbers of bridges, e.g. ½ and ¾, which have been rounded up in the compilation.)

[164] Biennial Report 1940-42, 91-92; this biennial report provides 1941-42 summary numbers only for bridges and grade separations, without individual annual totals 1941 and 1942 and without individual totals for overpasses and underpasses.

[165] Biennial Report 1942-44, 98-99; this biennial report provides 1943-44 summary numbers only for bridges, without individual annual totals for 1943 and 1944; no contracts were awarded for grade separation structures.

[166] Biennial Report 1944-46, 81-83; this biennial report provides 1945-46 summary numbers only, without individual annual totals for 1945 and 1946, meaning that some contracts were awarded in 1946 and outside the subject period. In addition, this report provides subtotals for "regular federal aid" (84), "war emergency relief construction" (7), "federal aid secondary" (37), and "state aid" (37).

and the integrated beam and slab design later known as the T-beam, which largely replaced the concrete beam. By the 1930s reinforced-concrete had become the material of choice for state and local highway departments.[167]

Steel was used nationwide for road and highway bridges after it replaced iron after 1890, often for truss bridges. Until the mid-1920s, the Pratt truss was the preferred type, but the more economical Warren truss had superseded the Pratt by the 1930s. Moreover, simpler steel beam spans, along with concrete slab and T-beams, were replacing truss bridges generally for shorter crossings. Steel trusses continued to be used for larger and longer bridges, but in more sophisticated truss designs, such as variations like Parker trusses and the K-truss in Oklahoma. Riveting plates into large girders allowed an additional use of steel for longer girder spans.[168]

The remaining two materials, stone and wood or timber, are venerable bridge construction staples with long histories. By the 1930s, stone masonry was supplanted by all other types with the significant exception of its use for federal-relief projects. In those cases, its major limitations—cost and inefficient use of labor—now became advantages, as programs required bridge projects to incorporate as much hand labor as possible, with cost being less of a concern if it created more work for the unemployed. For selected New Deal era projects, the aesthetic qualities of stone masonry also received new attention as interest increased in rustic architectural styles for parks and scenic road corridors.[169]

If stone masonry usage declined nationally because of cost and labor, timber usage was much the opposite. Timber was an inexpensive, locally available material that was relatively simple for use by less-experienced construction crews. As such, timber, especially when used in timber beam or stringer spans, was widely employed by counties and townships for small bridges on rural roads. Similar to stone, timber also became a desired bridge material where rustic architecture was desired in parks and scenic areas.[170]

(b) Bridge materials and types in Oklahoma

Two sources (1937 tables and 2012 ODOT database) were used to compile an overview of bridge types and materials in Oklahoma for the period of 1933-1945. The historical 1937 data and the recent 2012 data can be sorted into comparable categories of main-span type and main-span material so the two data sets can be compared to understand trends in Oklahoma bridge-building in the subject period.[171] Although both

[167] Parsons Brinckerhoff and Engineering and Industrial Heritage, *A Context for Common Historic Bridge Types, NCHRP Project 25-25, Task 15* ([Washington, D.C.]: National Cooperative Highway Research Program, Transportation Research Board, 2005), 2-26 – 2-27.

[168] Parsons Brinckerhoff and Engineering and Industrial Heritage, 2-27, 2-28.

[169] Parsons Brinckerhoff and Engineering and Industrial Heritage, 2-29, 3-48, 3-50.

[170] Parsons Brinckerhoff and Engineering and Industrial Heritage, 3-80, 3-81

[171] The sources include (1) a pair of 1937 tables presenting data on bridge materials and types for the state and county systems and (2) relevant data for the period 1930-1945 as extracted from the 2012 ODOT database of bridges in Oklahoma.

data sets include bridges statewide, each data set has its own limitations.[172] These limitations are incorporated into the discussions of bridge materials and types that follow Tables 9 and 10 below.[173]

The most important information provided in Tables 9 and 10 is the percentage or proportional distribution of bridges among types and materials. The percentages of bridge materials and types compared to the total populations in each data set provide approximate estimates of commonly used types and less-commonly used types. The types listed below as common are the types with the highest percentages of structures. In addition, the 1937 data provide an insight into differences between bridges built for the state system and bridges built by counties.

Table 9. 2012 Data: Proportional Distribution of Bridges by Main Span Type and Material (common types in bold)

Main span type	Material	2012 Data[174]			
		Extant + replaced		Extant	Replaced
		Total	Percent of total	Number	Number
Truss	**Steel**	**521**	**8.4**	**237**	**284**
	Concrete				
	Timber				
Girder, beam	**Steel**	**2507**	**40.5**	**1550**	**957**
	Concrete	176	2.8	151	25
	Timber	**1098**	**17.7**	**471**	**627**
T-beam	Concrete	45	-	32	13
Slab	**Concrete**	**1754**	**28.3**	**1532**	**222**
Arch	Concrete	77	1.2	52	25
	Stone masonry	13	-	7	6
Suspension	Steel[175]				
Canti-lever	Concrete[176]				
		6191		**4032**	**2159**

[172] The 1937 data includes all bridges extant in the state at that time, but provides no way to separate bridges by year-built. The 2012 data does include year-built, so the information presented is only for bridges constructed between 1930 and 1945. However, the 2012 data does not differentiate between original owner and system, whether state or county.

[173] The 2012 database includes both extant, in-service bridges as of 2012 and bridges that have been replaced. No background information is available regarding the list of replaced bridges and when the list was begun, so the actual number of bridges replaced for any particular year-built may be larger than the number provided by the 2012 database.

[174] Data compiled from ODOT database provided to Mead & Hunt, Inc., 2012.

[175] The 2012 ODOT database does not include a category for suspension bridges, although this category is used in the 1937 tables.

[176] The 2012 ODOT database does not include a category for concrete cantilever bridges, although this category is used in the 1937 tables.

