

NEW HAMPSHIRE HISTORIC PROPERTY DOCUMENTATION

HOOKSETT VILLAGE BRIDGE

NH State No. 737

- LOCATION:** Spanning Merrimack River between Riverside Street and Veterans Drive, Hooksett, Merrimack County, New Hampshire.
USGS Penacook, New Hampshire, Quadrangle.
UTM Coordinates: 19.287672.4799189
NH State Plane NAD 83 Coordinates (feet): x 1,038,567.38, y 217,201.07
- BUILDER:** Town of Hooksett
- ENGINEER:** John W. Storrs, consulting engineer.
- CONTRACTOR:** Substructure, deck and approaches: United Construction Company, Albany, NY.
Steelwork erectors: Horseheads Bridge Co, Horseheads, NY (division of American Bridge Company).
- FABRICATOR:** American Bridge Company, Elmira, New York plant.
- DATE:** 1909, 1936
- PRESENT OWNER:** Town of Hooksett.
- PRESENT USE:** None. Bridge closed and barricaded.
- SIGNIFICANCE:** The Hooksett Village Bridge was built in 1909 on the site of the preceding 1859 covered bridge and earlier bridges dating from 1806 and is therefore importantly associated with the transportation and development history of the town of Hooksett. It is a fairly early and mostly intact example of a riveted Pratt Truss highway bridge, a type important to the history of transportation engineering. The bridge rests on the stone abutments and piers built in 1859 that exhibit the extraordinary stone masonry skills of the period. It was designed by John W. Storrs, an engineer important to the engineering history of bridges in New Hampshire and neighboring states. American Bridge Company, fabricator, and United Construction Company, general contractor, have also made important contributions to the history of bridge engineering and bridge construction in New Hampshire and elsewhere. The bridge was determined important to the history of the state and was listed to the NH State Register of Historic Places in 2008.
- PROJECT INFORMATION:** The Hooksett Village Bridge was documented in accordance with the standards of the Historic American Engineering Record in 2016 by Historic Documentation Company Inc. (HDC), Portsmouth, RI, for the Town of Hooksett, NH. The documentation fulfills Stipulation No. 2 of the project Memorandum of Agreement, NHDOT Project # 29655, signed 26 May 2015. The report was written and compiled by Richard M. Casella, Engineering Historian, Historic Documentation Company. Rob Tucher Photographic Documentation, High Bridge, NJ, conducted the large-format black and white film photography.

DESCRIPTION

The Hooksett Village Bridge is a three-span riveted steel high Pratt truss highway bridge on stone and concrete abutments spanning the Merrimack River 0.28 miles southeast from NH Route 3-A in the Village of Hooksett, New Hampshire (see Figures 1 and 2). The bridge was built in 1909 in the place of a covered wood lattice-truss bridge built in 1859 that was determined unsafe. The bridges formerly carried Main Street in a roughly north-south direction over a sharp bend in the river, linking the east and west sides of the community (see Figures 3 and 4). The river is about 400 feet wide at the bridge, its flow regulated and tempered by a dam and hydroelectric station about 2500 feet upstream and another in Manchester about 7.3 miles downstream. Village Bridge was determined unsuitable for rehabilitation to meet modern traffic needs and was bypassed in 1976 when the Veterans Memorial Bridge was built to replace it on a parallel alignment about 200 feet downstream. Presently both ends of the bridge are barricaded with woven wire security fencing that prevents all vehicular and pedestrian access. When the Veterans Bridge was constructed, the alignment of North Main Street shifted to the west, bisecting Rosedale and Riverdale streets and isolating the village's historic Robie's Store and fire station from the traffic flow.

Village Bridge is a contributing resource of the local Hooksett Village Historic District, the cultural and historic heart of the community. The district was determined eligible for listing in the National Register of Historic Places in 1988 and listed in the State Register in 2008. Notable historic properties near the bridge include the Congregational Church of Hooksett (1846), Town Hall (1828), Arah W. Prescott Historical Library (1909), Robie's Country Store (present building 1907), Prescott Tavern (1794), Holy Rosary Church (1889), and the Boston & Maine Railroad Bridge (1931). The District encompasses the largest concentration of historic homes in the town.

Village Bridge is comprised of three trusses of the Pratt type, a design patented in 1844 by Thomas Pratt and characterized by parallel top and bottom chords connected with vertical posts in compression and diagonals in tension. As originally designed by Pratt, the primary structural members of the truss were joined with pin connections; the Village Bridge is joined with rigid riveted connections, typical of Pratt-type trusses built after about 1900. The history and technology of the Pratt truss is further discussed below.

The bridge is carried on stone abutments and two stone piers that carried the preceding covered wood truss bridge. [Please refer to Figures 6-10; Drawings 1-12 for additional details of the construction of the bridge.] The piers and abutments have been modified with reinforced concrete caps and repairs. The bridge has an overall length of 489'-9", consisting of three spans measuring 166'-6", 166'-6" and 148'-0". The trusses have an overall width of 22'-8", with a horizontal clearance between rails of 19'-4" and between curbs of 18'-6". A 5-foot sidewalk is carried on brackets outside the trusses along the downstream side. The bridge has a 15'-5" vertical clearance.

The north and center trusses are original, constructed in 1909. The southern truss was replaced in 1936 by the New Hampshire Highway Department when the original was destroyed by the 1936 flood. Remnants of the collapsed span remain in the river several hundred feet downstream and are partly visible during low-water events resulting from maintenance of the Amoskeag Dam downstream in Manchester (Figure 23). The 1936 replacement truss is identical to the original

and was fabricated using the original shop drawings that were still on file with the American Bridge Company (Drawings 6-12).

Superstructure

The three trusses are structurally identical and made up of panels each measuring 18'-6". The north truss has 8 panels for a total length of 148'-0"; the center and south trusses have 9 panels for a total length of 166'-6". There is a 3' break between each truss at the piers. All structural members of the trusses are built-up riveted sections.

