NPS Form 10-900-b
(Jan. 1991)

OMB No. 1024-0018

United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES
MULTIPLE PROPERTY DOCUMENTATION FORM

X New Submission __ Amended Submission

A. Name of Multiple Property Listing

Montana's Historic Steel Truss Bridges

B. Associated Historic Contexts

The Golden Age of Bridge Building in Montana, 1888-1915
The Montana Highway Department Takes Over: Bridge-Building at High Tide, 1915-1946

C. Form Prepared By

Name/Title: Jon Axline/Historian
Organization: Montana Department of Transportation
Street & Number: 2701 Prospect Avenue Telephone: (406) 444-6258
City or Town: Helena State: MT Zip: 59620-1001

D. Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this documentation form meets the National Register documentation standards and sets forth requirements for the listing of related properties consistent with the National Register criteria. This submission meets the procedural and professional requirements set forth in 36 CFR Part 60 and the Secretary of the Interior's Standards for Archaeology and Historic Preservation. (___ See continuation sheet for additional comments.)

Signature of certifying official Date

MONTANA STATE HISTORIC PRESERVATION OFFICE
State or Federal agency and bureau

I, hereby, certify that this multiple property documentation form has been approved by the National Register as a basis for evaluating related properties for listing in the National Register.

Signature of the Keeper of the National Register Date

TABLE OF CONTENTS FOR WRITTEN NARRATIVE

E. STATEMENT OF HISTORIC CONTEXTS

Historic bridges are a prominent and significant part of the Montana landscape. Truss bridges not only delineate the sites of important river crossings in an area, but also represent the hopes and dreams many Montanans had for their communities. A good bridge could make or break a community and they were much sought after by the state's residents. By the early twentieth century, bridges were important to local and statewide road improvement projects to improve transportation and commerce in Montana. The history of Montana's historic truss bridges is tied directly to the history of the state with bridges representing changes over time. The Montana Historic Steel Truss Bridges Multiple Properties Document (MPD) addresses steel truss bridges built in the state between 1888 and 1946, when the last one was built by the Montana Department of Transportation (MDT). The bridges are scattered across Montana and represent a variety of styles and forms that are indicative of the times they were built. This MPD includes through, pony, and deck truss bridges. The glossary at the end of Section E of this document describes each type of truss bridge.

The Golden Age of Bridge Building in Montana, 1888-1915

Army civil engineer John Mullan built the first bridges in northwestern Montana in 1860. The primitive log structures crossed the St. Regis-DeBorgia River and nearly all of them washed out during the spring run-off in 1861. Mullan diligently replaced the bridges and built a six-span structure across the Blackfoot River near present Missoula during the winter of 1862-63. The Blackfoot River Bridge was an important component of the Mullan Military Road until 1868 when it washed out and was temporarily replaced by a ferry. After gold was discovered in southwestern Montana in July 1862, the resulting stampede brought hundreds of newcomers to what had before been a sparsely settled area. Additional gold strikes in 1863 and 1864 triggered bigger stampedes to the region. By 1865, newly-established Montana Territory boasted a population of around 28,000 people. Transportation was critical to Montana, so, in December 1864, the first territorial legislature licensed nearly two dozen companies to build toll roads and bridges. None of the bridges, however, were designed by an engineer and they often failed or were in such poor condition that users frequently complained to the legislature about them. By 1872, user complaints and high tolls compelled the legislature to abolish the toll road system in Montana. The counties assumed control of the territory's roads and bridges and taxed their residents to maintain them. By the early 1880s, Montana was criss-crossed by a network of roads and timber bridges that were, for the most part, in deplorable condition. The remoteness of the territory, the nascent agricultural industry, and the decline of mining made the improvement of the system impractical until the territory could be connected to the rest of the country by a better and more reliable means of transportation – the railroads.[1]

The completion of the Utah and Northern Railroad in 1881, the Northern Pacific Railway in 1883, and the St. Paul, Minneapolis and Manitoba Railroad (Manitoba) in 1887 significantly changed the way Montanans did business and how its residents got around the territory. Instead of by road or steamboat as it had been previously, by the late 1880s all commercial freight moved through the state over one of those lines. The railroads caused Montana's road system to function more as farm-to-market routes that provided access to the railroads than as an inter- and intra-state system. The counties expended little money on roads and bridges during that period. Eventually, however, good bridges would be critical to the economic prosperity of the territory. The railroads significantly changed Montana's transportation landscape and caused a profound change in the system by allowing the cheap importation of steel and other materials necessary for an evolving road network. The railroads caused a boom in vehicular steel bridge construction in the territory. The first all-steel vehicular bridge, the Missouri River Bridge at Fort Benton (24CH335; listed 1980) was built in 1888 and still stands. It had a substantial impact on the economy of Fort Benton, a former river port that transitioned into a major agricultural trade community because of the bridge and the community's location on the Manitoba Railroad.[2]

Prior to the Manitoba Railroad's arrival in 1887, manufactured goods destined for the Montana mining camps, trade goods targeted for the Blackfeet Reservation, and supplies for the Royal Canadian Mountain Police posts in southern Alberta and Saskatchewan came up the Missouri River by steamboat to Fort Benton. With the arrival of the Northern Pacific Railway and the demise of the river trade, Fort Benton's fortunes were clearly on the wane by the 1880s. The community needed access to the nearby Judith Basin, the center of Montana's cattle and agricultural industries, which was located just across the Missouri River. In May 1886, Fort Benton businessmen, "who could . . . be numbered on the fingers of one hand," banded together and formed the Benton Bridge Company to construct a bridge across the Missouri River to tap into the lucrative Judith Basin trade. The company raised nearly $50,000 in private money to pay for the bridge, but because the U.S. military considered the Missouri navigable up to Fort Benton and Montana's territorial status made it dependent on Congress, the Benton Bridge Company needed Congressional authorization to build it. After

hard lobbying by Montana's Congressional delegate, Joseph K. Toole, Congress approved construction of the bridge, but specified the overall length of the bridge, the length of the main span, its clearance over the main channel during high water and that one of the spans be a pivot-type swing span. The swing span allowed commercial and military river traffic to maintain passage up the river beyond the bridge. It was not until February 1888, however, that the Benton Bridge Company awarded the contract for the bridge to the firm of Haney & Ryan to construct the piers and the approaches to the bridge, while the Milwaukee Bridge & Irons Works got the contract for the superstructure. Along with the community, the Manitoba Railroad would also benefit from the bridge by becoming a major shipper for agricultural products, sheep, and cattle. Consequently, it gave the company a break in the shipping costs on the 27 carloads of steel that arrived in Fort Benton in mid-March 1888.[3]

Completed in December 1888, the 825-foot Baltimore through truss bridge eventually cost Fort Benton businessmen $60,000. The bridge functioned well for the next two decades. In June 1908, a catastrophic flood destroyed the bridge's prominent swing span, which rendered the bridge unusable, denying Fort Benton the rich Judith Basin trade. Within a month of the disaster, the county commissioners, which had acquired jurisdiction over the bridge, hired Missoula bridge-builder O. E. Peppard to construct a timber span to reopen the structure. That span remained in place until 1925 when the county replaced it with a span from the old First Avenue North Bridge from Great Falls.[4]

The Fort Benton Bridge marked the beginning of a new era of bridge construction in Montana, one based on modern engineering principles and the use of structural steel rather than wood. Steel became the material of choice for bridges and the Northern Pacific and Great Northern railroads could easily haul it to Montana from fabrication plants in the East and Midwest. Along with prominent steel truss structures across major river crossings, Montana counties also utilized simple timber, steel stringer, and reinforced concrete bridges on important farm-to-market roads. The immigration of people to Montana after the completion of the railroads put pressure on the county governments to provide a modern infrastructure for their constituencies. They provided access to Montana for Midwest-based bridge construction companies, who could economically ship steel bridge components to the state at prices the counties could afford. Because of the large numbers of different types of steel bridges built, the period from 1892 to 1915 was a golden age for the bridge construction companies in Montana. The standard steel truss bridge, both through and pony, bridge built by the counties during this period was the pin-connected Pratt truss. Engineers initially developed the design to serve the railroads in the 1840s and then adapted them for use by horses and wagons. Along with Pratt trusses, the companies also built Pennsylvania and Parker truss structures for the counties during that period. The Pennsylvania and Parker trusses are both derived from the Pratt truss and were developed to carry heavier loads. Many of the bridges built by the counties still survive and are representative of practical bridge technology at the turn of the twentieth century. The structural components were easily moved to the construction site, structurally reliable, functional, and economical – four factors critical to their acceptance by Montana's county commissioners. The company-designed bridges, however, did not adhere to any state-imposed engineering standards and, occasionally, were of questionable engineering quality. Partly because of that unpredictability and fear of structural failures, the Montana legislature created the Montana State Highway Commission in 1913 to regulate the industry.[5]

All the counties basically followed the same pattern when considering the construction of a new bridge before the highway commission regulated the process in 1915. As county populations grew because of the expansion of the cattle and mining industries in the 1890s and, later, the Homestead Boom in the second decade of the twentieth century, county commissioners spent a great deal of time during their monthly meetings fielding requests or petitions from residents for new roads and bridges. If the commissioners determined the petition had validity (usually by the number of people who signed it), they sent their representatives to check the proposed route or bridge site and make a recommendation to the commissioners as to whether it would have some benefit to the people in the area or to the county. If the viewers recommended the project for approval, the commissioners accepted the road as a county facility or agreed to fund the construction of new bridges.[6]

The counties maintained funds specifically for bridge maintenance and new construction. They obtained the money from annual road taxes levied against the property owners. If the county's funds included enough money, then the bridge would be paid directly out of that source. Oftentimes, however, and especially in the Yellowstone, Clark Fork, and Milk River valleys, the size of the proposed bridge often cost more money than was available in the Bridge Funds. Also, the counties sometimes planned multiple bridge projects that required greater cash outlays than available in the budgets. In those instances, the county commissioners called for bond elections to raise money for the projects. Most county bond elections for new bridges passed, demonstrating the need for the structures and the willingness of citizens to pay for them. Once the commissioners determined that a bridge could be built and had the money to pay for

it, they directed the County Surveyor to ascertain the type of bridge needed as well as length and width. The County Surveyor could choose an appropriate design from catalogs provided by the companies. The bridge company agents worked out the details of the bridges, including the actual structural designs, with the County Surveyor.[7]

Typically, seven to ten bridge companies bid on major county projects; many submitted more than one design. County records show a pattern of the same companies obtaining contracts in certain counties. The pattern was part of a common practice in the United States in the late nineteenth and early twentieth centuries. Called "pooling," it originated as a method for railroad companies to divide up territories so each company was able to profitably share in the market. In Montana, the bridge companies divided the state into geographic areas where specific bridge companies obtained county contracts on a regular basis. Between 1897 and 1903, county commissioners always awarded the Cleveland, Ohio-based King Bridge Company contracts in Lewis and Clark County. In Meagher County, the Minnesota-based Hennepin Bridge Company won all five bridge contracts awarded by the county commissioners between 1910 and 1912. The Security Bridge Company built nearly all of the steel truss bridges in the Yellowstone Valley and central Montana after 1907, while O. E. Peppard of Missoula was the primary bridge-builder in Missoula, Powell, Phillips, and Blaine counties. During the late nineteenth and early twentieth centuries in Montana and elsewhere in the United States, bridge construction was a cutthroat business with an overabundance of companies competing in a limited market. To ensure business for all, the bridge companies, through unwritten gentlemen's agreements, divided Montana amongst themselves; each firm received contracts in a specific geographic area. While the system did not directly involve the county commissioners, many professional bridge engineers believed that pooling could not work without the cooperation of at least some of the commissioners. There is no evidence, however, that Montana's county commissioners profited from the practice. Importantly, the bridge pooling system guaranteed profitable markets for all those directly involved in the system. County commission records indicate that pooling existed in Montana from about 1892 until 1915 when the newly-created state highway commission ended the practice.[8]

In 1906, cousins William S. Hewett and Arthur L. Hewett founded the Security Bridge Company. Between then and 1926, it was the most prodigious bridge-construction company in the state. By 1917, the company had constructed at least sixty truss bridges throughout central and eastern Montana. Most were simple pin-connected Pratt through trusses or pin-connected Pratt or riveted Warren pony truss structures. In 1911, the Hewetts relocated the company headquarters from Minneapolis to Billings, Montana, and reincorporated with Arthur as president of the firm and fellow Minnesotan William P. Roscoe as vice-president. Though the creation of the Montana State Highway Commission's bridge department in 1915 ended the primary role of the bridge construction companies in Montana, the Security Bridge Company continued to build bridges under the auspices of both the highway commission and the counties until 1926. Arthur closed the company in 1926 to pursue other business interests. The company's successor, the William P. Roscoe Company, continued to build bridges in the state until Roscoe's death in 1956.[9]

Another productive Montana-based bridge builder was Obert E. Peppard of Missoula. Born in Lansing, Michigan, in December 1855, Peppard was the son of a bridge builder. In the 1870s, his family relocated to Red Field, Iowa, where Obert learned bridge-building from his father. He eventually took a position as the Northern Pacific Railway's supervisor of bridges and buildings in its Missoula Division in 1882 where he oversaw the construction of bridges on the Philipsburg and Bitterroot branch lines. In 1889, Peppard decided to go into the bridge business for himself. That year, he obtained contracts from Powell County to construct two bridges across the Clark Fork River at Gold Creek and another at Deer Lodge. Over the next three decades, Peppard built many bridges throughout western Montana, including the Van Buren Street Bridge (24MO248) in Missoula and nearly every vehicular bridge across the Bitterroot and Blackfoot rivers in western Montana. Like nearly every bridge-building company in the state in this era, he bid on all the major bridge projects. Between 1907 and 1918, when steel shortages during World War I caused him to stop building bridges, Peppard built at least thirty steel bridges in the Treasure State. When he died in September 1929, the *Daily Missoulian* praised him as "one of the best known bridge builders and contractors of western Montana." Peppard built two bridges included in this MPD: the Little Blackfoot River Bridge and Browne's Bridge.[10]

Active out-of-state bridge companies working in Montana included the Gillette-Herzog Manufacturing Company, which built most of the bridges in Flathead County from 1894 to 1901. Its former agent, A. Y. Bayne, went into business for himself and took the older company's place as the prime bridge builder in that area. The industry in eastern Montana was mostly dominated by Midwestern companies, who had direct access to the state because of the railroads. The illegal pooling system limited competition and created bridge monopolies in the counties. Several Montana-based bridge companies existed at the time, but the competition from the

Midwestern companies forced most of them out of business. The Security Bridge Company flourished because of its Minnesota connections and its connections to the Northern Pacific Railway. The county commissioners did not benefit from pooling because it was not always cost effective for them to participate and the quality of the product was sometimes questionable. The lack of technical knowledge about bridges and demand for the structures, often left the commissioners at a disadvantage when dealing the companies.[11]

Because of their limited knowledge about bridge design and construction, the county commissioners sometimes sacrificed good bridge designs in the interests of economy. Graft and fraud were rampant in the industry as fierce competition frequently pressured the more reputable firms to cut corners. One critic of pooling complained that the process of contracting for bridges made it "practically impossible for even honest officials to procure a satisfactory structure and open[ed] up the way for dishonest officials and contractors to arrange a deal whereby the public comes out second best." Further, he claimed, it allowed crooked public officials to receive part of the profits of the transaction. He concluded that the system resulted in highly priced bridges, some of which were not structurally sound.[12]

The bridge-building process in Montana was routine for the counties and bridge companies by 1900. After the county surveyor provided the basic dimensions of the bridge needed and the county commissioners contracted for it, the company agent ordered the structure from its headquarters office, which in turn placed an order with one of the numerous fabrication plants in the Midwest and East. The factory manufactured the bridge to the correct specifications, assembled it, marked the components, then disassembled the bridge and shipped it by railroad to the construction site. The fact that pin-connections held the bridge together instead of rivets made bridge-building an assembly line process. An "expert" sometimes accompanied the disassembled bridge to the construction site to supervise its construction. Oftentimes, however, the so-called expert was not a bridge engineer. By the second decade of the twentieth century, trained bridge engineers often cited the presence of the "expert" at the construction site and the lack of professional oversight of the process as one of the main problems with the bridge companies. The on-site assembly of the bridge was often done by local men working and generally took from three to six months to build.[13]

One of the most unusual bridges built under this system may well be the only one of its kind remaining in the United States. The Dearborn River High Bridge (24LC130; Listed 2003) spans a narrow canyon about eighteen miles southwest of Augusta in Lewis and Clark County. In 1896, the county commissioners officially established a road between Augusta and Bean Lake that was later extended to include the old Pend d'Oreille Crossing of the Dearborn River. After the establishment of the county road, the commissioners planned to construct a bridge at the crossing. In December 1896, the commissioners instructed the County Clerk to advertise for bids for the construction of a 250-foot "deck" bridge at the crossing about two miles southeast of the Clemons post office. On January 14, 1897, the commissioners opened the proposals in the presence of the bidding companies' agents. The commissioners awarded the bridge contract to the King Bridge Company for its bid of $9,000. The Dearborn River High Bridge is a rare pin-connected Pratt half-deck bridge that was recently rehabilitated by the Montana Department of Transportation.[14]