Table 10. 1937 Data: Proportional Distribution of Bridges by Main Span Type and Material (common types in bold)

Main span type	Material	1937 Data[177]					
		State + county		State		County	
		Total	Percent of total	Number	Percent of state	Number	Percent of county
Truss	**Steel**	**4058**	**21.3**	**584**	**20.2**	**3474**	**21.6**
	Concrete	5	-	2	-	3	-
	Timber	226	1.1	1	-	225	1.3
Girder, beam	**Steel**	**4931**	**25.9**	**839**	**29.0**	**4092**	**25.4**
	Concrete[178]	0	-	0	-	0	-
	Timber	**7554**	**39.8**	**190**	**6.5**	**7364**	**45.7**
T-beam	Concrete	355	1.8	131	4.5	224	1.3
Slab	**Concrete**	**1583**	**8.3**	**1076**	**37.3**	**507**	**3.1**
Arch	Concrete	181	-	42	1.4	139	-
	Stone masonry	28	-	7	-	21	-
Suspension	Steel	33	-	1	-	32	-
Canti-lever	Concrete	12	-	11	-	1	-
TOTAL		**18966**		**2884**		**16082**	

Based on the data in Tables 9 and 10, the bridge types and materials can be separated into common and less common categories, based on proportional representation represented by percentages of total populations. Each type is described in more detail below.

Common types

Overall, the types and materials most efficient for short spans account for over 85% of all bridges originally constructed: steel and timber beam/girder bridges and concrete slab bridges.

[177] The data presented here labeled 1937 were compiled from Table 7 (page 18) and Table 14 (page 26) in Oklahoma State Highway Commission, *Oklahoma Highway Studies 1936-1942: A Report of the State-Wide Planning Survey, Oklahoma State Highway Commission in Cooperation with the Federal Works Agency, Public Roads Administration* (Oklahoma City: Oklahoma State Highway Commission, N.d.). Table 7 presents data for state system bridges and Table 14 presents data for county system bridges. Both tables are dated January 1, 1937, and together are considered to represent the extant bridge population in Oklahoma as of 1936. The data in Table 7 had previously been published in the 1939-40 Biennial Report. Because the two tables present data on bridges in the two highway systems in Oklahoma (state and county systems), but lack any identification of year of construction, the tables serve as a snapshot in time (c.1936) of extant bridges and, specifically, as a guide to the distribution of bridges among types and materials. In other words, the data provide a general idea of the major types of bridges in service at the early/midpoint of the subject period, regardless of when they were constructed.

[178] The 1937 tables do not include a category for concrete beam or girder bridges other than concrete T-beam bridges, which are termed integral beam and slab bridges.

- Steel beam and girder. The most common and widespread bridge type built were steel beam or girder bridges, accounting for 41% or almost half of the bridges constructed during the subject period, according to 2012 data. This type was used for a variety of small or short-span crossings. Understanding that the use of steel declined to almost zero after 1941, the steel beam bridges likely dated from the beginning of the subject period to about 1941. Steel beam and girder designs accounted for approximately one-quarter of all bridges extant in 1937. However, there were almost five times more county steel-beam bridges than state examples, or about 4,000 compared to 800. The difference in percentage between 1937 and 2012 represents the greater numbers of other bridge types extant in the mid-1930s, such as steel truss bridges, making the numbers of steel-beam bridges appear proportionally less.

- Concrete slab. The next most common type after steel beam or girder was the concrete slab bridge with 28%, according to 2012 data. This extremely simple bridge type was used for the shortest spans. Concrete slab bridges were built throughout the 1930s, but declined in the 1940s when fewer bridges were built generally and reinforcing steel was in limited supply. In 1937 concrete slab bridges overall represented a relatively small percentage (8%) of the state's total bridge population. However, the state system had proportionally far more than the counties—37% to only 3%—in comparison to other main-span types. The explanation may be that concrete-slab bridges are more expensive solutions for short spans than the timber-beam bridges favored by the counties (as is evident in the next category), and counties typically had less money available per bridge than the state.

- Timber beam. The 2012 data indicate total construction of over 1,000 timber bridges, 18% of the population during the subject period. Although this represents a large number of bridges, it is relatively modest compared to the number that existed in 1937. The number of timber beam bridges extant in 2012 (less than 500) is an indication of the short lives of timber structures compared to concrete and steel. The 1937 data make clear that the counties used timber-beam spans for almost half (46%) of their extant bridges, while the state used timber-beam spans for only 7%. In real numbers, the counties' timber-beam population of 7,364 was almost double the next most common type. As with concrete-slab bridges, the counties built more of the less-expensive timber spans and fewer of the more costly concrete spans.

Less common types

The remaining bridges, representing less than 15% of the as-built total in 2012, are comprised of materials and types that were used for longer spans or for particular situations: steel truss, concrete beam, arch, T-beam, and stone masonry.

- Steel truss. The modest number of steel truss spans built in the subject period (521 according to the 2012 database) reflects the 1930's decline in steel truss bridge construction for shorter spans with the increase of the common types discussed above. Anecdotal information provided by the bridge photographs published in the biennial reports and the standard plans indicates that steel truss bridges constructed in the subject period were primarily Parker and K-truss spans, truss

types typically used for longer spans.[179] Within the standard plan sets, truss designs are the only plans provided for spans beyond 80 feet. The biennial report photographs also indicate that Parker or K through-truss main spans often had Parker pony trusses for approach spans. In 1937 steel truss spans were very common statewide, representing 21% of all extant bridges, divided equally (as a proportion of the population) between the state and counties. Comparing the 1937 and 2012 data, however, supports the interpretation that fewer truss bridges were being built in the 1930s-40s than previously, but those built were larger and intended for longer spans. Because the 1937 data represent all bridges extant, the numbers include many earlier trusses used for small crossings that would be replaced with steel or concrete beams and girders in the 1930s and later.

- Concrete beam and girder. The small number (only 3%) of concrete beam and girder bridges built in the subject period according to the 2012 data likely reflects the widespread use of steel beam and concrete slab types for small spans. This category of span type/material is not even included in the 1937 data, and therefore has no examples.

- Concrete arch. Arch bridges were among the earliest bridge types to use concrete as a bridge material and were built nationally from the early twentieth century through the World War II years and after. They might be found in almost any situation, on the state system or off, but in relatively small numbers. Concrete arch bridges were sometimes used where aesthetic treatments were desired because the arch form lends itself to more architectural treatment. The proportion of concrete arches as part of the overall population is small in both data sets, representing 1.2% in the 2012 data and less than 1% in the 1937 data set.

- Concrete T-beam. T-beam spans, or "integral slab and beam" bridges as they were termed in the 1937 tables, comprise less than 1% of the 2012 data. Generally, T-beam concrete bridge usage parallels concrete slab bridge construction, but is used for slightly longer spans.[180] Like concrete slab spans, T-beam bridges were constructed throughout the subject period until the 1940s, when reinforcing steel was not available. A T-beam bridge would require more complex formwork than a concrete slab or beam bridge, therefore raising the cost, and would likely be used only when the simpler slab or beam bridge would not provide the required span length or load-carrying capacity. While the representation in the 1937 population is small, the concrete T-beam was used much more by the state than by the counties, probably reflecting cost.