Top chords and inclined end-posts are built-up members consisting of 12" channels joined back-to-back with 16" wide cover plates on top and with double 2¼" lacing bars on the bottom. Posts are built-up H-sections consisting of four 4" x 3" or 3½" x 3" angles joined with single lacing bars. Diagonals vary between panels, all consisting of angles joined with either tie plates or single lacing bars. The portal strut is a lattice truss 74" deep built of triple-intersecting angles, joined to built-up angle members at the top and bottom with gusset plates. The strut is joined to the end posts with a curved sway brace. A builder's plaque originally mounted on the portal strut has been removed and is further discussed below. The sway-frame struts are 5'-10" deep and built entirely of angles, with single-intersecting angle diagonal members. Upper lateral bracing consists of single angles, typically 3" x 2½" x ¼" angles, crossing diagonally between panel points (top of posts).

Bottom chords are built-up H-section members consisting of four angles joined with tie plates, top and bottom. The angle vary in size from 6" x 3½" x ½" in the panels near the center of the span, to 3" x 3½" x 5/16" in the end panels.

The floor system consists of 24" riveted plate-girder floorbeams carrying seven lines of 10" I-beam stringers plus two outside stringers of 10" channel. Lower lateral bracing is configured the same as the upper laterals, except they are slightly larger angles, typically 3½" x 3" x 5/16" angles. As originally designed, a 6" x 4" timber sleeper was attached to the top of the stringers to which 3" thick timber decking was nailed. On the 1936 replacement south span, the plans show that the sleeper was eliminated and 4" plank (nominal) was instead laid directly on the stringers and anchored with metal plates to the stringer flanges. An overlay of 1" asphalt plank was applied to the wood deck as a wearing course. The original timber decking on the center and north truss was replaced in 1970. A 10" gravity sewer pipe is attached to the upstream side of the bridge, installed circa 1969.

Roadway guardrails along the inside of the trusses consist of three lines of 2¾" steel pipe railing mounted with U-bolts to the truss posts and intermediate steel-angle posts. The railings, terminate at the abutments into steel H-posts with rounded steel plate caps. At the north end, the pipe railing then continues over the abutments and a short distance along the approach, carried on square cast iron posts with pass-thru holes to accept the pipe. Three of the original cast iron posts remain intact. At the south end, none of the original approach railing remains, having been destroyed in the 1936 flood. Original plans and photographs show that the sidewalk was originally equipped with a decorative lattice-type railing (Figures 12, 16; Drawings 01, 05). Most of the railing was badly damaged in the 1936 flood. Photos of the bridge after the flood show sections of the railing still in place and other sections gone, bent over or dangling (Figure 16).

The 1936 repair drawings detail the railing that is present on the bridge now, as consisting of hand and toe rails of 2" pipe with vertical balusters of ¾" steel rod spaced on 6" centers. The balusters are referred to as "pailings" on the plans (Drawing 11).

A cast iron builder's plaque originally mounted on the portal frame was removed from the bridge and placed in the possession of the Hooksett Historical Society. It is mounted on granite posts in front of the Arah W. Prescott Historical Library, located just south of the bridge (Figure 13). The plaque reads:

1909
THE UNITED CONSTRUCTION CO.
CONTRACTORS
ALBANY, N.Y.
AMERICAN BRIDGE CO.
OF N.Y. BUILDERS.
TOWN OF HOOKSETT N.H.

JOHN W. K. ROWELL,
AUGUSTUS C. MARTIN, SELECTMEN
IRA H. CATE.

JOHN W. STORRS, CONSULTING ENGINEER.

Attached to the end post of the south span is a small cast iron builder's plate that simply reads:

American Bridge
Company
USA 1936

Substructure

The Village Bridge was built on the same alignment as the covered bridge in order to utilize the heavily built granite abutments and piers erected by the town at great expense in 1859. Storrs specified certain concrete repairs and modifications to properly carry the new steel trusses. The abutments and piers are constructed of tightly fitted cut granite ashlar blocks. Masonry joints on the piers are noticeably tighter than those on the abutments and in places are exceptionally fine. The upstream face of the piers are beveled to a sharp edge and vertically battered at roughly a 50-degree incline. This feature is known as a cutwater or ice breaker, its purpose to reduce the impact of water, logs, and particularly ice, which pushes up the inclined nosing to split and fall aside.

Bedding mortar was used so sparingly as to be evident only in some places where it was squeezed to the edge of the joints, giving the appearance of dry laid masonry. Based on a small sampling of measurements, most of the stone is of even thickness, typically 16-18 inches, but ranges from 12" to 22", with thicker courses at the bottom.

The piers and abutments are topped with reinforced concrete caps approximately 4 feet thick. These were designed by Storrs in 1909 to provide both a structurally sound foundation for the truss bearings and to raise the elevation of the bridge above expected flood levels. Concrete

pedestals about 2 feet high on top of the cap carry the bridge bearings. The abutment caps also have integral backwalls, about 3 feet high. Storrs determined that reinforcement of the north abutment would require partial concrete encasement and prepared a drawing sheet of dimensions and quantities for the work. The toe of the south abutment is also concrete encased; the date of placement was not determined. All of the concrete portions of the substructure remain in place with areas of deterioration.

HISTORICAL BACKGROUND

History of the Crossing and Prior Bridges

Hooksett was incorporated in 1822, comprising land from the townships of Chester, Dumbarton and Goffstown. Chester contributed the greatest area with Dumbarton contributing the area of present-day Hooksett Village.¹ The earliest public crossing of the Merrimack River in what is now the town of Hooksett is regarded as Martin's Ferry, located about 4 miles downstream of Hooksett Village Bridge, established in 1766 and chartered in 1782.² In that same year on June 11, 1782, Joshua Abbott and over 60 other subscribers "inhabiting near Isle a Hucksett Falls on Merrimack River" submitted a petition to the Legislature for establishment of a ferry "near said Falls."³ Three days later, Daniel Martin and John Dustin submitted their own petition to operate a ferry. Martin claimed he had been operating a ferry for 16 years at a location "Very advantageous to the Public" with established roads and "preferable" to the other petition for a ferry "about two or three miles up said River."⁴

In the House of Representatives, November 19, 1782, a committee having viewed the premises, reporting in favor of establishing the ferry asked for by Dustin and Martin instead of the one asked for by Abbott, *et als*. A vote giving leave in accordance therewith passed the Assembly. The locality is still called Martin's Ferry.⁵

In 1791, the General Court granted Jacob Green, Enoch Noyce, William Duncan and Daniel Livermore, "the Exclusive right of building a Toll bridge over Merrimack River at any place between one mile below Isle Hooksett Falls so called and one Mile above the said Falls under such regulations as the General Court should think fit..."⁶ The law included the specific tolls (e.g., Passenger and Horse two pence) that the proprietors would be allowed to charge and the further requirement that the bridge be completed by August 31, 1793. No record of the bridge having been started or completed was located.⁷

In 1805 the General Court took up the petition by the proprietors of the Londonderry Turnpike Incorporation to "erect a Bridge over Merrimack river near Isle-hookset fall, and to establish a

¹ For additional information on the history of the Hooksett Village area, see "Hooksett Village Historic District Area Form," prepared by Elizabeth D. Hengen, 2004-2005. On file at NH Division of Historical Resources, Concord.

