ANNOTATED BIBLIOGRAPHY OF

ALASKA RAILROAD & RELATED TIMBER BRIDGES

November 2008

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TABLE OF CONTENTS

Annotated Bibliography of Alaska Railroad and Related Timber Bridges November 21, 2008

I. General Historical Works: Timber and Trestle Bridges

Austill, H. "Use of Wood on American Railroads." Transactions of the American Society of Civil Engineers. (New York: ASCE, 1953): pp. 797-804.

As part of its 100th anniversary celebration, the American Society of Civil Engineers issued a special centennial edition of its Transactions, featuring papers on the major sub-fields of the profession. Within structural engineering, four papers were published encompassing various aspects of wooden bridges and trestles, and timber construction technology. Austill's paper, on the use of wood in American railroad structures, provides a concise account of both railroad trestle and truss development, including the growing use of treated timber in these wooden structures.

Committee on History and Heritage of American Civil Engineering. American Wooden Bridges. (New York: American Society of Civil Engineers, 1976), 176 pp.

This volume is comprised of a collection of five articles on wooden bridge building in America, including three that appeared in the Transactions of the ASCE, all dating from the late 19th century through the 1930s. The lengthiest of these reprints is J. P. Snow and Robert Fletcher's "A History of the Development of Wooden Bridges," which remains the single most comprehensive account of the wooden bridge construction from antiquity through the early 20th century. Snow and Fletcher included a section on wooden stringer bridges and railroad trestles. In addition to the reprinted articles, this volume includes a brief introduction and a three-page bibliography, although the majority of the citations relate to covered bridges.

Condit, Carl W. American Building: Materials and Techniques from the Beginning of the Colonial Settlements to the Present. (Chicago and London: University of Chicago Press, 1968), 329 pp.

Published 40 years ago, this book remains the definitive work on the history of American building technology. It contains a chapter on the wooden truss bridge and places this material and bridge type within the larger context of bridge building and design. Included in this chapter is a brief discussion of the significance of timber trestle technology in relation to topographical influences in the design of American bridges. In addition, the author analyses the change from craft and artisanal approaches in the erection of bridges and buildings, to scientifically based structural engineering design.

Edwards, Llewellyn N. History and Evolution of Early American Bridges. (Orono: University of Maine Press, 1959), 443 pp.

For many years the author served as chief engineer for the Maine State Highway Commission and designed a number of highway bridges in his native state. His extensive historical work on bridges included research on Samuel Sewall, a prominent bridge builder in late-18th century New England. The author discusses Sewall's York River Bridge (1761) in Maine, which he identifies as the first pile trestle bridge constructed in the United States. Seven years after Edwards' death his manuscript, encompassing a history of bridges in early America, was published. In addition to material on Sewall, this book includes a discussion on wooden bridge construction in the Colonial and early Republic periods in the United States. It provides a useful framework for understanding the development of timber trestle technology in relation to early American highway and railroad bridges.

Hool, George A. and W.S. Kinne. Steel and Timber Structures. 2nd edition. (New York: McGraw-Hill, 1942), 733 pp.

One of the premier structural engineering textbooks between WWI and WWII for both engineering students and practicing engineers. Section 4: Timber Bridges and Trestles contains a detailed discussion of the factors affecting design and construction of timber bridges and trestles including practical considerations of life cycle, materials, joint connections, structural components, floor systems and truss types for both railroad and highway uses. The Appendix includes standard specifications for piles and timber bridge components. This work is relevant for timber bridges that were constructed and used for the Alaska Railroad prior to WWII.

Hopkins, H.J. A Span of Bridges: An Illustrated History. (New York and Washington: Praeger Publishers, Inc., 1970), 288 pp.

Although most of this British publication is devoted to masonry, metal, and concrete bridges from antiquity through the mid-20th century, it contains a concise, contextual segment on wooden bridges. As a useful overview of bridge and trestle engineering during the "age of wood," much of the discussion of this segment focuses on the structural behavior of wooden bridges to tensile and compressive forces, with an assessment of the structural forms and designs in relation to these forces.

Olson, Sherry H. The Depletion Myth: A History of Railroad Use of Timber. (London, England: Oxford University Press; and Cambridge, MA: Harvard University Press, 1971), 228 pp.

The author of studies in economic history and historical geography, Professor Olson produced this revisionist history of the relationship between U.S. railroads as massive industrial consumers of timber in the late-19th century and the emergence of government-sponsored conservation programs. Of special note is the role of railroads in the growth of the chemical preservative industry, the expansion of research into the structural properties of wood, alterations in timber design and structural design standards, and the substitution of other materials for wood in the building of railroad structures, including bridges and trestles.

Pease, George B. "Timothy Palmer, Bridge Builder of the Eighteenth Century," The Essex Institute: Historical Collections, v. 83, (April, 1947): pp. 97-111.

This article includes genealogical and biographical material on one of the most important bridge builders in late 18th and early 19th century America, as well as an assessment of his contribution to timber bridge-building technology. Most of the brief history of bridge building is drawn from secondary sources, but this article contains a number of images and drawings of Palmer and his bridge work.

Plowden, David. Bridges: The Spans of North America. (New York: Viking Press, 1974), 328 pp.

A modern work that traces the history and evolution of bridge types throughout North America. The chapter on wood bridges is particularly relevant to the early wood bridges and documents the roles of early constructors and engineers who pioneered the design and construction of wooden bridges, particularly for early 19th Century railroad purposes.

Steinman, David B. and Sara Ruth Watson. Bridges and Their Builders. (New York: G.P. Putnam & Sons, 1941), 379 pp.

Authored by one of the foremost structural engineers of America's early 20th Century long-span bridges, Chapter 7 of this work provides a well-documented history of wooden bridges throughout the northeastern United States.

Troyano, Leonardo Fernández. Bridge Engineering: A Global Perspective. (London: Thomas Telford Press, 2003), 775 pp.

Originally issued in Spain, this English translation of Troyano's comprehensive book on bridges contains sections on wooden bridges, including a brief history of the timber trestle with examples of several notable such spans in the United States. In the larger context of bridge design and construction, this remarkable international study is the most up-to-date and complete bridge book published in recent decades. It is lavishly illustrated with drawings, engravings, and photographs, including a number of exquisite images of timber trestles.

Tyrrell, Henry Grattan. Bridge Engineering: A Brief History of this Constructive Art from the Earliest Times to the Present Day. (Chicago: n.p., 1911), 479 pp.

The author, who lived from 1867 to 1948, was a civil engineer specializing in bridge design and wrote several books on bridges, buildings, and aesthetics in bridge engineering and architecture. This volume contains chapters on wooden bridges and trestles and viaducts. The latter chapter includes a brief history of trestle construction and highlights leading examples of railroad trestles in 19th century America. Included are numerous illustrations that appeared in engineering journals or were created by Grattan's wife, a graduate of the Chicago Art Institute. Out of print for many decades, this book was recently (2007) republished without any changes to the original edition.

II. General Engineering and Technical Works

American Railway Engineering and Maintenance of Way Association, "Report on the Committee of Wooden Bridges and Trestles," Proceedings of the Sixth Annual Convention of the American Railway Engineering and Maintenance of Way Association. (Chicago: The Blakely Printing Company, 1905), pp. 23-117.

This committee report includes general specifications and plans for railroad trestle bridge construction as well as examples of plans and specifications of Santa Fe Railroad trestles. In addition, the report contains a brief history and bibliography of historic writings on wooden bridge construction. It should be noted that throughout most of the 20th century this committee published yearly reports in the Proceedings of the American Railway Engineering Association and that these reports provide valuable statistics on trestle and wooden railroad bridges in the United States, as well as terminology and specifications for timber trestle design. (For example, see the Proceedings of the Seventh Annual Convention, published the following year, in which this committee updated railroad trestle and wooden bridge specifications.) These various committee reports also document the changing technology of trestle construction and wooden bridge design, from the 1890s into the 1950s.

American Railway and Engineering and Maintenance of Way Association, Manual for Railway Engineering, Volume 2: Structures. (Washington, DC: AREMA, 2007).

Founded in 1898, the American Railway Engineering and Maintenance of Way Association began issuing an annual publication for recommended railway engineering practice in 1905 and this manual included a section on wooden bridges and trestles. It was developed by the committee of the same name (see citation above). By the 1960s, this section on trestles was included in the manual's chapter 7, encompassing railway structural engineering. For nearly twenty years, beginning in 1970, this manual was produced by the American Railway Engineering Association. In 1997, this association was reorganized as AREMA. Contemporary practice and standards for timber railroad structures are now found in AREMA's manual, Volume 2: Structures, in Chapter 7. Topics range from design standards and structural detailing to fire proofing and bridge inspection.

American Wood Preservers' Association. Handbook on Wood Preservation. (Baltimore, MD: The Peters Publishing & Printing Co., 1916.), 73 pp.

A comprehensive treatment on wood preservation technology in the United States, this handbook includes a list of the major companies involved in chemical and other treatments of timber products, as well as the processes employed. It notes the growing use of timber treated products in all aspects of railroad construction, including ties, piles, and trestles. Additionally, this handbook contains a timeline history of wood preservation technology and points out that in 1895 there were 15 wood preservation plants in the United States, but this number had grown to 127 by 1915.

Foster, Wolcott C. Wooden Trestle Bridges and Their Concrete Substitutes According to the Present Practice on American Railroads. 4th edition. (New York: John Wiley & Sons, Inc., 1913), 440 pp.