- Stone masonry. Stone masonry bridges represent less than 1% in the 2012 and 1937 tables. The relatively small number might reflect an era dominated by inexpensive concrete and steel beam spans. This observation seems to contradict the impression that federal relief programs

[179] See "Parker Truss" in Parsons Brinckerhoff and Engineering and Industrial Heritage, 3-34, which states that "The form was adopted by highway departments as standard designs for pony trusses (30 to 60 feet) and through trusses (100 to 300 feet)."

[180] Parsons Brinckerhoff and Engineering and Industrial Heritage, 3-88.

promoted labor-intensive projects and, among bridges, stone masonry would be the most labor-intensive. Many bridges appearing to be stone construction are actually stone veneer on a concrete superstructure and therefore may not be categorized in a database as stone masonry bridges.[181] A similar situation arises with a type of concrete slab carried on stone masonry piers and abutments, which is depicted in a biennial report photograph from 1935-36 and is featured as an example of a "masonry and concrete bridge construction" as a NRWR drought-relief project.[182]

- Other bridge types. The 1937 tables separately categorize a small number of bridges as steel suspension type, almost all in counties, and concrete cantilever type, almost all on the state system. Discussions in biennial reports suggest that the state was working in the 1930s to eliminate the suspension bridges, which were largely built in earlier years as toll bridges at major river crossings. Research to date has revealed little about the concrete cantilever bridges, although standard plan sheets exist for concrete cantilever designs from 1920 and 1921 suggesting that the 12 examples extant in 1937 were built prior to the subject period.

  The use of the rigid-frame design is currently unknown in Oklahoma, but was a type used nationally during the subject period for grade-separation situations. No direct references have been found for rigid-frame bridges in the biennial reports, but the photograph of an Oklahoma City grade-separation underpass in the 1937-38 biennial report is subsequently identified in *Oklahoma Highway Studies 1936-1942* as a rigid-frame concrete structure.[183] The 2012 database includes no bridges coded as rigid-frame types, either concrete or steel.[184] Further investigation may result in additional information on the design and construction of rigid-frame concrete bridges in the subject period, particularly for grade separation situations.

(2) Bridge design and construction practice

For OHC and the state highway department, the 1930s were characterized largely by a continuation of design practices established at the end of the 1920s and early years of the Depression. Two major work relief programs involved with bridge construction during the subject period, the CCC and WPA, also followed this general trend. By the beginning of the subject period, the state highway department had established a "complete series of standard superstructure plans ranging in length from ten (10) to two hundred and ten (210) feet. For the shorter spans the designs call for concrete slabs, concrete girders or

[181] This detail is supported anecdotally by a review of National Register Nomination forms for Oklahoma state parks, which identify concrete bridges with stone veneer, built by federal relief programs such as CCC and WPA. For example, see Gabbert, *Wintersmith Park Historic District*.

[182] See photograph in Biennial Report 1935-36, 125.

[183] Biennial Report 1937-38, photograph of Oklahoma Railway underpass on north Western Avenue, Oklahoma City, Project No. WPGS-511-A, 141; see rigid frame type confirmed in caption of photo of the same bridge in Oklahoma State Highway Commission, *Oklahoma Highway Studies 1936-1942*, 6.

[184] See "Reinforced Concrete Rigid Frames," in Parsons Brinckerhoff and Engineering and Industrial Heritage, 3-96-98. The Oklahoma City example is considered nonextant.

I-beams, and for the longer spans, steel trusses. The state has never attempted to standardize the sub-structure plans…"[185]

After 1933, design and construction practices showed little change in terms of innovation or technological improvement. Bridges continued to be built, but design and construction followed established practices with no notable technological innovations.[186]

(a) Bridges and the CCC

Although the CCC is reported to have constructed 668 bridges of all types in Oklahoma from 1933 to 1940, bridges were not a major priority and typically were built as a necessary part of a larger project.[187] Typical large projects that might have included bridges were road construction and park construction. A study of OHC biennial reports for the subject period reveals no references to bridge construction by the CCC, suggesting that CCC bridge construction was not necessarily connected with the state highway department's bridge design and construction activities.

The fact that bridges were constructed by the CCC in Oklahoma state parks is well-documented in the 1993 report on "Intensive-level Survey of New Deal-Era State Parks in Oklahoma," as well as numerous National Register Nomination forms for particular state parks. The understanding of bridge design and construction as they relate to CCC policies, standards, or specifications, is very limited. The same parks also were the subject of activity by the WPA, which sometimes completed bridges started by the CCC or altered existing CCC bridges.[188]

For example, at Wintersmith Park six bridges were built in 1933-34 by the CCC and three were built in 1939-40 by the WPA. Bridge types in the CCC group include: concrete slab, wood plank, concrete culverts (both arch and box designs), and concrete arch bridges with stone veneer or facing. The WPA bridges are concrete slabs. The National Register Nomination for Wintersmith Park notes:

[185] Biennial Report 1929-30, 52; by 1934, standard plans for trusses included spans up to 300 feet.

[186] The OHC biennial reports of 1933-34 and 1935-36, in contrast to reports before and after, include no narrative discussion of bridge design and construction at all, suggesting that there was little of qualitative technical change in the early Depression years.

[187] McEntee.

[188] See "Final Survey Report, Intensive-Level Survey of New Deal-Era State Parks in Oklahoma," prepared by Oklahoma State Historic Preservation Office, June 1993; See also Neysa Clark, *Lake Murray State Park* (Washington, D.C.: National Register of Historic Places, National Park Service, 12 February 1995); Cynthia Savage, *Norman City Park New Deal Resources* (Washington, D.C.: National Register of Historic Places, National Park Service, 28 December 2000); Neysa Clark, *Robbers Cave State Park*, (Washington, D.C.: National Register of Historic Places, National Park Service, February 1996, updated August 2002).

