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NAT. REGISTER OF HISTORIC PLACES
NATIONAL PARK SERVICE

United States Department of the Interior
National Park Service

National Register of Historic Places Multiple Property Documentation Form

This form is used for documenting multiple property groups relating to one or several historic contexts. See instructions in *How to Complete the Multiple Property Documentation Form* (National Register Bulletin 16B). Complete each item by entering the requested information for additional space, use continuation sheets (Form 10-900-a). Use a typewriter, word processor, or computer to complete all items.

x New Submission ____ Amended Submission

A. Name of Multiple Property Listing

Pegram Truss Railroad Bridges of Idaho

B. Associated Historic Contexts

1. Pegram Truss Railroad Bridges of Idaho, 1894-1917
2. George Herndon Pegram (1855-1937)

C. Form Prepared By

name/title Donald W. Watts, Historic Preservation Planner
organization Idaho State Historic Preservation Office date May 20, 1997
street & number 210 Main Street telephone (208) 334-3861
city or town Boise state ID zip code 83702

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 and Guidelines for Archaeology and ~~Historic~~ Preservation.

Signature of certifying official — Date 6/4/97

Robert M. Yohe II, Idaho State Historic Preservation Officer

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 7/25/97

STATEMENT OF HISTORIC CONTEXTS

This Multiple Property Listing is based on two National Register criteria. The bridges are eligible under Criterion C as rare surviving examples of the Pegram truss, an innovative, but short-lived and geographically limited, design used primarily by its originator, George H. Pegram, during his associations with the Missouri Pacific Railway and the Union Pacific Railroad Company. The bridges are also eligible under Criterion B for their association with Pegram, a nationally known civil engineer in the late 19th and early 20th centuries. The bridges represent the earliest phase of his work, and it was the bridge design which first brought him national attention and launched him on a long engineering career. Besides the truss design, some of Pegram's other accomplishments include the Union Station trainshed in St. Louis and the completion of the first railway tunnel under East River in New York City. Although the bridges are also eligible under Criterion A for their historic association with the development of railroad transportation in southern Idaho, that particular context is not included in this Multiple Property Documentation Form.

E.1. The Pegram Truss

In order to place the Pegram truss design in a proper context, a brief overview of principal bridge truss types is necessary.[1]

A truss is a web-like arrangement of smaller components fitted together in a prescribed manner to make a larger structure capable of carrying loads. In general, a truss bridge performs like a beam -- supported at either end with various components of the truss carrying compression and tension forces. Truss bridges, whether the components are wood or metal, use relatively small amounts of structural material to support very heavy loads.

One of the most common truss types is the Pratt, developed in the 1840s. A Pratt truss is characterized by parallel top and bottom chords with vertical posts carrying compressive forces and diagonal posts carrying the tensile forces. Visually, the truss is identified by the fact that the verticals are more substantial while the dimensions of the diagonals are relatively smaller. Variations on the Pratt include the Baltimore (Petit) truss which incorporates additional substruts and subties to increase strength.

Another common design, also since the 1840s, is the Warren truss in which the diagonals are heavier than the verticals. Like the Pratt, the basic Warren truss has parallel top and bottom chords (See Figure 1).

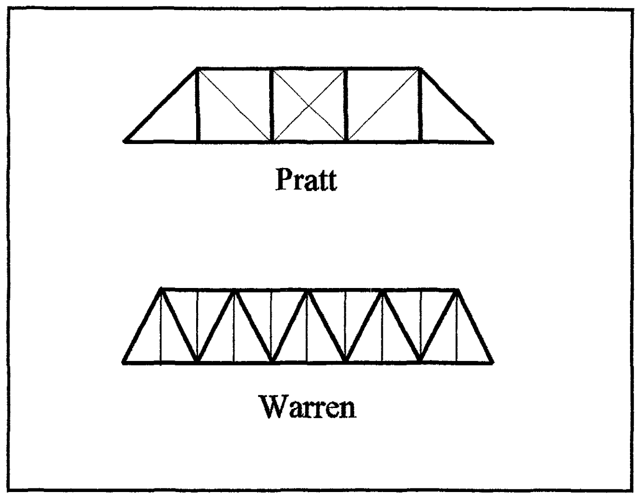

Figure 1

By the latter half of the 19th Century, engineers began designing trusses with polygonal or curved top chords. The reason for this was economic. Structurally, the heaviest load stresses on a bridge occur at the center of the truss, the lightest at the ends which are supported by the bridge abutments. Because the characteristics of the Pratt and Warren included parallel top and bottom chords, this meant that such designs, when used for long spans, used superfluous amounts of metal at the ends. In other words, more steel was used than was structurally necessary. As a result, designs were developed which incorporated polygonal top chords -- this used less steel but retained the same structural strength of a parallel-chord bridge of the same length.