Reliable steel bridges, like the Dearborn River High Bridge, were an important goal of the national Good Roads movement in the late nineteenth and early twentieth centuries. A good road was meaningless unless there were good bridges to carry them over river obstacles. In the late 1890s, the Good Roads movement gained momentum in the east to promote the construction of roads and bridges. In Montana, the movement to promote good roads appeared about 1900 and resulted in the creation of the Montana Good Roads Congress in 1910. While dominated by farmers, ranchers, and bicyclers, the group also included local business promoters, road associations, and individuals with an interest in the issue. The Good Roads Congress advocated the construction of farm-to-market roads, which, they believed, would result in the "autonomy and self-sufficiency" of rural communities and also promote tourism. The congress also encouraged counties to assume greater responsibility for bridge construction and enlisted the broad-based support of the state's middle class. It supported the establishment of a state highway commission to standardize road and bridge construction. The counties, however, continued to rely on the private bridge companies. By 1900, about the time the organization emerged in Montana, the number of bridge failures on the nation's highways surpassed those of the railroads and the public momentum to regulate the bridge industry increased.[15]

The Montana Good Roads Congress actively lobbied the Montana legislature for the creation of a state highway commission in early 1913 and remained an influential organization in the state until the early 1920s, when the need for it faded after federal legislation satisfied many of its goals. The homestead boom in Montana from 1909 until 1918 forced the counties to initiate ambitious programs to provide infrastructure to their constituents, mostly in the form of reliable access to railroad terminals and the county seats. From 1910 until the collapse of homesteading in Montana in 1918, counties oversaw the construction of hundreds of steel truss, reinforced

concrete, and steel stringer bridges by the bridge companies. While simple farm-to-market bridges usually sufficed, the presence of a substantial bridge, whether steel or reinforced concrete, symbolized a prosperous district and aided the perception of local residents and visitors of permanency, stability, and optimism.[16]

Bridges built during the 1909-1918 homestead boom often reflect the complex evolution of bridge engineering technology. In the late nineteenth century, the companies constructed many combination timber and steel pin-connected bridges that utilized local resources. The use of reinforced concrete required specialized providers, and, ironically, required better transportation corridors before its use became widespread. But as manufacturing and construction methods improved, the bridge companies constructed more riveted truss bridges. Riveting reflected a technological change necessitated by the transition from horse and wagon transport to the more complex era of automobiles. The challenge for bridge engineers was the development of an enduring and quickly repairable bridge. The growing tax base and inflated agricultural prices of the 1910s made it possible for counties to finance the construction of many riveted steel bridges before the country's entry into World War I.[17]

The shortage and concurrent higher prices charged by the bridge companies for its products stirred a debate among professional engineers, Good Roads advocates, and progressive-minded politicians about the fees charged by the companies and the products they provided to the county taxpayers. Despite the debate about the bridge companies, the quality of the products they provided and the bridge pooling issue, the bridge companies served a valuable function in Montana. For most bridges, the critics' fears about quality proved unfounded. Because the companies could charge the counties more money if more steel was utilized on the structure, many of the bridges are over-engineered. More steel meant more money they could charge their clients, guaranteeing maximum earnings for themselves. Many structures built by the bridge companies still survive and function in their original capacity. There were few failures caused by structural flaws. Instead, damage was usually caused by overweight vehicles, collisions, floods, and ice. One Montana firm, the Security Bridge Company, went on to become an important bridge-builder after the Montana State Highway Commission regulated the industry in 1915. Indeed, one of its employees, William P. Roscoe, was the state's most prolific bridge contractor in the mid-twentieth century. Bridges built during the golden age from 1887 to 1915 still dot the Montana landscape and are testaments to the optimism and prosperity of Montana's counties in the late nineteenth and early twentieth centuries.

The Montana Highway Department Takes Over: Bridge-Building at High Tide, 1915-1946

When the Thirteenth Montana Legislature created the State Highway Commission in March 1913, it caused a profound change in the state's bridge industry. The commission was the result of many years' lobbying by state good roads groups to develop engineering standards for roads and impose order on bridge-builders. Importantly, Congress's impending passage of the first Federal Aid Road Act in 1914 made it mandatory that the states establish state highway commissions to manage the federal funds. When formed, the highway commission consisted of three civil engineers appointed to the position by the governor. At first, the commission was only an advisory body that provided information on modern road construction techniques to the state's counties. It published pamphlets (one with the compelling title "Drainage of Roads"), developed a statewide highway map, and met with local governments about their transportation needs. Even with the state's increased influence on road and bridge matters, the counties still followed the old system of advertising and letting contracts for new bridges because there was no state money available to them for construction.

In June 1913, the highway commission sponsored a conference in Helena that included the state's county surveyors and a few county commissioners to outline the priorities the commission should follow in developing its road and bridge programs. The highway commissioners divided the attendees into five advisory committees, each assigned to develop recommendations for specific problems related to road construction, surveying, mapping, convict labor, and bridges. The bridge committee's recommendations addressed the main problem then plaguing the counties: their dependence on the bridge construction companies.[18]

The committee recommended that all bridge company plans be submitted to the State Highway Commission for approval before the counties let the contracts. The commission would check the plans, bids, and building materials to ensure the counties got their money's worth when purchasing a new bridge. The committee, however, recommended against the highway commission developing standardized bridge plans to allow counties the option of choosing the most suitable and affordable designs. The committee also recommended the highway commission investigate the use of reinforced concrete for bridges rather than the more expensive steel. Despite the committee's recommendation, the commission's initial interest in concrete was only for culverts.[19]

The 1915 Legislature ordered the highway commission to adopt most of the committee's recommendations, thus requiring the

commission to address the issue of bridges. The legislature ordered it to provide to the counties standard plans and specifications for all bridges that cost more than $500. Typically, bridges that cost less than that amount were built through county force account and did not require a contractor or the time-consuming advertising/bidding process. More expensive bridges, however, entailed the advertising for bids and the development of detailed plans. Instead of allowing bridge companies to submit as many designs as they saw fit to win a particular contract, they could only submit one design. The legislative mandate suggests that the counties recognized the problem of pooling, dishonest contractors, and their "utter lack of any technical knowledge" about bridge engineering.[20]

The 1915 state legislature also expanded the State Highway Commission to accommodate its added responsibilities to the counties for standardized bridge designs, the review of bid packages, and contract oversight. The expansion coincided with an economic boom in Montana. In 1909, the federal government passed the Enlarged Homestead Act to promote the agricultural development of the Great Plains. The opportunity for free land and economic self-sufficiency in the American West proved irresistible to people throughout the United States. Between 1910 and 1918, nearly 400,000 would-be farmers and their families moved to the Treasure State. At the same time, mineral production in Butte and the surrounding area also increased. Demand for building materials, generated by the booming economy and staggering population growth proved a boon to the state's timber industry. The immediate pre-World War I years were, indeed, a good time to be in Montana.[21]

In March 1915, the highway commission formed a bridge department and hired Utah engineer Charles A. Kyle to oversee because of his extensive experience in the design and construction of steel bridges. Over the next month, the commissioners and Kyle hammered out the details of Montana's new bridge-building system, which included guidelines for letting contracts and distribution of standardized bid sheets to all the counties. Kyle also devised thirteen standardized steel truss bridge designs and one combination wood and steel truss design, which he sent to the counties by mid-July of that year. Although these bridge plans were housed at the county courthouses, the commission required contractors to obtain final plans from the bridge department in Helena to ensure that the contractors built the bridge to the specifications defined in the standard plans. The counties remained responsible for letting the contracts and paying for the structures. The state, however, supervised the construction and inspected the bridges before authorizing payments to the contractors. Even though the law encouraged the counties to follow the new process, a few hold-outs, including Sweet Grass and Valley counties, ignored the law and continued to build any type of bridge they wanted or adapted the state designs for their own purposes. Most counties welcomed the involvement of the state bridge department in their bridge projects.[22]

On July 18, 1915, the highway commission supervised its first contract letting for a 240-foot bridge over the Bitterroot River near Florence in Ravalli County. A few days later, Valley County awarded a contract to the Illinois Steel Bridge Company for a commission-designed structure across Beaver Creek. Shortly after the contractor completed the bridge, Kyle discovered the structure's deck did not meet the 20-ton standard load limit specified by the state. The contractor never submitted shop drawings of the structure to the commission. Instead, it bypassed the commission and sent them directly to the county surveyor, who approved the plans. Although the county eventually strengthened the Beaver Creek bridge, the episode demonstrated that even with the standards the counties could still modify the designs without any serious repercussions from the state.[23]

Browne's Bridge (24BE1534/24MA1210) on the Big Hole River just south of Melrose is the oldest remaining through truss bridge in Montana that utilized the highway commission's standardized bridge plans. It is a classic example of the standardized commission-designed riveted Warren through truss bridge. Unlike the pin-connected Pratt trusses, designed primarily for horse and wagon traffic, highway department engineers designed the sturdy Warren trusses for automobile and tractor traffic. Browne's Bridge is a single-span structure located just a few yards downstream of the original site of Browne's Bridge, an old toll bridge built in 1866. By 1915, old age and high water caused both Beaverhead and Madison counties to condemn the old toll bridge. Residents continued to use it despite the center span's tendency to sway whenever any weight was placed on it. In September 1915, the highway commission and county commissioners let the contract for a new bridge to Missoula contractor O. E. Peppard. Within weeks of completion of the new bridge, high water washed out the old bridge, which had become a "melancholy reminder of the passing of the old west, and its pioneer men and their works."[24]

By the end of its first year, the commission's bridge department had worked through the procedural details of its new system and regularly provided plans to the counties for steel truss bridges. The commission promoted Kyle to Chief Bridge Engineer and authorized him to hire "competent engineers to supervise the construction of new steel bridges" in the state. Indeed, by the end of 1915, Kyle and his assistants had overseen the counties' construction of nearly seventy steel bridges in the state. Within a year, Kyle had also developed standard plans for timber, reinforced concrete, and steel stringer bridges.[25]

In 1916, the highway commission and the U.S. Department of Agriculture, which oversaw the federal Bureau of Public Roads (BPR) and the Forest Service, began plans to build two large bridges on the Yellowstone Trail in Mineral County. Responding to pressure from the lumber companies and the Yellowstone Trail Association, Mineral County had embarked on an ambitious bridge-building program just two years after its formation from the western part of Missoula County. In its original incarnation, the Yellowstone Trail incorporated portions of the old Mullan Road on the north side of the Clark Fork west of Alberton, a small Milwaukee Road division point in eastern Mineral County. By 1916, however, plans were underway in the county to move it to the south side of the river to St. Regis where it would cross over again to the north side. The Alberton and St. Regis bridges were critical to county's plan. The bridge department designed both bridges, but because both structures would be located on a county road within a national forest, the USDA and Mineral County shared in the funding for the projects. The county let contracts to the Wausau Iron Works of Wausau, Wisconsin for the St. Regis bridge and the Lord Construction Company of Missoula for the Alberton bridge in 1916. Of the two structures, only the Alberton bridge still exists intact. Now called the Natural Pier Bridge (24MN243), it replaced an old timber through truss built by Missoula County. Both the old and the new bridges utilized a rock outcrop in the Clark Fork for one of its piers. Along with incorporating the outcrop into its plan, the bridge is a standard highway commission-designed, two-span riveted Warren through truss. The county ran out of funds twice while building the structure, forcing two bond elections and a grant from the USDA to complete the bridge in late 1918.[26]

The state legislature reorganized the highway commission in 1917 to better manage the additional responsibilities caused by Montana's $1.5 million share of the first Federal Aid Highway Act. The policies and procedures enacted by the commission concerning the bridge department remained in effect. The restructured highway commission was more concerned with road-building than bridges – with the exception of two Great Falls reinforced concrete bridges on Second Avenue North and Tenth Street (24CA308). Despite the aesthetic appeal of the reinforced concrete bridges at Great Falls, the commission continued to focus on steel as its material of choice. In late 1920, the highway commission initiated construction of what would be the largest steel truss bridge built by it to that date. The bridge would incorporate all the latest design features for steel Warren trusses. The Bonner Bridge (24MO451) on the Yellowstone Trail in Missoula County replaced an aging through truss that had been badly damaged in the 1908 flood. In 1919, the highway commission announced plans to replace the failing bridge. Missoula County awarded the contract for the new bridge to the Security Bridge Company in December 1920, which began work on it in March 1921.[27]

Within weeks, however, the commissioners received complaints from Missoula County regarding the poor condition of the detour and from the Security Bridge Company that a change in the plans required a substantial increase in the tonnage of steel needed to build the bridge for which the firm had not anticipated and not considered in its bid to construct the structure. The commissioners directed the company to make the detour passable and authorized it to adjust its bid and order the additional steel needed to complete the bridge. By early October 1921, Missoula County work crews began construction of the approaches to the bridge. The final cost of the bridge was just under $110,000, making it the most expensive steel bridge built for highway use in Montana up to that time.[28]

The 1920s

The 1920s marked a transitional period in the construction of bridges in Montana. Changes in the organization and funding of the Federal Aid highway system by Congress in 1922 and 1926 had a profound effect on Montana, the State Highway Commission, and the counties. Most notably, was the formation of the Montana Highway Department in 1919. Prior to then, all activities occurred under the aegis of the highway commission, known collectively as the State Highway Commission. With the creation of the department, however, the highway commission became responsible for the political agenda of road and bridge building as well as awarding contracts, managing the department's budget, setting policies, and working with the federal Bureau of Public Roads (BPR). The highway department was responsible for the actual design, construction, and maintenance work on Montana highways. The department operated under the direction of the Chief Engineer, who supervised other department heads, including the bridge department. The Chief Engineer was responsible for ensuring that the highway department carried out the program set by the highway

commissioners. The commission's and highway department's relationship with the BPR also became more formalized in the 1920s. The BPR channeled federal funds to the state, approved all projects scheduled by the department, and had the final approval of plans developed by the state's bridge department. It was also responsible for the design and construction of roads and bridges on federally owned land, such as the national forests and national parks, and on Indian Reservations. The process of road and bridge building in Montana became much more bureaucratically structured in the 1920s as the federal government channeled more money into the state for that purpose.[29]

The Federal Aid Act of 1921 and its 1922 amendment more than doubled the federal allocation for road and bridge construction in Montana. Although the commission used most of the money for road improvements, a substantial amount found its way into the highway department's bridge budget. Prior to 1926, the counties were responsible for the construction of roads and bridges within their jurisdictions. Increasingly during the 1920s, however, the state gradually gained control of highway and bridge construction in Montana by reducing the amount of matching funds needed by the counties. The counties were nominally the lead in the process, but it was the highway commission that controlled the purse strings. In 1926, the commission assumed control of the entire preconstruction and construction process – including payment for the project with federal and state funds. The counties still provided partial funding of bridges, but the commission through the highway department managed the contracts with the builders and decided where the bridges would be located. Steel shortages during World War I disappeared by the early 1920s, allowing bridge department engineers to modify the basic structural designs developed in 1915 to accommodate heavier traffic caused by the evolution of automobiles and commercial trucks. The state's revitalized road and bridge construction program benefitted when returning veterans and out-of-work farmers made labor more plentiful to the contractors.

Although the State Highway Commission funded the construction of many single-span bridges during the 1920s, it could afford only a few major bridge projects. One of those was a new bridge across the Yellowstone River at Glendive (24DW290; Listed 1988). The Commission contracted with the Boomer, McGuire, and Blakeslee Company of Great Falls to build this six-span Warren through truss bridge on Bell Street in Glendive in 1924. The bridge, which took two years to build, replaced a truss bridge that had been originally constructed in 1895 and rebuilt in 1900. With the completion of the new bridge, the state demolished the old structure.[30]

Big bridges in Montana's picturesque areas along primary tourist travel corridors also garnered much attention by the highway commissioners. The main east-west route through the state was U.S. Highway 10, the federal designation of the old Yellowstone Trail; today Interstates 90 and 94 east of Billings parallels much of old U.S. 10. In western Montana, bridge engineers wrestled with the same problems that plagued John Mullan in the mid-nineteenth century – the terrain through which the St. Regis and Clark Fork rivers pass. The rugged environment, though, also provided them the opportunity to design some truly spectacular bridges that enhanced the motorists' experience in western Montana. One of the most picturesque bridges in Montana is the Scenic Bridge (24MN304) located four miles east of Tarkio in Mineral County. The bridge spans a spectacular Clark Fork chasm underneath a Milwaukee Road Railroad bridge on the Interstate 90 frontage east of Tarkio.