> The trail and the bridges and all structures built in the park were to follow the design guidelines of the National Park Service. The design ethic of the Park Service created a style of construction and architecture that would later be called "National Park Service Rustic." The various projects at Wintersmith Park closely followed this design ethic, modified slightly to address the needs of a small, metropolitan park.[189]

(b) WPA involvement with state, county, and municipal sponsors

In Oklahoma the WPA built 2,712 bridges and viaducts between 1936 and 1943 in a variety of types. The specific needs of each location, availability of materials, and quantity and quality of local labor all contributed to bridge design, planning, and execution. For example, when the WPA was tasked with constructing a new bridge over a particularly wide expanse of the Cimarron River with shifting sands, the conditions called for a wooden structure on steel piles. In other cases, such as when streams were encountered along farm-to-market roads, bridges with simple steel superstructures were the selected type. When a rock quarry was in the vicinity of a stream to be bridged, masonry construction became an option.[190] Altogether, two-thirds of the bridges built by the WPA in Oklahoma were of wood, which was consistent with the national percentage. In the later years of the WPA program, timber and masonry were predominantly used in an effort to conserve steel needed for defense projects during World War II.[191]

Although the WPA in Oklahoma reported constructing 2,712 bridges and viaducts, the information in the OHC biennial reports, discussing state projects, suggests the construction of a much smaller number of bridges by the WPA at the state level. The WPA activities in 1936, for example, involved state sponsorship of “many W.P.A. projects on State Highways and a few on Federal Highways and on Farm to Market roads.” According to the biennial report, “The major portion of the projects were Grade, Drainage Structures and Gravel Surface constructions. A few bridges were constructed.” [192]

A similar statement applied to WPA work with the state highway department in 1939-40, with the biennial report noting that projects both on the state highway system and on farm-to-market roads not on the state system included “the construction of drainage structures including large multiple concrete boxes and a few I-beam bridges…”[193] The 1941-42 biennial report included a reference to projects on the same road systems, but did not mention bridges at all.[194] A review of the table of all state-system contracts for 1938-40 reveals only seven bridges that are part of WPA contracts and WPA construction forces. If WPA-

[189] Gabbert, *Wintersmith Park Historic District*.

[190] Key, 26; Marjorie Barton, *Leaning on a Legacy: The WPA in Oklahoma* (Oklahoma Heritage Association, 2008), 49-52.

[191] Barton, 52.

[192] WPA activities in 1936 are discussed in Biennial Report 1937-38, 53.

[193] Biennial Report 1939-40, 110.

[194] Biennial Report 1941-42, 98.

related grade-separation contracts are included, a few more bridges can be added to the total.[195] A year or two earlier the official publication *Accomplishments: Works Progress Administration for Oklahoma* (for the period 1935-1937), in discussing substantial WPA bridge projects, stated, "scores of such [bridges with steel superstructures] were constructed by Works Progress Administration crews."[196] As noted by Joseph King in the 1993 *Spans of Time: Oklahoma Historic Highway Bridges*, "When bridge projects had WPA support they usually involved repairs and renovations, but the agency also provided funds for dismantling and moving trusses, constructing small concrete slab and girder spans, or installing masonry arches in recreational areas."[197]

A review of the individual county and municipal reports submitted for the 1938 CIAR indicates that the majority of the WPA bridges, viaducts, and culverts were constructed as parts of local projects. Except for a few individual bridges, almost all the local WPA bridges were incorporated into road projects, usually for counties but also for municipalities. There were more bridges and culverts built on county roads because those roads were built for longer segments, often over more irregular terrain that required a variety of structures for drainage, from small culverts to longer-span bridges. City street projects, which usually involved grading and paving existing city blocks, were less likely to require larger bridges for drainage.

If described in reports at all, local bridges were roughly classified by material, such as concrete (sometimes reinforced-concrete), stone, I-beam, and timber or wood, with the quantity of each type listed. For example, the report for WPA farm-to-market road construction in Woods County lists five 80-foot trusses, a 40-foot reinforced-concrete bridge, and 10 reinforced-concrete bridges on concrete piles. Culverts were considered as important as bridges in the reports, since both bridges and culverts were used as necessary to provide drainage in the construction of all-weather roads. Most county descriptions were more like that of Kay County, which simply listed 15 new bridges, 37 concrete culverts, and 31 masonry culverts. Blaine County's report is unusual and longer than most. Each of Blaine's WPA project proposals over a three-year period is described in detail, including information about engineering, grading, and construction issues, along with notes about the particular bridges and culverts required for each road segment.[198]

Available research indicates that bridges and culverts, along with roads, were designed and constructed to comply with state specification, including state standard plans where applicable, for local as well as state projects. In the reference to WPA work completed between 1936 and 1938, the OHC biennial report states, "All construction has been under State Standard Specifications and the work done is up to

[195] Compiled from table of State Highway Construction and Special Maintenance Projects, July 1, 1938, to June 30, 1940, Biennial Report 1939-1940, 47-82. The table identifies the funding program(s) and the project work force(s) for each contract.

[196] United States Works Progress Administration, Oklahoma, *Accomplishments Works Progress Administration for Oklahoma* (Oklahoma City: Works Progress Administration, 1937), 26.

[197] King, 27-28.

[198] Appraisal reports for Woods, Kay, and Blaine counties, CIAR.

the standards of contract construction."[199] In general, the "division as to participation was for the State to furnish engineering, supervision, materials and equipment and the W.P.A. to furnish labor. The State furnished the Engineering for all the projects and named the supervisory employees."[200]

At the county and municipal level, the source of plans and specifications was not always stated in the CIARs; however, when identified, the source was the highway department. Garfield County reported that their WPA farm-to-market roads were "built to state highway specifications," a statement echoed by reports from Enid (which included CWA projects), Mayes County, Custer County, Jackson County, and Kingfisher County. The report on a WPA project sponsored by Noble County was specific about adhering to state standards:

> All structures were built in accordance with State Highway Commission standard plans and specifications. All of the structures on this job are equal to corresponding structures that have been constructed under contract on other State projects, and will compare very favorable in general appearance, line and finish. The highway grade has been constructed to State Highway standard profile and cross section.

In describing the WPA farm-to-market roads project it sponsored, Osage County stated: "Oklahoma State Standard Plans have been used in constructing these bridges and culverts," and added, "We have furnished our engineering force and expert road and bridge foremen on all projects."[201]

(c) State standard plans

Begun by railroad engineering departments in the nineteenth century, the practice of preparing standard plans for bridges was adopted by the federal government and the newly formed state highway departments in the first decades of the twentieth century. The Office of Public Roads was preparing standard plans for highway bridges soon after 1910. The states created plans for both state highway use and for local county governments on local roadways.[202] The development of standard plans by many states soon after their highway departments were created was part of the process through which government agencies assumed authority over bridge designs previously controlled by the private bridge-building companies. The standard plans reflected the growing centralization and top-down management of bridge engineering. The private bridge companies became more specialized as bridge fabricators and their engineers migrated to state highway departments and professional engineering firms.[203]

The state highway department prepared many sets of standard plans, beginning as early as 1920 and continuing throughout the subject period and into the 1950s.[204] Although the total number originally prepared is unknown, 225 state highway department plan sheets from 1930 to 1945 still exist. The plan

[199] Biennial Report 1937-38, 50.