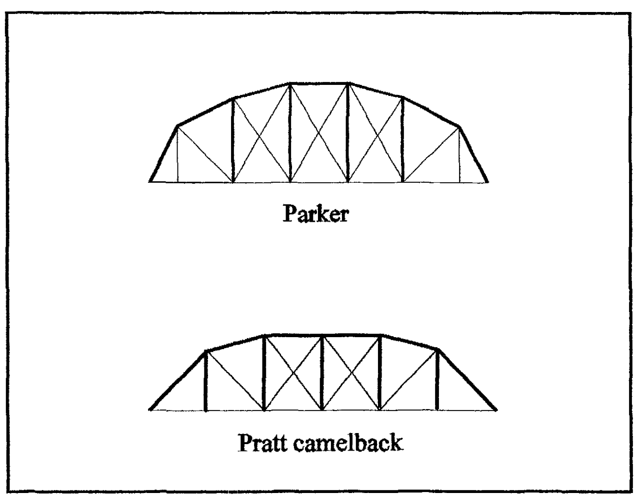

Figure 2

An aspect which can be readily seen in Figure 2 is that each of the individual components of a curved top chord design necessitated varying lengths. The compression posts of the Parker, for example, are of several different lengths, as are the individual members of the polygonal top chord. At the manufacturing stage, this required resetting the stamps for different lengths of steel several times during fabrication. It was this issue which George Pegram addressed in his original design.[2]

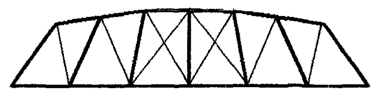

Figure 3

The Pegram design uses the same length for all of the top chord members, the same length for each of the compression posts, and the same length for the bottom chord members (see Figure 3). Pegram's reasoning was that this simplification would save manufacturing costs by minimizing the stamp tool resetting time, and, therefore, cost. Further, this would also simplify erection of the final bridge in the field since the individual components of the three major segments (top chord, posts, and bottom chord) were essentially interchangeable. In practice, Pegram modified this design by using different post lengths to provide a more circular arc to the upper chord (See Figure 4). The upper and lower components, however, remained true to the original concept. When assembled, the Pegram truss produces a very distinguishable design. The geometry of the combination of elements produces a design which has the posts arranged at increasing angles from the vertical as one moves from the center of the truss toward the ends.

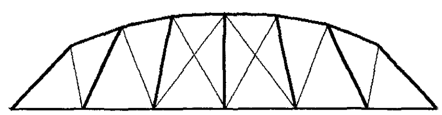

Figure 4

THE DEVELOPMENT AND APPLICATION OF THE PEGRAM TRUSS

The Pegram truss was patented in 1885, and in 1887 Pegram published an extensive description of his design in *Engineering News*, one of the leading professional journals at the time. Although the article generated some correspondence, it was clear that Pegram would have to build a bridge with his design in order to prove its worth to the engineering community. In 1889 he successfully bid on a contract to construct his first Pegram truss bridge over the Verdigris River in Indian Territory (now Oklahoma) for the Missouri Pacific Railway Company.[3]

The successful project brought him and his work to the attention of S. H. H. Clark, vice president and general manager of the Missouri Pacific, an association which would help solidify Pegram's engineering career in the next ensuing years. In 1889 Pegram joined the Missouri Pacific as consulting engineer and moved to St. Louis, leaving his share of a fledgling New York practice to an associate.

During his tenure with the Missouri Pacific from 1889 to 1893, Pegram was responsible for all new bridges and, under Chief Engineer James W. Way, the construction of all new lines for the railroad. The Pegram truss was used for many replacement bridges on the old lines and in all the new bridges constructed. It is estimated that over twenty Pegram truss bridges were constructed during 1890. The Missouri Pacific at that time controlled about 7,500 miles of track from St. Louis to Omaha on the north, to Pueblo, Colorado, on the west, and to San Antonio, Texas, in the southwest. New branch lines were constructed to Ft. Smith, Arkansas; Fort Scott, Kansas; and to Alexandria, Louisiana. The largest Pegram truss bridge (a combination railroad and highway structure) was the Arkansas River crossing at Ft. Smith -- the bridge (1890) consisted of thirteen 200-foot spans and a 350-foot draw span, all of Pegram trusses.