Sometime in the late 19th or early 20th centuries, Missoula County constructed a timber through truss bridge across the Clark Fork in the Alberton Gorge. It was situated in a precipitous canyon on sharp "S" curves at the bottom of steep approach roads. The narrow bridge reportedly filled motorists with fear. In early 1926, the Mineral County commissioners condemned the bridge and called for a special bond election to raise money to match federal and state funds to construct a new bridge. The election succeeded by only eighteen votes. The William P. Roscoe Company of Billings began construction of the bridge in the late summer of 1927. Roscoe, a former vice-president of the Security Bridge Company, had formed his own contracting firm in 1926. Structural problems with the foundation of the bridge drove final construction costs to more than $85,000. Roscoe completed the three-span, 424-foot Pratt deck truss structure in early May 1928.[31]

Mineral County businessmen hoped the bridge would provide a boost to the county's economy. On May 8, businessmen from Superior and Alberton and the county commissioners met at the bridge site to plan for the official opening of the structure, which they set for May 13. The commissioners officially christened it the Scenic Bridge in an attempt to cash in on the tourism potential of the deck truss structure. Over a thousand people attended the grand opening. Superior resident Eugene Harpole presided over the festivities, which included sporting events, a picnic, and music provided by Missoula's Legion Drum Corps. The local chambers of commerce furnished ice cream and coffee to the celebrants. Keynote speaker Howard Toole, a Missoula attorney, spoke to the crowd from the west end of the structure. The *Mineral Independent* called the structure "one of the finest bridges in Montana, and outside cities, perhaps one of

the most beautiful in the west."[32]

The Scenic Bridge is one of only a handful of deck truss bridges built by the highway department from 1926 to 1941. The trusses on this type of bridge are located under the deck instead of alongside the driving lanes. This type was used primarily on river gorge crossings and provided unobstructed views of what often was very impressive scenery. All of the deck truss bridges built by the Commission during the 1920s, including the Gardiner Bridge, are of riveted Pratt trusses. Increasing and heavier traffic demands compelled the Commission to switch to riveted Warren trusses for deck truss bridges during the 1930s. The Scenic Bridge and another deck truss at nearby Cyr (24MN305) provide magnificent views of the Alberton Gorge and surrounding area. The Scenic Bridge perhaps influenced the thinking of the highway commissioners and the BPR about how a bridge could take advantage of and enhance the landscape of a scenic area when it began planning for the construction of a new bridge at Gardiner (24PA790) in December 1927. The new bridge generated debate about both location and the picturesque qualities of the north entrance to Yellowstone National Park. The highway department began planning for a deck truss bridge at Gardiner in late 1927 to replace a deteriorated and unsafe through-truss bridge. The bridge project was tied to a major highway project to relocate U.S. Highway 89 south from Corwin Springs through Yankee Jim Canyon to Gardiner to provide a safer highway for automobile traffic to the country's first national park. The proximity to Yellowstone National Park though, sparked a confrontation between the highway commission and the Bureau of Public Roads, which had the final approval of the project, about the bridge design and the federal funds allocated to the project. Also involved in the debate was the Livingston business community and the National Park Service, which saw the new bridge as an opportunity to provide an aesthetically pleasing entrance to the park through Gardiner.[33]

The Park Service proposed that the new bridge be located downstream of the old bridge, while the highway commission insisted that it be built at the site of the old bridge. The disagreement eventually dragged in Park Service Director Horace Albright and BPR Chief Engineer Laurence Hewes in July 1929. Highway Department chief engineer Ralph Rader met with the men in Gardiner to discuss the structure's location, but there was little room for compromise, even after the county commissioners threatened to withdraw their $10,000 contribution to the project. Hewes, an engineer known in the BPR for his attention to details, sided with Albright in the controversy and supported the downstream site based on its "aesthetic and landscape viewpoint" as an approach to the park's entrance.[34]

A second meeting held in Livingston in September failed to produce any agreement between federal officials, state agencies, and county commissioners. The highway commission and Rader countered the Park Service's insistence on the alternate location by observing that two bridges would be necessary to please the Park Service. Rader believed that a second bridge was redundant; besides, there was only enough money in the budget for one. Eventually, in September 1929, the Commission and federal agencies compromised and agreed to construct a bridge on Second Street. The state commissioners agreed to build a second bridge at Gardiner to improve the aesthetics of the approach to the park once the Park Service made funds available. The Great Depression interceded in 1930 and a second bridge was never built.[35]

By the time the agencies reached a compromise, the only way to get across the river at Gardiner was either the railroad bridge or a precarious pedestrian suspension bridge. The BPR completed the highway bridge in 1930, but the highway department could not finish the approaches until the following year because of bad weather. The absence of graded approaches failed to stop Gardiner residents from using the bridge – they simply leaned ladders at each end of the bridge and climbed up and down from the deck.[36]

The 1920s was a decade of tremendous expansion for Montana's highway system. By 1928, the highway commission had improved over twenty percent of the state's 4,673 road miles by straightening dangerous alignments, grading, improving drainage, installing guardrails, and surfacing dirt roads with gravel, scoria, asphalt, and, occasionally, concrete. It also constructed nearly 400 bridges. Even with the improvements, Montana's roads had a reputation for being truly abysmal. Popular Westerns writer Hoffman Birney complained in 1930 that Montana's roads were the "poorest of any state in the Union. Even the glorious scenery of the Rockies can't entirely make up for ruts, chug-holes, mud, and detours to say nothing of broken springs or stone-bruised tires." Sturdy, resilient, and less prone to wash-outs than they had been in the past, bridges fared much better than the roads. Many of the bridges built by the highway department in the 1920s were still in use on the state's highway system at the turn of the 21st century. The Great Depression, however, would mark a period of consolidation as economic calamity forced the Montana and federal governments to improve the system through emergency make-work projects. The construction materials would remain the same, but many of the designs would be modified and simplified to make them easier to construct and less expensive to build. The bridges of the 1930s fit perfectly with the decade – they were spare in appearance and functional in design. Because of the simplicity and relative ease of assembly, they were

perfect for the federal government's make-work programs of the Great Depression.[37]

The 1930s

The Great Depression devastated Montana. Drought and declining prices for agricultural goods, copper, timber, and oil put thousands of Montanans out of work and their families in desperate need of relief. Ironically, hard times contributed to the transformation of Montana's transportation system from one of the worst in the United States to one of the nation's best in less than a decade. President Franklin Delano Roosevelt's New Deal programs put unemployed Montanans to work on a variety of public works projects, including improvement or construction of the state's roads and bridges. The transformation, however, was not always an easy one as federal and state governments struggled to work out the details of the funding formulas, strict employment guidelines, and set priorities for the road and bridge building programs.

From 1930 to 1941, the Montana Highway Department built nearly 3,000 miles of road and 1,213 bridges, many of which still survive on the state's two lane roads. The federal government believed that one of the paths to economic recovery was highway projects. Only about seventeen percent of the bridges built by the department during the 1930s were steel truss, reinforced concrete, and girder bridges. Most were inexpensive timber structures designed to span the countless creeks and dry coulees in eastern Montana. They also met the intent of the federal government's economic relief programs: they required large numbers of laborers. While not structurally distinctive, timber bridges played a vital role in the state's economic recovery by putting hundreds of unemployed men back to work.[38]

While reinforced concrete did not meet the needs of the federal and state road-building programs of the Great Depression, neither did steel truss bridges. Increasingly during the decade, the department moved away from the use of through and pony truss structures because of high construction costs, chronic steel shortages, the dependence on skilled labor, and height and width clearance restrictions. Instead, it reserved trusses for wide river crossings on the Missouri, Clark Fork, Milk, Powder, Bitterroot, and Yellowstone rivers. The most effective bridges for intermediate crossings were steel stringer and girder bridges. They did not have the height restrictions of the trusses and did not require as much steel to build a good functional river bridge. In many ways, these types of bridges also fit better with the Montana engineers' policy of building bridges of "honest structural design with simple lines, and . . . good workmanship." Like today's prestressed concrete structures, steel stringer and girder bridges were not much to look at, but they were functional.[39]

Benedict J. Ornburn supervised the highway department's expanded design section from 1929 to 1942. Born in Granville, Missouri in 1900, he attended the University of Missouri and, after graduation, worked for the Missouri Highway Department. In November 1929, Chief Engineer Ralph Rader hired Ornburn as a design engineer for the Montana Highway Department. The highway commissioners promoted him to Chief Bridge Engineer of the highway department in 1935. Ornburn had very specific ideas about which designs were appropriate for specific locations. He was also well aware the public was interested in bridge aesthetics. In 1938, engineer Vere Maun wrote in the highway department's newsletter, *The Center Line*, that "In recent years both engineers and the public have become more critical of the appearance of bridges and are asking that where possible, they harmonize with the surroundings." Ornburn certainly influenced Maun's faith in the "good appearance" of bridges, since his designs included "simple lines" that kept the structures "in proportion to [their] environment." That philosophy, promoted by Ornburn, was the guiding principle for the bridge department during the 1930s. By all accounts, Ornburn was a taskmaster who demanded the best from his engineers and designers. He resigned his position at the highway department in April 1942 and went to work in the war industries.[40]

One of the bridge engineers hired by Ben Ornburn was John H. Morrison, Jr. who later became the department's chief bridge designer. Born in Manchester, England in August 1902, Morrison emigrated to the United States with his family in 1911 and became a U.S. citizen in 1916. Two years later, he went to work as an apprentice surveyor and draftsman for Lewis Oldershaw, a consulting engineer in New Britain, Connecticut. In 1922 Morrison and his younger brother headed west from New Britain to see the Pacific Ocean. In October of that year, they arrived near the community of Arlee, Montana, where they went to work for a Montana Highway Department location crew, which was plotting an alignment for U.S. Highway 93. From 1922 to 1930, Morrison obtained practical experience in the field and also obtained a degree in engineering from Montana State College in Bozeman. In 1930, he accepted a job with the highway department as a bridge designer and project engineer. The highway commission promoted Morrison to the position

of Chief Bridge Designer in 1935.[41]

Before the onset of the Great Depression, the federal law stipulated that the state match the federal funds provided to Montana. The state raised the funds primarily through taxes on gasoline sold in the state. After 1930, however, the state did not have the revenue necessary to match the federal funds. Beginning in 1930, the federal government funded Montana's bridge program through a series of emergency relief acts. The legislation, simply stated, provided Montana with its federal funding allocation without the matching money from the state. Instead, the federal government planned to withhold portions of the state's future allocations until the amount was paid off. Funding provided by the U.S. government by the Hoover Administration, however, was quite a bit different than during Roosevelt's New Deal a few years later. In December 1930, the Administration pushed through its first Federal Road Relief Act. It allocated $1.67 million to Montana for road and bridge projects. In early 1931, the state legislature enacted the first of several debentures to supplement the federal money.[42]

Importantly, Hoover's federal relief legislation placed restrictions on the money to provide the maximum amount of employment and, therefore, ease the states' unemployment problems. Specifically, Congress stipulated contractors hire local workers, maintain maximum thirty hour work weeks, and that only a minimal amount of machinery be used on road and bridge projects to ensure the need for manual labor in quantity. The State Highway Commissioners warned any contractor who did not comply with the employment provisions would be disqualified from bidding on future contracts. The system worked well enough that the Roosevelt Administration continued the employment policies in its New Deal programs.[43]

The commission contracted the first of several emergency relief projects in late January 1931. Among those were four bridge projects, including the Yellowstone River bridge at Sidney. Local campaigning for the bridge had begun in the late 1920s, when a group of northeastern Montana businessmen petitioned the commission for a crossing at Sidney. The bridge was an important part of their plan to develop a north-south road through the region. Fortunately for them, the proposed bridge also fit nicely with the commission's plans to build new bridges across the upper Missouri and Yellowstone rivers to facilitate the shipping of agricultural and manufactured goods between Canada, the United States, and Mexico. The Portland Bridge Company completed the massive six-span, 1,220-foot, riveted Pennsylvania through truss structure in June 1932. The *Sidney Herald* followed the company's progress on the bridge and was well aware of its significance to not only Sidney, but the residents on the east side of the Yellowstone, who were isolated there eight months of the year because there was no way to cross the river after the ice broke up in the spring.[44]

The Sidney Chamber of Commerce sponsored a daylong bridge dedication celebration on July 4th. North Dakota governor George Shafer, Montana Lieutenant Governor and gubernatorial candidate Frank Hazelbaker, and State Highway Commission chairman Oliver S. Warden spoke to a crowd of over 8,000 area residents while standing on a flag-draped span of the new bridge. Festivities included a tug-of-war between representatives from the east and west sides of the Yellowstone River, a golf tournament, musical entertainment by the fifty-piece Medicine Lake band, a free barbeque, and a fly-over by a squadron of private planes from North Dakota. The Sidney and Culbertson bridges opened up a major route between Regina, Saskatchewan and points south that significantly enhanced the agricultural economy of northeastern Montana by including the region on a significant north-south highway route.[45]

The Sidney Bridge was the exception during that initial period of direct federal involvement in bridge projects. Most of the funds expended by the highway commission were for timber and reinforced concrete bridges built in conjunction with highway improvement projects. The commissioners scheduled few large steel truss bridges for construction because they required skilled steel and concrete workers, riveters, and other tradesmen who did not meet the prerequisite of utilizing mostly unskilled labor. From 1930 to May 1933, less than one percent of the 504 bridges built by the highway department were steel trusses.

Notwithstanding the infusion of federal funds in 1931 and even after a second round of relief money from Congress in 1932, the Montana Highway Department and the contractors continued to struggle economically. Evidence suggests some contractors during the early 1930s bid on projects for which they were not qualified. In July 1931, Edward J. Dunnigan, Inc. of St. Paul, Minnesota, obtained a contract from the commission to build a steel truss bridge across the Big Horn River at Custer (24TE120/24YL1603). The company, however, severely underbid the project in order to get the contract. Within a few months, it became clear to the highway department's Chief Engineer Ralph Rader and Chief Bridge Engineer Ben Ornburn that Dunnigan was not up to the task of building the four-span Pennsylvania through- truss bridge. Even though Dunnigan promised to take "steps which [would] probably result in more satisfactory progress in the future," it never did catch up; the company did not pay its bills, and the highway commissioners eventually declared

Dunnigan in default of the contract. Highway department workers completed construction of the bridge in late 1933.[46]

In November 1932, the highway commissioners hired the William P. Roscoe Company of Billings for a new bridge across the Missouri River just northeast of Wolf Creek (24LC131). The bridge, along with the Missouri River bridge at Hardy (24CA389), were components of the new U.S. Highway 91 alignment between Great Falls and Helena. Prior to 1932, motorists traveling between the two cities had to take a circuitous route around the Missouri River canyon that had changed little since it was part of the old territorial Benton Road. The new road through the scenic Missouri River canyon included a new type of truss bridge that had hitherto not been constructed in Montana. The Wolf Creek Bridge is a simply-supported continuous span Warren through truss. Instead of individual spans each delineated at the piers, a continuous through truss is essentially one single truss resting on three or more piers. The 476-foot bridge was the first continuous span truss built by the highway department in Montana.

Because the project was funded under the strict employment guidelines of the 1932 federal relief law, Roscoe had to make certain he followed its stipulations. The novelty of the bridge's design proved irresistible to the highway department's bridge staff, who made frequent trips to the construction site to observe its progress. The regular presence of so many state-employed engineers at the site made Roscoe nervous and compelled him to write Ben Ornburn a letter accusing him of sending his employees to spy on him. Ornburn responded that "If men have been placed on your work as detectives, this [has] been done without the knowledge of the State Highway Department. We have never resorted to placing 'stool pigeons' on any contractors work . . . It is our intention to make every reasonable effort to see that the labor provisions are enforced, but you can rest assured that we will do so by fair methods . . . ." He was not quite truthful with Roscoe. The highway department may not have had "stool pigeons" on every road and bridge project, but it did have a resident engineer on all its projects. Project Field Engineer H. H. List's job was to make sure that Roscoe followed the highway department's plans and complied with the federal employment provisions. If the contractor failed to comply, List reported back to Chief Engineer Rader, who reported the violation to the state highway commissioners.[47]

Because the Wolf Creek Bridge required new construction techniques, department engineers and Roscoe experimented with its construction as they went along. The continuous span design meant that the bridge could not be permanently riveted until the entire structure had been assembled. The engineers were unsure about how it would function as an interconnected structure in regards to stresses and reactions. The engineers and contractor tested it by raising the structure from the piers and abutments to make sure it functioned correctly, it was raised with hydraulic jacks equipped with pressure gauges borrowed by the Oregon Highway Department. The Wolf Creek Bridge was the first of eight continuous through truss bridges built by the department through 1946. It was also the last major bridge built in Montana under the auspices of the Hoover Administration's relief programs.[48]

The New Deal

Within three months of his inauguration in March 1933, President Franklin Roosevelt pushed through legislation creating the National Industrial Recovery Act (NIRA). Title II of the Act created the Public Works Administration (PWA), which distributed the $400 million allocated to the states for public works projects, including roads and bridges. Montana received nearly $7.5 million from the PWA specifically for road and bridge construction. The PWA initiated the greatest boom in road and bridge construction yet seen in Montana. By the time the U.S. Supreme Court declared the NIRA unconstitutional in May 1935, the Montana Highway Department had overseen the construction of 228 bridges, only five of which were steel truss structures. Prior federal legislation funded projects occurred only on the state's primary highway system. The NIRA's road and bridge program, however, was the first real federal effort to integrate a system of primary highways, secondary farm-to-market roads, and urban routes into a national transportation system.[49]

The NIRA continued many of the policies first used under Hoover's Emergency Relief Act. Primarily, it specified thirty hour work weeks, minimal use of heavy equipment, strict wage scales for skilled and unskilled labor, and, importantly, the hiring of as much local labor as possible. NIRA also mandated labor be obtained through district National Reemployment Service offices and that the contractors keep detailed records of wages paid, number of men employed, and hours worked. NIRA's intent was to put as many men to work on public works projects as possible. Oftentimes, however, the contractors misunderstood the employment regulations or just ignored them. Despite the increased paperwork and the lower wages, contractors rarely had problems obtaining labor on road and bridge projects.[50]