A consulting civil engineer who specialized in railroad construction, sanitation, and waterworks, Foster produced the most comprehensive treatise on timber trestle bridges, unmatched by any other single technical work on bridge design and construction. The 4th edition includes an extensive array of trestle construction projects from the late-19th and early 20th century, as well as numerous illustrations, diagrams, and tables, including a glossary of terms associated with timber trestle and bent bridges. In addition, it includes a section on reinforced concrete pilings and trestles as a substitute for timber structures. The 4th edition features an extremely comprehensive bibliography, encompassing all aspects of timber piles and trestle technology, wood preservation, and construction techniques. This bibliography represents the most thorough review of the era's technical and trade journal literature. (Note: The 3rd edition of Foster's work, titled A Treatise on Wooden Trestle Bridges According to the Present Practice on American Railroads was published in 1900 and numbered 255 pages in length. It covered exclusively timber trestle, piling, and bent structures for railroads as well as electric interurban railways.)

Goltra, William F. "History of Wood Preservation." Proceedings of the Ninth Annual Meeting of the Wood Preservers' Association held at Chicago, January 21-23, 1913. (Baltimore, MD: 1913).

The owner of a company that specialized in the wood preservation of railroad ties, the author produced a concise history of wood preservation technology, with an emphasis on developments in the United States and in conjunction with the nation's railroads, including techniques applied to wood in the construction of timber bridges and trestles.

Haupt, Herman. Military Bridges: With Suggestions for New Expedients and Constructions for Crossing Streams and Chasms, including also, Designs for Trestles and Truss Bridges for Military Railroads. (New York: D. Van Nostrand, 1864), 310 pp.

A graduate of the U.S. Military Academy at West Point in 1835, Haupt produced the most important early structural engineering text on bridges in the United States (General Theory of Bridge Construction, 1851, with subsequent editions). This was followed by his treatise on military and railroad bridges. This latter book includes several sections on timber trestle and pile bridges, with numerous illustrations and it remained the most extensive work on this topic until the early 20th century.

Johnson, A. L. Bulletin No. 12: Economical Designing of Timber Trestle Bridges. (Washington, D.C.: Government Printing Office, 1902), 57 pp.

In this important study conducted under the aegis of the U. S. Department of Agriculture's Division of Forestry (later the U. S. Forest Service), the author amassed data on elastic properties of various types of wood, as well as allowable stresses and safety factors employed in the design of timber structures by a number of leading structural and railroad engineers to show the wide variances in these values and design approaches. The author's aim was to establish greater uniformity in acceptable values and design, most notably in safety factors assigned to timber trestle beams, stringers, columns, and bracing, and promote greater economy in the construction of timber trestles. This work reflects a larger social and political movement in the late 19th and early 20th century to conserve the nation's timberlands through greater economy in the design of timber railroad structures.

Peale, Charles Wilson. An Essay on Building Wooden Bridges. (Philadelphia: Francis Bailey, 1797).

This widely cited, late-18th century pamphlet promoting the author's wooden arch bridge design is an early and classic account of the artisanal nature of timber bridge construction in the early Republic. It remains an important primary source, alongside the drawings and published works of Timothy Palmer, Theodore Burr, and Lewis Wernwag.

Raymond, William G. The Elements of Railroad Engineering. 4th edition. (New York: John Wiley & Sons, Inc., 1923), 453 pp.

This classic railroad engineering text was written by the University of Iowa's dean of the College of Engineering and includes a chapter on the design of culverts, bridges, and minor structures, part of which encompasses trestles and pile bridges. Its design examples, drawn from the New York Central & Hartford Railroad, represent the standard designs for this bridge type from the early 20th century.

Ritter, Michael A. Timber Bridges: Design, Construction, Inspection, and Maintenance. (U.S. Department of Agriculture, Forest Service, Washington, D.C., 1990).

This Forest Service publication is a comprehensive treatise for the design, construction, inspection and maintenance of contemporary timber bridges, particularly with modern techniques and applications of glue-laminated lumber. It includes background history and documentation of timber bridge construction in the United States and is useful for modern preservation and rehabilitation treatments of wood components of timber bridges of all types.

Vose, George L. Handbook of Railroad Construction for the Use of American Engineers. (Boston and Cambridge, MA: James Munroe and Company, 1857), 480 pp.

A consulting civil engineer, the author produced this handbook for railroad construction a few years after Haupt (see other citation) came out with his widely used treatise on bridge construction. Vose included a lengthy chapter on wooden bridges. This chapter featured a short, illustrated section on wooden trestles (Vose used the term "trestling"). As an example of trestling, Vose highlighted the New York & Erie Railroad's Portage Bridge (1851-52) over the Genesee River, which was the most massive timber trestle bridge in the world at the time of its construction.

Webb, Walter L. Railroad Construction: Theory and Practice. (New York: John Wiley & Sons, Inc., 1917).

The author was a professor of civil engineering, specializing in railroad engineering, at the University of Pennsylvania, and wrote this text for students; however, it also served as a handbook for railroad engineers in the field. This book features a full chapter on trestle design and construction with in-depth descriptions of the major construction techniques and equipment used in the early 20th century in erecting trestle and pile bridges.

Waddell, J. A. L. Bridge Engineering. 2 volumes, (New York: John Wiley & Sons, Inc., 1916), 1064 pp.

A renowned consulting bridge engineer, the author included a chapter on trestles, viaducts, and bridge approaches in vol. 1 of his classic two-volume work. Most the trestle examples he provides, however, are of steel construction. Included in vol. 1 is a chapter titled "Evolution of Bridge Engineering," in which the author declares that the first timber trestle railroad bridge was built about 1840 as part of the Philadelphia and Reading Railroad construction (pp. 21-22).

III. Railroad Periodicals and Engineering Trade Journals: Key (Historical) Articles on Trestles

"'High Bridge,' Portage, New York." The Civil Engineer and Architect's Journal. v. 26, (February, 1853): pp. 65-66.

Published without author attribution (though it was likely Silas Seymour, chief engineer of the New York & Erie Railroad) in a venerable British engineering journal, this article discusses the design and construction of what was America's most significant 19th century wooden trestle viaduct. Designed by Seymour and completed in 1852, the "High Bridge," also called the Portage Viaduct, was the largest timber trestle in the world.

"Improved System for Trestle Bridges." Scientific American. v. 12, (May 13, 1865): p. 40.

Like Herman Haupt, Colonel Andrew Derrom, from Paterson, New Jersey, was an officer in the union army during the Civil War and designed trestle bridges for the military. This article highlights Derrom's system for constructing wooden trestles, requiring no metal fasteners or tiebars, relying instead on carpentry joints, most notably mortise and tenon connections. Although generally more expensive, Haupt's trestle bridge designs were structurally superior and proved more popular, while Derrom's system saw limited use primarily for temporary structures.

"Pile and Timber Trestle Bridges." Railway Age. v. 59, (October 22, 1915): pp. 754-756.

This brief article focuses on excavation and foundation work associated with the construction of railroad trestle bridges. It provides useful information on what, at the time of the article's publication, were current practices in substructure design and construction associated with railroad pile and timber trestle spans.

"Piledriver with Traversing Leads for Driving Trestle Bents." Engineering News. v. 73, (January 7, 1915): pp. 28-29.

Illustrated with diagrams, this short article highlights contemporary pile-driving techniques for constructing railroad trestle bents. This article is a useful companion to "Pile and Timber Trestle Bridges," Railway Age, v 59, (October 22, 1915). Both of these short technical works appeared just as construction work on the Alaska Railroad was commencing.

"Practical and Economical Way to Build a Trestle." Building Age. v. 40, (October 16, 1919): pp. 287-288.

This illustrated article is a general guide to designing and constructing railroad trestle bridges with an emphasis on the economics of trestle design. It reflects the prevailing practice at the time that the Alaska Railroad was under construction.

"Views on the Central Pacific." Scientific American. v. 20, (May 22, 1869): p. 328.

This illustrated article on the Central Pacific Railroad discusses the many trestle structures built as part of the line's construction through the Sierra Nevada Mountains in the late 1860s. Of the many short articles covering the topic of timber trestle technology in mid-19th century America, this is one of the finest that deals with western railroad construction.

IV. Railroad Periodicals and Engineering Trade Journals: Articles on Alaska Railroad and Trestle Construction

"Alaska Northern Railway." Railway Age Gazette. v. 51, (September 22, 1911): pp. 561-565.

This is an illustrated article on the construction of the Alaska Northern Railway, including its wooden and trestle bridges. It features the work carried out on one of the most difficult sections of the line, the Spencer Glacier area.

"Progress on Government Railway in Alaska." Railway Age Gazette. v. 57, (April 20, 1917): pp. 826-832,

This is one of a series of articles on the Alaska Railroad and the Alaska Engineering Commission during the construction of the road. Featured in this article is a map of the railroad, a profile of the line from Seward to Kern Creek (mile 70), and a series of photographs of the construction work.

"Railroad Construction Progress in Alaska." Railway Review. (October 5, 1918): pp. 487-490.

The first of a two-part series on the construction of the Alaska Railroad, this article reviews the progress made on the road since work commenced in 1915 and summarizes rail service on the stretch of the line completed by late summer 1918. It contains a number of illustrations, including trestle bridges, as well as a map that highlights the status of construction across the 470-mile length of the line.

"Railroad Construction Progress in Alaska." Railway Review. (October 12, 1918): pp. 537-539.

This is the second of the two-part series on the Alaska Railroad's construction. It focuses on the work underway in the Matanuska and Nenana coal districts and also includes photographs of the construction work. (See previous annotation above for part one of this series.)

V. Illustrated Publications and Rail Enthusiast Periodicals

"Alaska's New Railway." National Geographic Magazine. v. 28, (December, 1915): pp. 567-589.

This article includes a number of photographs documenting the existing railroad structures, including trestle bridges, and topography of the projected line of the Alaska Railroad. Images and information about the personnel and work underway of the Alaska Engineering Commission is also featured, much of which is promotional in tone.

Prince, Bernadine Lemay. The Alaska Railroad in Pictures, 1914-1964. (Ken Wray's Printshop, Anchorage, 1964), 2 volumes.

This is the most heavily illustrated book on the Alaska Railroad and contains about 1,000 historic photographs, a number of reproduced historic documents, and maps. The text is wholly descriptive and without footnotes, and the book does not contain a bibliography. Many of the photographs, including images of bridges and trestles, are from private collections and Alaska Railroad holdings.