In 1891 Pegram established a national reputation for himself as the engineer/designer of the great Union Station trainshed in St. Louis which was completed in 1893. This project, in assocation with architects Theodore C. Link and Edward D. Cameron who designed the terminal building, was a monumental structure -- the trainshed was one of the world's largest at the time, being approximately 700 feet long by 600 feet wide and covering 32 tracks. Pegram used his truss design to support the roof system with a series of five Pegram trusses combined in tandem to form a gigantic arch over the tracks. The visual qualities of the truss resulted in a curtain-like appearance to the underside of the roof structure. The trainshed and depot were designated a National Historic Landmark in 1970.

In 1893 Pegram left the Missouri Pacific and became the chief engineer for the Union Pacific Railroad Company, the largest railway system in the world at that time, with control of over 9,000 miles of track and about 40 different railroads. Pegram stayed with the Union Pacific until 1898, and it was during his tenure there that the Idaho bridges were constructed.

IDAHO'S PEGRAM TRUSS BRIDGES

Completed in 1884, the Oregon Short Line (OSL) railroad was an instrumental turning point in the development of southern Idaho. Although rail service to Idaho was begun in 1871 with the Utah Northern (later Utah and Northern), that first line was a north-south route in eastern Idaho which connected the main rail line in Utah with the mining regions of western Montana. The OSL, a subsidiary of the Union Pacific Railroad (UP), was a major east-west connection and generally followed the route of the Oregon Trail connecting the UP main line at Granger, Wyoming, with the markets and transportation network of the Pacific Northwest.

The OSL route necessitated four major crossings of the Snake River, one at American Falls in the southeast area of the state, and three at the Idaho-Oregon border at Nyssa, Ontario, and Huntington, Oregon. Other bridges crossed the Bear River in the southeast, and the Weiser and Payette rivers in the west. Most, if not all, of the original OSL bridges were timber Howe trusses, a proven design used often in the west where a plentiful supply of timber offered a more economical choice than transporting iron truss bridges from the east. By the last decade of the 19th Century, however, the versatility and ease of construction of prefabricated iron bridges, along with the need to increase bridge loading capabilities, necessitated their replacement in order to meet much increased rail traffic demands.

As he did during his time with the Missouri Pacific, Pegram appeared to take advantage of his position as chief engineer with Union Pacific to utilize his bridge design. In his autobiography, he states, "In 1894 it became necessary to replace the wooden bridges of the Oregon Short Line with iron bridges, and I rejoiced at the opportunity to make extensive use of the Pegram truss."[4]

He did make extensive use of the truss in Idaho: Pegram truss bridges were constructed in 1894 and 1896 in at least six locations in the state. At Georgetown in Bear Lake County a 172-foot single span bridge on the main line crossed the Bear River. On a branch line, a two-span bridge crossed the Weiser River near Weiser, and a three-span structure crossed the Payette River near Payette. Both the Weiser and Payette bridges were composed of trusses 135 feet in length. (There is photographic evidence that a three-span Pegram bridge crossed the Boise River near Middleton on the Idaho Northern Railroad, but that has not yet been confirmed). It was at three of the four great main line crossings of the Snake River, however, that Pegram built his largest Idaho structures. The first crossing was at American Falls, from the south side of the Snake River to the north; the second from Idaho to Oregon at Nyssa; and the third from Oregon back into

Idaho at Ontario. The fourth and final crossing, back from Idaho to Oregon and points west, was not a Pegram truss.

It was at the first crossing, at American Falls, that Pegram appears to have made a unique application of his truss design. All other known Pegram bridges were of a through-truss design; that is, the roadbed was located on the bottom chord of the truss with the train passing through the superstructure of the bridge. At American Falls, however, he constructed the Pegram truss in a deck-truss configuration. Because this required a flat upper chord to accommodate the trackbed, the principals of the Pegram truss (longer, equal-length bottom chord members) resulted in the bottom chord acquiring a curved appearance. The post lengths, radiating outward at increasing angles from the vertical, resulted in a fanlike or almost drapery effect similar to the roof trusses of the Union Station trainshed at St. Louis. Although Pegram described a deck truss bridge configuration in his *Engineering News* article in 1887, there does not appear to be any record of a deck Pegram bridge being constructed anywhere else aside from American Falls, Idaho. It is possible it was a unique application of the design.