² D. Hamilton Hurd, *History of Merrimack and Belknap Counties, New Hampshire*, 1885, p. 366.

³ Hurd, 1885, p. 365.

⁴ *Ibid*, p. 366.

⁵ *Ibid*, p. 366.

⁶ Laws of New Hampshire 1791, Chapter 6, p. 373.

⁷ Charles R. Hardy. *Hooksett Historical Sketches*, 1969, p. 36. Hardy states that no record of the bridge being built has been found and that crossings were limited to ferries.

rate of toll similar to that of other Bridges over said river in that vicinity..."⁸ The Londonderry Turnpike Incorporation was chartered June 20, 1804. In 1817 it was described as extending "from Butter's corner in Concord, to the state line near Andover bridge, Massachusetts. Its course from Concord is about southeast, through Bow to Isle-Hookset bridge, thence through Chester, Londonderry, the easterly corner of Windham and Salem to the state line, a distance of about 35 miles."⁹

The charter for the bridge was granted by the Senate and approved by Governor John Langdon on December 20th 1805 and included the following clause pertaining to the allowable bridge tolls:

And be it further enacted, that for the purposes of reimbursing the said Proprietors the money expended by them in building and supporting said bridge a Toll be and is hereby granted and established for the benefit of said Proprietors according to the rates following, namely for each foot passenger, one cent, for each horse and rider, four cents, Sleigh with one Horse, six cents, Sleigh with two horses, ten cents, Chaise, Chair or Sulkey, ten cents, Waggon Cart or Sled with two beasts, twelve and half cents – each additional beast three cents – Sheep or Swine, one half cents, led horse or neat creature, one half cent, Curricule or Phaeton, twelve and half cents, Chariot or Coach with two horses, twenty cents – with four horses, twenty five cents – Cart with one horse, six cents, and to each team one person and no more as a driver to pass free of Toll.

Other sources have given the date of 1805 as the date of the Londonderry Turnpike Hooksett Toll Bridge, but based on the date of the charter the soonest it might have been constructed and opened would be 1806.

In 1836 the Londonderry Turnpike was made a free road but the proprietors retained ownership and toll rights to their Hooksett bridge. The town purchased the Turnpike bridge in 1853 for \$1640 and removed the tolls.

On the evening of September 30, 1857 the Turnpike bridge along with the Concord railroad bridge and the nearby store owned by Joseph T. Goss (later to be Robie's Store) were destroyed in "the most extensive conflagration that ever visited Hooksett. The total loss was about thirty thousand dollars. The bridges were replaced by better and more substantial ones, the town bridge costing seven thousand dollars."¹⁰ The town believed the fire to have been caused by the railroad, a common occurrence resulting from hot embers spewing from locomotives fired with cord wood. The railroads employed "cinder crews" to follow trains on foot extinguishing fires. Covered wood truss bridges with their myriad of nooks and crannies were especially susceptible to fires, sometimes kindling hours after the bridge was determined safe. "At a town meeting to consider the rebuilding of the bridge, it was voted an open bridge be built, but that motion was later rescinded, and there was no indication the railroad assumed any responsibility in burning the bridge."¹¹

⁸ Laws of New Hampshire 1805, Chapter 16, p. 138.

⁹ Eliphalet Merrill and Phinehas Merrill. *Gazetteer of the State of New Hampshire in Three Parts*. Exeter, NH: Published by C. Norris & Co. for the authors, 1817, p. 11. Phinehas Merrill, a noted New Hampshire surveyor, was responsible for many of the 1805 town maps required by the state legislature.

¹⁰ Hurd, 1885, p. 383.

¹¹ Hardy, 1968, p. 36.

On March 20, 1859 this new bridge was destroyed by ice floes brought down upon it by a spring freshet. A bridge building committee including Horace Gage, Jesse Gault and Jabez Green was organized to oversee construction of the replacement bridge. The men were paid \$60.67, \$53.90 and \$39.20, respectively, for their service.¹² A total of \$4,716.37 was spent on the stonework alone for the new bridge, a huge expenditure for the time, indicating the Town's want of a permanent structure. The exceptional quality and permanence of the stonework is evident today as most of it survives in good service and condition. The masonry contractor was unfortunately not mentioned in the town reports. John C. Briggs is separately noted in the record as having been paid a total of \$5,200 in two installments of \$2,600 in 1859 and 1860 for the bridge and it is assumed that he erected the timber superstructure.¹³ According to the town reports the 1859 bridge cost a total of \$9,916.37, although Hurd (1885) reports that it was built at a cost of eight thousand dollars.¹⁴

In 1908 the Town began to question the safety of the 1859 covered bridge and secured the services of John Williams Storrs, a bridge engineer from Concord, to prepare a condition assessment.¹⁵ Storrs was well qualified for the undertaking, having worked for the Boston and Maine Railroad "fifteen years as assistant engineer and bridge inspector"¹⁶ and then as a New Hampshire state engineer for Carroll, Coos, and Grafton counties. He established a private engineering practice in his hometown of Concord in 1905, beginning what would become a long career specializing in designing modern highway bridges across New Hampshire and neighboring states. By 1908, Storrs had already completed several large steel truss bridges for other New Hampshire towns, including a 131-foot span Pratt truss of similar design for Claremont (see Figure 24). Storrs and his work is further discussed below.