On only one bridge project during the 1930s did labor unrest play a major role in its construction. The Orange Street bridge (HAER No. MT-99; now demolished) across the Clark Fork in Missoula best represented the cooperation between the public and the state's

bridge engineers to design a structure that harmonized with its surroundings. The bridge was a seven-span Warren deck truss structure. Deck trusses in the 1930s served much as the old reinforced concrete arch bridges did during the 1920s, by providing a visually stunning gateway to a community. Although many unemployed Montanans were happy to go back to work, the Orange Street bridge project demonstrated there was some dissatisfaction by the Montana Trades and Labor Council and Teamsters Union over the wages paid to the workers stipulated by federal law. The PWA's successor agency, the Works Progress Administration (WPA), stipulated wage scales based on the skills of the workers. In many cases, the wages specified by the WPA were less than the scales negotiated by the unions with the contractors prior to 1935. Although labor representatives frequently petitioned the state highway commissioners to resolve the inequity, the commissioners' hands were tied by federal regulations. In this case, labor unrest distinguished the Orange Street bridge project because of the unions' frustration over the standard wages paid under the terms of the WPA. The Montana Trades and Labor Council picketed the building site during much of the time the bridge was under construction. At the neighboring Milwaukee Road overpass project, five Teamsters' Union members attacked and severely beat contractor Tom Staunton and an assistant outside a Missoula restaurant for hiring scabs on his bridge project. Regardless of the trouble experienced on the Orange Street bridge projects, labor problems on Montana bridge projects during the 1930s were rare.[51]

Projects funded and built during the New Deal years included the long-awaited Missouri River bridge at Culbertson (demolished 1988). Before the 1930s, the Missouri River inhibited the economic development of northeastern Montana. In 1930, however, an effort by developers resulted in the construction of the Wolf Point Bridge (24RV438/24MC438; Listed 1997), which reduced the area's economic and social isolation by providing direct access to central and southern Montana. The citizens' campaign to get the Wolf Point Bridge built provided the model for future bridge projects in the region. On a wintry night in December 1929, a group of farmers from the south side of the Missouri River crossed the ice to meet with the Culbertson Commercial Club about building a bridge between Roosevelt and Richland counties. For much of the year, residents south of the river depended on a paddlewheel ferry to carry them across the Missouri to Culbertson, where the Great Northern Railway maintained a station and depot. During the winter months, they either stayed at home or risked crossing the Missouri on the ice. The farmers' appeal could not have been timed better. Plans were already underway by northeastern Montana promoters to build a road from Saskatchewan south over the Missouri to connect with U. S. Highway 10 near Glendive.[52]

Just a couple of months later, the business promoters in northeastern Montana and southern Saskatchewan formed two groups, the Missouri Bridge Association and the Sioux Pass Missouri River Road-Bridge Association. Fifteen members of both organizations petitioned the State Highway Commission to construct the road and bridge. Although the commissioners supported the project, they did not have the federal funds necessary for the project. The groups, they said, needed to raise $120,000 to pay for part of the project before they would discuss it with the Bureau of Public Roads. Through county bond elections in Roosevelt, Richland, and Sheridan counties and a $30,000 contribution from the Great Northern Railway, the organizations were able to raise the money for the project. True to their word, the commissioners met with the BPR and instructed the highway department's chief bridge engineer, Ben Ornburn, to begin designing the structure. State and federal funds, however, were not yet forthcoming. Because the Missouri River was navigable at Culbertson, the highway department also needed the approval of the War Department's U.S Army Corps of Engineers and Congress before the bridge could be built.[53]

The bridge did not come about quickly or smoothly. The State Highway Commission discovered that the revenues it used to match the federal allotment from the gas tax had dried up and were not available for the project. President's Hoover's relief programs provided some money, but not enough to build any big projects like a bridge across the Missouri River. Consequently, the proposed Culbertson Bridge languished for nearly two years before the highway commission had enough money to fund its portion of the bridge – and only because FDR's recently enacted NIRA legislation provided $7,439,748 to Montana for road and bridge projects. Contractors flocked to Culbertson during the summer of 1933 in anticipation of the commission awarding the project. On August 23, 1933, the State Highway Commission finally let the "long cherished dream" to contract. The Seattle-based Puget Sound Construction Company won it with a low bid of $305,156.70, about $80,000 below Ben Ornburn's estimate.[54]

The Culbertson Bridge was a seven-span, 1,169-foot structure. It consisted of two 380-foot Pennsylvania through- truss spans, three 100-foot Warren deck truss spans, and two 50-foot steel I-beam spans. The bridge was 21-feet wide with just barely enough room for two ten-foot driving lanes. The bridge's superstructure consisted of an alloy of silicon and carbon steel, which kept the price of the structure affordable.[55]

Like the Sidney Bridge, the bridge's promoters in northeastern Montana planned a celebration to dedicate the new bridge on September 22nd. Festivities included speeches by the key people involved in the construction of the bridge, including Culbertson Commercial Club president John W. Stahl, Chief Highway Engineer Ralph Rader, Democratic Senate candidate James Murray, and Ben Ornburn among others. The keynote address was given by Senator Burton K. Wheeler, who called the completion of the bridge an integral part of the success of the Fort Peck Dam project.[56]

Increased federal funding for road and bridge construction provided the Montana Highway Department the opportunity to replace many older bridges in the state with structures comparable to the Culbertson bridge. Many of the older structures dated to the late nineteenth and early twentieth centuries and had been badly damaged by vehicular collisions, ice jams, or were just worn out. In March 1930, high winds blew down a span of the new Clark Fork bridge at Paradise in northwestern Montana. Ice destroyed the Yellowstone River bridge at Terry, and the old East Bridge in Billings had become so unsafe that the county stationed watchmen at both ends to prevent vehicles weighing more than five tons from crossing it.[57]

Collisions proved more damaging to bridges than natural calamities. In the early evening of November 3, 1934, an oil tanker slammed into the north span of the 1914 Yellowstone River bridge south of Laurel. The force of the collision pushed the span off the abutments and into the river. A truck, driven by Fromberg farmer Charles Carroll, was halfway across the span when the tanker knocked it off the piers. The span slowly sank, the "water of the river gurgling under the wood flooring." Deputy sheriff Herbert Bailey and residents of a transient camp south of the river prevented any serious accidents by blocking the approaches to the bridge. Because engineers could not salvage the structure, the state highway commissioners began plans to construct a new bridge south of the city. Laurel residents did not dispute the need for a new bridge, but were concerned about the commission's initial plans to locate it a mile downstream which would have bypassed Laurel's business district. After much debate, the commissioners decided to build a new bridge at the site of the old bridge on U.S. 310.[58]

The ready availability of federal funds gave the highway department the opportunity to replace many bridges that had become so structurally deficient because of age that they could no longer safely carry traffic. Often the commission worked with local chambers of commerce and other business interests, like Laurel's, to ensure that it built a structure that would have maximum benefit to the concerned communities. In September 1934, the highway commission awarded an $86,430 contract to Butte contractor William A. O'Brien for the construction of a new bridge to replace Billings' old East Bridge. The project was the result of intense lobbying of the highway commission by the Billings Shipping Corporation and the Billings Traffic Bureau, which believed the old East Bridge could not be rehabilitated to withstand the demands placed on it by modern truck traffic. The new East Bridge was the second continuous span steel through truss built by the highway department. Completed in late June 1935, the *Billings Gazette* called it a "modern structure in all details," the continuous spans and reinforced concrete pier "giving the appearance of a single span" structure.[59]

In May 1935, the U.S. Supreme Court declared most provisions of the National Industrial Recovery Act of 1933 unconstitutional. Consequently, the Roosevelt Administration folded parts of the Public Works Administration into other federal agencies and created new ones, including the Works Progress Administration. Under the auspices of the WPA regulations (which were virtually the same as those of the PWA), the state highway commission authorized the construction of 502 steel, timber, and reinforced concrete bridges between May 1935 and December 1941.[60]

As the 1930s drew to a close and war appeared unavoidable, the priorities of the state highway commissioners and the department engineers were redirected at the direction of the Bureau of Public Roads. Increasingly, discussions in commission meetings concentrated on the integration of Montana's roads and bridges into a national military strategic highway network. The BPR and Montana highway commission discussed at length which roads in the Treasure State had the greatest value to the national defense and which roads were of secondary importance to that purpose. Primary highways, like U.S. Highways 10 and 91, best served the nation's interests in the event of a national emergency because of their connections to strategically important places in Montana and their interstate connections. Secondary roads functioned primarily as farm-to-market routes and were not as critical to the defense system. The BPR and state highway commission established three categories of strategically important defense highways in April 1941. The First Priority highways included U.S. Highway 10 (the main east-west highway in the state that was supplanted by Interstates 90 and 94) and Highway 91, which today parallels Interstate 15. These two highways, along with U.S. 87 between the Wyoming border and Billings, provided the necessary interstate connections and linked Butte, Anaconda, Helena, Great Falls, Billings, and the strategically important chrome mines in Stillwater County to the system. Second and Third Priority roads provided connections to important railroad centers and less important manufacturing and mining centers in Montana.[61]

The strategic highway system had a profound impact on Montana's bridge program. Because of the redirection of steel and oil supplies to military industries, the Public Roads Administration (formerly the Bureau of Public Roads) and the state highway commission prioritized its construction schedule to best meet the needs of the strategic highway system. The War Department deemed projects on First Priority highways as critical to national defense and directed that limited supplies of steel be utilized on those roads first. The highway commission and PRA then prioritized projects on the secondary system based on their proximity to strategically important main roads. As a result, it took years for the contractors to complete some bridge projects because they could not get the necessary building materials. Discussions between the commissioners and the highway department's engineers involved the modifications of existing roads and bridges to carry heavy military loads and debate on whether to post guards at important highway bridges in the event the United States got involved in the war.[62]

From April to December 1941, the commissioners let the majority of its contracts for timber, steel stringer, and girder bridges rather than road projects, which required large amounts of oil for surfacing. Not surprisingly, the biggest project was also located on a Priority One strategic highway. The Big Horn River Bridge (24BH2559; now demolished) on U.S. Highway 87 just south of Hardin was the fourth continuous span steel through truss bridge designed by the highway department's bridge engineers. The department's most prolific bridge builder, William Roscoe, got the contract to build the structure in May 1941. Roscoe had barely completed the substructure and approaches for the bridge when the Japanese attacked Pearl Harbor on December 7, 1941. Although the bridge was located on a First Priority defense highway, Roscoe could not get the 466 tons of structural steel he needed to build the bridge, forcing him to shut down the project. Roscoe finally obtained the steel, but then found that all the skilled steel workers in Montana had either been drafted, found work in the shipyards on the West Coast, or were tied up in other strategically vital projects in the state. Because of the labor shortage, Roscoe had to import steel workers from the West Coast, which caused the highway commission to allocate more money to finish the contract. The Big Horn River bridge was one of several bridge projects impacted by the country's entry into World War II. While all were eventually completed, it was not without considerable delays, design modifications, and complaints by the contractors.[63]

The Japanese attack on Pearl Harbor and Hitler's declaration of war against the United States ended the bridge-building boom, which peaked in 1936 and transformed Montana's transportation landscape. The Public Roads Administration, state highway commission, and the highway department built well over 1,200 bridges of all shapes, sizes, and types between 1930 and 1941. Bridges built by the counties on what would later become Federal Aid highways and "feeder" roads in the late nineteenth and early twentieth centuries were replaced by the department in an effort to modernize the state's roads. Much of the program was intended to make Montana's highways safer by providing sturdy and reliable timber, steel, and reinforced concrete bridges. Steel and reinforced concrete grade separations, moreover, provided safer crossings at busy railroad crossings. Much of the Depression-era infrastructure survives along Montana's two-lane roads. Timber, steel stringer, and girder bridges are common on the state's highways. Although not as common as before, the steel truss bridges bear mute testimony to the utilitarian art of bridge engineering prior to World War II.

From replacing deteriorated county bridges in the 1920s to expanding Montana's infrastructure during the Great Depression, the Montana Highway Department struggled to keep up with the demands placed on it by county, state, and federal agencies. World War II brought a brief respite due to material shortages and the federal government's focus on the war effort. Beginning in 1948, however, road and bridge building boomed again as the post-war economic boom, commercial trucking, recreational tourism, and the Cold War created need for improved roads and bridges. The Cold War drove much of that economic expansion as the federal government reacted to its new role as the avatar of democracy in the world. The Cold War manifested itself domestically in a variety of ways, including increased defense spending for improvement of the country's transportation infrastructure, which culminated in the Federal Aid Highway Act of 1956 which created the Interstate highway system.

World War II and the Post-War Years

Within weeks of the Japanese attack on Pearl Harbor and President Franklin Roosevelt's declaration of war, the highway commissioners canceled all bridge projects scheduled for construction for the next few years, but allowed those already underway to be completed. Only those projects deemed essential to the national defense would certified by the War Department. Unless the highway or bridge was located on a Priority One road of the Strategic Highway Network, the Army and Navy would not authorize the expenditure of federal funds. In Montana, only projects on U.S. Highways 10 and 91 fell into that category. The military retained strict control of steel, restricting its use for projects deemed essential to the war effort. As the highway department's demanding

program during the Great Depression faded, it encouraged its employees to find work in the war industries, promising them their jobs when the "national emergency" ended. The military authorized the construction of both bridges during wartime because of their importance to strategic US Highway 10.[64]

Although Montana was traversed by three major east-west routes (U.S. Highways 2, 10, and 12), only US 10 connected important commercial, industrial, and population centers in the state. The highway, which was later bypassed by Interstates 90 and 94, linked rail centers and oil refineries in Billings and Laurel to the Butte mines, Anaconda smelter, and the sawmills around Missoula to the west coast. By contrast, Highways 2 and 12 passed through sparsely populated agricultural centers. The main north-south route in the state, U.S. Highway 91 provided a connection between Salt Lake City and the Canadian border that included Butte, Helena, and Great Falls. Because the War Department had determined U.S. Highways 10 and 91 critical to the national defense, the highway commission allocated more money to road and bridge projects on those routes than it did on other roads in the state from 1942 to 1956.

The Montana Highway Department concentrated most of its bridge work during the war on U.S. Highway 10 and secondary highways in Stillwater County. Chrome mines critical to the war effort were located in the Beartooth Mountains south of Columbus off Highway 10, the only known source of the ore in the United States. Industries utilized chrome for airplane frames and other war materiel. The aging bridges in the lower Stillwater River valley did not meet federal standards for loading, roadway widths, or overhead clearances. In May 1942, the highway commissioners let a contract to build a timber through truss span across the Yellowstone River at Columbus. Built of wood because of shortages in steel caused by the war effort, the new bridge replaced an aging steel truss that could not handle the demands placed on it by the increased truck traffic between the chrome mines and U.S. Highway 10. Other priority projects related to the mines included timber bridges on Secondary Highway 420 in Stillwater County between Absarokee and the Mouat and Benbow chrome mines.[65]

While the needs of the U.S. national emergency drove the highway department's limited programs during the war, sometimes Mother Nature reasserted herself and placed new demands on the department. On March 27, 1943, ice destroyed the Yellowstone River bridge at Fallon. The force of the jam was so enormous that it sheered off all three concrete piers and carried three of the bridge's four spans out of sight downstream. Witnesses stated that the "entire structure seemed to break up at the same time, the spans falling from their piers and heading down the river on the ice-pack." Built in 1914 by the Security Bridge Company, the bridge had frequently withstood ice on the river, but an exceptionally cold winter followed by a rapid spring thaw caused more ice than the bridge could handle. The loss of the bridge forced motorists on US Highway 10 to make a 55-mile detour around Fallon.[66]

Because the War Department had designated US 10 a strategically important highway in 1941, it called for the construction of a new bridge as soon as possible. By June 1943, the highway department's bridge engineers had designed a continuous span through truss to replace the old structure. Shortly before the highway commissioners awarded the contract for the project, a delegation from Dawson County petitioned it for the construction of the bridge at an alternate site near the community of Marsh. Founded by the Northern Pacific Railway in 1910, Marsh was a shipping point for sugar beets harvested in the area. The proposed new site, the delegation argued, would be more convenient for the many sugar beet farmers living near there than it would for the people of Fallon.[67]

At the urging of the War Production Board and the Public Roads Administration (formerly the Bureau of Public Roads), the highway commissioners decided against the Marsh site for the bridge, which would have added ten miles to U.S. 10 and would delay construction of the strategically important bridge. Also, the Public Roads Administration and Army Corps of Engineers had already approved a new site near Fallon for the structure. The highway commissioners tabled the discussion of the Marsh site and immediately called for bids to construct a bridge across the Yellowstone River near Fallon (24PE618).[68]

The commission awarded the contract to the William P. Roscoe Company in October 1943. Few men have had as big an impact on Montana's construction industry as William P. Roscoe. For thirty years from 1926 to 1956, Roscoe built more bridges in Montana than any other contractor employed by the Montana Highway Department. Although he specialized in the construction of large steel bridges, Roscoe also built reinforced concrete and timber bridges across the state. Born in Wadena, Minnesota, in February 1886, William P. Roscoe dropped out of school in 1902 and worked in South Dakota as a cowboy for several years. In 1905 he returned to Minnesota and went to work for William and Arthur Hewett's Security Bridge Company as a laborer. Within a few years, he worked his way up to foreman and, by October 1915, was the company's vice president when the Hewetts moved Security's headquarters to

Billings. Roscoe had supervised the construction of the first Fallon bridge in 1914 while employed by Security. He continued his association with the company until 1925, when he formed the William P. Roscoe Company in Billings. The following year, William and Arthur Hewett dissolved the Security Bridge Company. Roscoe was one of the few contractors from whom the highway department bridge engineers sought advice on construction problems.[69]