At the second crossing of the Snake at Nyssa, Oregon, Pegram used five 207-foot through trusses, three over the east channel and two over the west. The ease of erection of the Pegram truss was documented in a contemporary article in the *Engineering Record*: "The [Nyssa] bridge . . . was probably erected in as short a time as any bridge of its length in America, and most likely establishes a record . . . . That the design is simple for erection is in evidence when it is stated that the last span . . . was erected in 5 hours and 20 minutes."[5]

The 1,000-foot crossing of the Snake near Ontario, Oregon, was accomplished with four 217-foot through spans across the west channel and a single 217-foot span across the east channel a few hundred yards away. Pegram himself included an anecdote in his autobiography:

> On one trip with [Union Pacific] General Manager [Edward] Dickinson we crossed the Snake at Ontario, where one 200-ft span had been erected. Coming back at sundown, Mr. Dickinson said, "My memory must be going back on me. I remember this as one span and it is two." I explained that he was still sane, the second span having been erected while we were away. [6]

REPLACEMENT AND RELOCATION OF THE PEGRAM BRIDGES IN IDAHO

Pegram's bridges served the Oregon Short Line well, but within less than two decades they had become obsolete as main line structures. During this period at the turn of the century, the OSL was doubletracking the main line and building and expanding several branch lines. In addition, with locomotives and their trains becoming heavier and larger, it became clear that the Pegrams (as were other older bridges on the line) were not capable of sustaining long-term growth and expected Twentieth Century rail traffic. By World War I all the Pegram bridges had been replaced with more modern structures. However, the versatility and transportability of the pin-connected Pegram bridges precluded their total discarding for scrap. Disassembled, many of the spans were reerected at other locations where their condition and load capacities were sufficient for smaller branch lines.[7]

The Ontario crossing, consisting of five 217-foot spans, was disassembled in 1914. Two of the spans were relocated to the vicinity of Ketchum and reerected in 1917 to serve the Wood River Line, an important branch connecting the Wood River Valley with the main line.[8] Both bridges, now identified as the Cold Springs Bridge and the Gimlet Bridge, have been adaptively reused as part of a pedestrian path along Wood River and are included in this nomination. It is unknown what became of the remaining three Ontario spans.

The Nyssa crossing, of five 207-foot spans, was also disassembled in 1914, and all five of the through-spans are accounted for. Three of the spans were re-erected near Ririe in eastern Idaho that same year -- two spans over the main channel and one over the flood channel a half-mile away. These present bridges are now identified in the nomination as Ririe A and B, respectively. The remaining two Nyssa spans were reerected on the West Belt branch line near Menan in 1914. Unfortunately, the Menan bridge was destroyed in 1976 by the collapse of Teton Dam and its ensuing flood.[9]

The Payette and Weiser bridges, consisting of a total of five 135-foot spans, were taken down about 1913 or 1914. Two spans were reerected across the Henry's Fork of the Snake River at St. Anthony in eastern Idaho in 1914. They remain today (now identified as the St. Anthony Bridge) and are included in this nomination. Another span was reerected on the East Belt Branch line near Newdale that same year. Like the Menan structure, the relocated Newdale bridge was destroyed by the Teton Dam disaster in 1976. It is unknown what became of the other two Payette/Weiser spans (although it is possible they were relocated to Yakima, Washington).

The Georgetown structure, a single 172-foot through truss, was removed from the main line and relocated to a small branch line near Grace, about 25 miles away, presumably about 1914. Now identified as the Grace Bridge, it is included in this nomination.

The great American Falls deck truss was disassembled circa 1911 during doubletracking of the main line. The three 165-foot spans were reerected about 1914 over Conant Creek near Grainville, Fremont County, using tall steel towers to support the structure. In 1916 the bridge was reinforced with another Pegram truss installed in the centerline of the undercarriage. Approach spans were replaced in 1927. Included in this nomination, the Pegram deck truss Conant Creek Bridge is possibly unique in the United States.

OTHER PEGRAM TRUSS BRIDGES IN THE UNITED STATES

From Union Pacific records, the known disposition of Pegram truss bridges indicate very few survivors in the United States. The Verdigris River bridge (Pegram's first) near Claremore, Oklahoma, was replaced in 1922. The large Arkansas River structure at Fort Smith, Arkansas, was dismantled in the late 1960s or early 1970s. The Oachita River bridge near Columbia, Louisiana, was replaced in 1945, as was the Red River structure near Alexandria, Louisiana. The Marmaton River bridge at Ft. Scott, Kansas, was dismantled in 1927.[10]

There are, however, a few examples remaining outside of Idaho.