Storrs inspected the covered bridge in June 1908 and prepared a sketch of the structure (Figure 5, 6). He reported his findings in a letter "To the Honorable Board of Selectmen, John W. K. Rowell, Chairman, Hooksett, N.H." dated July 14, 1908:¹⁷

In accordance with your request I have made an examination of your highway bridge over the Merrimack River. The bridge consist of three spans, with a total length of about 490 ft. and carries a roadway 18 ft. wide. The bridge is a single lattice truss with arches, said to have been built in 1858. I did not find decayed timber except in the floor. There is one floor beam that has recently broken. Under a moving load the bridge shows a very serious movement of deflection and vibration. The trusses and arches are out of line. The bottom chords are pulled, showing joints opened. The camber is down and the bridge sags very badly between bearings. The bridge has been over strained and computations show it to be structurally weak. I would advise immediately that you limit the loads to the lightest possible. Have automobiles go slow, and horses walk.

¹² Hooksett Town Report, for year ending March 1, 1861, pp. 3, 4.

¹³ *Ibid.* for the years ending March 1860, p. 3 and March 1861, p. 3.

¹⁴ Hurd, 1885, p. 383.

¹⁵ Portions of this section are excerpted from "Hooksett Village Bridge," NH Division of Historical Resources Individual Inventory Form No. HOK0019, prepared by Kathleen Northrup, January 11, 2008. On file at Hooksett Heritage Commission and NHDHR, Concord.

¹⁶ The quote was printed on Storrs letterhead.

¹⁷ John W. Storrs. Letter, Storrs to Hooksett Board of Selectmen, 7/14/1908. NHDOT files.

In 1909 the town Selectmen, John W. K. Rowell, Augustus C. Martin and Ira H. Cate, presented Article 9 in the Warrants for the upcoming town meeting that read:

To see what action the town will take with reference to repairing, replacing, or rebuilding the bridge over the Merrimack River, what amount of money shall be raised therefor, the method of raising the same and to pass any votes relating thereto.¹⁸

Storrs prepared an elevation drawing of a proposed three-span steel truss bridge which he submitted to the town for the purpose of presenting to the voters for approval (Figure 7). At the town meeting on March 9, 1909, the voters authorized funding for construction of a new steel highway bridge through the issuance of bonds at a total cost not to exceed \$26,000.¹⁹ It can be assumed that Storrs suggested the figure of \$26,000 as being sufficient for the job, based on other similar bridges he had recently completed. The following week, on March 16, the Selectmen executed an agreement for engineering services with Storrs with the following conditions:

John W. Storrs agrees to furnish a set of plans and specifications for a steel bridge/said plans to be acceptable and approved by the Selectmen.

John W. Storrs further agrees to furnish notification blanks and proposal blanks to contractors and to assist its Board of Selectmen in every way at the awarding of contract

John W. Storrs further agrees to furnish sufficient inspections to look after shop plans, inspection of material, rivets and erection of bridge complete

The Selectmen agree to pay to John W. Storrs a sum equal to 5% of the total contract price of the work.

John W. Storrs further agrees to furnish an inspector during the work on the substructure in placing concrete.²⁰

One month later on April 17, 1909, the town executed a contract with the United Construction Company of Albany, New York for construction of the bridge for the sum of \$21,487.00, with the condition that it be "fully completed and delivered free from all liens of mechanics and others and ready for use by the Town of Hooksett on or before September 15th, 1909."²¹

Design, Fabrication and Construction

Storrs chose a Pratt truss as the most cost effective bridge type for the site. The Pratt is a quadrilateral truss (four-sided panels) with vertical posts in compression and diagonals in tension. The type was invented and patented by Thomas Pratt in 1844 to be built largely of wood, but the design was well suited to all-metal construction as well and was soon widely built by the railroads using cast iron posts and wrought iron ties. The increasing use of Bessemer steel for bridge building in the United States in the 1890s further increased the use of the Pratt truss.

¹⁸ Hooksett Town Report, for year ending February 15, 1909. p. 4.

¹⁹ Hooksett Town Records, March 9, 1909. Town Meeting Minutes, pp. 282-284.

²⁰ Hooksett Town Records, April 17, 1909. Storrs consulting contract, pp. 290.

²¹ Hooksett Town Records, April 17, 1909. Bridge contract, pp. 291-295.

By 1900, truss bridges with all-riveted connections – a superior design in widespread use in Europe at the time – were finding increasing acceptance with American railroad engineers. The Pratt design was readily adaptable to all-riveted construction. Riveted connections provided a stiffer bridge and allowed for greater distribution of stresses at the joints and a subsequent savings in metal costs. The introduction of the portable air powered riveting gun in the early part of the century allowed for the field assembly of riveted connections, eliminating the expensive and high maintenance pin connected joints. By the 1920s riveted connections had replaced pin connections as the primary method of metal truss bridge construction in the U.S.

Storrs' prior experience as a bridge engineer with the Boston & Maine Railroad would have exposed him to the benefits of an all-riveted bridge. By 1901 riveted highway bridges were being built with the same design and construction practices that Storrs would specify for the Hooksett bridge.

Five sheets of original bridge drawings prepared by Storrs and seven sheets of shop drawings prepared by American Bridge Company are on file with NHDOT and reproduced in the Drawings section. Storrs bridge-proposal drawing that he submitted to the town is dated March 1909 (see Figure 6); the other four are simply dated 1909 and were evidently prepared between March 16 when he was given the contract and April 17 when United Construction Company was given their contract. United would have required the plans before submitting their bid. No record of other bids was located and United may have submitted the bid to Storrs who then recommended acceptance by the town since it came in below the amount approved by the voters.

By May 17 American Bridge Company was preparing the shop drawings. The trusses were fabricated at the company's Elmira, New York plant and erected under the supervision of Clinton F. Swaine, foreman of the Horseheads Bridge Company of Horseheads, New York, a subsidiary of American Bridge.²²

The American Bridge Company was incorporated in 1900 by J.P. Morgan as a consolidation of twenty-eight bridge companies representing eighty-percent of the structural steel fabricating capacity of the United States, immediately making it the largest bridge fabrication and building company in the world. The United Construction Company was closely affiliated with the American Bridge Company, which fabricated most bridges built by the company.²³ American Bridge Company and United Construction Company are further discussed below.

The Hooksett bridge did not open to traffic until early November 1909 and was ultimately over-budget by nearly \$2,500, the reasons for which were not determined. On November 9, the *Manchester Union Leader* newspaper reported:

With but a few finishing touches necessary to complete it, the new steel bridge across the Merrimack, already open for traffic, has settled into the every-day life of the village as if it were always part of the established order of things, and had not crowded out the picturesque old structure, whose long, dimly lighted tunnel always affected the imagination so strongly, and among whose timbers the river voices echoed mysteriously.