[200] Biennial Report 1937-38, 53

[201] Appraisal reports for City of Enid and Garfield, Noble, Mayes, Custer, Jackson, Kingfisher and Osage counties, CIAR.

[202] Parsons Brinckerhoff and Engineering and Industrial Heritage, 2-20, 2-22, 2-25

[203] Parsons Brinckerhoff and Engineering and Industrial Heritage, 2-20.

[204] Biennial Report 1919-1924 (inclusive), 18.

sheets dates generally follow the publication dates of Oklahoma Standard Specification books, especially the books for 1931 and 1937, which are cited on some of the sheets.[205]

Table 11 identifies the plan sheets according to the original state highway department categories and lists the number of extant sheets, the range of dates that the sheets were originally prepared, and the range of span lengths for each category. Many standard plans were revised multiple times in the years following their original design, as many as ten times in some cases.

Table 11. Bridge Types Represented by State Standard Plans, 1930-1945

Bridge material/type	Plan sheets	Date scope	Span range in feet
Concrete arch culvert	1	1942	4-10
Deck girder	2	c.1931	80
Concrete culvert, misc.	3	1942	2-14
Steel continuous plate girder	5	1932 1938	24
Concrete slab	6	1931 1942	10-25
Timber trestle	6	1930 1935 1937 1939	20-24
Concrete T-beam	7	1930-31 1942 1946	24-60
Concrete trestle	9	1933 1940-41	26-60
Timber I-beam	11	1932-33 1937	20-24
Steel continuous I-beam	12	1927 1931 1935 1941 1944	26-70
Steel continuous beam	38	1932-34 1938 1940-41 1944-45	26-30
Steel trusses	125	1930-35 1937-39 1941	60-300
Total Sheets	**225**		

[205] See *Standard Specifications for Road and Bridge Construction* (1931) and *Standard Specifications for Highway Construction* (1937), Oklahoma State Highway Department, Oklahoma State Archives.

Except for steel trusses and steel deck girders, all the bridge types in the standard plans were designed for relatively short spans, ranging from about 20 feet to 60 or 70 feet. The deck girder plans are for 80 feet. The trusses begin at 60 feet and extend to 300 feet and include a complex variety of span lengths, roadway widths, and truss configurations, including through, pony, and deck trusses.

(d) Grade separation projects

Efforts by the OHC to replace dangerous at-grade highway/railroad crossings with grade-separation structures began prior to the 1930s and continued throughout the subject period (see Table 8 for chronological sequence of construction). Work diminished to almost nothing during the last few years of the subject period due to World War II.

Not all at-grade crossing situations were remedied with new bridges, since bridge construction was the most expensive solution. Therefore, an important part of the grade-separation program was prioritizing locations for different solutions, ranging from new bridges to relatively inexpensive flashing signals, with bridges being only part of the larger and more comprehensive program.

The OHC prioritization policy in the 1930s was to identify locations with a record of "an excessive number of accidents or where future developments in the highway system or traffic increase appear to warrant the expenditure involved." Early in the program locations were selected because of safety needs, but also because of work-relief needs. Locations were selected where the project could move quickly with design, contracts, and construction, because "the unemployment situation at the time demanded that men be put to work as speedily as possible."[206]

After a location was selected, the state highway department engineers would conduct a survey and determine whether an overpass (highway over railroad) or underpass (highway under railroad) was the best solution. Overpasses required a minimum vertical clearance for rail traffic of 22 feet; underpasses required a minimum vertical clearance for highway vehicles of 14 feet. Choices also depended on alignments, grades, and sight lines, as well as pedestrian traffic and sidewalks. Engineering plans were prepared by the transportation entity whose traffic was carried on the bridge; plans for overpasses were prepared by the state highway department bridge department and plans for underpasses were prepared by the affected railroad's engineering department. Completed plans were submitted to the district office of the BPR for final approval (or recommended changes) before being advertised for construction bids.[207]

The grade separation effort received its greatest boost with the Emergency Relief Appropriation Act of 1935, which included over $5 million to Oklahoma for grade separations and protective devices. Of that amount, 25% was to be spent on roads on the secondary system. The state was to bear the expense of all preliminary engineering and investigation, including project plans.[208] As a result, construction of grade-separation bridges jumped from seven in 1934 to 20 in 1935, and 38 in 1936 (see Table 8).

[206] Biennial Report 1937-38, 55.

[207] Biennial Report 1937-38, 56.

[208] Biennial Report 1937-38, 55.

Despite being the same report that announced the 1935 appropriation, the 1938-39 biennial report also stated:

> Since the trend of the amount of appropriations for this class of work is downward, plans for the future will likely involve more protective devices and less separations. The major portion of grade separations that could be constructed at a reasonable cost have been built and utilizing protective devices, the cost of which is relatively low, will permit spreading the appropriation over a greater area to provide the most protection for the traveling public.[209]

The decline soon arrived, as 17 structures were contracted in 1937 and none in 1938. Construction was sporadic in the years following. Altogether, the construction of grade-separation bridges throughout the subject period was relatively small, compared to the number of bridges constructed overall. The 1941-42 biennial report summarized the effort:

> In the six years previous to this biennium, Department has carried on an extensive program of railroad grade crossing elimination and protection. All told, 87 structures were built, 6 crossings eliminated by highway relocation, and 135 flashing light signals were installed. In this biennium we have built10 separations at a cost $1,069,850. *These ten represent the most difficult construction jobs undertaken by the Highway Commission.*[210] [italics added]

The report did not elaborate on the 10 difficult construction jobs, where they were located, or why they were the Commission's most difficult. The statement suggests that while grade-separation bridges were few in number, they were significant in terms of difficulty and complexity.