Near Concordia, Kansas, a 203-foot single-span through truss across the Republican River was abandoned by the railroad and the bridge converted to serve as a vehicular structure. The bridge is unusual in that the Pegram through truss is used with two triple-intersection Warren through trusses as approach spans. The bridge, built in 1893 by Edge Moor Bridge Works, was listed in the National Register of Historic Places in 1990 (#89002190).

In Yakima, Washington, a two-span Pegram truss bridge crosses the Yakima River for the Yakima Valley Transportation Company, formerly a subsidiary of Union Pacific. It is unknown whether these spans were originally constructed there or if they were relocated from another location.[11] Based on their estimated dimensions of the spans, it is possible they were relocated from the dismantled bridges at Payette or Weiser, Idaho, but this conjecture needs further study.

In Ogden, Utah, a 157-foot single-span Pegram truss bridge crosses the Weber River on a spur line to the Ogden Sugar Works. The spur, although located in Utah, was part of the Oregon Short Line. According to Union Pacific, this may be the only Pegram truss span which is still in use in its original location.[12]

According to Union Pacific, there is a single 148-foot span Pegram truss bridge crossing the Solomon Branch near Minneapolis, Kansas. The structure originally was located near Columbus, Nebraska, over the Loup River, but was dismantled in 1908 to accommodate doubletracking of the line.[13]

E.2. George H. Pegram (1855 - 1937)

George Herndon Pegram was born in 1855 in Council Bluffs, Iowa, the son of Benjamin Rush and Mercy Adelaide (Robbins) Pegram. The elder Pegram owned a bank and a store in Council Bluffs and operated a freight business to Denver. One of Pegram's business partners was General Grenville M. Dodge, later of the Union Pacific Railroad, and that association later assisted George Pegram in his earliest employment as an engineer. At the outbreak of the Civil War, the Pegrams moved to St. Louis where, in association with his brother, Benjamin Pegram owned a steamboat company operating on the Mississippi River. In 1864 the Pegrams moved to New Orleans, but returned to St. Louis shortly after the war in 1866.[14]

In 1877 George Pegram completed his civil engineering degree from Washington University, St. Louis. Economic times were difficult, but Pegram was able to find employment thanks to the efforts of his father's previous partner, Grenville Dodge. Thus, Pegram's first professional position was as a member of the survey crew laying out a new route for the Utah & Northern Railway Company in southeast Idaho in 1877.

In 1878 Pegram joined the staff of Col. C. Shaler Smith of St. Louis. Smith had been a consulting engineer for the great Eads Bridge in St. Louis several years earlier, and it was Smith who recommended Pegram for the position of chief engineer of the Edge Moor Iron Company which he joined in 1880. Located in Wilmington, Delaware, Edge Moor was one of the largest bridge manufacturers in the world at that time. His tenure at Edge Moor was an important one, as it was there that Pegram began a life-long association with some of the future leading engineers of the time including J. E. Greiner (J. E. Greiner & Company, Baltimore); H. B. Seaman (chief engineer, Public Service Commission of New York); and C. W. Bryan and O.E. Hovey (American Bridge Company). In 1885, Pegram designed and patented his Pegram truss which is described in more detail in Section E.1.

Pegram resigned from Edge Moor in 1886. After a brief visit to Europe, he moved to New York City where he opened his own engineering firm. It was during this time that Pegram published his first extensive article about his truss design in *Engineering News* and endeavored to get a bridge into practice. In 1889 he bid on a contract to construct a bridge over the Verdigris River in Indian Territory (Oklahoma) for the Missouri Pacific Railway Company. When confronted with the novel design, the railroad's engineer "threw [the] design out as an 'experiment.' "[15] Pegram appealed to S. H. H. Clark, then vice president and general manager of the railroad, who assured Pegram that he would get the contract. Aside from constructing his first Pegram truss bridge, this was also the beginning of a long professional association with Clark.

The Verdigris River bridge successfully completed, in June 1889 Pegram was offered and accepted a position as consulting engineer for the Missouri Pacific. Leaving his New York practice to an associate, he moved to St. Louis. His position with the Missouri Pacific left him responsible for all new bridges for the railroad, and under the chief engineer, of the construction of all new lines. During his time with the Missouri Pacific, many Pegram truss bridges were constructed, chiefly in Kansas, Arkansas and Louisiana. It is estimated that over twenty Pegram truss bridges were constructed in 1890.

In 1891 Pegram was selected to design the Union Station trainshed in St. Louis, one of the largest trainsheds in the world at that time at 700 feet long by 610 feet wide. The roof structure, a large arched design covering 32 tracks, was supported by a series of five Pegram trusses.