Cohen, Stan. Rails across the Tundra: A Historical Album of the Alaska Railroad. (Missoula, MT: Pictorial Histories Publishing Co., 1984), 144 pp.

The author produced this book of historic photographs of the Alaska Railroad, including numerous views of the line's trestle bridges, and a second illustrated book of the White Pass and Yukon route. Many of the images of the Alaska Railroad document the construction of the line and its early years of operation.

VI. Drawings, Maps and Photographs

Alaska's Digital Archives. Website address: http://vilda.alaska.edu/index.php

Developed by a consortium of university libraries and the Alaska State Library at Juneau, this online digital archive contains over 10,000 items, including nearly 2,500 historic images related to the Alaska Engineering Commission and the Alaska Railroad. Numerous images of timber trestles under construction (Tanana River, for example), completed, or damaged from accidents or such natural causes as snow avalanches, are in this collection. The vast majority of these images have been dated and labeled.

Alaska Engineering Commission. "General Specifications for Pilings for Trestle Bridges, May 25, 1919." On file at the Alaska Railroad Corporation, Anchorage, Alaska.

Among the documents dating from the period of government ownership of the Alaska Railroad and available in the offices of the Alaska Railroad Corporation is the drawing and specifications for timber pilings for the road's trestle bridges. This set dates from 1919, although the Alaska Engineering Commission probably used similar specifications and designs for pilings of trestle bridges built between 1916 and 1919.

"Alaska Engineering Commission Collection." Anchorage Museum at Rasmuson Center, Anchorage, Alaska.

This collection contains over 1600 historical photographs many of which chart the progress of construction of the Alaska Railroad. These include numerous photographs of the railroad's trestle and pile bent structures.

Alaska Railroad, "1192.01 Standard Open Deck Pile Trestle, June 1949, [signed] R. A. Sharood." On file at the Alaska Railroad Corporation, Anchorage, Alaska.

This drawing from the late 1940s is the standard for timber trestle bridges used as part of the post-World War II campaign to replace aging and deteriorating trestle spans on the Alaska Railroad.

Alaska Railroad Corporation. "Alaska Railroad Track Chart." On file, Alaska Railroad Corporation, Maintenance and Right of Way Department, Anchorage, Alaska.

Updated every two years, this booklet of the Alaska Railroad trackage encompasses the line from Mile Post 0.00 in Seward to Mile Post 470.3 in Fairbanks including all branch lines that remain in operation. The track chart indicates the locations of all physical features along the trackage including vertical grades, trestles, bridges and bridge components, culverts, utility lines, grade crossings, speed limits, wayside signals and track layouts of sidings and storage yards. The most recent of the track charts is from 2006.

VII. Unpublished Technical Reports and Surveys

Alaska Engineering Commission. "Map of the Alaska Northern Railway and Alternative Survey, Seward to Turnagain Arm, Mile 0-65, S/158." On file, U.S. Department of the Interior, Bureau of Land Management, Anchorage, Alaska.

Shortly after its establishment the Alaska Engineering Commission issued this map showing the existing line of the Alaska Northern Railway and proposed routes for completing the road between Seward and Anchorage. This map is useful for viewing the road's major river crossings (bridged by trusses or trestles) over this section of the line.

Alaska Railroad. "Pile Reports, [various dates]." On file at the Alaska Railroad Corporation, Anchorage, Alaska.

As part of the Alaska Railroad's regular inspection and maintenance of bridges and trestles, pile reports, dating from as early as the 1920s, were produced with the location, size, and condition of each timber pile recorded on a standardized form originally developed by the Alaska Railroad Commission. Each report is dated as to when the field inspection was carried out.

U.S. Department of the Interior, Alaska Engineering Commission. Annual Reports, (Washington, DC: Government Printing Office, 1915-1923), Record Group 322, P2258, National Archive and Records Administration, Anchorage, Alaska.

These annual reports of the Alaska Engineering Commission (AEC) were issued from 1915 to 1923, during the course of the Alaska Railroad's planning, survey, and construction. The reports include information on the design and technical specifications for the railroad's buildings, bridges, and related structures, progress of construction, and expenditures. In 1924 the AEC was reorganized as the Alaska Railroad Commission.

U.S. Department of the Interior, Alaska Railroad Commission. Annual Reports, (Washington, DC: Government Printing Office, 1924-1954), Record Group 322, P2258, National Archive and Records Administration, Anchorage, Alaska.

These annual reports of the Alaska Railroad Commission, which operated the line following its completion in 1923, includes information on improvements, maintenance, and additions to the Alaska Railroad, along with annual expenditures for the road's operation and maintenance, encompassing buildings, bridges, trestles, and right-of-way.

VIII. Unpublished Historical Reports, National Register Surveys and Historical Documentation

Alaska Railroad Corporation. Historic Bridge Survey of the Alaska Railroad 2002-2005 (unfinished). Alaska Railroad Corporation, Anchorage, Alaska.

The Alaska Railroad Corporation with the support of the Federal Railroad Administration decided to undertake a historic bridge survey of all of the railroad bridges of the Alaska Railroad in 2002. They engaged McGinley Kalsow & Associates of Somerville, Massachusetts and Cultural Resource Consultants of Anchorage, Alaska to provide technical assistance. A computerized database of all bridges was formulated along with a cultural resource survey process to guide the evaluation of various types of bridges. An actual field survey was undertaken of all bridges in 2003 to photograph each bridge and its significant features. Of the 169 total bridges, 83 were timber trestles or have timber trestle components. A historical evaluation of each bridge's eligibility for listing in the National Register of Historic Places as an individual property. The historic bridge survey remains uncompleted; however the railroad utilizes the survey materials and data in its management of bridge structures to maintain the overall safety and efficiency of the railroad.

Alaska Railroad Corporation, Historic American Buildings Survey/Historic Engineering Record Documentation of Timber Railroad Trestle Bridges.

Several timber trestle bridges have been documented to HABS/HAER standards as mitigation measures and includes photographs and data pages that are on file at the National Archives and Records Administration, Anchorage, Alaska and are available at http://lcweb2.loc.gov/ammem/collections/habs_haer/hhmap.html. These timber trestle bridges include:

Bridge at Mile 187.6 over Iron Creek

Bridge at Mile 200.9 over Caswell Creek

Bridge at Mile 233.4 over drainage to the Susitna River

Bridge at Mile 233.6 over drainage to the Susitna River

Bridge at Mile 267.7 over Valentine Creek

Brown, Charles Michael. "The Alaska Railroad: Probing the Interior." October 1975 (Historical and Archaeology Series No. 15, Office of Statewide Cultural Programs, Anchorage, Alaska), 64 pp.

Historical study of the U.S. Government railroad in Alaska to 1925 including summaries of two private Alaska railroads which were subsequently incorporated into the Government's railroad system. The study includes an inventory and brief description of historic sites and structures that deserve entry in the National Register of Historic Places. It includes an extensive bibliography on the early development of the Alaska Railroad to 1925.

Oliver, Capt. Frederick L. (Retired U.S. Navy). "The Bridges of the Charles." Proceedings of The Bostonian Society, (January 19, 1956): pp. 33-47

This article was a paper read in the Council Chamber of the Old State House at a meeting of The Bostonian Society on February 20, 1951. The paper focuses on the evolution of early bridges over the Charles River between Boston and Cambridge, Massachusetts. It documents the construction and costs of the so-called timber "Great Bridge" that was completed in 1662 that lasted until 1685 when it was washed away and rebuilt on piling in 1690. It is the site of the present Anderson Bridge which is a major traffic route linking the Harvard University campus on both sides of the river.

Parsons, Brinckerhoff & Engineering and Industrial Heritage. "A Context for Common Historic Bridge Types: NCHRP Project 25-25, Task 15." October, 2005, (unpublished report prepared for the National Cooperative Highway Research Program, Transportation Research Council, National Research Council), 221 pp.

Prepared by consultants for the Transportation Research Council, this report is primarily a guide for use by federal and state highway officials administering compliance with provisions of the National Historic Preservation Act, in the survey and documentation of historic highway bridges. Although it does not deal directly with railroad structures, the report contains a section on trestles and viaducts with a brief historical overview of these bridge types.

Patterson, Helen B. and Philip Dana Orcutt. "The Saving of Sewall's Bridge", Old Time New England, Vol. XXIV, No. 3, Society for the Preservation of New England Antiquities, January 1934, pp. 100-103.

This article documents the construction in 1761 by Major Samuel Sewall in York, Maine of what is believed to be the first pile bridge built in the United States including Sewall's original plan. Sewall was then commissioned to build similar and larger bridges in the Boston area. The article also describes a later replacement bridge that was constructed from Sewall's original plan.

U.S. Department of the Interior, National Park Service, Historic American Buildings Survey/Historic American Engineering Record.

The following railroad trestles have been documented by HABS/HAER. Most of the documentary materials include photographs and data pages. The most extensive set of drawings are of the Ogden-Lucin Cut-off Trestle. A few of the trestles are documented with photographs and captions only. (All of the HABS/HAER documentary materials are available at: http://lcweb2.loc.gov/ammem/collections/habs_haer/hhmap.html, through the Library of Congress, accessed on October 7, 2008):

Arizona Eastern Railroad Bridge, built c. 1905-1915, combination steel through trusses and timber trestles spanning Salt River, Tempe, Maricopa County, Arizona.

Baltimore & Ohio Railroad, Long Bridge, timber trestle built c. 1869 (repaired at unknown date), spanning ravine in Keedysville vicinity, Washington County, Maryland.

Camas Prairie Railroad, Second Subdivision, includes a group of timber trestle spans erected in the early 20th century, line extending from Spalding in Nez Perce County, through Lewis C, Spalding, Nez Perce County, Idaho.