Two years later, in 1943-44, the federal government stopped work on the program because of the general wartime restriction on state highway department activities. Several projects were halted in the middle of construction. One that was completed involved the Frisco underpass on US-75, which provided access to the Tulsa Bomber Plant.[211]

(e) Aesthetic treatments

Aesthetic treatment for a bridge is related to architectural styles in vogue at the time of the bridge's design and construction. Nationally, the 1930s and early 1940s represent a transitional era in aesthetic treatments that reflects broad movements in architectural style. During the early years of the twentieth century, bridges that received intentional architectural treatments typically were designed with the Beaux Arts Style of the City Beautiful movement and were in urban locations. These bridges often were arch spans, or beam spans designed to resemble arches, and were built of concrete, occasionally with stone railings and other ornamentation. Classical details, like open-balustrade railings, were commonly used to create a City Beautiful appearance.

[209] Biennial Report 1937-38, 56.

[210] Biennial Report 1941-42, 92

[211] Biennial Report 1943-44, 99.

In the 1930s, the Beaux Arts occasionally was replaced with one or another version of a newer architectural style to reflect a machine-age culture of modernism. These styles could include Art Deco and Streamline Moderne, which, like the Beaux Arts Style, were compatible with concrete construction. Concrete lent itself to the modern styles that could transform piers, abutments, and entryways into pylons and other modern geometric shapes and forms.

At the same time some designers looked to modern machine-age forms and materials, others intentionally adopted rustic styles for parks and scenic areas. In such locations bridges were built with local and natural materials, like stone and timber, consciously avoiding any reference to machines and modern materials like steel and concrete. These aesthetic styles, featuring a rustic appearance, were also compatible with the New Deal interest in the manual labor and hand-crafted work of the WPA and CCC crews. In some cases, artists were employed to participate in WPA bridge projects in cities and parks.[212]

Research revealed little information about the state highway department's use and application of aesthetic treatments. State highway department documents from the 1933-1945 subject period do not discuss aesthetics in relation to bridge design or materials. Available standard plans are for small and simple beam and girder bridges and exhibit minimal design treatment other than railings. However, bridge photographs published in the biennial reports illustrate that aesthetic treatments were used in some cases.

Concrete treatments of piers and abutments in grade separation structures occasionally display architectural styles from the period, including elements of Art Deco and Streamline Moderne. Examples include photographs of bridges in the 1939-40 biennial report, depicting stylized concrete piers and abutments.[213] A notable overpass in a concrete rib-arch design, featured in the 1933-34 biennial report, has distinctive spandrel columns with large, round-arch openings that give the structure a noticeably contemporary aesthetic look.[214] None of the biennial report photographs include examples of Classical Revival architectural styling, which typically was used on concrete arch bridges, usually in urban areas.

Bridge railings also often reflect application of architectural styles. Many of the bridge railings shown in available photographs from the period are of the stark, rectangular, white concrete bi-rail, with simple rectangular white posts and double rectangular horizontal rails. This railing design, which might be considered "modern" with its clean geometrical lines, was used on almost all bridge types, from large (multi-cell) culverts to a NRWR (drought-relief) Project bridge, with a concrete slab and stone masonry piers and abutments, providing an unusual combination of modern and rustic elements in a small bridge

[212] Parsons Brinckerhoff and Engineering and Industrial Heritage, 2-29.

[213] See stylized concrete piers and abutments on the plate-girder underpass, US 62 and 270, Oklahoma County and similar but more subdued treatments on the underpass on State Highway 9, Pottawatomie County, in Biennial Report for 1939-40, 100-101.

[214] See overpass on State Highway 17 near State Highway 51 at Stillwell, in Biennial Report 1933-34, 140.

structure.[215] The same railing is seen on state standard plans throughout the subject period for many bridge types, including steel I-beam bridges, concrete girder spans, concrete slab spans, steel continuous beams, steel plate girders, and timber I-beams. On a standard plan sheet from 1944 this design is identified as a type "D" handrail.[216]

In general, the intentional use of ornament and architectural styles for aesthetic treatment of bridges was uncommon, at least for state bridges, and not discussed in OHC biennial reports.

(f) Roadway and bridge-deck width and sidewalks

Clear roadway width on bridge decks for bridges on state highways was a concern of OHC and the state highway department in the 1930s that increasingly was a reason for bridge widening if not replacement. At the beginning of the decade, in 1929-30, the minimum width of roadway was increased from 20 feet to 22 feet, while design loading—essentially the strength of the bridge—was increased by 20 percent. These two changes responded to increasingly larger vehicles, primarily trucks, and higher speeds on the state's roads. According to the OHC, the higher speeds on roadways created dangerous crowding on existing bridges that had 18- and 20-foot widths, and were therefore too narrow to accommodate faster-moving vehicles.[217] In the 1930-31 biennium, "obsolete structures on paved highways were widened or replaced with modern bridges of standard width and improved design." The policy of widening or replacement represented a change from the earlier practice of not replacing bridges that were narrow but still strong in order to save money.[218] By the end of the 1930s, the OHC and the state highway department were still concerned about the lack of adequate width on state-system bridges, pointing out that a decade after the minimum width was extended to 22 feet, 715 bridges out of 3,000 had a clear width of less than 20 feet and 130 had less than 16 feet. The OHC stated, "Any bridge or other structure on the State Highway System having a clear width of less than 20 feet represents a serious hazard to traffic and should be replaced in any program of progressive development."[219]

Roadway width on bridges was such a concern in the 1930s that the comprehensive 1937 survey of all state and county bridges were categorized by width and condition. The bridges in the tables were divided into good, fair, and poor condition, and within each condition by four classes of width: under 16 feet, 16-19 feet, 20-26 feet, and 27-36 feet.[220]

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[215] A railing that is almost identical was considered an important early modern design detail in establishing National Register significance in Bridge 6679 in Minnesota, although the Minnesota example was designed in 1948, almost 20 years after the Oklahoma examples. See the large, four-cell box culvert on State Highway 48 in photograph in Biennial Report 1929-30, 71; see also the photograph of the concrete and stone example in Biennial Report 1935-36, 125.

[216] See plan sheet IB-10(1), "Standard I-BM. Bridges 30' Roadway with 2-18' Sidewalks 30' to 60' Spans," 1944.

[217] Biennial Report 1929-30, 57.

[218] Biennial Report 1931-32, 13.

[219] Biennial Report 1939-40, 17.

[220] Table 7 and Table 14 in Oklahoma State Highway Commission, *Oklahoma Highway Studies 1936-1942*.