In 1893 Pegram left the Missouri Pacific and moved to Omaha to become chief engineer of the Union Pacific Railroad Company under S. H. H. Clark, president of the company, with whom he had previously been associated at Missouri Pacific. The Union Pacific was the largest railway system in the world at that time, with control of about 40 railroads and over 9,000 miles of track, only about 32 miles of which were double-tracked. As chief engineer, Pegram's position allowed him the opportunity to construct many other bridges of his design, and it appears that most of the new and replacement bridges were Pegram trusses, chiefly in Kansas, Wyoming, and Idaho. Pegram stayed with the Union Pacific until 1898. In recognition of his achievements with the company, the Union Pacific renamed the small community of Nupher, Idaho, in his honor. Pegram, Idaho, is located on the main line in Bear Lake County, about 25 miles from where Pegram began his engineering career on the Utah & Northern Railroad survey crew near Franklin.

While still with the Union Pacific in 1896, Pegram was called to New York to meet with Jay Gould to evaluate the soundness of the city's elevated railways. Gould's engineers were of the opinion that the structures had reached the end of their lifespan. Pegram's examination and report suggested that with major reinforcement, the lines would last another hundred years. Pegram was convinced that this report led him to being named chief engineer of the Manhattan Railway in New York City in 1898.[16]

Pegram's move to New York City in 1898 would be his last, and he spent the remaining forty years of his life deeply involved in the development of the city's rapid transit system. At Pegram's arrival in New York, the city operated elevated, steam-powered, railroads with a total of 167 miles of track. At his death in 1937, there were 780 miles of track, both elevated and subway, all electrified. During this interval, passenger traffic increased from 250,000,000 per year to over 1,900,000,000. It was a pioneering period for the city's transit system, and Pegram's role in various capacities was significant.[17]

After the Manhattan Railway Company was leased to the Interborough Rapid Transit Company, Pegram became chief engineer of the Interborough as well as the Rapid Transit Subway Construction Company in 1905. From 1912 to 1924, he also served as chief engineer of the New York Railways Company which was responsible for much of the surface rail lines (streetcars) in Manhattan.

The electrification of the lines, first put in operation in 1901, made possible the use of subways, and Pegram was closely associated with this hallmark of New York public transportation. Under his jurisdiction, the elevated lines were reinforced and adapted for electrification and the first tunnels completed. Among many of his direct responsibilities was the design and construction of the 74th Street Powerhouse, the largest and most efficient power-generating station in the world at that time, extensions of the elevated lines, completion of a third-track system, and completion in 1907 of the first railway (subway) tunnel under East River. Other notable achievements included twelve power substations, subway platform extensions, 157 miles of subway line equipment, signaling, drainage, and ventilation, and construction of a deep-tunnel station.[18]

Throughout his career, Pegram remained an active member of the American Society of Civil Engineers (A.S.C.E.) which he first joined in 1880 as a Junior, then as a full member in 1883. He served in various leadership capacities including a Director from 1902 to 1904, Vice-President in 1909 and 1910, and as President in 1917 during which he guided the move of the Society's headquarters to the Engineering Societies Building where the A.S.C.E. joined in the creation of the Engineering Council. Among other activities, he was a trustee of the Engineering Foundation, member of the American Society of Professional Engineers, and member and director of the Engineers' Club of New York. In 1931 he was recognized by his professional peers when he was elected an Honorary Member of the A.S.C.E.[19]

George Pegram died in Brooklyn, New York, in 1937.

ENDNOTES

1. Good overviews of bridge truss types can be found in Donald C. Jackson, Great American Bridges and Dams (Washington, D.C.: The Preservation Press, National Trust for Historic Preservation), 1988; and in T. Allan Comp and Donald Jackson, Bridge Truss Types: A Guide to Dating and Identifying (Nashville: American Association for State and Local History); Technical Leaflet 95, n.d.

2. Pegram, George Herndon; "Autobiography of George H. Pegram -- Part II;" *Civil Engineering*, Vol. 9, #2 (February 1939), p 101.

3. *Ibid.*

4. Pegram; "Autobiography -- Part III," p 176.

5. *Engineering Record*, 1894, p 256.

6. Pegram; "Autobiography -- Part III," p 177.

7. Disposition of the Pegram truss bridges is based on two principal sources: personal correspondence from J. R. Beran, Chief Engineer - Design, Union Pacific Railroad Company, to Donald W. Watts, Idaho SHPO, dated June 8, 1990; and Union Pacific construction drawings. The drawings are particularly helpful as they identify disassembly and reerection dates, bridge manufacturers and dates, locations, and so forth. Specific sources are identified in the individual nominations.