Copper River & Northwestern Railroad, Gilahina Bridge, timber trestle, built in 1911 and located at Mile 28.5, McCarthy Road, Chitina vicinity, Valdez-Cordova Census Area, Alaska.

Georgia Pacific Railroad (later Southern Railroad), Linn Crossing Trestle Bridge, built c. 1885, spanning County Road 71, Linn Crossing, Jefferson County, Alabama.

Gulf, Mobile & Ohio Railroad Bridge, built c. 1899, repaired 1924, wooden trestle with steel center span, crossing Black Warrior River between Northport & Tuscaloosa, Tuscaloosa County, Alabama.

Heber Creeper Railroad Line, Vivian Park Bridge, a timber trestle built c. 1915 spanning South Fork of Provo River, Provo vicinity, Utah County, Utah.

Marquette Ore Dock No. 6, timber railroad trestle, erected 1931-32 as part of ore dock operation, located between East Lake Street & Ore Dock No. 6, Marquette, Marquette County, Michigan.

Oregon Electric Railroad, Cattle Pass Trestle, a number of early 20th century wooden trestles, located along former Oregon Electric Railroad line, in the vicinity of Wilsonville, Clackamas County, Oregon.

Promontory Route Railroad Trestles, several wooden railroad trestles comprise this section of the Central Pacific Railroad line, originally built in the early 1870s, 11 miles west of Corrine, Corinne vicinity, Box Elder County, Utah.

Southern Pacific Railroad, Ogden-Lucin Cutoff Trestle, built 1902-1904, spanning Great Salt Lake, Brigham City vicinity, Box Elder County, Utah.

Uintah Railway, Whiskey Creek Trestle, built c. 1906, wooden trestle spanning Baxter Pass Road & Whiskey Creek Road, Rangely vicinity, Rio Blanco County, Colorado.

West Feliciana Railroad, Right-of-Way, including timber trestle built in early 20th century, Woodville vicinity, Wilkinson County, Mississippi.

Western New York & Pennsylvania Railway, Bridge No. 30, a steel through truss erected 1900, with timber trestle approach spans, crossing the Allegheny River, north of State Route 446 Bridge, Eldred, McKean County, Pennsylvania.

[Green Bay & Western Railroad] Winona Bridge, a steel swing span with multiple steel through-truss spans and timber trestle approach spans, built in 1891 (note: HABS/HAER has no data on this structure) spanning the Mississippi River, Winona, Winona County, Minnesota.

U.S. Department of the Interior, National Park Service, National Register of Historic Places.

The following railroad trestles are listed on the National Register of Historic Places (research done on NR database, http://www.nps.gov/nr/, accessed on October 7, 2008):

Delta Trestle Bridge, former Maryland and Pennsylvania Railroad, York County, Pennsylvania; wooden trestle in ruins, built c. 1875.

Doe Run Trestle, Seaboard [Railroad] Lines, Washington County, Kentucky; abandoned wooden trestle, built c. 1899, near Springfield, Kentucky.

Mexican Canyon Trestle, Alamogordo & Sacramento Mountain Railroad, Otero County, New Mexico; abandoned wooden trestle built as part of a logging railroad in 1899, currently being rehabilitated

Ogden-Lucin Cut-Off Trestle, Southern Pacific Railroad, near Salt Lake City, Utah; wooden trestle, built c. 1905; (this structure was documented by the Historic American recorded by HAER, see above citation).

Union Street Railroad Bridge and Trestle, crossing Willamette River, Salem, OR
Built in 1911-12 and designed by Waddell and Harrington, this structure is a vertical lift bridge along with steel through trusses and contains timber trestle approach spans. The trestles are of marginal significance, the main importance is the vertical lift and truss spans.

Willis Canyon Spur Trestle, abandoned wooden trestle, near Cloudcroft, NM
Built c. 1900, part of a logging railroad.

IX. General Historical Works: Alaska Railroad

Ballaine, John E. "Alaska's Government Railroad." The American Review of Reviews. v. 51, (May, 1915): pp. 572-577.

Along with his brother, the author was a founder of Seward, Alaska, as well as the Alaska Central Railroad, later the Alaska Northern, which the U.S. Government subsequently acquired. This illustrated article with a map showing Alaska's rail routes, navigable waterways, and mining districts, highlights the important connection between river and proposed railroad transportation networks. This article is redolent with the boosterism of Ballaine, who vigorously promoted the railroad and maintained significant financial interests in Seward.

Bernhardt, Joshua. The Alaskan Engineering Commission: Its History, Activities and Organization. (New York and London: D. Appleton & Company, 1922), 124 pp.

Published as part of a series of the Institute for Government Research, this is the first history of the Alaskan Engineering Commission, which oversaw the construction of the Alaska Railroad. It contains a concise history of Alaska's railroads, including the government-owned line, as well as an administrative history of the commission. In addition, this study features a comprehensive bibliography, most notably encompassing government documents related to the commission and the Alaska Railroad.

Crittenden, Katherine Carson. Get Mears! Frederick Mears: Builder of the Alaska Railroad. (Portland, OR: Binford & Mort, 2002), 385 pp.

This full-length and well-illustrated biography of the chief engineer of the Alaska Railroad, and later Chairman of the Alaska Engineering Commission, examines Mears' role in leading the construction of the government-owned road. It includes numerous historic photographs of the Mears family, as well as the railroad's construction. Formerly chair of the Anchorage Historical Landmarks Preservation Commission, the author drew extensively from the collection of the Anchorage Museum at Rasmuson Center and the private collection of the Mears family. The book includes a brief bibliography. Citations from each chapter appear as a series of notes at the end of the book.

Fitch, Edwin M. The Alaska Railroad. (New York: Frederick A. Praeger, 1967), 326 pp.

The author, who served as an assistant to the general manager of the Alaska Railroad, when the line was under federal control, has written a policy-oriented organizational and economic history of this railroad from its inception as the privately held Alaska Central Railway in 1903, up through its years as a government-owned line to 1966.

Mears, Frederick. "The Alaska Railroad." Journal of the Society of Western Engineers. v. 26, no. 9 (September, 1921): pp. 323-325.

Possibly the only published piece on the Alaska Railroad by its chief engineer, this article is from a presentation Mears delivered at a meeting of the Society of Western Engineers. It comprises an introduction to an extemporaneous talk with accompanying lantern slides of the Alaska Railroad

project. These slides are presumably from photographs taken personally by Mears which became part of the family's private collection (a number of these photographs from this rivate collection were published in Katherine Crittendon's biography of Mears.)

Riggs, Thomas. "Government Railroad in Alaska—What Two Years and Limited Funds Have Accomplished." Engineering Record. v. 73 (May 6, 1916): pp. 600-603.

A former mining engineer and member of the Alaska Engineering Commission that supervised the survey and construction of the Alaska Railroad, Riggs authored this concise article chronicling the accomplishments of the AEC after its first two years of oversight of the government railroad project.

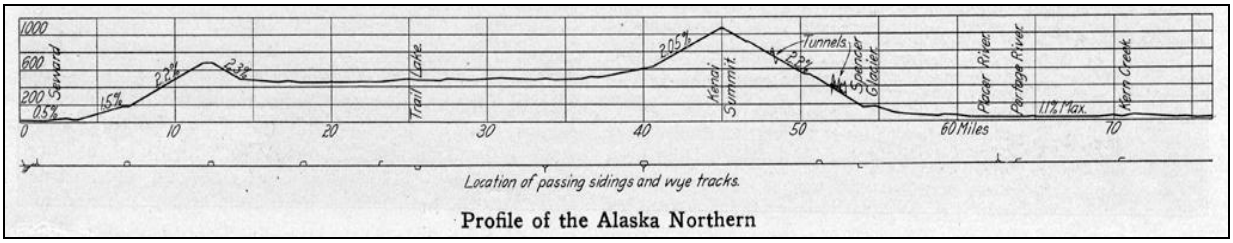
Wilson, William H. Railroad in the Clouds: The Alaska Railroad in the Age of Steam, 1914-1945. Boulder, CO: Pruett Publishing, 1977), 279 pp.

A professor of history at North Texas State University, the author has produced several works on Alaskan transportation, agricultural, and economic history. This well-illustrated study is the most comprehensive, scholarly history of the Alaska Railroad and focuses on the railroad's origin, its construction and development of towns along the line, and its early years of operation.

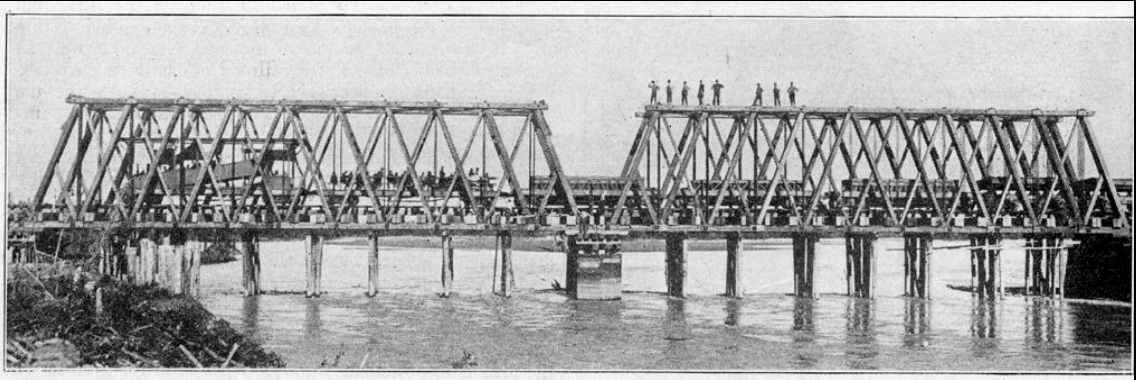
Wilson, William H. "The Alaska Railroad: Elements of Continuity, 1915-1941." Transportation in Alaska's Past, ed. Michael S. Kennedy (Anchorage: Alaska Historical Society, 1982), pp. 317-339.