²² *Concord Evening Monitor*, November 27, 1909.

²³ James L. Garvin. *Builders of Bridges in New Hampshire*. Uncompleted draft provided by James L Garvin, Division of Historical Resources, Concord, NH, 1999

When the bridge was formerly accepted as complete by the Board of Selectmen on November 27, 1909, the *Concord Evening Monitor* reported that the "citizens of Hooksett are to be congratulated upon having one of the best and most thoroughly constructed up-to-date bridges in this part of the country."

The total cost of the bridge was itemized Annual Report of the Town of Hooksett, for the Year Ending February 15, 1910:

New Bridge	
United Construction Co.	\$23,939.80
John Storrs	1,293.50
Honeheads Construction Co.	365.30
J. B. Ordway	10.50
O. J. Cate	37.00
C. A. Ordway	13.57
Wm. Blanchard	17.94
J. H. Mottram	4.50
Geo. Canwell	3.75
W. J. Mottram	15.50
L. Courchane	5.75
John Watkins	15.00
Samuel Head	48.10
James Thompson	<u>53.50</u>
Total	\$25,823.71

The completed bridge appeared on a postcard and in Storrs bridge engineering handbook he published in 1918 (Figures 11, 12).

1936 Flood Damage and Subsequent Repairs

Hooksett Village Bridge apparently served well and without incident until the Great Flood of March 1936. The region was emerging from one of the severest winters on record when hard rains began falling from the Ohio Valley to Maine around the 15th of March. The hillsides were laden with snow, rivers were packed with ice and the underlying earth was still frozen solid. By the 19th, a massive low-pressure center, formed in Texas and heavy with moisture from the Gulf of Mexico, pushed into the region dumping torrents of rain on the sodden snow pack and already flooded rivers. New Hampshire was especially hard hit and lost the greatest number of bridges although monetary losses were greater in Maine and Massachusetts due to destruction of several large and recently constructed bridges.²⁴

To expedite bridge repair and replacement, New Hampshire moved quickly and authorized a bond issue of \$2,000,000 to supplement the Federal funds. These funds allowed the New Hampshire Highway Department to immediately initiate contracts with qualified bridge contractors while neighboring states were waiting for Federal money. With the bond issue monies, New Hampshire was able to build fourteen temporary bridges and repair or replace 101 other bridges in addition to the 189 Federally-funded bridges built throughout the state.²⁵

²⁴ Bowman, "Bridge Building Follows Flood," 1937, pp. 54-58.

²⁵ Ibid.

An article in *New Hampshire Highways* on the damage to bridges wrought by the flood, by bridge historian and former New Hampshire State Architectural Historian James Garvin, notes that Hooksett was hit particularly hard. The article features two photos of the destruction at Hooksett.²⁶ The article can be accessed online at

<http://www.nhgoodroads.org/UploadedFiles/Files/MarAprAnniversarySeries.pdf>

Just upstream of the Village Bridge were three massive wooden-lattice truss spans carrying the Boston & Maine Railroad over the the Merrimack River at Hooksett Falls. One of the spans torn loose by the flood was hurtled into the south span of the Village Bridge, knocking it off its foundations and depositing it several hundred yards downstream (Figures 4, 14-16). Also destroyed at the south end of the bridge were the brick Village School and the Odd Fellows building on Merrimack Street. Several other buildings were seriously damaged including the Protestant and Catholic churches.²⁷

Even with the State's expedited bridge repair and replacement program, the town was informed that repairs to the Village Bridge would not be completed until the fall. Within a month or so, state highway department forces erected a wood-trestle foot-bridge across the washout at the south end of the bridge that led to a temporary sidewalk extended off the north side of the railroad bridge (Figure 17). Highway department records include an estimate of the cost of the repairs totaling \$16,038.15, including \$10,404.25 for the structural steel, and note that the contract for the south-span replacement was advertised for bids July 3, 1936. Information on the construction and reopening of the bridge was not obtained.²⁸ Two photographs of the construction of the replacement span in 1936 are reproduced in Figure 18.

The bridge was inspected and photographed on April 13, 1942 by the New Hampshire Highway Department as part of a statewide inventory of bridges conducted during World War II. Notes and sketches on the design, materials and condition were made on the cards which remain on file at NHDOT (Figures 9, 10, 19-21).

In 1948 the bridge was cleaned, spot primed and painted in its entirety at a total cost of \$5,635.86. The job required 100 gallons of Masury brand primer, 109 gallons of gray undercoat paint and 126 gallons of Aluminum topcoat paint.

During the work seasons of 1950, 1951 and 1952 the roadway and sidewalk flooring was replaced by the state highway department forces the using treated lumber at a total cost of \$23,546.18. In 1953 the State officially assumed all maintenance of bridge. The bridge was posted at 12.5 tons to allow busses to go over it in May, 1959.

In 1968 a member of the local school board questioned the safety of the bridge, noting that four school busses cross the bridge eight times a day, and since the tragic collapse of the Silver

²⁶ James Garvin. "High Water: Rebuilding bridges after the floods of 1927 and 1936. *New Hampshire Highways*, March April 2004.

²⁷ Anonymous. Undated manuscript filed under "Bridges," Hooksett Historical Society files.

²⁸ Information on 1936 flood repairs and subsequent maintenance and repairs is found on the Bridge Card and Project Cards on file at NHDOT.

Bridge over the Ohio River a year earlier, he has been continually worrying about the Hooksett bridge.²⁹ When the bridge was then posted for 6 tons on December 22, 1969, the school board ordered school busses to stop at the end of the bridge and unload the students who crossed the bridge on foot while police stopped traffic. In 1970 the deck was replaced and gusset plates were repaired on the south span but this work did not result in the lifting of the 6-ton posting. A photo of students of the Hooksett Village School crossing the bridge on foot to reach busses on the other side appeared in the *Union Leader* on September 11, 1972. The caption noted that the bridge was "closed to all traffic other than passenger cars, pickup trucks and emergency vehicles in line of duty." At some time prior to 1973, signs were suspended in the portals that read "THIS BRIDGE CONSIDERED UNSAFE FOR MORE THAN TWO PASSENGER CARS AT THE SAME TIME" (Figure 22).