The new Fallon Bridge took Roscoe over a year to complete. Plagued by labor and steel shortages, high water, and inclement weather, he pushed his crews to complete the bridge by the November 1945 deadline. Roscoe hired men from the Crow Reservation to help pour the concrete piers and sub-contracted with the Texas-based John F. Beasley Company to erect the steel trusses. In July 1944, the *Terry Tribune* wrote of the construction that "To a spectator who likes to have both feet planted firmly on the earth, the sight of the steel crew high up in the air erecting and attaching the steel beams is quite a thrill. The top of the spans are 70 feet above the ground and the men walk around the 'I' beams 21 inches in width and on the cross beams nine inches wide as nonchalantly as if traveling on a broad highway." As the bridge neared completion, the highway commission contracted with Stanley Arkwright Company to build the approaches to the structure. The new bridge's location north of town, however, meant that Fallon would be bypassed by US Highway 10.[70]

By mid-October 1944, the Beasley Company had completed riveting together the steel trusses and returned to Texas. All that remained was for Roscoe to finish pouring the concrete deck. He opened the bridge for traffic on November 22, 1944, about one year after construction began on the structure. Flagmen regulated the traffic since the contractor had not yet installed the steel guardrails and workmen were still painting the bridge. The massive five-span continuous through truss bridge contains nearly 1,167 tons of structural steel, 126 tons of reinforcing steel in the piers and concrete deck, and sixteen tons of cast steel. At 1,149-feet, it remained the longest Yellowstone River bridge in Montana until surpassed by the 2,013-foot bridge on Interstate 94 immediately adjacent to it in 1968. Fallon, Glendive, and Terry residents celebrated the opening of the bridge with a concert provided by the communities' high school bands in late November. At about the same time, the highway department opened up a five-span continuous through truss bridge across the Powder River (24PE1810) on U.S. 10 about seven miles southeast of Terry. Also built by the Roscoe Company, the Powder River bridge was the last truss bridge built by the Montana Highway Department.[71]

The War Department funded the construction of the Yellowstone and Powder river bridges because they were critical to the war effort by keeping a significant interstate highway open. But as victory against the Axis powers appeared imminent, Congress began planning for the post-war years. To that end, it passed the Federal Highway Act of 1944, which provided the foundation for the post-war highway-building boom by allocating $1.5 billion to the states for road and bridge construction. The money, however, would not become available to them until after the conclusion of the war. Importantly, the Act created the National System of Interstate and Defense Highways and put more emphasis on roads and bridges in urban areas and secondary highways. Those roads had been largely neglected by the highway commission during the 1930s. The Act also directed Montana Governor John Bonner, the highway department's former chief legal counsel, to create the Montana Highway Planning Committee (MHPC) to study the state's highway needs over the next decade. Changing highway design standards and traffic demands made most of Montana's highway system obsolete by the end of the 1940s. Narrow roads and bridges, tight curves, and poor alignments made to Montana's highways incapable of handling the anticipated demands traffic would place on the state's road infrastructure in the post-war years. Bonner formed the committee to address the problems, the state's future transportation requirements, and how best to finance them.[72]

Built in 1946, the Powder River Bridge southwest of Terry (24PE1810) was the last steel truss bridge designed and constructed by the Montana Highway Department. It replaced a pin-connected bridge built by the Security Bridge Company in the 1910s. In a sense, bridge-building came full circle with the completion of the bridge and the transition to new bridge-building technologies that would culminate in the Interstate highway program in the latter part of the century. Both Powder River bridges represented the epitome of practical bridge engineering at the time they were constructed. One was the product of the old county-sponsored system that had originated in Montana in the 1870s, while the successor in 1946 best represented the state-run program that had begun in 1915. Steel trusses best represented the height of bridge engineering in Montana, but they were not suitable to post-World War II traffic needs. The different phases of steel truss bridge engineering is well represented in Montana with examples ranging from the 1888 Fort Benton Bridge (24CH335), to the utilitarian pin-connected Pratt and riveted Warren trusses to the continuous span through trusses used between 1933 and 1946.

Endnotes for Section "E"

1. Jon Axline, *Conveniences Sorely Needed: Montana's Historic Highway Bridges, 1860-1956*, (Helena: Montana Historical Society, 2005), 12-13, 1, 20; Michael P. Malone, Richard B. Roeder, and William L. Lang, *Montana: A History of Two Centuries*, Rev. ed., (Seattle: University of Washington, 1991), 68; Patricia M. Ingram, *Historic Transportation Routes Through Southwestern Montana*, (Boulder CO: Western Interstate Commission for Higher Education, 1976), 57-61.

2. Fredric L. Quivik, *Historic Bridges of Montana*, (Washington DC: National Park Service, 1982), 24, 27.

3. Axline, *Conveniences Sorely Needed*, 24-26; *Fort Benton River Press*, May 1886.

4. Axline, *Conveniences Sorely Needed*, 26.

5. Fredric L. Quivik, "Montana's Minneapolis Bridge Builders," *IA: The Journal of the Society for Industrial Archeology*, 10 (1984), 39, 42; George R. Metlen, *Report of the Montana State Highway Commission for the Years 1915-1916*, (Helena: State Highway Commission, 1916), 4-5.

6. Axline, *Conveniences Sorely Needed*, 142.

7. Axline, *Ibid*.

8. Joseph Gies, *Bridges and Men*, (Garden City, NY: Doubleday, 1963), 130.

9. Quivik, *Historic Bridges*, 41, 43; Quivik, "Montana's Minneapolis Bridge Builders," 38-39; Maurice W. Hewett, "William Sherman Hewett, 1956, Bridges Vertical File, MHS Research Center, Helena; Axline, *Conveniences Sorely Needed*, 35, 37.

10. Quivik, *Historic Bridges*, 39, 41; "O.E. Peppard Passes After Short Illness," (Missoula) *Daily Missoulian*, 26 September 1929.

11. The Gillette-Herzog Manufacturing Company built the Jefferson Slough Bridge (24GA831) and Bayne built the Swan River Bridge in Bigfork (24FH743); both are included in this MPD. Quivik, *Historic Bridges*, 33; Quivik, "Montana's Minneapolis Bridge Builders," 47.

12. Milo S. Ketchum, *The Design of Highway Bridges of Steel, Timber, and Concrete*, (New York: McGraw-Hill Book Co., 1920), 426-427.

13. Robert Newberry and H. W. Guy Meyer, "Ordinary Iron Highway Bridges," *Wisconsin Academy Review*, 30 (March 1984), 34-35; David Plowden, *Bridges: The Spans of North America*, (New York: Viking Press, 1974), 67; Quivik, "Montana's Minneapolis Bridge Builders," 47.

14. Lewis and Clark County Commissioners Journals, Book 6, 177-178, 236, 238, 239, 336, 337; "Proposals for Bridge," *Helena Independent*, 12 December 1896; "The Contract Let," *Helena Independent*, 17 January 1897.

15. Montana Good Roads Congress, *Minutes of the Proceedings of the Montana Good Roads Convention Held at Billings, Montana, June 16th, 17th, 18th, 1910*, (Helena: Montana Lookout, 1910), 17-21; William L. Hall, *Financing Modern Highways for Montana: Report on Highway Finances to the Montana Fact Finding Committee on Highways, Streets, and Bridges*, (Helena: Montana Fact Finding Committee on Highways, Streets, and Bridges, 1956), 4; Patrick M. Morris, "The Good Roads Movement and Montana to 1916," (Masters Thesis, University of Montana, 1967), 57.

16. Axline, *Conveniences Sorely Needed*, 47-48.

17. Axline, *Ibid*, 56-57.

18. Montana State Highway Commission Meeting Minutes, Book 1, 13-15, 67; *Laws, Resolutions, and Memorials of the State of Montana Passed by the Thirteenth Regular Session of the Legislative Assembly*, (Helena: State Publishing Co., 1913), 318-326; M. J. Steere, *History of the Montana State Highway Department, 1913-1942*, (Helena: State Highway Commission, 1943), 9-12.

19. Quivik, *Historic Bridges*, 43; Montana State Highway Commission Meeting Minutes, Book 1, 13-15.

20. *Laws, Resolutions, and Memorials of the State of Montana Passed by the 14th Regular Session of the Legislative Assembly*, (Helena: State Publishing Co., 1915), 332-333; Metlen, *Report of the Montana State Highway Commission*, 4-5.

21. Malone, Roeder, and Lang, *Montana*, 242.

22. Little is known about Charles A. Kyle. Born in Canada in January 1864, he emigrated to the United States with his family in 1869. By 1900, he had married and was working as a civil engineer in Chicago. In May 1915, he inquired about a new position as the bridge engineer for the Montana State Highway Commission. He accepted the job a week later at an annual salary of $2,500. Chief Engineer George Metlen called Kyle "a structural steel designer of many years successful experience both in designing and building steel and concrete structures." Kyle was responsible for standardizing steel, timber, and concrete bridge designs for the commission from 1915 to 1917. He also attended many of the contract letting meetings in the counties, and oversaw the bidding process. In 1916, he became Chief Bridge Designer when the highway commission demoted Metlen to Bridge Engineer. When he was finally sacked in 1918, Kyle resumed his position as Bridge Engineer. Kyle continued his employment with the highway commission until 1919 when he left to seek other business opportunities in Boise, Idaho. Kyle died in Idaho in January 1936. State Highway Commission Meeting Minutes, Book 1, 70, 71, 72, 124-125, 178; Metlen, *Report of the Montana State Highway Commission*, 5-8; US Census Records, 1880, 1900-1930, Montana Historical Society, Helena.

23. Montana State Highway Commission Meeting Minutes, Book 1, 75, 81.

24. Ibid., 79; "Browne's Bridge is Condemned, *Dillon Examiner*, 7 April 1915; "First Meeting of the Commission Held Last Week" *Dillon Examiner*, 11 April 1915; "Commissioners are to Meet," *Dillon Examiner*, 4 August 1915; "Steel Bridge Being Built," *Dillon Examiner*, 13 October 1915; "Passing of Browne's Toll Bridge," *Dillon Examiner*, 15 December 1915; "Ancient Toll Bridge Across the Big Hole River Washed Out," C. December 15 newspaper clipping, Bridges vertical file. MHS Research Center, Helena.

25. Montana State Highway Commission Meeting Minutes, Book 1, 93; "Bridge Building in Montana," *Dillon Examiner*, 15 December 1915.

26. In the 1940s, Mineral County moved a span of the St. Regis bridge to Lozeau (24MN293). The county rehabilitated the bridge in 1997. Jon Axline, "Site Form: Natural Pier Bridge (24MN243)," on file at MDT Helena and Montana SHPO, Helena.

27. Montana State Highway Commission Meeting Minutes, Book 1, 81, 163.

28. The construction of a Montana Highway 200 alignment in 1949 bypassed the Bonner Bridge, which was closed to traffic by Missoula County. In 2007, the county made plans to incorporate one span of the bridge into a bicycle/pedestrian path. Consequently, one of the bridge's two spans was scrapped, while the remaining span was removed from the piers and placed on land where it currently (as of August 2008) sits. Montana State Highway Commission Meeting Minutes, Book 1, 245.

29. Steere, *History of the Montana State Highway Department*, 19-21, 23.

30. Axline, *Conveniences Sorely Needed*, 5.

31. Montana State Highway Commission Meeting Minutes, Book 3, 175,178; "Scenic' Bridge to Open Sunday," *Superior Mineral Independent*, 10 May 1928; Montana State Highway Commission Meeting Minutes, Book 4, 19; "About 1000 People Attend Celebration," *Superior Mineral Independent*, 17 May 1928.

32. Axline, *Conveniences Sorely Needed*, 75-76.

33. Montana State Highway Commission Meeting Minutes, Book 3, 253-254.

34. Ibid, 144-145, 230-231.

35. Ibid, 254-255.

36. Doris Whithorn and Bill Whithorn, *Photo History of Gardiner, Jardine, Crevasse: Entrance to Yellowstone National Park Wonderland*, (Livingston: Park County News, 1972), np.

37. Axline, *Conveniences Sorely Needed*, 81-82; Hoffman Birney, *Roads to Roam*, (Philadelphia: The Penn Publishing Company, 1930), 162.

38. Steere, *History of the Montana Highway Department*, 55.

39. Vere P. Maun, "Bridge Building," *Center Line* 1, no. 5 (May 1938), 34.

40. "Benedict Joseph Ornburn," *Center Line* 1, no. 5 (May 1938), 2; personnel card no. 6662 on file at MDT, Helena; Montana State Highway Commission Meeting Minutes, Book 6, 293-294; Maun, "Bridge Building," 34; Montana State Highway Commission Meeting Minutes, Book 5, 243-244; John H. Morrison Interview by Jon Axline, Spring 1994.

41. Theodore E. Lang, "Bringing Montana Out of the Mud: The Early Years of John Morrison, Sr.," *Montana The Magazine of Western History*, 44 (Autumn, 1994), 28, 30-34, 36, 38; "John Morrison," *Helena Independent Record*, 16 September 2003; "Morrison, 101, Engineering Founder Dies," *Helena Independent Record*, 16 September 2003; personnel card no. 6218, on file at MDT, Helena.

42. Malone, Roeder, and Lang, *Montana*, 296; Steere, *History of the Montana Highway Department*, 28.

43. Steere, *Ibid*, 28-29; Montana State Highway Commission Meeting Minutes, Book 4, 413, 447.

44. Montana State Highway Commission Meeting Minutes, Book 5, 165; *Report of State Highway Commission for Biennium Ending December 1930*, (Helena: State Highway Commission, 1930), 43; "Work Beings on Bridge Approach," *Sidney Herald*, 2 June 1932.

45. "Crew of Over 70 Will Serve Barbecue July 4," *Sidney Herald*, 30 June 1932; "Over 8,000 at Bridge Dedication Celebration," *Sidney Herald*, 7 July 1932.

46. Montana State Highway Commission Meeting Minutes, Book 5, 19, 21, 71, 97-98.

47. Ibid, Book 4, 228; Bridge Construction File ECHP No. E 172-D, US, on at MDT, Helena; "New Bridge Between Craig and Wolf Creek," *White Sulphur Springs Meagher Republican*, 23 August 1933.

48. Bridge Construction File ECHP No. E 172-D,U2.

49. Axline, *Conveniences Sorely Needed*, 96-98.

50. "New Highway Era," *Engineering News- Record*, 19 January 1934.

51. Montana State Highway Commission Meeting Minutes, Book 6, 181-182; "Staunton Drops Assault Charge Against Group," *Missoula Daily Missoulian*, 25 September 1936; Montana State Highway Commission Meeting Minutes, Book 8, 2; Jon Axline,

"Orange Street Bridge (HAER No. MT-99)," 1999 report prepared for Historic American Engineering Record, on file at MDT, Helena.

52. *Culbertson Searchlight*, 8 October 1931 – 28 September 1934; Loretta Segars, *100 Years in Culbertson, 1887-1987*, (Culbertson: Culbertson Centennial Steering Committee, 1986), 144; Axline, *Conveniences Sorely Needed*, 99-100.

53. Axline, *Conveniences Sorely Needed*, 100-101.

54. *Ibid*, 101.

55. *Ibid*, 102.

56. *Ibid*, 102-103.

57. Montana State Highway Commission Meeting Minutes, Book 4, 302, 311; ibid, Book 5, 317; ibid, Book 6, 56, 74; "Span of Terry Bridge Collapses and Hinders Traffic North," *Terry Tribune*, 28 February 1930; "East Bridge is Thrown Open to Traffic Friday," *Billings Gazette*, 29 June 1935; Montana State Highway Commission Meeting Minutes, Book 7, 292.

58. Bridge Collapse Seriously Impedes Traffic," *Laurel Outlook*, 7 November 1934; "Highway Engineers Seek Date on New Bridge, Road, *Laurel Outlook*, 5 December 1934; "New Bridge Road Plans Learned," *Laurel Outlook*, 12 December 1934; "Ask Bridge, Road Story Unchanged," *Laurel Outlook*, 9 January 1935; "Community Takes Bridge Protest to Commission," *Laurel Outlook*, 23 January 1935; "Highway Commission Orders New Survey for Laurel Bridge Sites," *Laurel Outlook*, 30 January 1935; "New Bridge Here is Opened, *Laurel Outlook*, 10 June 1936; State Highway Commission Meeting Minutes, Book 6, 207, 229, 240, 287, 317.

59. "Contract is Let for Building East Bridge," *Billings Gazette*, 22 September 1934; "East Bridge is Thrown Open to Traffic," *Billings Gazette*, 29 June 1935.

60. T. H. Watkins, *The Great Depression: America in the 1930s*, (Boston: Little, Brown and Co., 1993), 241.

61. Montana State Highway Commission Meeting Minutes, Book 8, 242-243, 298-299.

62. Steere, *History of the Montana State Highway Department*, 38-39; Montana State Highway Commission Meeting Minutes, Book 8, 395; Planning Survey Division, *Montana Highway History, 1943-1959*, (Helena: State Highway Commission, 1960), 1-2.

63. Montana State Highway Commission Meeting Minutes, Book 8, 319, 320, 404, 453, 474; "Road Work Being Carried On Here," *Hardin Tribune-Herald*, 17 July 1941; "Bridge to be Closed Monday," *Hardin Tribune-Herald*, 7 August 1941; Montana State Highway Commission Meeting Minutes, Book 9, 30.

64. Steere, *History of the Montana Highway Department*, 103.

65. Montana State Highway Commission Meeting Minutes, Book 8, 427, 437.

66. Ibid, Book 8, 500; "Gorge Wrecks Fallon Bridge," *Terry Tribune*, 1 April 1943.

67. Montana State Highway Commission Meeting Minutes, Book 9, 4; Roberta Carkeek Cheney, *Names on the Face of Montana: The Story of Montana's Place Names*, (Missoula: Mountain Press Publishing, 1990), 177.