Published as part of the proceedings from a special conference on Alaskan transportation history, this article examines the operation of the Alaska Railroad from its completion up to the U.S. entry in World War II.

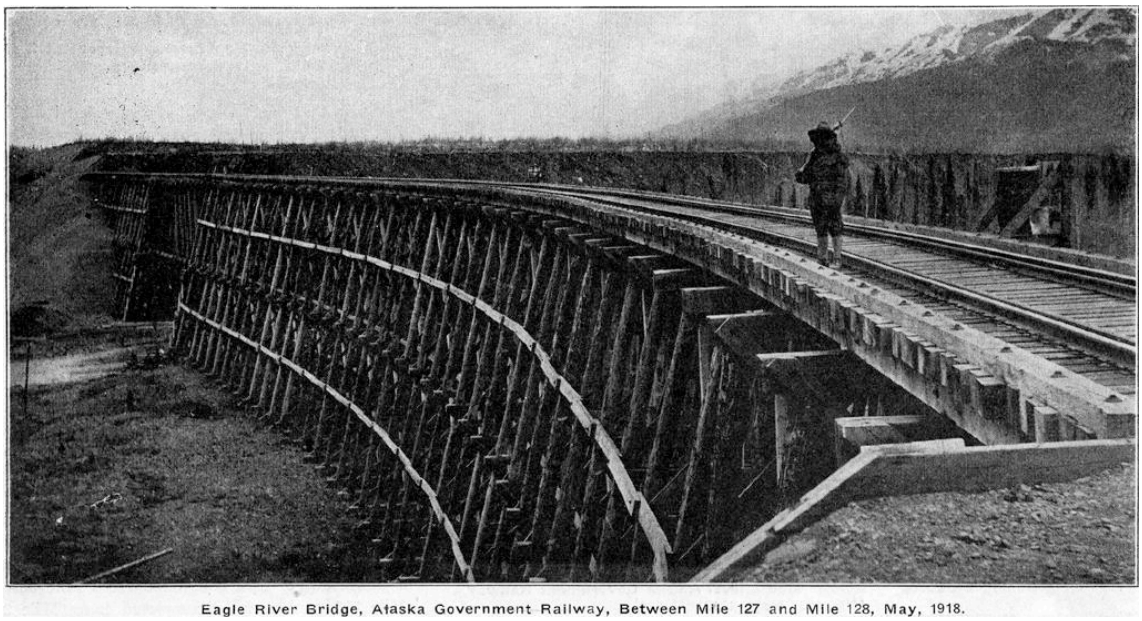
APPENDIX: EXAMPLES OF ILLUSTRATIONS AND DOCUMENTARY MATERIALS FROM SOURCES CITED IN BIBLIOGRAPHY



Profile of the Alaska Northern



Typical Howe Truss Spans



Eagle River Bridge, Alaska Government Railway, Between Mile 127 and Mile 128, May, 1918.

Three illustrations from a series of articles that appeared in railroad trade journals during the construction of the Alaska Railroad. The upper two are from "Progress on Government Railway in Alaska," which appeared in Railway Age Gazette, April 20, 1917; the illustration at the bottom is from "Railroad Construction Progress in Alaska," Railway Review, October 5, 1918.

TECHNICAL TERMS, NAMES, AND DEFINITIONS.

THE following list gives the names and their synonyms of some of the more important parts of wooden trestles. In connection with this list see Figs. 1 and 2, to which the numbers opposite the names refer.

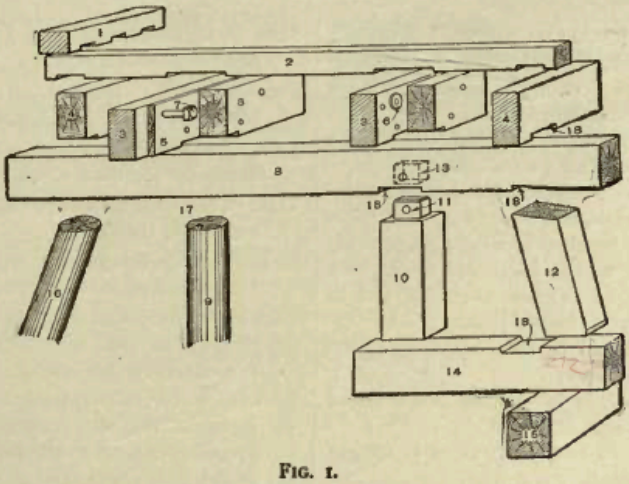


FIG. 1.

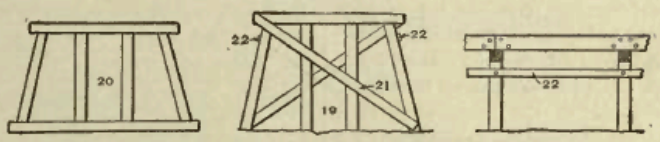


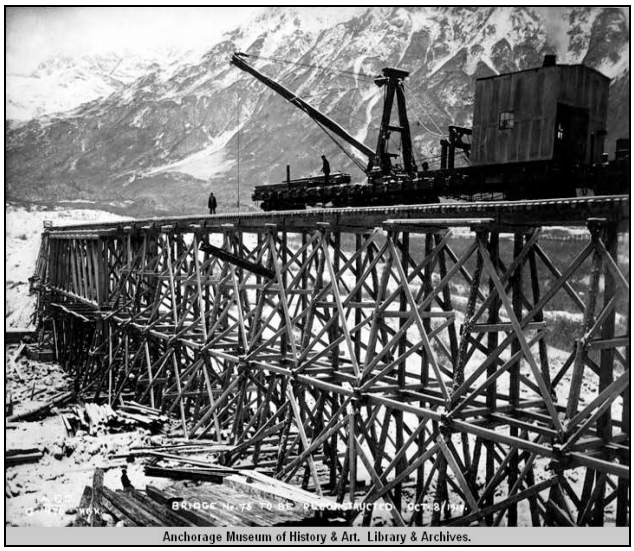
FIG. 2.

Bent, Framed, 20.
Pile, 19.
Cluster.
Bent Brace, see Sway-brace.
Block, see Sub-sill.
Bolster, see Corbel.
Cap, 3.
Chord, see Stringer.
Corbel, Bolster.
Cross-tie, 2.
Cut-off, 17.
Dapping, see Notching.
Fender, Guard-rail, 1.
Gaining, see Notching.
Girt, see Longitudinal Brace.
Girder, see Stringer.
Guard-rail, Fender, Ribbands, 1.
Jack-stringer, see Stringer.
Longitudinal Brace, Girt, Waling-strip, 22.
Mortise, 13.
Mud-sill, see Sub-sill.
Notching, Gaining, Dapping, 18.
Outside Stringer, see Stringer.
Packing-block, Packing piece, 5.
Packing-bolt, 7.
Packing-piece, see Packing-block.
Packing-washers, see Separator.
Piles, Batter, Inclined Brace, 16.
Vertical, Plumb, Upright, 9.
Posts, Batter, Inclined, 12.
Vertical, Plumb, Upright, 10
Ribbands, see Guard-rail.
Separator, Packing-washer, Thimble Spool, 6.
Sill, 14.
Spool, see Separator.
Stringer, Chord, Girder.
Track, 3.
Outside, Jack, 4.
Sub-sill, Mud-sill, Blocks, 15.
Sway-brace, Bent Brace, 21.
Tenon, 11.
Thimble, see Separator.
Track-stringer, see Stringer.
Waling-strip, see Longitudinal Brace.

xvii

From Foster C. Wolcott, Wooden Trestle Bridges and Their Concrete Substitutes According to the Present Practice on American Railroads. 4th edition. (New York: John Wiley & Sons, Inc., 1913)

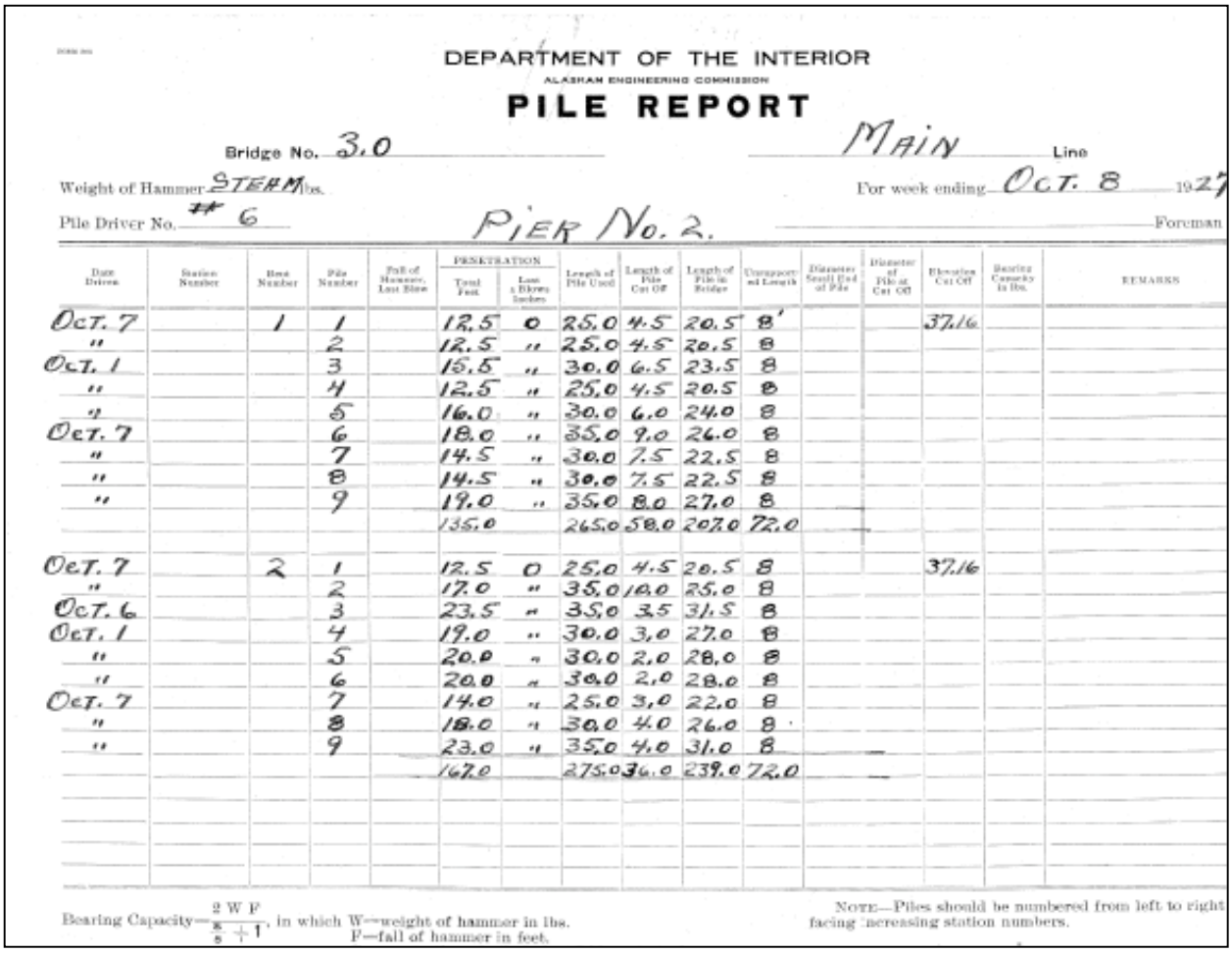
Anchorage Museum of History & Art. Library & Archives.