The state highway department scheduled the bridge for replacement and prepared plans for a high-level five-span continuous welded-girder bridge approximately 685 feet in length. On March 7, 1972, Hooksett voters overwhelmingly approved a bond issue of \$180,000 for the town's share of the new bridge.³⁰ A public hearing on the plan was held in January 1974 to discuss the bridge relocation plan that would place the new span west of the railroad bridge and leave the town-owned Village Bridge in place. The plan was ultimately accepted by the town and construction began in 1975. On August 7, 1976 the new Hooksett Memorial Bridge was officially dedicated. As planned, it was located west of the railroad bridge, bypassing the Village Bridge which was then closed, barricaded and moved "off-system" by the NHDOT (Figure 2).

The closed Village Bridge continued to stand abandoned and barricaded. In 1994 Town voters rejected efforts to establish a fund to demolish bridge. In 1995 Hooksett Historical Society led a movement to rehabilitate bridge as a pedestrian bridge. FHWA Transportation Enhancement funds were granted in 1996, but the necessary supplemental TE funds were denied in 2000.³¹

The Town Council renamed the bridge "The Lilac Bridge" in 1997 at the suggestion of Grace Pomeroy, then president of the Hooksett Historical Society. It was designated an Official Project of Save America's Treasures in 2000.³²

In 2004 the Town and Community Economic Development Corporation of Hooksett (CEDCOH) commissioned a professional planning and design study to supplement the 2004 Town Master Plan. The Design Study "envisions the river and a restored Lilac Bridge [as the] focal point of the village."³³

The town's hopes to save the bridge came to an end in 2014 when a fractured lower chord – a critical deficiency – was discovered during a routine inspection by the NHDOT. The Town contracted with CMA Engineers of Portsmouth, NH to confirm the inspection findings and study possible rehabilitation of structure to serve as a pedestrian crossing. Additional critical fractures

²⁹ Carlton Smith. "Doubt Safety of Hooksett Bridge." *Manchester Union Leader*, December 26, 1968.

³⁰ Hooksett Town Report, 1972.

³¹ Kathleen Northrup. "Hooksett Village Bridge," NH Division of Historical Resources Individual Inventory Form No. HOK0019.

³² *Ibid.*

³³ Hooksett Village Design Study, 2004. Access online at:
http://www.hooksett.org/Pages/HooksettNH_CommDev/Village_Design.pdf.

were discovered leading to the preparation of an emergency stabilization plan to prevent collapse of the structure and rupture of the active sewer-line crossing it. A single bid of \$1.95 million just to effect stabilization was determined economically impractical and the project was not awarded.

In 2015 the Town awarded a contract to DuBois & King Engineers of Randolph, VT to design the removal of the Village Bridge and its replacement with a new pedestrian bridge. The preparation of this documentation report for the Town of Hooksett was a requirement of the Memorandum of Agreement that concluded the National Historic Preservation Act, Section 106, consultation, a component of the Army Corps of Engineers permitting process.

Significance

The Hooksett Village Bridge was built in 1909 on the site of the preceding 1859 covered bridge and earlier bridges dating from 1806 and is therefore importantly associated with the transportation and development history of the town of Hooksett.

The bridge rests on the stone abutments and piers built in 1859 for the covered wood bridge that preceded it. The stonework exhibits the extraordinary stone masonry skills of the period, demonstrated by the 157 years of abuse by the Merrimack River they have endured with relatively little damage. The bridge was designed by John W. Storrs, an engineer important to the engineering history of bridges in New Hampshire and neighboring states. American Bridge Company, the fabricator of the bridge, and United Construction Company, the builder and general contractor that erected the bridge, have also made important contributions to the history of bridge engineering and bridge construction in New Hampshire and elsewhere.

The bridge itself is a relatively unaltered example of an early 20th century all-riveted Pratt Truss highway bridge and one of the few remaining three-span examples. It is the oldest surviving riveted Pratt truss in New Hampshire and one of only two or three remaining designed by John Storrs. Hooksett Village Bridge, typical of thousands similar truss bridges built in the U.S. during the first half of the twentieth century, was determined to possess important physical characteristics meaningful in the history and engineering of New Hampshire residents and communities. It was listed to the New Hampshire State Register of Historic Places in 2008.

ADDITIONAL BACKGROUND INFORMATION

The Pratt Truss

Thomas Pratt was born in Boston in 1812, entered Rensselaer Polytechnic Institute at age 14, became an engineer with the United States Army Engineers at 18, and began a professional engineering career with Boston & Maine Railroad at age 21. Pratt worked his entire life in the employ of various New England railroad companies.³⁴ Pratt is famous for a bridge truss design he patented in 1844, consisting of two parallel chords connected by vertical wood posts in

³⁴ American Society of Civil Engineers (ASCE), "Memoir of Thomas Willis Pratt." Proceedings of the American Society of Civil Engineers 1 (1876): 332-335; Carl W. Condit, *American Building Art, The Nineteenth Century*. (New York: Oxford University Press, 1960): 108.

compression and double wrought iron diagonals in tension. Pratt's design was similar in appearance to an earlier truss patented by William Howe, but functioned structurally opposite. The Howe design put the verticals in tension and the diagonals in compression. The Pratt truss is considered to be the first scientifically designed truss, incorporating what are now considered basic structural engineering principles. Pratt used shorter compression members, allowing members of smaller cross section to be used without sacrificing overall strength. This innovation provided a lighter truss requiring less material yet offered greater span and load bearing capability than the other truss designs of the time.³⁵

Pratt's 1844 patent also diagramed and set forth claims to a truss design with a polygonal top chord. The polygonal version reflected Pratt's understanding of the application of mathematical principles in calculating the forces involved and the precise strength of material required to counter those forces. The center panels, where the stresses were the greatest required the tallest panels, with the posts getting successively shorter towards the ends of the bridge. The primary advantage of the design was a reduction in the weight of the bridge, or dead load, allowing for greater spans without increasing the sectional area of the bridge's structural members. A savings in material cost was a direct result; however, this advantage was largely offset by the cost of having to fabricate a greater variety of members.³⁶ The cost advantage increased with longer spans, and by the early twentieth century designers improved the economy of the polygonal truss by limiting the number of variations in the slope of the top chord to three, for a total of five polygonal segments.³⁷