68. Montana State Highway Commission Meeting Minutes, Book 9, 16-17, 31; "Construction of Fallon Bridge is Authorized," *Terry Tribune*, 15 July 1943; "Approval of Fallon Bridge May Be Delayed Further," *Terry Tribune*, 9 September 1943.

69. Montana State Highway Commission Meeting Minutes, Book 9, 39, 40; Tom Stout, *Montana, Its Story and Biography: A History of Aboriginal and Territorial Montana and Three Decades of Statehood*, Volume 2, (Chicago: American Historical Society, 1921), 221-222; Quivik, *Historic Bridges*, 43; Jim Roscoe, Telephone Interview by Jon Axline, April 2004.

70. Montana State Highway Commission Meeting Minutes, Book 9, 39-40; "Construction Contract for Fallon Bridge is Let, *Terry Tribune*, 28 October 1943; "Crew Now Working at 1,142 Ft. Span Over River," *Terry Tribune*, 25 November 1943; "Labor Problem Critical in Bridge Construction," *Terry Tribune*, 13 April 1944; "Steel Spans the Yellowstone River at Fallon," *Terry Tribune*, 14 September 1944; Construction File No. SN-FAP 130-B(4), Unit 1: Fallon Bridge," on file at MDT, Helena.

71. "Construction of Fallon Bridge Nearing End," *Terry Tribune*, 5 October 1944; "Traffic Will Soon Cross Yellowstone River at Fallon," *Terry Tribune*, 26 October 1944; "Yellowstone River Bridge is Now Open for Traffic," *Terry Tribune*, 23 November 1944; "Combined Band Present Concert at Fallon Bridge," *Terry Tribune*, 29 November 1944; Montana State Highway Commission Meeting Minutes, Book 9, 129-130; "Construction File No. SN-FAP 130-B(4), Unit 1: Fallon Bridge."

72. Planning Survey Division, *Montana Highway History*, 3-4, 7.

Glossary

Abutment: A concrete or wood structure used to support the ends of bridges and to transfer traffic off the deck of the bridge.

Beam: A generic term for a variety of horizontal structural components. Beams can be constructed of wood, metal, concrete, or combinations of these materials. They may be solid, flat, I-shaped, T-shaped, latticed, or boxed.

Bottom Cord: A bridge beam running along the bottom of a truss bridge. Usually connecting to abutments or central piers or pilings.

Cantilever: An extension of a beam without support on one end. An upward force mid-beam is countered by a downward force on the end opposite the extension.

Compression: A force that works to press together or squeeze.

Deck: The horizontal surface that stretches from abutment to abutment of a bridge. Traffic and utility loads are placed on the deck. In modern bridges, most decks are concrete. The deck also provides stiffness for the bridge by connecting support beams and trusses.

Deck Truss: A type of bridge with the deck attached to the top cord of the bridge. They are more laterally rigid and structurally stable than through truss bridges. They are economical for lighter loads and smaller spans.

Diagonal Bracing: In truss bridges, this member can be used to transfer either compression or tension forces.

End Diagonals: Diagonal beams connecting the top cord to the abutments. These beams transfer loads through compression.

Eye Bar: A heavy bar with holes on either end-- "eyes--used in lower cords of pin-connected bridges.

Floor Beams: These beams stretch between the beams in the bottom cords of the bridge to support the road deck and stringers.

Guard Rails: Metal, concrete or wood panels on the side of bridges that serve to prevent traffic from leaving the bridge mid-span.

Gusset Plate: A plate used to connect various support members in Riveted Connected bridges.

King Post: The simplest truss bridge formed by a triangle. Variations have central posts.

Jersey-barriers: A type of modern closed-balustrade guard wall that is designed to deflect traffic back onto the roadway. These barriers are either permanent or can be installed in removable modules.

Lateral Bracing: Secondary bridge members used to stiffen the structure.

Pier: A mid-span bridge support. Piers transfer bridge loads from the spans to the ground. Piers can be either solid walls or multiple columns. Piers can be constructed of a variety of materials including concrete, metal or wood.

Pier Cap: A transverse member connecting the top of pier columns or the top of a wall pier. In beam bridges it supports the stringers of the bridge.

Pony Truss: A Truss bridge with a deck attached to either the top or the bottom cord with no bridge bracing above the deck. Traffic passes between the side members. This bridge type is typically used on smaller spans. While not as strong as through truss bridges, it has the advantage of having no height limitations on traffic.

Pratt Truss Bridge: Invented by Thomas and Caleb Pratt in 1844, the Pratt Bridge features diagonal members that form "V's". The

center section often has crossing members forming an "X". The Pratt bridge has numerous variations such as the Parker, and Pennsylvania trusses .

Queen Post: A longer version of the King Post Truss bridge with a truncated peak replaced by a top cord.

Riveted Connections: The use of rivets to connect plates, girders and beams in truss bridges.

Stringers: As series of parallel beams supporting the deck of a bridge. These beams run lengthwise to the bridge and are supported by abutments and / or center supports. The terms "Stringer", "Beam" and "Girder" are often used interchangeably in the literature. However, stringers usually directly support the deck while girders are often employed transversely to support or connect the stringers. Both are composed of beams (see above).

Struts: Secondary bridge members used to stiffen the structure.

Sway Bracing: Secondary bridge members used to stiffen the structure.

Tension: A stress on material produced by the pull of forces tending to cause extension.

Through Truss Bridge: A bridge that approximates a box with bottom, side, and top structural components. The deck of these bridges may either be on the top cord or on the bottom cord within the "box".

Top Cord: The bridge beam running on top of truss bridges.

Truss: An arrangement of beams, rods, cables, or struts that are connected together to form a rigid framework. The truss is characterized by a system of triangles that are arranged to provide both tension and compression and thus carry its own and live loads across rivers, streams, or other obstacles.

Vertical Posts: In Truss bridges, the vertical posts are in tension transferring the weight of the bridge and its traffic upward to a joint supported by diagonal bracing.

Warren Truss: Similar to Lattice Truss bridges, the Warren Truss bridge is composed of a series of diagonal support members (isosceles triangles), though some Warren bridges also contain vertical members. A variation also employs an arch. Englishmen James Warren and Theobald Monzani invented the truss in 1848.

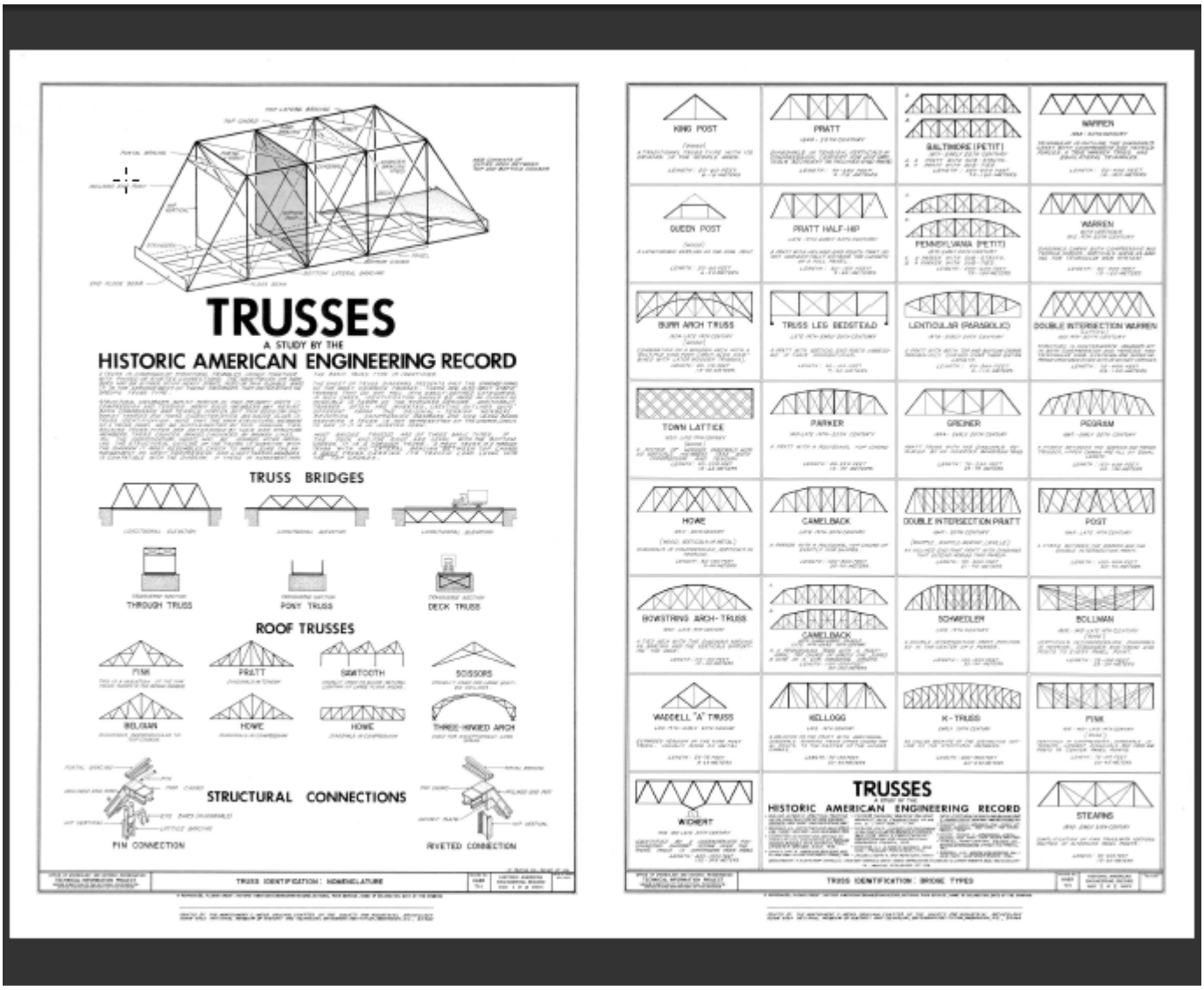

Diagram of Trusses

F. ASSOCIATED PROPERTY TYPES

A. Introduction: Bridges and the National Register Evaluation Criteria[1]

This documentation form examines steel truss bridges constructed in Montana from 1888 to 1946. According to National Register Bulletin No. 15, "How to Apply the National Register Criteria for Evaluation," to be eligible for listing in the National Register of Historic Places, a bridge must be significant in state, local or national history, architecture, engineering or culture, and possess integrity of location, setting, design, material, workmanship, feeling, and association. In addition, the bridge must meet one or more of the four National Register Criteria:

A. be associated with events that have made a significant contribution to the broad patterns of our history; or

B. be associated with the lives of persons significant in our past;

C. embody the distinctive characteristics of a type, period, or method of construction, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. have yielded, or may be likely to yield, information important in prehistory or history.

The specific means by which a bridge may meet each of the National Register Criteria are discussed below.

National Register Criterion A: Under Criterion A, a bridge may be eligible for the National Register through its association with historic themes. Applicable areas of significance for bridges as defined in National Register Bulletin No. 16 include:

- Exploration/Settlement: Bridges, especially early bridges, may have been associated in a meaningful way with the settlement or development of a geographically definable area. Larger bridges over major rivers may have significance for their historical associations with regional settlement or development.

- Industry: The design of bridges has been closely associated with the technology and process of producing new materials. Bridges associated with the development and introduction of new materials are important.

- Politics/Government: The construction of bridges has most often been undertaken by governmental bodies – first townships, then counties, and later the state with federal regulations and financial inducements. Bridges may be significant if they represent important patterns in the methods counties awarded contracts or are associated with standardized state designs. Although the Montana State Highway Commission began providing bridge plans to the counties in 1915, it was not until 1926 that all bridge engineering work was taken over by the state. Other important bridges may be associated with federal emergency relief and New Deal programs, such as the Works Progress Administration, during the Great Depression that were intended to create labor intensive jobs.

- Transportation: Every bridge in Montana found eligible for the listing in the National Register of Historic Places is associated with the "broad pattern" of transportation. Bridges may gain additional significance under this theme if they facilitated major passage to or through a region or played an important role in the development of an effective transportation system. Large bridges, especially the costly steel through and deck trusses, represent major investments on the part of counties to address the public's demand for adequate transportation routes.

National Register Criterion B: Under Criterion B, a bridge may be eligible for the National Register if a historically significant person's importance relates directly to the structure. Since the National Register's guidelines state that properties significant as an important example of an engineer's skill should be nominated under Criterion C, it is rare that a bridge would be found eligible under Criterion B. Because all historic bridges in Montana were constructed from standardized designs or from designs purchased from a catalogue, no bridge in the state is eligible for the National Register under Criterion B.

National Register Criterion C: Under Criterion C, a bridge may be eligible for the National Register if it embodies "the distinctive characteristics or a type, period, or method of construction, or represents the work of a master, possesses high artistic value, or represents a significant and distinguishable entity whose components may lack individual distinction." The only applicable area of significance for bridges under this criterion from Bulletin 16 is in the category of engineering.

The design and popular use of bridge types has been closely tied to the development of new materials and an understanding of their use. Bridges can provide excellent illustrations of the changes that have occurred in metal and concrete technologies. Some bridges may be significant as rare examples of a type, either as design experiments or widely accepted types that are no longer common. Other bridges, by their ubiquity, are significant as representative examples of a commonly used type and method of construction. Engineers also added aesthetic details, such as decorative balustrades, to some bridges which increase their significance beyond the pure mathematical application of the science.

National Register Criterion D: Under Criterion D, a bridge or its remains may be eligible for the National Register if it can yield important information about bridge technology or construction. The information should be embodied in the bridge or its remains; the mere existence, or former existence of a bridge at a particular location does not constitute sufficient important information. Furthermore, the information should not be available through other sources, such as historical documents or extant bridges. Prior inventories of Montana highway bridges have identified no properties that meet this criterion.

B. Property Types

I. Name of Property Type: Steel Highway Truss Bridges

II. Description:

This property type includes those bridges constructed of a metal framework superstructure (the truss), over or through which the roadway passes. The framework is comprised of individual members assembled in a prominent geometric pattern of solids and voids. Each individual member consists of metal structural shapes of various sizes and configurations, used both individually and in combination with each other.

The bridges in this property type are built of metal. Steel truss types receive their names from the configuration of the truss members. In most cases, the name for each truss type comes from the person or company who developed it. Except for the Fort Benton Bridge's Baltimore trusses, the only steel truss types found in Montana are the Pratt and the Warren and their derivatives, the Parker and Pennsylvania trusses.

Pratt trusses are characterized by vertical members which, because they are designed to be in compression when under load, are relatively thick and visually prominent. On the other hand, diagonal members function in tension, and are thus relatively thin. Pratt trusses have horizontal upper chords. There are several sub-varieties of the Pratt truss, including the Parker and Pennsylvania trusses. Both types are represented in Montana. The Parker and Pennsylvania trusses both have polygonal upper chords and are stronger in long spans, making them ideal for railroad bridges and for wide river crossings for vehicular bridges.[2] In Montana, Pratt trusses were widely used from 1892 until 1915, although they continued to be built by the counties (with highway department bridge plans) until the late 1920s. The Pennsylvania truss came into general usage during the first decade of the 20th century; its design was suited to longer spans, reaching lengths in Montana up to 1,074 feet at the Wolf Point Bridge in northeastern Montana.

Warren trusses are characterized by diagonal members which function in both tension and compression, and therefore, are relatively thick. The diagonal members form a "W" pattern along the length of the truss. Warren trusses often also have vertical members, which are usually thinner than the diagonals. Warren pony trusses became increasingly popular in Montana in the early 20th century as field riveting technology improved. In 1915, the Montana State Highway Commission standardized a riveted Warren through truss design that supplanted the Pratt truss on highway bridges within a few years. Two variations of the basic Warren truss are identified on highways in Montana: Warren pony trusses with a polygonal upper chord and a sub-divided Warren through truss with polygonal upper chords.

Within each truss type, bridges are usually divided into three categories based on the location of the deck: 1) through truss bridges, 2) pony truss bridges, and 3) deck truss bridges. In a through truss, the deck or roadway is located at or near the bottom chord and vehicles pass between the truss members. A pony truss is identical to a through truss in the location of the deck, but is low enough not to require overhead lateral bracing. In a deck truss, the deck or roadway is carried on the top chord. Site conditions usually determine which type of bridge should be used. Pony and through truss bridges were generally selected when there was relatively little difference between the level of the road and the level of the water. Deck truss bridges were used where that elevation difference was great, such as when a bridge was needed to carry a road over a deep gorge. In Montana, pony trusses served relatively short spans (40 to 120 feet) and through trusses served longer spans (120 to 220 feet). Pennsylvania trusses were utilized for spans greater than 220 feet. In addition, Montana Highway Department bridge engineers specified when a Pratt truss bridge was more suitable to a crossing than a Warren truss. That determination was made based on the number of standardized width panel sections that would be needed to construct a bridge across a river. For example, if an odd number of panels would be needed, then a Pratt truss was selected. Even-numbered panels usually meant the bridge engineers would design a Warren truss for the crossing. There is also one bridge, the Dearborn River High Bridge (24LC130; listed 2003), where the deck is attached mid-way between the top and bottom chord.[3]

Steel truss bridges are also categorized based on the way the bridge's structural members are connected. From 1892 until 1915, most steel truss bridges were pin-connected. Pins set through the holes held members together at the each intersection of vertical, diagonal, and chord members. Pins facilitated the construction process for the counties before the Montana State Highway Commission specified riveted connections. About 1915, bridge designers and builders began to make greater use of riveted connections as field riveting technology improved. The vertical, diagonal, and chord members were riveted to a steel gusset plate at their intersection. At times, sections of a truss were riveted in a fabricating shop and then bolted together in the field. By 1920, riveted connections replaced pins in all new bridges.