8. *Wood River Times*, July 9, 1917.

9. Ltr dtd June 8, 1990, from J. R. Beran to Donald W. Watts.

10. Ltr dtd September 13, 1990, from J. R. Beran to Donald W. Watts.

11. Ltr dtd June 8, 1990, from J. R. Beran to Donald W. Watts.

12. *Ibid.*

13. *Ibid.*

14. "Memoir of George Herndon Pegram," Transactions of the American Society of Civil Engineers, Vol 103, 1938, p 1732.

15. Pegram, George H., "Autobiography of George H. Pegram -- Part II," *Civil Engineering*, Vol. 9, #2 (February 1939), p 100. Pegram's autobiography was published posthumously in four parts from January through April, 1939. In addition to the "Memoir" cited above, other biographical information is available in The National Cyclopaedia of American Biography, (New York: James T. White & Company), Vol XXVIII, 1940.

16. Pegram, "Autobiography -- Part III," Vol. 9 #3 (March 1939), p 178.

17. "Memoir," *op. cit.*, pp 1734-5.

18. *Ibid.*

19. *Ibid.*

ASSOCIATED PROPERTY TYPES:

This Multiple Property Listing is based on only one property type -- the Pegram truss railroad bridge.

Description: The basic physical characteristics of the truss are that the upper chord members are of equal length, the bottom chord members are of equal length (longer than the upper), and the compression posts radiate at increasing angles from the vertical outward from the center of the truss to the ends. A full description is provided in Section E.

Significance: The bridges are eligible under Criterion C as rare survivors of a property type. The Pegram truss is an engineering design which was conceived as a method to achieve the structural advantages of a polygonal top chord (such as Parker or others) while also minimizing manufacturing and erection costs.

They are eligible under Criterion B for their association with the engineer who designed them, George H. Pegram, who became a nationally known civil engineer by the turn of the century. His extensive use of this truss design for the Missouri Pacific Railway Company contributed to his being selected as the designer for the Union Pacific trainshed in St. Louis in 1891, an achievement which gained him national recognition. From 1893 to 1898 he was the chief engineer for the Union Pacific Railroad Company, during which time the Idaho bridges were constructed. Following his time with the Union Pacific, Pegram spent the remainder of his career as a major developer of New York City's rapid transit system.

Although not developed in this nomination, the bridges are also eligible under Criterion A for their historic association with the expansion and upgrade of railroad transportation in southern Idaho.

Registration requirements: The only requirements are that the bridge be of a Pegram truss design and physical integrity remains. The basic physical integrity elements include the bottom and top chords and the panels. The presence of railroad trackbed (rails and ties) is not necessary for integrity purposes. Moved structures remain eligible under Criterion C since the principal significance is in the engineering design and not necessarily the location. A disassembled, but relatively complete, Pegram truss bridge may remain eligible as long as most principal elements survive and are stored together. The physical integrity of approach spans, if any, are not relevant for this purpose.

GEOGRAPHICAL DATA:

The geographical area covered by this Multiple Property Documentation Form is restricted to the actual site locations of the bridges themselves. In general, they are all presently located on what are or were the smaller branch lines of the old Oregon Short Line (now Union Pacific) railroad routes in southern Idaho. Specifically, the bridges are presently located at, or in the vicinity of, Grainville, St. Anthony, Ririe, Grace, and Ketchum. Site-specific UTM coordinates are identified in each individual nomination form.

SUMMARY OF IDENTIFICATION AND EVALUATION METHODS:

Initial identification of some of the Pegram bridges was a result of a comprehensive statewide survey of bridges on the Idaho state highway system in 1982-3. Although that survey was primarily concerned with vehicular bridges, many railroad bridges were also inventoried if they were easily accessible. In addition, other Pegram bridges were identified through subsequent research and on-site survey resulting from information from Union Pacific Railroad Company. Although there has been no similar comprehensive railroad bridge survey conducted in Idaho as yet, there appear to be no other Pegram truss structures in the state other than those included in this nomination.

The survey information was minimal, so subsequent historical research was conducted to compile contextual information on the Pegram bridges. Significant information, in the form of engineering plans and drawings, was provided by the Union Pacific Railroad Museum in Omaha. Onsite inspection of each of the bridges several times since 1990 supplemented information from the 1982 survey. In addition, onsite inspections of the Pegram bridges in Yakima (Washington) and Ogden (Utah) as well as information from the Concordia (Kansas) National Register nomination were useful. Other major sources included contemporary newspaper accounts of the bridges' construction, dismantling, and reerection; autobiographical and biographical information on George Pegram; historical photographs from the University of Idaho library collections; contemporary engineering journal articles; and personal correspondence.