The use of the Pratt truss for the deck of John Roebling's Niagara River Suspension Bridge in 1855 drew worldwide attention to the design and undoubtedly contributed to its increased use. By 1889 the truss in its iron form ranked first in usage for railroad bridges. Tens of thousands of bridges, both highway and railroad have been built following the Pratt design or some variation.³⁸

John W. Storrs, Consulting Engineer

John W. Storrs worked as a bridge engineer for the Boston and Maine Railroad in the 1890s, as the state engineer for Carroll, Coos, and Grafton counties in 1903, and established a private engineering practice in Concord in 1905. He designed a large number of steel truss bridges in New Hampshire including ones over the Connecticut River at Claremont and Woodsville; over the Merrimack River at Concord, Boscawen and Hooksett; over the Androscoggin River at Berlin; and the Pemigewasset River at Hill and Sanbornton.³⁹ In addition to steel truss bridges of many types and sizes, Storrs designed nearly every other bridge type in use at the time, including steel girder, concrete arch, concrete slab, concrete beam, and even a stone arch. Examples of his

³⁵ Condit 1960, p. 109.

³⁶ Thomas W. Pratt and Caleb Pratt, Truss-Frame of Bridges, Specifications of Letters Patent No. 3,523, dated April 4, 1844. (Washington, D.C.: U.S. Patent Office); Condit 1960:110.

³⁷ Waddell 1916, p. 478.

³⁸ ASCE 1876; 334-335; Condit 1960:111, 112, 302; Theodore M. Cooper, "American Railroad Bridges."

Transactions of the American Society of Civil Engineers 21 (July 1889): 11.

³⁹ James L. Garvin. *New Hampshire's Highway Bridges: Masonry and Metal*. Unedited draft on file at the NH Division of Historical Resources, Concord, NH. 1999.

truss bridges similar in type and period to the Hooksett bridge, as well as a few other types, are presented in Figures 23-33.

The following information on Storrs is an excerpt from *Builders of Bridges in New Hampshire* by James Garvin (1999).

Consulting engineers like John Storrs also had a powerful effect on towns that were striving to replace aging bridges with new spans that met state weight standards. Storrs left state employment in 1905 to establish his own engineering firm in Concord, N.H., soon taking his son Edward as his partner and becoming “the only engineering firm in New England making a specialty of bridge design.” Many of Storrs’ office records survive and show that his practice included the structural evaluation of innumerable wooden bridges throughout the state.⁴⁰ Storrs found many of these to have been neglected and overstressed by excessive loading.

To assist towns in improving the bridges for which they were responsible, Storrs took the unusual step of publishing a non-technical book on bridge design in 1918. Entitled *Storrs: A Handbook for the Use of Those Interested in the Construction of Short Span Bridges*, the 75-page volume was “intended to be of some assistance to road agents, town clerks, selectmen and others who may be interested in the designing and construction of small bridges, culverts, etc.”⁴¹ Most of the bridge designs in Storrs’ book were calculated for loads ranging from twelve to fifteen tons, thus offering a comfortable margin of safety against legal liability to towns that built spans according to Storrs’ designs.

Storrs’ book emphasized the use of concrete, which Storrs had pioneered in his work in the White Mountains fifteen years earlier. The book illustrated steel I-beam stringer bridges with concrete jack arches spanning the intervals between the beams and supporting the bridge deck; bridges with reinforced concrete girders and concrete decks; reinforced concrete slab bridges; and concrete arches and pipe culverts. Storrs’ handbook was instrumental in introducing contractors and road agents to concrete as a construction material.

Storrs’ private engineering practice emphasized steel truss bridges of widely varying designs. His bridges spanned the Connecticut River at Claremont and Woodsville; the Merrimack at Concord, Boscawen and Hooksett; the Androscoggin at Berlin; the

⁴⁰ As noted by Garvin, 1999: Storrs Business Records, NH Division of Archives and Records Management, Boxes 049141, 049142, 049151, 049152, and 049161. Surviving Storrs bridge drawings are in the bridge files at the NH Department of Transportation. For more on Storrs, see “State Highway History, 1899 to 1905,” *New Hampshire Highways* 6 (December 1928); H. H. Metcalf, “The Ford Foundry Company, An Old Concord Industry in New Hampshire,” *Granite Monthly* 42 (August 1910): 243-246; “Concord’s 150th Anniversary,” *Granite Monthly* 47 (May-June 1915); “Concord’s New Bridges,” *Ibid.*; Henry Harrison Metcalf, ed., *One Thousand New Hampshire Notables* (Concord, N. H.: Rumford Printing Company, 1919); Ezra S. Stearns, ed., *Genealogical and Family History of the State of New Hampshire*, 4 vols. (New York: Lewis Publishing Company, 1908), Vol. 3, p. 1055; and obituaries in the *Concord Daily Monitor and N. H. Patriot*, September 21, 1942, and *The Manchester Union*, September 21, 1942. Obituary, Edward Dow Storrs: *Concord Monitor*, March 27, 1956; *Manchester Union-Leader*, March 28, 1956.

⁴¹ As noted by Garvin, 1999: John W. Storrs and Edward D. Storrs, *Storrs: A Handbook for the Use of Those Interested in the Construction of Short Span Bridges* (Concord, N. H.: by the authors, 1918)

Pemigewasset at Hill and Sanbornton; and many other streams throughout New Hampshire and neighboring states. Most of Storrs' longer trusses were riveted Pratt or Parker trusses, but he designed a number of low Warren truss bridges and the dramatic steel arched deck span (originally a railroad bridge and now a highway span) 165 feet above Quechee Gorge in Vermont.