The determination to achieve adequate width, at least on state system highways, appears to have resulted in a campaign to alter existing bridges through widening, even if the superstructure was not entirely rebuilt. The 1939-40 biennial report stated:

> A considerable number of existing bridges have been reconstructed to provide a wider roadway. The existing substructure units have been utilized in some cases without any appreciable changes and in other cases by removing the top portion of piers and reconstructing a support for the wider superstructure. In this type of work, existing steel I-beams have been utilized to support the new and wider concrete deck by reinforcing the flanges of I-beams by welding on additional reinforcing plates.[221]

The continued concern with bridge-deck width in the 1930s, and particularly with the description of the design and construction approach to widening in 1939 and 1940, suggests that bridges identified with year-built dates during this time period that have roadways of 22 feet or more may turn out to be rebuilt or widened and not new construction.

Somewhat related to bridge and roadway width was the issue of sidewalks on bridges. In 1940 the OHC observed, "the provision for sidewalks on structures decreases the hazard both for the pedestrian and for car traffic as the driver of a car often pulls out of his lane to avoid hitting a pedestrian, with a resultant collision with an on-coming car." In other words, there was a need for adequate deck width to include a sidewalk. Consequently, the OHC stated, "During this biennial period [1939-40] plans for nearly all structures have provided a pedestrian walk on both sides of the roadway." In cities or towns with heavier pedestrian traffic, sidewalks were to be three or four feet wide. In areas of light pedestrian traffic, a "1'-6" narrow walkway is provided." The narrow walkway had the added benefit of allowing for "bumpers or overhanging loads on trucks" to avoid damage to railings.[222]

(g) Wartime shortages

The advent of World War II in 1941-42 quickly and substantially curtailed bridge construction, particularly of large bridges. The primary reason was the shortage of construction materials, the OHC reported, "principally in steel and high grade timber, which materials are essential in the construction of any type of bridge." As a result, previously programmed bridge projects were deferred until after the war. In-process plans were stopped on some bridges and even in-process construction projects were halted. "Although correlation of the Highway Program to the National Defense Program required the elimination from the Construction program of all the larger bridges, the Department concentrated on the smaller structures during this period…"[223]

For the short-span bridges and culverts that remained in the state highway department's list of active projects, the designs were reworked to reduce the amount of steel utilized. For culverts, this resulted in an unreinforced concrete arch culvert and a box culvert in which only the top slab was reinforced. The design changes for short-span bridges were unspecified by the state highway department, except to state

[221] Biennial Report 1939-40, 87.

[222] Biennial Report 1939-40, 87.

[223] Biennial Report 1941-42, 91.

that there was a significant increase in the use of concrete, to the degree that such structures became more expensive because the additional concrete expense was more than the reduction in cost of steel. From the limited information in the biennial report, it is not possible to determine if these concrete-heavy wartime structures differ significantly in outward appearance from other similar bridges and culverts that used conventional steel reinforcing.[224]

[224] Biennial Report 1941-42, 92. A further analysis of state standard plans, to be completed in a subsequent phase of the project, may provide additional information about the wartime designs.

6. Conclusion

The Great Depression had a profound impact on Oklahoma. However, federal relief came in the form of the numerous New Deal programs implemented nationwide and in Oklahoma. Building and maintaining public roads and bridges was the focus and direct financial beneficiary of government efforts through New Deal programs such as the FERA, CCC, PWA, and WPA to combat unemployment. Completing work on its road network became one of Oklahoma's most important Depression-era initiatives.

Among the major federal relief programs, the CCC and WPA had the greatest presence in the state. The latter, according to its final report, constructed, reconstructed, or improved 29,324 miles of roads and 2,712 bridges in Oklahoma, and also participated in efforts to eliminate unsafe railroad crossings by constructing grade separations. Over 40 percent of all WPA money in Oklahoma went to highway and road building, and the OHC, who awarded more than $74 million in construction contracts during the 1930s, sponsored numerous WPA projects. As for the CCC, the program contributed mostly to soil conservation work, but also constructed or improved many transportation-related resources such as roads, bridges, and culverts in an effort to connect communities or create scenic highways.

During the Depression years in Oklahoma, attention was focused on work that would employ large numbers of laborers. As such, paving, grading, and drainage projects were primary undertakings during this era. For instance, between 1936 and 1942 more than 1,000 miles of earthen roads within the state's highway system were paved or surfaced. The most common road surfacing types were oil mat or inverted emulsion surfacing, rock asphalt surfacing on gravel, rock or red bed base, and water bound macadam. Federal-aid funds were frequently used for the improvement of secondary roads, which included farm-to-market roads, rural mail routes, and public bus routes. Additionally, projects often involved making roadside improvements, such as adding new landscaping, safety features, and erosion control measures.

Depression-era funding was also heavily directed toward bridge construction. Overall, steel and wood beam/girder and concrete slab bridges were the most common types constructed between 1933 and 1945, collectively accounting for over 85% of all new construction during this period.

Apart from special provisions requiring the use of hand labor methods (labor-intensive projects meant more people could be put to work), road and bridge design and construction projects during the subject period essentially followed previously established federal and state specifications and practices. The major factors that influenced design and construction of these types of resources were available local materials and the ability to use hand labor. As a result, these projects became physical embodiments of the federal relief programs' goals to employ as many people as possible.

It is clear that the impact of the federal aid programs on Oklahoma's transportation network was far-reaching. In his book *ODOT 100: Celebrating the First 100 Years of Transportation in Oklahoma*, historian Bob Burke writes, "By the late 1930s, the scars left on Oklahoma by the Great Depression began healing."[225] While New Deal programs were still actively engaged in transportation projects into

[225] Burke, 63.

the early 1940s, the OHC's focus began shifting to planning for the future of Oklahoma's transportation system. In 1939 the OHC announced, "the goal that within a few years, 40 percent of all rural residents of the state would be within a mile of the state highway system, 89 percent would be within three miles, and only ten percent would be more than five miles from the nearest state highway."[226] The work completed during the Depression era laid the foundation for the future work to complete these goals and the achievement of a modern, post-World War II transportation system.

[226] Burke, 63.

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Appendix A. Oklahoma Bridge Numbering System

The following describes the Oklahoma Department of Transportation's current bridge numbering system. The information is adapted from the Oklahoma Department of Transportation, Planning and Research Division, Cultural Resources Program, "Oklahoma Historic Bridge Survey, Phase I: A Re-evaluation of *Spans of Time: Oklahoma Historic Highway Bridges*," May 2007.