Anchorage Museum of History & Art. Library & Archives.


Anchorage Museum of History & Art. Library & Archives.

Anchorage Museum of History & Art. Library & Archives.

Examples of photographs of the Alaska Railroad available through Alaska's Digital Archives. See the Website: http://vilda.alaska.edu/index.php



DEPARTMENT OF THE INTERIOR
ALASKAN ENGINEERING COMMISSION

PILE REPORT

Bridge No. 3.0 Main Line

Weight of Hammer STEAM lbs. For week ending Oct. 8 1927

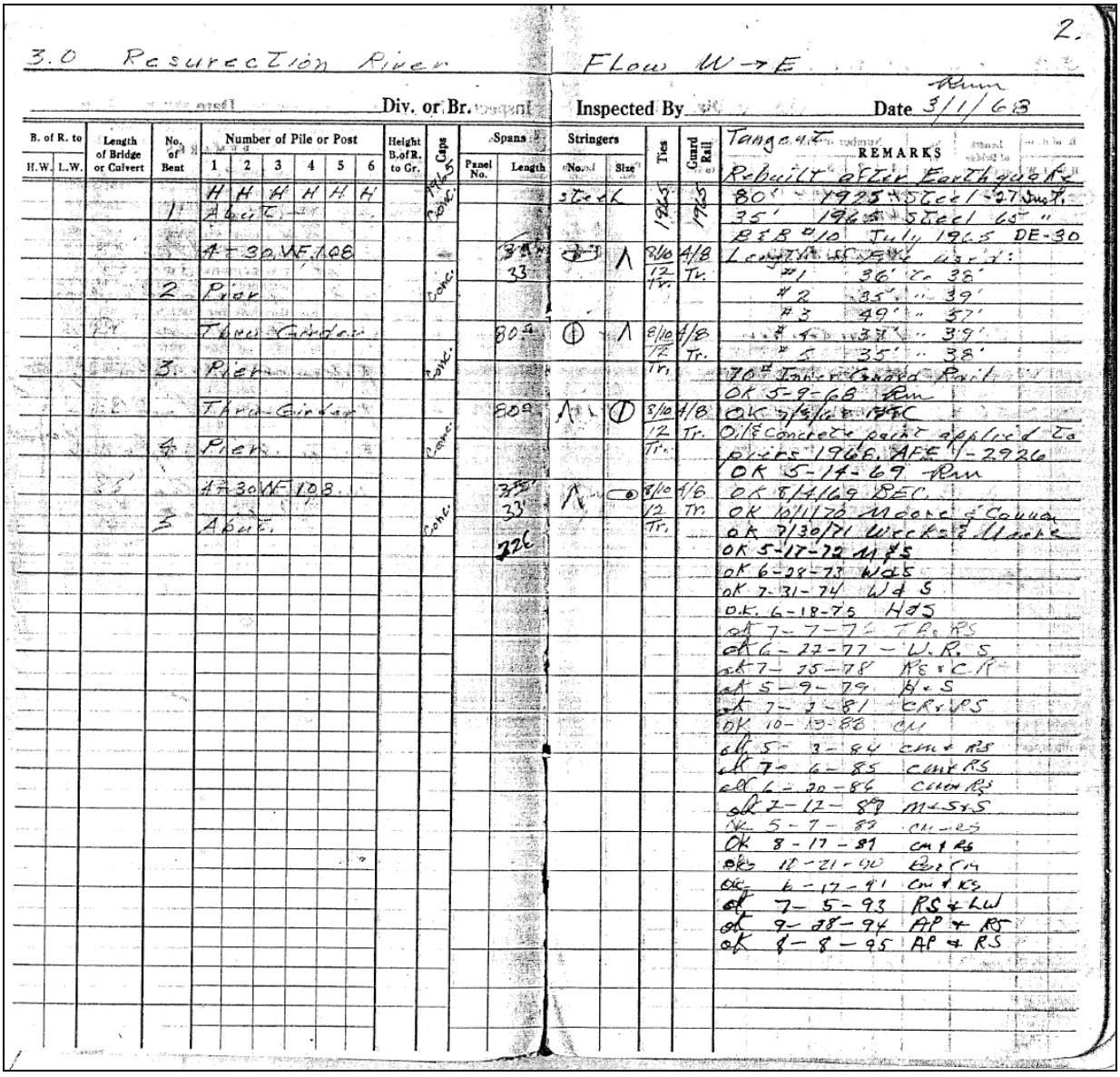
Pile Driver No. # 6 PIER No. 2. Foreman

Date Driven	Station Number	Bent Number	Pile Number	Fall of Hammer, Last Blow	Penetration: Total Feet	Penetration: Last 5 Blows Inches	Length of Pile Used	Length of Pile Cut Off	Length of Pile in Bridge	Unsupported Length	Diameter Small End of Pile	Diameter of Pile at Cut Off	Elevation Cut Off	Bearing Capacity in lbs.	REMARKS
Oct. 7		1	1		12.5	0	25.0	4.5	20.5	8'			37.16		
"			2		12.5	"	25.0	4.5	20.5	8					
Oct. 1			3		15.5	"	30.0	6.5	23.5	8					
"			4		12.5	"	25.0	4.5	20.5	8					
"			5		16.0	"	30.0	6.0	24.0	8					
Oct. 7			6		18.0	"	35.0	9.0	26.0	8					
"			7		14.5	"	30.0	7.5	22.5	8					
"			8		14.5	"	30.0	7.5	22.5	8					
"			9		19.0	"	35.0	8.0	27.0	8					
					135.0		265.0	58.0	207.0	72.0					
Oct. 7		2	1		12.5	0	25.0	4.5	20.5	8			37.16		
"			2		17.0	"	35.0	10.0	25.0	8					
Oct. 6			3		23.5	"	35.0	3.5	31.5	8					
Oct. 1			4		19.0	"	30.0	3.0	27.0	8					
"			5		20.0	"	30.0	2.0	28.0	8					
"			6		20.0	"	30.0	2.0	28.0	8					
Oct. 7			7		14.0	"	25.0	3.0	22.0	8					
"			8		18.0	"	30.0	4.0	26.0	8					
"			9		23.0	"	35.0	4.0	31.0	8					
					167.0		275.0	36.0	239.0	72.0					

Bearing Capacity = $\frac{2\,W\,F}{\frac{S}{5}+1}$, in which W = weight of hammer in lbs.
F = fall of hammer in feet.

NOTE—Piles should be numbered from left to right facing increasing station numbers.

Alaska Railroad Commission, "Pile Report," dated October 8, 1927, from the offices of the Alaska Railroad Corporation, Anchorage, Alaska.