Although the superstructure is the most significant aspect of bridges in this property type, the substructure is also important. In Montana, the most common substructure for bridges built between 1892 and 1915 are concrete-filled tubular steel caissons. Pairs of these caissons served as piers and, sometimes, abutments. Sometimes the substructures included timber or steel stringer approach spans. Timber and concrete also functioned as abutments, while concrete also served as piers for several Montana bridges included in this document. In 1915, the state specified the use of timber or concrete abutments and concrete piers.[4]

III. Significance

Within the general guidelines for significance of Montana steel truss bridges established in the introduction to the property types section, the following steel truss bridge specific information is added:

Criterion A: Both in-state and out-of-state fabricators and contractors are important to the history Montana bridge building for introducing steel bridge technologies. Bridges associated with these companies have historical significance. Companies include the Gillette-Herzog Manufacturing Company, the King Bridge Company, O.E. Peppard, the Security Bridge Company, and the William P. Roscoe Company among others. Out-of-state bridge companies were more active in areas close to Montana's borders, while the in-state companies dominated the business in the interior. A number of smaller, local and out-of-state companies also successfully competed for Montana bridge contracts, especially after 1915 when the state began overseeing the advertising and bidding process for the counties.

A noteworthy pattern of bridge contract awards was identified in many Montana county records. Even though the commissioners would advertise for competitive bids for bridge construction, one bridge building company would submit the low bid year after year in the same geographic area. This was a form of collusion called "bridge pooling" which was a common, if illegal, practice throughout the United States in the late 19th and early 20th centuries. Indeed, bridge pooling was one of the factors directly responsible for the creation of state highway commissions and the state standardization of bridge plans in the years proceeding World War I. After 1915, bridge-building continued to follow a standardized practice that was under the control of the state and reliant on federal funding.

Criterion C: The Pratt and Warren trusses are the only major known truss types represented in Montana's inventory of surviving steel historic bridges. The basic forms of these two truss types exist in relatively large numbers. National Register Bulletin No. 15 states that a "structure is eligible as a specimen of its type or period of construction if it is an important example (within its context) of

building practices of a particular time in history." Within those guidelines, the oldest and longest steel trusses within each county are significant. The oldest surviving bridges show the earliest extant use of the technology; the longest spans reflect maximum limits of the technology.

The Pratt truss, both in through and pony truss configurations, was the most common steel truss type constructed in Montana from 1892 to 1915, Pratt trusses are, therefore, significant representatives of a once common type. Because Pratt trusses remain in relatively high numbers, important representative examples should be selected for listing based on age, length, and structural details. The Pennsylvania truss is a sub-category of the Pratt, and in Montana, dates to the 1902 to the 1933 period. Since Parker and Pennsylvania trusses were used to cross wide rivers, these structures should also be evaluated for their engineering significance. Both pin-connected and riveted Parker and Pennsylvania trusses can be listed on the National Register.

The Warren truss is the only other truss type represented in Montana.[5] The riveted Warren through trusses gained general acceptance because the Montana State Highway Commission standardized the design in 1915 and encouraged the counties to utilize it. By 1918, they had become the most commonly constructed truss type in the state. Warren trusses are also significant representatives of a common type. Slightly more Pratts than Warrens (64 Pratts vs. 63 Warrens) survive today, probably because of the location of Pratt trusses on county-maintained roads, while the Warren trusses were on Federal Aid routes and have been replaced as the highway system evolved. Important representative examples of riveted Warren trusses should be selected for listing on the National Register based on age, length, and significance to the Montana Highway Department's construction programs. Variations on the basic Warren truss design include the massive continuous span through truss structures built by the highway department between 1933 and 1946.[6]

IV. Registration Requirements

The period of significance for this property type is from 1888 (the construction date of the first steel bridge built in Montana and oldest surviving bridge in the state) to 1946 (when the Montana Highway Department built the last steel truss bridge in the Treasure State).

National Register Criterion A: A steel truss bridge in Montana may be eligible for listing in the National Register of Historic Places under Criterion A if it was or is:

1. Associated with county-sponsored and funded infrastructure improvement programs during periods of expansion or consolidation. Montana's economy throughout its history has been characterized by recurring boom and bust cycles. During periods of prosperity in the state (i.e. 1881-1893 and 1909-1918), counties endeavored to provide good roads and bridges for its constituency. Bridges built during these periods tend to be Pratt pony and through trusses because they were relatively inexpensive and reliable. Larger bridge projects usually required bond elections. When the Montana State Highway Commission stepped into the process in 1915, it continued the pattern established by the counties, but with state oversight of the design, bidding, and construction process. By the early 1920s, though, the boom/bust cycle tended to be less relevant to the process because of the involvement of federal and state funds.

2. Documented as being constructed by a fixed competitive bidding (pooling) process in the period 1892 to 1915. Bridge-building was a lucrative business with many companies competing in a limited market. In order to assure business for all, the companies (and sometimes the county commissioners) engaged in a practice called "pooling" where Montana was divided into geographic areas where specific bridge companies obtained county contracts on a regular basis. This practice was illegal as it meant that single companies had monopolies on bridge-building in a specific geographic area. For example, the Security Bridge Company built all the bridges in portions of the Yellowstone Valley and central Montana between circa 1906 and 1915. The Missoula-based O.E. Peppard Company was most active in the counties surrounding Missoula in western Montana, while the Cleveland, Ohio-based King Bridge Company was the primary bridge contractor in Lewis and Clark County from 1894 until 1903. Bridge pooling ended in 1915 with the creation of the Montana State Highway Commission's bridge department (see below). The County Commissioner meeting minute books provide the best evidence for pooling. Bridges that can be associated with this practice would be eligible for the National Register of Historic Places under Criterion A for their association with the broad pattern of Montana's state and local history.

3. Associated with broader road-building or improvement projects. After 1915, bridge-building was usually tied to road improvement projects that encompassed them, or new bridges replaced older structures on already existing roads that were in the process of being upgraded and improved by either the state or counties. Before 1915, many steel truss bridges replaced older county-built bridges that

had either failed, had been condemned, did not meet traffic demands, or had become obsolete and no longer functioned properly. During the 1920s and 1930s, the Montana Highway Department initiated an extensive road and bridge building program. Unlike the county era, few state-built bridges were constructed as stand-alone structures, but, instead, were part of larger road-building activities.

4. Associated with state or federal programs that encouraged the construction of modern new bridges to replace sub-standard structures on existing or new roads. Beginning in 1915, the Montana State Highway Commission formed a bridge department, hired a bridge designer, and encouraged the state's counties to follow a prescribed process for advertising, bidding, and building steel truss bridges in the state. The process was designed to provide efficient, cost-effective bridges to the counties by standardizing the procedure and ensuring the counties got what they paid for. Bridges built under this initial phase immediately following the creation of the state bridge department would be eligible under Criterion A because they are part of a broader program to improve and modernize the state's transportation system. During the Great Depression (1930-1941), bridges were built under the Hoover Administration's emergency relief programs or during Franklin D. Roosevelt's New Deal. The state process was combined with new federal regulations to maximize labor and provide modern steel bridges using the most up-to-date bridge and steel technology. The result was the greatest period of road and bridge construction yet seen in Montana (it was surpassed in the 1960s and 1970s by the Interstate Highway program). That process was significantly modified during World War II to keep strategic highways open during the national crisis. Bridges built during this period would also be eligible for the National Register under Criterion A for their association with the war effort during World War II.

National Register Criterion C: A steel truss bridge in Montana may be eligible for listing in the National Register under Criterion C if it was or is:

1. A Bridge Built Prior to 1900. Bridges built before 1900 are among the oldest spans remaining in Montana. They tend to be a little heavier than bridges built after 1900 and many may contain iron structural components. Some, like the Williams Street Bridge (24LC128) and the Jefferson Slough Bridge (24GA831) incorporate ornamental elements into the designs. The ornaments, moreover, are distinctly Victorian in design and distinguish the bridges as having been built during that era. There are few bridges remaining in Montana that date to the 1890s. The bridges are representative of the early years of practical bridge design and construction in Montana and pre-date the more extensive bridge-building programs of the 20th century. Many, moreover, replaced toll bridges constructed by private entrepreneurs and the counties during Montana's territorial period.

2. A Through Truss Bridge which is not a standard Pratt or Warren Truss Designs or that contains features not standard to the designs. Bridge designers and builders often had to modify standardized designs to make them fit particular site conditions. While most Pratt and Warren designs are straightforward with few if any design modifications, a few contain adaptations that distinguish the bridge as structurally unique. They may incorporate natural geologic features into the design, rest on a modified substructure, or be of a design that was rare when the structure was constructed. In other cases, improvements in technology may lead to the development of a whole new bridge design that was not widely built in the state or became the standard for bridges built at wide river crossings, i.e. continuous span Warren through trusses. After 1933, continuous span Warren through truss bridges largely supplanted Pennsylvania trusses for wide river crossings in Montana. Some bridges also utilize materials in their superstructures that are not steel or iron which also reflects an adaptation to a unique situation.

3. The Oldest Bridge in a County or area (prior to 1915). Bridges with documented dates of construction as the oldest in a county or in an area have local significance.

4. The Oldest Bridge of a Type in Montana. The first Pratt truss or the first Warren truss or the first of a particular design modification (i.e. continuous span structures) have local and statewide significance.

5. The Longest Bridge of a Type in Montana. Long spans represent the maximum limits of the technology available at the time the bridges were built and have significance.

6. A Bridge where all of the structural components (other than the decking) is original to the structure. Like most man-made structures, modifications are made to bridges as the demands placed on them change. Substructures can be altered to handle heavier loads, additional structural components added, and new guardrails replace original railings. Modifications might also be made to

portal braces to increase the height clearance or approach spans added or subtracted. Finally, bridges still at their original locations would have more integrity than those relocated – even during the historic period.

V. Integrity

In addition to the requirement that a bridge must meet one of more of the National Register criteria to be considered eligible for listing in the National Register, it must also retain integrity. The integrity of each bridge is assessed through the following aspects:

Design: The most important parts of a steel truss bridge design are the configuration of the truss and the connections. A steel truss bridge retains integrity of design if it is capable of conveying these engineering features. A steel truss bridge has lost integrity of design if the spatial relationship between its members has been changed or the connections have been replaced with connections differing from those used historically.

Materials: A steel truss bridge retains integrity of materials if the superstructure retains materials original to the construction, replacement materials were installed during the period of historic significance, or modern repairs or replacements are the same type as those used during the period of significance. Materials include the individual and composite members and the connections. Because the superstructure is the most important feature of the bridges in this property type, neither an original substructure nor an original deck and railing system are necessary for the bridge to be eligible (although these original components may add to the significance of the bridge). On the other hand, for a bridge in this property type to be eligible, replacement substructure or deck components must be of such scale and composition that they do not overwhelm or otherwise detract from a clear visual impression of the steel frame of the superstructure and its function.

Workmanship: The superstructures of bridges exhibit no workmanship because all of the materials used were mass-produced and prefabricated.

Setting and Location: Bridges which are eligible under Criterion A for their associations with an important crossing must have integrity of location. Bridges eligible under Criterion C may have been moved during the historic period, but they should retain integrity of setting; i.e. they should still span a channel or body of water, railroad tracks, or some other barrier to vehicular travel. Physical and visual intrusions can diminish the integrity of setting and location, but do not in themselves, preclude eligibility unless the relationship of the bridge to the topographic feature which resulted in its construction has been destroyed.

Feeling and Association: These two aspects have equal effect on overall integrity. In general, the integrity of design, materials, and workmanship has a direct bearing on the integrity of feeling and association of a bridge will be lost if modern materials are of such scale and contrast to the remaining historic materials that the observer is more impressed by the alterations than the historic resource.

Endnotes for Section "F"

1. This section of the MPD is adapted from "Historic Highway Bridges of North Dakota (February 1997), prepared for the North Dakota State Historic Preservation Office by Mark Hufstetler of Renewable Technologies, Inc. of Butte, Montana.

2. Carl W. Condit, *American Building*, (Chicago: University of Chicago Press, 1982), 143.

3. George R. Metlen, *Report of the Montana State Highway Commission for the Years 1915-1916*, (Helena: State Highway Commission, 1916), 5-6.

4. *Ibid*, 6.

5. The Fort Benton Bridge (24CH335) includes two Baltimore through truss spans. The bridge was listed in the National Register in 1980.

6. Six Pratt trusses have been listed in the National Register since 1986. Two Warren trusses have been listed in the NRHP since 1988.

G. GEOGRAPHICAL DATA

This nomination applies to properties located within the present boundaries of the State of Montana.

H. SUMMARY OF IDENTIFICATION AND EVALUATION METHODS

This Multiple Properties Nomination is a product of two distinct research and field survey projects: a statewide field inventory and context development for Montana steel truss highway bridges conducted between 1979 and 1980 and an update for steel truss bridges that had reached historic age completed in 2000. Two published works, *Historic Bridges in Montana* (Quivik 1982) and *Conveniences Sorely Needed: Montana's Historic Highway Bridges, 1860-1956* (Axline 2005) have also been produced that deal with Montana's bridges. The field surveys and published historic contexts (1982 and 2005) culminated in the preparation of this document and ten new individual National Register nominations. Each of the phases is discussed below.

Nine steel truss bridges have previously been listed in the National Register between 1980 and 2006. They are:

1. Fort Benton Bridge (24CH335; listed 1980)
2. Joliet Bridge (24CB1260; listed 1986)
3. Bell Street Bridge (24DW290; listed 1988),
4. Forsyth Bridge (24RB1028; listed 1990)
5. Wolf Point Bridge (24MC438/24RV438; listed 1997)
6. Hutchins Bridge (24MA1774; listed 1999)
7. Dearborn River High Bridge (24LC130; listed 2003)
8. Toston Bridge (24BW814; listed 2005)
9. Williams Street Bridge (24LC128; listed 2006)

1. Initial field survey and context development (1979-1985)

Montana initiated one of the first state-sponsored historic bridge inventories in the United States in 1979. In addition to recording steel truss, reinforced concrete, and steel girder bridges, the survey also included railroad bridges that were not under county or state jurisdiction. The field survey along with the background research provided the basis for additional historic bridge surveys conducted by the Montana Department of Transportation (MDT) in 1986 (treated timber bridges), 1999 (reinforced concrete bridges), and 2000 (truss bridges built between 1935 and 1946). Renewable Technologies, Inc. (RTI) of Butte, Montana conducted the 1979-1980 inventory, under contract to the MDT. Frederic Quivik and Gray Fitzsimons conducted the survey; Jet Lowe provided photographs of the bridges. The intensive field survey inventoried 477 historic highway and railroad bridges in the state, and also completed substantial primary and secondary research related to the history of Montana's bridges. That survey provided the basis for subsequent historic bridge surveys conducted in Montana. Primary research included construction files and plans at the MDT for on-system bridges. For off-system structures, RTI conducted research in city halls and county courthouses, specifically in the county commissioner and city council meeting minutes and road books. Secondary research included county histories, J.A.L. Waddell's *Bridge Engineering* (John Wiley & Sons 1916) and Milo Ketchum's *The Design of Highway Bridges* (McGraw-Hill 1912). In addition, to those sources, some bridges have dedication plates attached to them that provide the date of construction and the name of the contractor.

The MDT also initiated a bridge inspection program in 1979. The inspections included both on-system bridges administered by the MDT and off-system bridges under the jurisdiction of cities and counties. Because of this inspection program, the MDT was able to provide RTI with a list of bridges built before 1930 and their locations. The resulting field survey conducted by RTI included only those structures inspected by the MDT. In 1982, the MDT and the National Park Service published Quivik's *Historic Bridges in Montana*, a seminal work that was among the first publications in the United States to address historic bridges. The book provided the basis for additional Montana bridge surveys and for this document. It was not until 1985, however, that the MDT submitted a Determination of National Register Eligibility for historic bridges to the Montana State Historic Preservation Office (SHPO). The SHPO concurred in the determination that 77 bridges were eligible for the National Register and that 400 bridges were ineligible for the National Register. The criteria outlined in Section "F" above provided the basis for that first determination of eligibility for historic bridges in 1985.

RTI's historic bridge survey and the 1985 determinations of eligibility provided the basis for the MDT's management of historic bridges for the next twelve years. In 1989, the Montana SHPO, Federal Highway Administration (FHWA), Advisory Council on Historic Preservation (ACHP), and the MDT implemented a programmatic agreement concerning historic roads and bridges. The PA, the first of its kind in the United States, abrogated the MDT's requirement to further inventory historic roads and bridges within the state. Instead, it required the department to complete narrative and technical histories of road and bridge development in the state. Consequently, the MDT produced *Roads to Romance: The Origins and Development of the Road and Trail System in Montana* (Wyss 1992) and *Monuments Above the Water: Montana's Historic Highway Bridges* (Axline 1993). The agreement also specified that the MDT develop educational programs and an Adopt-A-Bridge Program. The PA remained in effect until supplanted by expanded agreement's in 1997 and 2007.