Bridge Numbering System

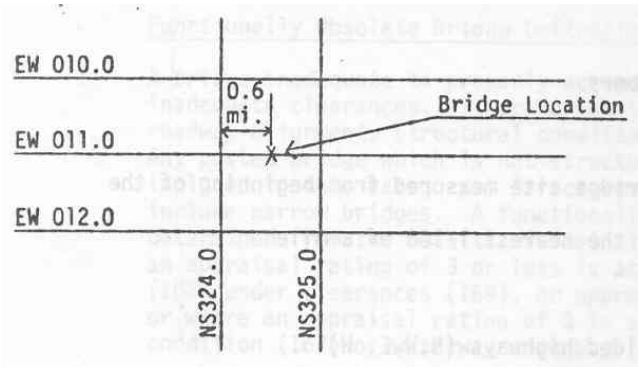
The Oklahoma Department of Transportation (ODOT) gives each bridge a structure number derived from the bridge's location on the road system; these numbers identify each bridge in the survey also. Most of those designated as "NO NUMBER" in the survey are not in the ODOT bridge files, usually because they are bypassed and no longer open to traffic or they are too short to be classified as bridges.

County Roads and City Streets

ODOT assigns bridge numbers based on the state's numbered section lines. East-west section lines are numbered beginning with the Kansas-Oklahoma state line as EW-1, or E001.0, and increasing at one mile increments as one travels south. North-south section lines are numbered beginning with the New Mexico-Oklahoma state line as NS-1, or N001.0, and increasing at one mile increments as one travels east. Also used in the bridge numbering system is a county number. The counties are numbered in alphabetical order: Adair County is 01, Alfalfa County is 02, continuing to Woodward County which is 77. In the structure number, the bridge's location is measured in tenths of a mile from the south or east of two intersecting section lines. For example:

36 E011.0 N324.0 00.6

36 Kay County
E011.0 Indicates the bridge is on EW-11, the section line road 11 miles south of the Kansas line.
N324.0 Refers to county road NS-324, the section line road 324 miles east of the New Mexico line. The bridge is to the east of this section line.
00.6 The bridge is located six-tenths of a mile east of the intersection of EW-11 and NS-324.

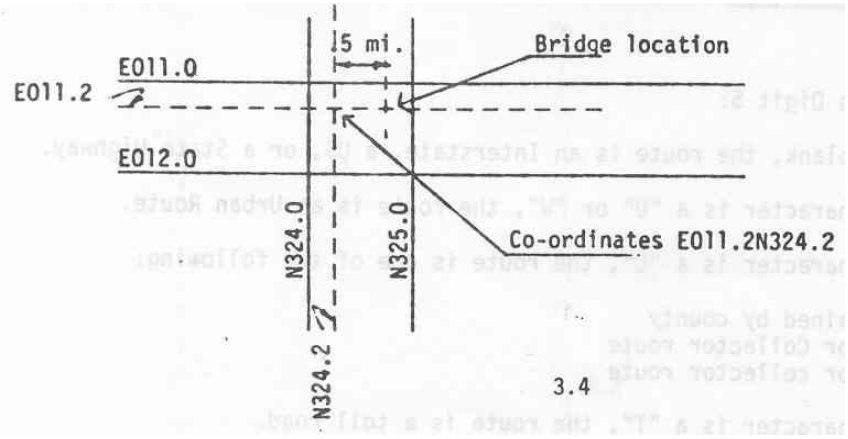


The following applies to bridges that are not located on section line roads, but instead on roads that parallel section lines:

36 E011.2 N324.2 00.5

36 Kay County
E011.2 Indicates the bridge is on an east-west road 11.2 miles south of the Kansas

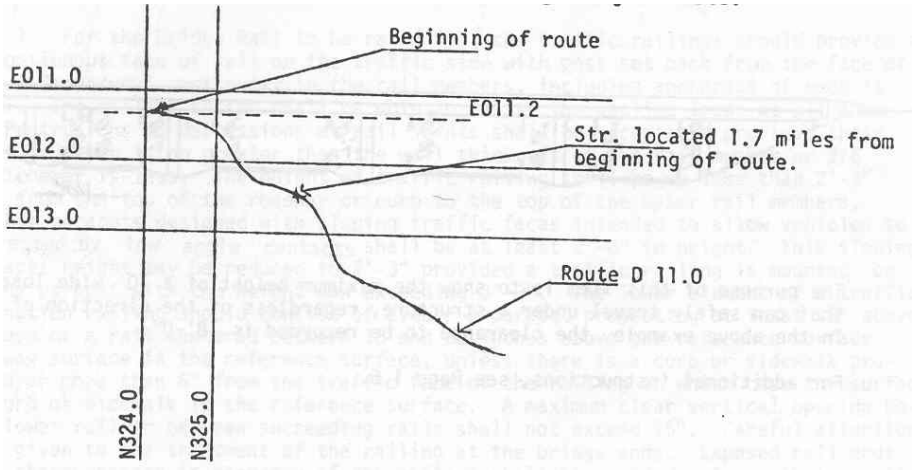
line
N324.2 Indicates the north-south road is 324.2 miles east of the New Mexico line. The bridge is to the east of this road.
00.5 The bridge is located five-tenths of a mile east of the intersection of EW-11.2 and NS-324.2**.**



The following applies to bridges on roads that are not section lines or parallel to section lines, but instead are diagonal, or meandering, roads:

36 D 011.2 N324.0 01.7

36 Kay County
D Diagonal or meandering route
011.2 Indicates the beginning of the road is 11.2 miles south of the Kansas line
N324.0 Indicates the beginning of the road is 324 miles east of the New Mexico line
01.7 The bridge is 1.7 miles from the beginning of the road



State , Interstate, and US Highways

The structure numbers for bridges on state, interstate, and US highways make use of control sections. Each highway is divided into numbered control sections, which usually have

county lines and intersecting highways as their beginning and ending points, and usually run from west to east and south to north, although there are some exceptions. The Oklahoma Department of Transportation's Planning and Research Division compiles and publishes the Control Section Map Book which defines these control sections and gives their numbers. The structure numbers for state, interstate, and US highway bridges are arranged as follows:

6602 0368 WX

66 Rogers County
02 Control section numbered 02
0368 Milepoint of the bridge site measured from the beginning of the control section to the nearest hundredth of a mile. Bridge is 3.68 miles from the beginning of the control section.
W Bridge is on a divided highway and carries westbound lanes. This digit is omitted when the bridge is not on a divided highway.
X Bridge indicator. If the bridge is on a frontage road or ramp, **F** or **R** will follow the **X**.