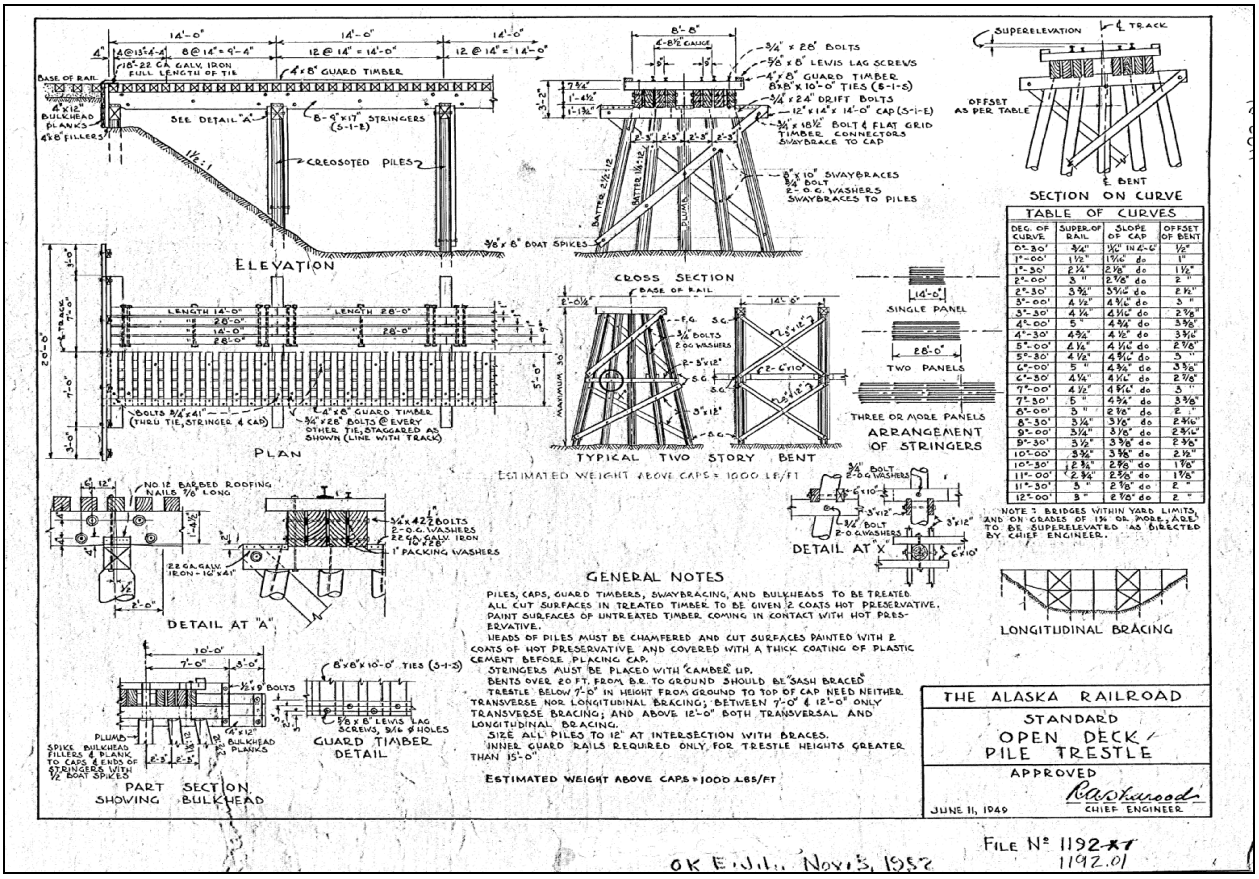
2.

3.0 Resurrection River — Flow W→E

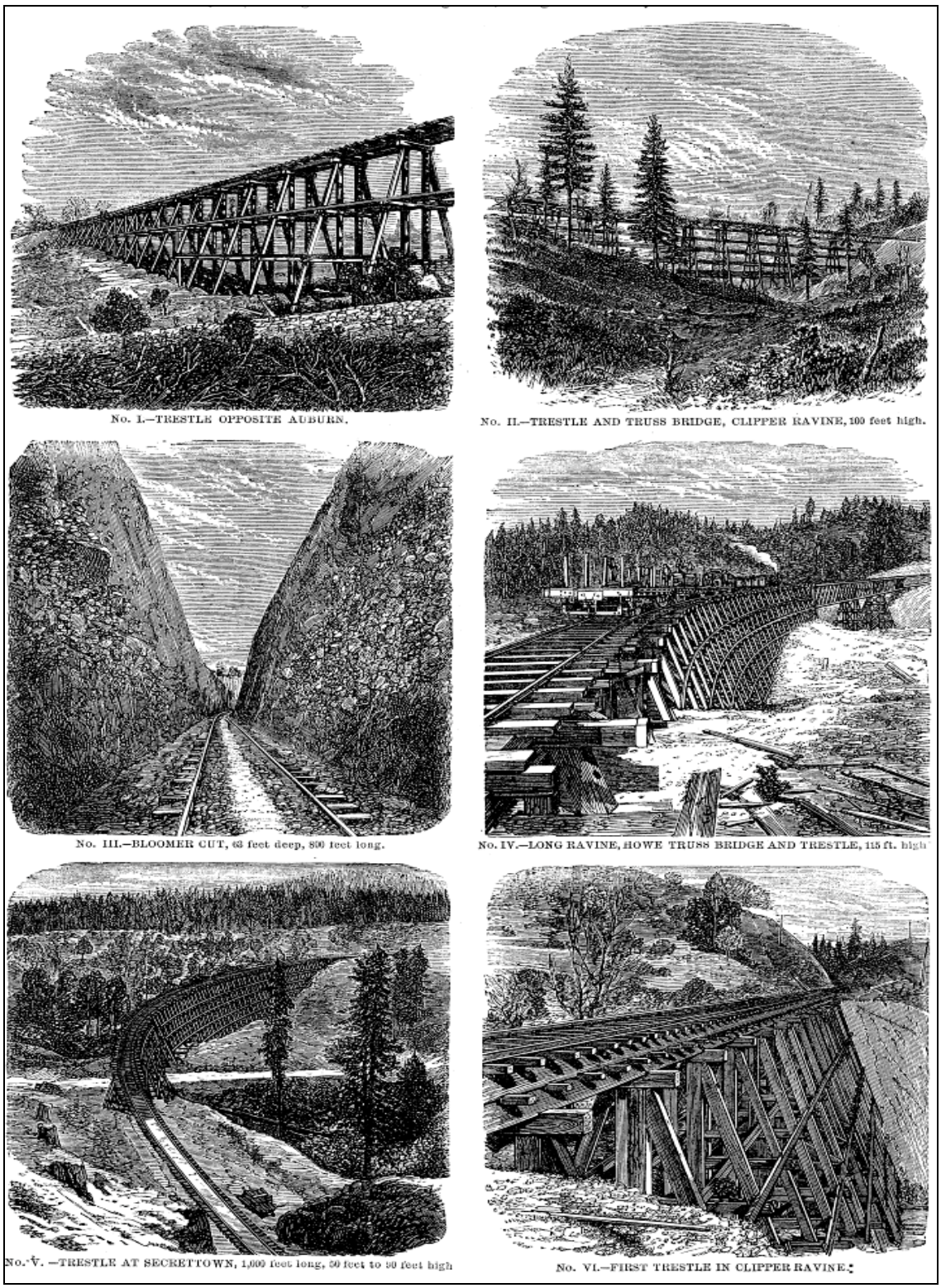
Div. or Br. — Inspected By — Date 3/1/63

B. of R. to H.W.	B. of R. to L.W.	Length of Bridge or Culvert	No. of Bent	Number of Pile or Post 1	2	3	4	5	6	Height B. of R. to Gr.	Caps	Spans Panel No.	Spans Length	Stringers No.	Stringers Size	Ties	Guard Rail	REMARKS
				H	H	H	H	H	H		1965			Steel		1965	1965	Rebuilt after Earthquake
			1	Abut.							Conc.							80' — 1925 Steel — 27 Jun T.
				A-30 WF 108														35' — 1963 Steel 65"
																		BSB #10 July 1965 DE-30
			2	Pier							Conc.					8/10 12 Tr.	A/B Tr.	Longitudinal Wood:
				Thru Girder														#1 36' to 38'
																		#2 35' " 39'
																		#3 49' " 57'
																		#4 37' " 39'
			3	Pier							Conc.							#5 35' " 38'
				Thru Girder														70# Inverted Guard Rail
																		OK 5-9-68 Rm
																		OK 7/3/68 + BEC
			4	Pier							Conc.					8/10 12 Tr.	A/B Tr.	Oil & Concrete paint applied to piers 1966. AFE 1-2926
				A-30 WF 108														OK 5-14-69 Rm
																		OK 8/14/69 BEC
			5	Abut.							Conc.							OK 10/1/70 Moore & Connor
																		OK 7/30/71 Wrecker & Moore
																		OK 5-17-72 W&S
																		OK 6-28-73 W&S
																		OK 7-31-74 W & S
																		OK 6-18-75 W&S
																		OK 7-7-76 T.R. RS
																		OK 6-22-77 — W.R. S
																		OK 7-15-78 RS & C.R.
																		OK 5-9-79 R & S
																		OK 7-2-81 CR & RS
																		OK 10-13-83 CM
																		OK 5-2-84 CM & RS
																		OK 7-6-85 CM & RS
																		OK 6-20-86 CM & RS
																		OK 7-12-89 M+S+S
																		OK 5-7-90 CM & RS
																		OK 8-17-91 CM & RS
																		OK 8-21-92 CM & RS
																		OK 6-17-91 CM & RS
																		OK 7-5-93 RS & LW
																		OK 9-28-94 AP & RS
																		OK 8-8-95 AP & RS