In terms of evaluation, the initial 1982 bridge inventory only noted that few Pegrams appear to have survived. Subsequent research, including contact with most other states which are known to have once had them, only revealed three (possibly four) other extant examples outside of Idaho (see narrative). As a result, evaluation of the structures (in terms of scarcity) was made on a national scale. In addition, the career of Pegram himself indicates a potential national level of significance for these structures since they represent his first major achievement in bridge design and firmly established him in a notable engineering career. The historical physical integrity of each of the Idaho bridges is good. Although all of the bridges in Idaho have been moved from their original locations, their new locations were all established before World War I and reflect the policy of Union Pacific reusing older structures on lines requiring less loading constraints. Many of the bridges have undergone some minor modifications and reinforcement over the years, but all retain their original design and reflect their historic appearance.

MAJOR BIBLIOGRAPHICAL REFERENCES:

Beal, Merrill D., and Merle W. Wells; History of Idaho (New York: Lewis Historical Publishing Company, Inc.), 2 vols, 1959.

Beal, Merrill D.; Intermountain Railroads: Standard and Narrow Gauge (Caldwell, ID: Caxton Printers, Ltd.), 1962.

Beran, J. R., Chief Engineer - Design, Union Pacific Railroad, letter to Donald W. Watts, Idaho State Historical Society, June 8, 1990.

---------------------; letter dated September 13, 1990.

Berg, Walter G.; Buildings and Structures of American Railroads: A Reference Book (New York: John Wiley & Sons), 1893. Reprinted in Train Shed Cyclopedia, No. 33 (Novato, CA: Newton K. Gregg, Publisher), 1975.

Billington, David P.; The Tower and the Bridge: The New Art of Structural Engineering (New York: Basic Books, Inc.), 1983.

Comp, T. Allan, and Donald Jackson; Bridge Truss Types: A Guide to Dating and Identifying (Nashville: American Association for State and Local History); Technical Leaflet 95, n.d.

Condit, Carl W.; American Building Art: The Nineteenth Century (New York: Oxford University Press), 1960. [Idaho State Library call # LCS 27255; in storage].

Cooper, Theodore; "American Railroad Bridges," *Transactions of the American Society of Civil Engineers,* No. 418, Vol. 21 (July 1889); pp 1-58.

Edwards, Llewellyn Nathaniel; A Record of History and Evolution of Early American Bridges (Orono, Maine: The University Press), 1959.

Ehernberger, James L., and Francis G. Gschwind; Smoke Down the Canyons (Callaway, NE: E. & G. Publications), 1966.

Engineering News, Feb 14, 1891, p 154 (with inset); Feb 21, 1891, p 178; Feb 28, 1891, pp 207-; Mar 14, 1891, p 254; Apr 11, 1891, p 351; Apr 25, 1891, pp 402-3; May 2, 1891, p 428.

Idaho Bridge Inventory (SHPO Report #17); Idaho Transportation Department, 1983.

Jackson, Donald C.; Great American Bridges and Dams (Washington, D.C.: The Preservation Press, National Trust for Historic Preservation), 1988.

"George Herndon Pegram;" The National Cyclopaedia of American Biography, Vol. XXVIII, (New York: James T. White & Company), 1940.

"Memoir of George Herndon Pegram;" *Transactions of the American Society of Civil Engineers*; Vol. 103, 1938.

Pegram, George H.; "A New Bridge Truss," *Engineering News*, Vol. XVIII, Dec. 10, 1887, pp 414-416.

------------------; Dec. 17, 1887, pp 432-434.

Pegram, George Herndon; "Autobiography of George H. Pegram -- Part I;" *Civil Engineering*; Vol. 9, #1 (January 1939).

--------; Part II; Vol. 9, #2 (February 1939).

--------; Part III; Vol. 9, #3 (March 1939).

--------; Part IV; Vol. 9, #4 (April 1939).

Tyrrell, Henry Grattan; History of Bridge Engineering (Chicago: G. B. Williams Co.), 1911.

Waddell, J. A. L.; Bridge Engineering (New York: John Wiley & Sons, Inc.), 2 vols., 1916.

Watts, Donald W.; "Mr. Pegram's Bridges: Engineering Legacies in Idaho," *Journal of the West*, Vol. XXXI, No. 1, January 1992, pp 79-87.