2. 2000 Field Review

In 2000, the MDT initiated a second survey of historic truss bridges. This survey, which was conducted by MDT Historian Jon Axline, included all through, pony, and deck truss bridges built by the MDT and the counties between 1935 and 1946. The survey also included steel truss bridges unintentionally missed during the 1979-1980 survey conducted by RTI. In all, 23 additional steel truss bridges were inventoried. However, instead of treating them thematically as was done in 1985, the MDT made determinations of eligibility on a case-by-case basis per the terms of the expanded 1997 PA.

3. 2007 Programmatic Agreement and publication of *Conveniences Sorely Needed: Montana's Historic Highway Bridges, 1860-1956.*

In 2007, the Montana SHPO, FHWA, ACHP, and the MDT implemented a new PA that better addressed the management of the state's remaining historic steel truss bridges than had the 1989 and 1997 documents. The document contains provisions for the development of an historic bridge database, the implementation of an historic bridge rehabilitation program, and the development of Multiple Properties Documents for steel truss, reinforced concrete, timber, and steel stringer and girder structures. The Adopt-A-Bridge Program was carried forward in the 2007 PA. Prior to 2007, however, the MDT amended the 1997 PA to better handle historic bridges that could not feasibly be relocated under the Adopt-A-Bridge Program. These included reinforced concrete and substantial steel stringer and steel girder structures. The amendment stipulated that the MDT and Montana Historical Society would cooperate in the production and publication of a book on Montana's historic highway bridges. The book built on the groundwork laid by RTI and Frederic Quivik and included additional research in both primary and secondary sources by the author, Jon Axline. The book provides an historic context for Montana bridges built between 1860 and 1956. Historic steel truss bridges built between 1888 and 1946 are included in the book and the historic context in the book provided the context statement for this MPD. The book, *Conveniences Sorely Needed: Montana's Historic Highway Bridges, 1860-1956*, was published by the Montana Historical Society Press in 2005.

4. National Register of Historic Places nominations (2008)

Stipulation 4(C) of the 2007 Programmatic Agreement states that the MDT will "develop National Register Multiple Property Documents (MPD's) for steel truss, reinforced concrete, steel stringer, girder, and timber bridges in Montana." To complete that stipulation, the MDT re-evaluated the remaining 148 on- and off-system steel truss vehicular bridges in Montana for possible nomination under an MPD in 2007. Consequently, ten bridges suitable for individual National Register nominations as part of an MPD submittal were developed by the MDT. All ten bridges meet the criteria described above and have not been programmed by the MDT or nominated by the counties for replacement. Six of the bridges are owned by the MDT and four are off-system and county-owned. Each of these bridges has been re-photographed, or in the case of three bridges not included in the original 1979-1980 inventory, photographed for the first time. Additional research in primary and secondary sources about each structure was completed and included in the individual National Register nomination forms.

Using the 1979-1980 research materials, supplemented by additional research done between 1990 and 2008, MDT Historian Jon Axline prepared this Multiple Properties form and the individual nomination forms during the summer of 2008. All products were submitted to the Montana SHPO in December 2008.

I. Major Bibliographic References

Acts, Resolutions and Memorials of the Territory of Montana Passed by the First Legislative Assembly. (Virginia City: D. W. Tilton & Co., 1866).

American Association of State Highway Officials. *Standard Specifications for Highway Bridges*. Seven volumes (Washington DC: AASHO, 1921-1957).

"American Institute of Steel Award." *The Centerline* 2:6 (August, 1939).

Armstrong, Ellis L. *History of Public Works in the United States*. (Chicago: American Public Works Association, 1976).

Automotive Safety Foundation. *Moving Ahead on Montana's Highways: An Engineering Study of Road and State Needs*. (Helena: State Highway Commission, 1956).

Axline, Jon. *Conveniences Sorely Needed: Montana's Historic Highway Bridges, 1860-1956*. (Helena: Montana Historical Society, 2005).

Bandy, William R. "Search for County Boundaries Inspires Investigation Into Exact Location of Historic Parsons Bridge Near Whitehall." *Montana The Magazine of Western History*. 13:4 (Autumn, 1963).

"Benedict Joseph Ornburn." *The Centerline*. 1:5 (May, 1938).

Biographical Sketch of the Members of the Senate, Historical Society of Montana Library, 8 January 1959 (Vertical File, Montana Historical Society).

Birney, Hoffman. *Roads to Roam*. (Philadelphia: Penn Publishing, 1930).

Borth, Christy. *Mankind on the Move: The Story of Highways*. (Washington DC: Automotive Safety Foundation, 1969).

Burlingame, Merrill G. *The Montana Frontier*. (Helena: State Publishing, 1942).

Carbon County Bridge Record. Clerk & Recorders Office. Carbon County Courthouse, Red Lodge, Montana.

Cheney, Roberta Carkeek. *Names on the Face of Montana: The Story of Montana's Place Names*. (Missoula: Mountain Press, 1990).

Condit, Carl W. *American Building*. Second Ed (Chicago: University of Chicago: 1982).

Conley, Frank. *Nineteenth Annual Report for the Montana State Prison for the Year Ending December 31, 1914*. (Deer Lodge: Montana State Prison, 1915).

Contributions to the Historical Society of Montana. Vol. VI (Helena: The Historical Society of Montana, 1907).

Cultural Resource Report: Montana Department of Transportation's Missouri River Ferries Rehabilitation Project (Control No. 4493), Prepared for Morrison-Maierle, Inc. by Historical Research Associates, (February, 2001).

Dearborn Country: A History of the Dearborn, Wolf Creek, and Craig Areas. (Fairfield: Fairfield Times, 1976).

Deaver, Ken and Sheri Deaver. Archeological Site Testing and Evaluation on the Beartrap Canyon of Madison County, Montana. Report prepared for the Bureau of Land Management (1984).

"Did You Know That . . . ." *The Centerline*. 3:7 (July, 1940).

Directory of Billings, Red Lodge and Yellowstone and Carbon Counties, (Billings: R. L. Polk, 1909).

Eckel, C. L. "The Development of Simple Types of Bridge Structures in the United States." *The Colorado Engineer*, 25 (November, 1928).

Federal Highway Administration. *America's Highways, 1776-1976: A History of the Federal-Aid Program*. (Washington DC: Government Printing Office, 1976).

General Laws, Memorials and Resolutions of the Territory of Montana, 1867. (Virginia City, Montana Territory: D. W. Tilton, 1868).

Gies, Joseph. *Bridges and Men*. (New York: Doubleday, 1963).

Goff, John V. *Miles City, Montana: An Architectural History*. (Miles City: Custer County Society for the Preservation of Local Folklore, Legend, History, and Tradition, 1987).

Golden Jubilee, 1915-1965: A Brief History of the Development and Progress of Wolf Point, Montana. (Wolf Point: Golden Jubilee History Committee, 1965).

Hall, William L. *Financing Modern Highways for Montana*. (Helena: Montana Fact Finding Committee on Highways, Streets, and Bridges, 1956).

Harbison, Gertrude. "Story of Parsons' Bridge as Told to Me by Mrs. Z. D. Foster, a Matron in the 1860s – 1870s," Unpublished Manuscript, Vertical Files, Montana Historical Society

Hewett, Maurice W. "William Sherman Hewett," (Unpublished Manuscript, 1956).

History of Beaverhead County. Vol. 1 (Dillon: Beaverhead County History Book Association, 1990).

Hopkins, H. J. *A Span of Bridges*. (New York: Praeger Publishers, 1970).

House Journal of the Twenty-Ninth Legislative Assembly of the State of Montana, (Helena: State Publishing, 1945).

Hoye, Leota ed., *Roosevelt County's "Treasured Years,"* (Wolf Point: Roosevelt County Bicentennial Committee, 1976),

Ingram, Patricia M. Historic Transportation Routes Through Southwestern Montana. Unpublished manuscript. Bureau of Land Management, 1976.

Jacobs, David and Anthony E. Neville. *Bridges, Canals and Tunnels: The Engineering Conquest of America*. (Washington DC: American Heritage Publishing, 1968).

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

Lang, Theodore E. "Bringing Montana Out of the Mud: The Early Years of John Morrison, SR." *Montana The Magazine of Western History* 44:4 (Autumn, 1994).

Laws, Memorials and Resolutions of the Territory of Montana Passed at the Seventh Session of the Legislative Assembly. (Deer

Lodge: James H. Mills, 1872).

Laws, Resolutions and Memorials of the State of Montana Passed by the Thirteenth Regular Session of the Legislative Assembly. (Helena: State Publishing, 1913).

Laws, Resolutions and Memorials of the State of Montana Passed by the 14th Regular Session of the Legislative Assembly. (Helena: State Publishing, 1915).

Laws, Resolutions, and Memorials of the State of Montana Passed by the Thirty-third (1953) Legislative Assembly in Regular Session, (Helena: State Publishing, 1953).

Laws, Resolutions, and Memorials of the State of Montana Passed by the Thirty-fourth (1955) Legislative Assembly in Regular Session. (Helena: State Publishing, 1955).

Leeson, Michael A. *History of Montana, 1739-1885*. (Chicago: Warner, Beers, 1885).

Lewis, Tom. *Divided Highway: Building the Interstate Highways, Transforming American Life*. (New York: Viking Press, 1997).

Madsen, Betty M. and Brigham D. Madsen. *North to Montana! Jehus, Bullwhackers, and Mule Skinners on the Montana Trail*. (Salt Lake City: University of Utah, 1980).

Malone, Michael P. Richard B. Roeder, and William L. Lang. *Montana: A History of Two Centuries*. Rev. Ed. (Seattle: University of Washington, 1991).

Maun, Vere P. "Bridge Building." *The Centerline* 1:5 (May, 1938).

McKay, Kathryn L. *Looking Back: A Pictorial History of the Flathead Valley, Montana*. (Kalispell: Northwest Valley Historical Society, 1997).

___. *Montana Main Streets: A Guide to Kalispell*. (Helena: Montana Historical Society, 2001).

Meeks, Harold A. *On The Road to Yellowstone: The Yellowstone Trail and American Highways, 1900-1930*. (Missoula: Pictorial Histories, 2000).

Metlen, George R. R*eport of the Montana State Highway Commission for the Years 1915 –1916*. (Helena: State Highway Commission, 1916).

Montana Department of Highways Bridge Bureau Records, B 7: 1-7 (2004). Montana Historical Society, Helena.

Montana Good Roads Congress. *Minutes of the Proceedings of the Montana Good Roads Convention Held at Billings, Montana, June 16th, 17th, 18th, 1910*. (Helena: Montana Lookout, 1910).

Montana Highway Commission Meeting Minutes. Books 1-10. Montana Department of Transportation. Helena, Montana.

Montana State Highway Commission. *Report of the Montana Fact Finding Commission on Highways, Streets, and Bridges to the Legislature of the State of Montana*. (Helena: State Highway Commission, 1956).

Montana State Highway Planning Survey, *Preliminary Report on Highway Needs in Montana: Montana's Highway Problems*, (Helena: State Highway Commission, 1948),

More History of Beaverhead County, Montana. Vol. 2 (Dillon: Beaverhead County Museum Association, 1997).

Morris, Patrick M. "The Good Roads Movement and Montana to 1916." (Master's Thesis, University of Montana, 1967).

Moulton, Gary E. ed. *The Definitive Journals of the Lewis & Clark Expedition: From Fort Mandan to Three Forks*. Volume 4 (Lincoln: University of Nebraska, 1987).

Mullan, John. *Report on the Construction of a Military Road From Fort Walla-Walla to Fort Benton*. (Washington DC: General Printing Office, 1863).

___. *Miners and Travelers' Guide*. (New York: W. M. Franklin, 1865).

"New Highway Era." *Engineering News-Record* Annual Highway Number. (January 19, 1934).

Newberry, Robert and H. W. Guy Meyer. "Ordinary Iron Highway Bridges," *Wisconsin Academy Review*, 30 (March, 1984).

Oviatt, Alton B. "The Movement for a Northern Trail: The Mullan Road, 1859 – 1869." (Ph.D. diss., University of California, Berkeley, 1947).

Patterson, James T. *The New Deal and the States: Federalism in Transition*. (Princeton: Princeton University Press, 1969).

Pioneer Trails and Trials: Madison County, 1863-1920, (Twin Bridges: Madison County History Association, 1976).

Planning Survey Division. *Montana Highway History, 1943 – 1959*. (Helena: State Highway Commission, 1960).

Plowden, David. *Bridges: The Spans of North America*. (New York: Viking Press, 1974).

Potter, James E. and L. Robert Puschendorf, ed. *Spans in Time: A History of Nebraska Bridges*. (Lincoln Nebraska State Historical Society, 1999).

Progressive Men of the State of Montana. (Chicago: A. W. Bowen, 1902).

Quivik, Fredric L. *Historic Bridges in Montana*. (Washington DC: National Park Service, 1982).

__. "Montana's Minneapolis Bridge Builders." *IA: The Journal of the Society for Industrial Archeology* 10 (1984).

Rae, John B. *The Road and the Car in American Life*. (Boston: Massachusetts Institute of Technology, 1971).

Reeder, George C., ed., *Theodore Roosevelt International Highway: Guide Through Montana*. (Glasgow: Montana Division of the Theodore Roosevelt International Highway, 1923).

Report of State Highway Commission for Period Ending December, 1928. (Helena: State Highway Commission, 1929).

Report of State Highway Commission for Biennium Ending December, 1930. (Helena: SHC, 1930).

Report of State Highway Commission of Montana for Biennium Ending December 1932. (Helena: State Highway Commission, 1933).

The Revised Statutes of Montana Enacted at the Regular Session of the Twelfth Legislative Assembly of Montana. (Helena: George E. Boos, 1879).

Ridge, Alice A. and John Wm Ridge. *Introducing the Yellowstone Trail: A Good Road from Plymouth Rock to Puget Sound*. (Altoona, Wisconsin: Yellowstone Trail Publishers, 2000).

Rings, Frederick. *Reinforced Concrete Bridges*. (New York: Van Nostrand, 1913).

Schwantes, Carlo Arnaldo. *Long Day's Journey: The Steamboat & Stagecoach Era in the Northern West*. (Seattle: University of Washington Press, 1999).

Second Biennial Report State Highway Commission of Montana, 1919-1920. (Helena: State Highway Commission, 1921).

Segars, Loretta. *100 Years in Culbertson, 1887-1987*. (Culbertson: Culbertson Centennial Steering Committee, 1986).

Senate Journal of the Fifth Session of the Legislative Assembly of the State of Montana. (Helena: State Publishing, 1897).

Sherman, William Tecumseh. *Travel Accounts of General William T. Sherman to Spokan Falls, Washington Territory, in the Summers of 1877 and 1883.* (Fairfield, Washington: Galleon Press, 1984).

Spritzer, Don. *Roadside History of Montana*, (Missoula: Mountain Press, 1999)

Steere, M. J. *History of the Montana State Highway Department, 1913 – 1942*. (Helena: State Highway Commission, 1943).

Stephenson, R. A. "Bridge Building in Montana." *The Centerline.* 1:9 (September, 1938).

Stout, Tom. *Montana: Its Story and Biography*. Three volumes (Chicago: American Historical Society, 1921).

Stuart, Mrs. Granville. "When Virginia City was the Capital of Montana." *The Montana Magazine of History* 3:1 (January, 1953).

Third Biennial Report State Highway Commission of Montana, 1921-1922. (Helena: State Highway Commission, 1923).

Thirteenth Annual Report of the Water Department, City of Kalispell, Montana Ending December 31, 1926. (Kalispell: City of Kalispell, 1927).

Toole, K. Ross and Merrill G. Burlingame, *A History of Montana*, Volume 3 (New York: Lewis Publishing, 1957),

"Twin Bridges and the Normal School." *The Rockies* 2:4 (April, 1892).

Tyrell, Henry Grattan. *History of Bridge Engineering*. (Chicago: The Author, 1911).

Waddell, J. A. L. *Bridge Engineering*. Two volumes. (New York: John Wiley & Sons, 1925).

"Warren C. Gillette Crosses Great Divide," Undated Obituary.

Watkins, T. H. *The Great Depression: America in the 1930s*. (Boston: Little, Brown and Company, 1993).

Whithorn, Doris. *Yankee Jim's National Park Toll Road and the Yellowstone Trail*. (Privately Published, 1989).

Whithorn, Doris and Bill. *Photo History of Gardiner, Jardine, Crevasse: Entrance to Yellowstone National Park Wonderland*. (Livingston: Park County News, 1972).

Whitney, Charles S. *Bridges: A Study in Their Art, Science, and Evolution*. (New York: William Edwin Rudge, 1929).

Wohlgenant, Carl F. "Development of the Federal-Aid Highway System in Montana." (Master's Thesis, University of Montana, 1954).

Wyss, Marilyn. *Roads to Romance: The Origins and Development of the Road and Trail System in Montana*. (Helena: Montana Department of Transportation, 1992).

Newspapers Consulted

Billings Gazette

Culbertson Searchlight

Dillon Examiner

Polson Flathead Courier

Fort Benton River Press

Great Falls Tribune

Hardin Tribune-Herald

Helena Independent

Helena Independent Record

Kalispell Daily Inter Lake

Kalispell Graphic

Laurel Outlook

Liberty County Times

Madisonian

White Sulphur Springs Meagher Republican

Miles City Yellowstone Journal

Missoulian

Montana Post

Phillips County News

Red Lodge Picket

Sidney Herald

Terry Tribune

Wolf Point Herald