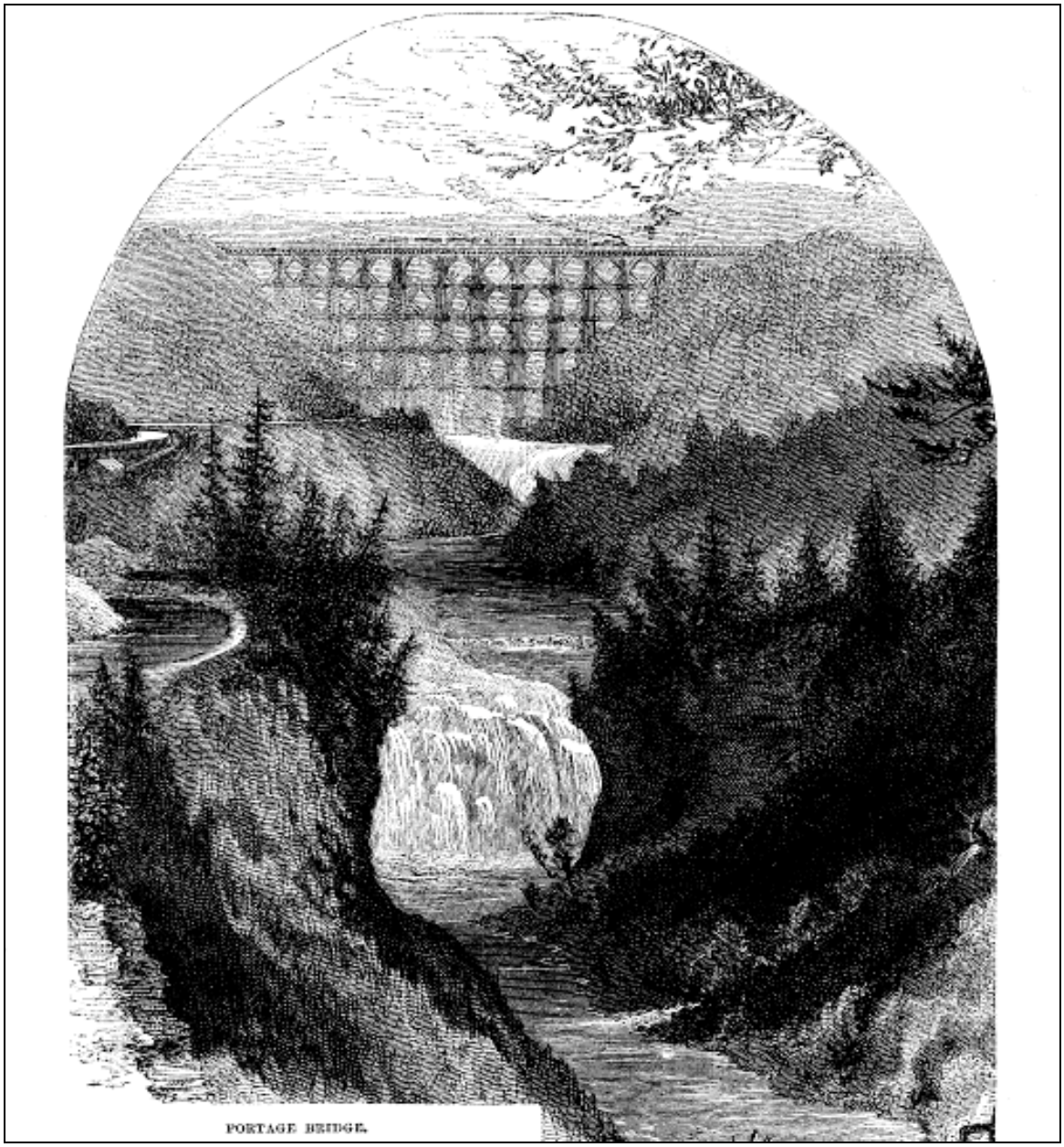
Alaska Railroad, "Bridge Inspection Book," dated March 1, 1963, from the offices of the Alaska Railroad Corporation, Anchorage, Alaska.



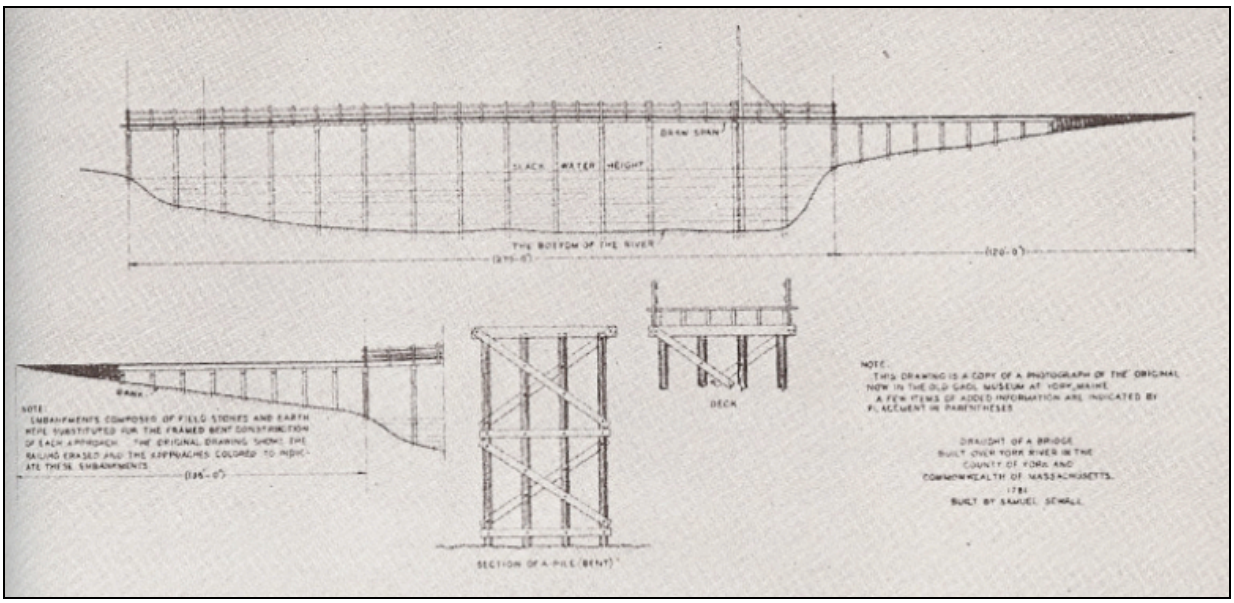
Alaska Railroad, "1192.01 Standard Open Deck Pile Trestle, June 1949, [signed] R.A. Sharood," from the offices of the Alaska Railroad Corporation, Anchorage, Alaska.



These engravings were published in Scientific American in 1869. The article, titled "Views of the Central Pacific," is one of the most highly illustrated works, featuring trestle spans, from the 19th century and provides an outstanding documentary record of railroad trestle construction from this period.

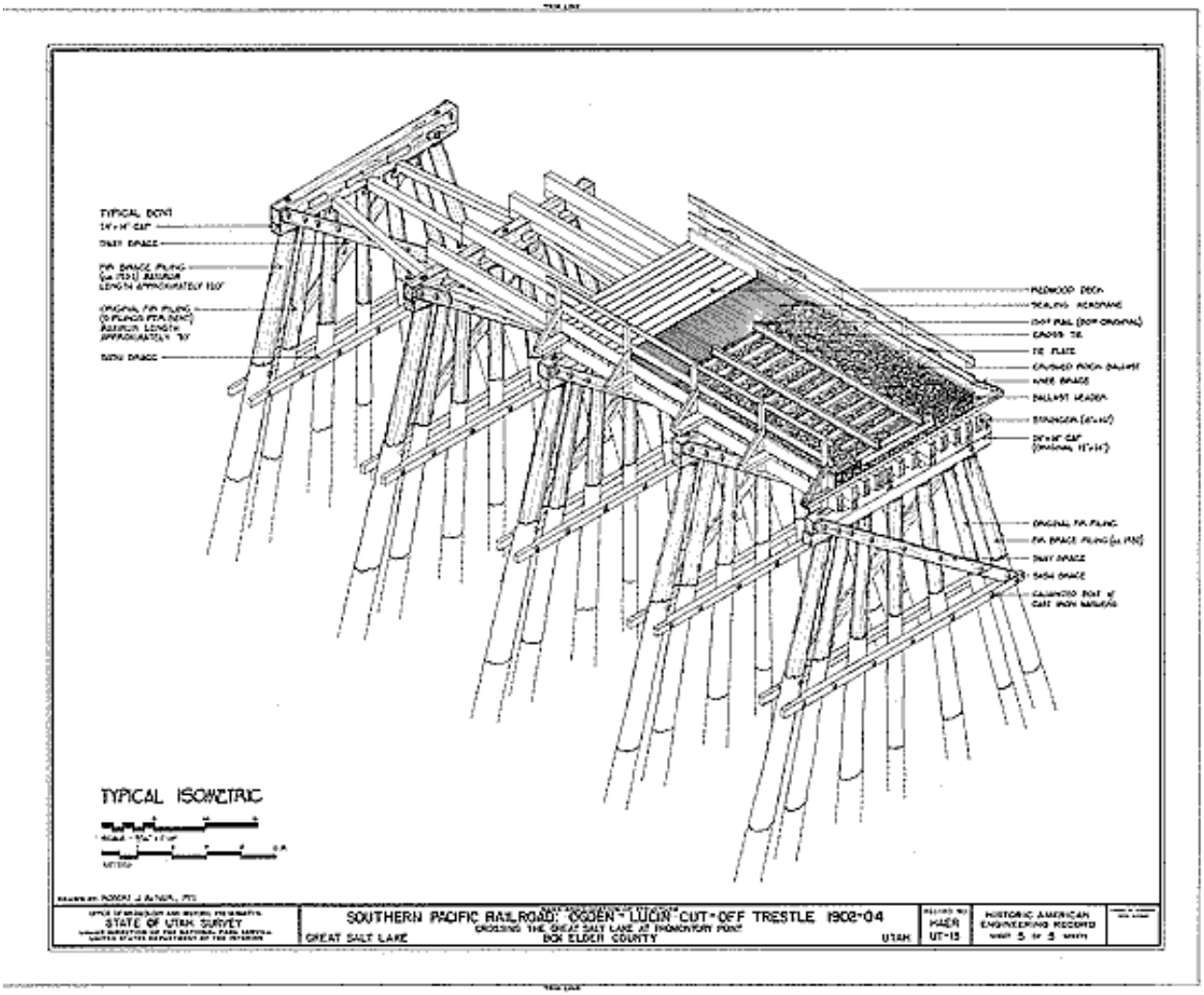


This engraving of the New York & Erie Railroad's Portage Bridge, completed in 1852, appeared in Harper's New Monthly Magazine, in August 1874. The Portage Bridge, which spanned a gorge of the Genesee River, was the largest trestle in the world at the time of its construction. Views of this trestle appeared in various 19th century periodicals for this massive span was considered one of the marvels of American engineering. Destroyed by fire at about the time this article appeared in Harper's, the Portage Bridge was quickly replaced with an all-iron trestle, designed by renowned engineer Octave Chanute.



This drawing of Samuel Sewall's York River Bridge (1761), the first wooden trestle constructed in the United States, appears in Llewellyn N. Edwards' History and Evolution of Early American Bridges.

Photograph from the HAER Collection, showing the Copper River & Northwestern Railroad's Gilahina Bridge, timber trestle, built in 1911.



One of the HAER measured drawings of the Ogden Lucin Cut-off Trestle. Of all the timber railroad trestles in the HAER collection, this Southern Pacific Railroad structure is the most extensively documented.