American Bridge Company, New York, New York, Fabricator

American Bridge has fabricated and erected the steel for a major portion of the world's greatest bridges and tallest buildings.⁴² The American Bridge Company was incorporated in 1900 by J.P. Morgan as a consolidation of twenty-eight bridge companies, representing eighty-percent of the structural steel fabricating capacity of the United States. The following year Morgan folded ownership of the American Bridge Company into his newly formed United States Steel Company (US Steel) in the form of a subsidiary. Four other bridge companies were purchased and added to the firm over the years and included the Toledo Bridge Company in 1901, the Detroit Bridge and Iron Company in 1902, the Koken Iron Works of St. Louis in 1912 and the Virginia Bridge and Iron Company of Roanoke in 1936.⁴³

The company operated out of New York until 1904 when the headquarters were moved to Pittsburgh. In 1902, American Bridge began construction of a huge new plant outside Pittsburgh near the town of Economy, alongside the Ohio River. This facility was the largest of its kind in the world with a structural steel capacity of 20,000 tons per month.⁴⁴ The new town of Ambridge was eventually formed around the plant. In 1909 a new ninety-acre fabrication plant was built at Gary, Indiana.⁴⁵

Among the firms acquired by American Bridge were four leaders in the field of movable bridges: the Edge Moor Bridge Works, the Detroit Bridge and Iron Works, the Union Bridge Company, and the Pencoyd Iron Works. American Bridge Company was quickly established as the largest builder of heavy long span movable bridges in the world. This expertise in movable structures helped American Bridge win the contract for the building of the lockgates, dams, shop buildings and other structures of the Panama Canal between 1910 and 1913.⁴⁶ By 1926, American Bridge's parent company, US Steel, had become the largest company in the world, with assets of nearly 2.5 billion dollars.⁴⁷ During World War II the American Bridge Company was primarily responsible for the nearly two-fold expansion of America's steel industry, regarded as an important factor in the outcome of the War. The company produced over 350 electric steel-making furnaces during the war years.

Through the twentieth century many of the original plants acquired at the time of formation of the company were subsequently closed as their equipment and production methods became

⁴² Douglas A. Fisher, *Steel Serves The Nation* (Pittsburgh: United States Steel Corporation, 1951): 181.

⁴³ R. A. Talbot, *American Bridge Division, History and Organization* (Pittsburgh: United States Steel Corporation, 1975): 7.

⁴⁴ "The New Pittsburgh Plant of the American Bridge Company," *Engineering News* (June 26, 1902): 527-528.

⁴⁵ Talbot, *American Bridge Division, History and Organization*, p. 7.

⁴⁶ Fisher, *Steel Serves The Nation*, p. 182; O.E. Hovey, *Movable Bridges, Volume I*. (New York: John Wiley & Sons, 1926): 107.

⁴⁷ Stuart Chase, "Ten Companies Reach the Billion Dollar Mark. *The New York Times* (March 27, 1927): S8: 1.

obsolete. In 1975 American Bridge operated ten plants in the United States located at Ambridge and Harrisburg, Pennsylvania; Antioch, Fresno and Los Angeles, California; Elmira, New York; Gary, Indiana; Orange, Texas; Birmingham, Alabama; Memphis, Tennessee; and Roanoke, Virginia.⁴⁸ In 1987 US Steel sold American Bridge to an employee group. The company was again sold in 1989 to the Ing family of Taiwan who holds the company today as a long-term investment. American Bridge continues to be one of the world's foremost builders of large and complex steel structures.⁴⁹

United Construction Company, Albany, New York, Contractor

The United Construction Company was apparently formed in 1902 as a direct result of the creation of the American Bridge Company in 1900 and its acquisition of the Berlin Iron Bridge Company of East Berlin Connecticut that year. Between 1907 and 1920 the firm was led by James R. Watt, president and treasurer; Walter R. Marden, vice president and chief engineer; and A. H. Kittredge, secretary.⁵⁰ Walter R. Marden left his job as a highway bridge engineer for the American Bridge Company in Pittsburg to become vice-president and chief engineer of United Construction in 1902, a position he held into the 1930s.⁵¹ The American Bridge Company reportedly "fabricated most bridges built by United Construction Company."⁵² Whether this was because Marden was most comfortable working with his former employer or due to a formal agreement between the companies is not known.

An article by Walter Marden published in *The Engineering Record* in 1903 describes in detail the design of a all-riveted high Pratt truss highway bridge with a span of 143' built by United Construction in Springfield, New York. The purpose of the article appears to be to promote the company rather than introduce any innovative or novel design features. Like most bridge building companies, the firm drew upon standard bridge designs that could be easily modified in length and width to meet the requirements of each site. "The former Prescott Road Bridge in Raymond (1916) was an example of their "Standard Two-Beam Girder Bridge;" the former Bosco Bell Bridge in Barnstead (1916) was an example of their "Standard 4 Panel" low Warren truss; and the former Mary's or Bridge Street Bridge in Pittsfield (1909) may have been an example of a standardized low Parker truss."⁵³

United Construction Company worked closely with consulting engineer John W. Storrs of Concord, NH and built numerous bridges in NH designed by Storrs including the Winnisquam Bridge over Lake Winnisquam a five-span low Warren truss between Tilton and Belmont; the former three-span pin-connected Parker truss bridge over the Connecticut River between

⁴⁸ Talbot, *American Bridge Division, History and Organization*, p. 7.

⁴⁹ American Bridge corporate information available at <http://www.americanbridge.net>

⁵⁰ Garvin, 1999, n.p.

⁵¹ W. R. Marden (1865-1934) worked as a bridge engineer for various companies in New York, New Jersey, Virginia and Pennsylvania between 1888 and 1900 when he joined the American Bridge Company in Pittsburgh. From 1902 until 1931 he was vice president and chief engineer of the United Construction Company of Albany, NY. ("Walter R. Marden" in Downs, Winfield Scott, Editor, *Who's Who in Engineering*. New York: Lewis Historical Publishing Company, 1931, p. 858). Upon his death, February 7, 1934, Marden was vice president and chief engineer of the Standard Engineering Corporation, also of Albany, NY. ("Walter R. Marden." Obituary in *New York Times*, February 10, 1934, p. 7).

⁵² Garvin, 1999.

⁵³ *Ibid.*

Claremont and Springfield, Vermont; the former Union Bridge, a two-span riveted Pratt truss over the Pemigewasset River between Ashland and Bridgewater; the former Mason Street Bridge over the Androscoggin River in Berlin; the three-span Pratt truss bridge over the Merrimack River at Hooksett; a high Warren truss bridge in Wentworth (1909); and a single-span high Parker truss (1920) over the Connecticut River between Hinsdale and Brattleboro, Vermont. Other low Warren truss bridges known to have been built by United Construction Company in New Hampshire include those built in Thornton (1907), Stark (1909), Danbury (1913), Goshen (1913), Carroll (1915), and Hebron (1921) and Canaan (1921).⁵⁴

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⁵⁴ *Ibid.*

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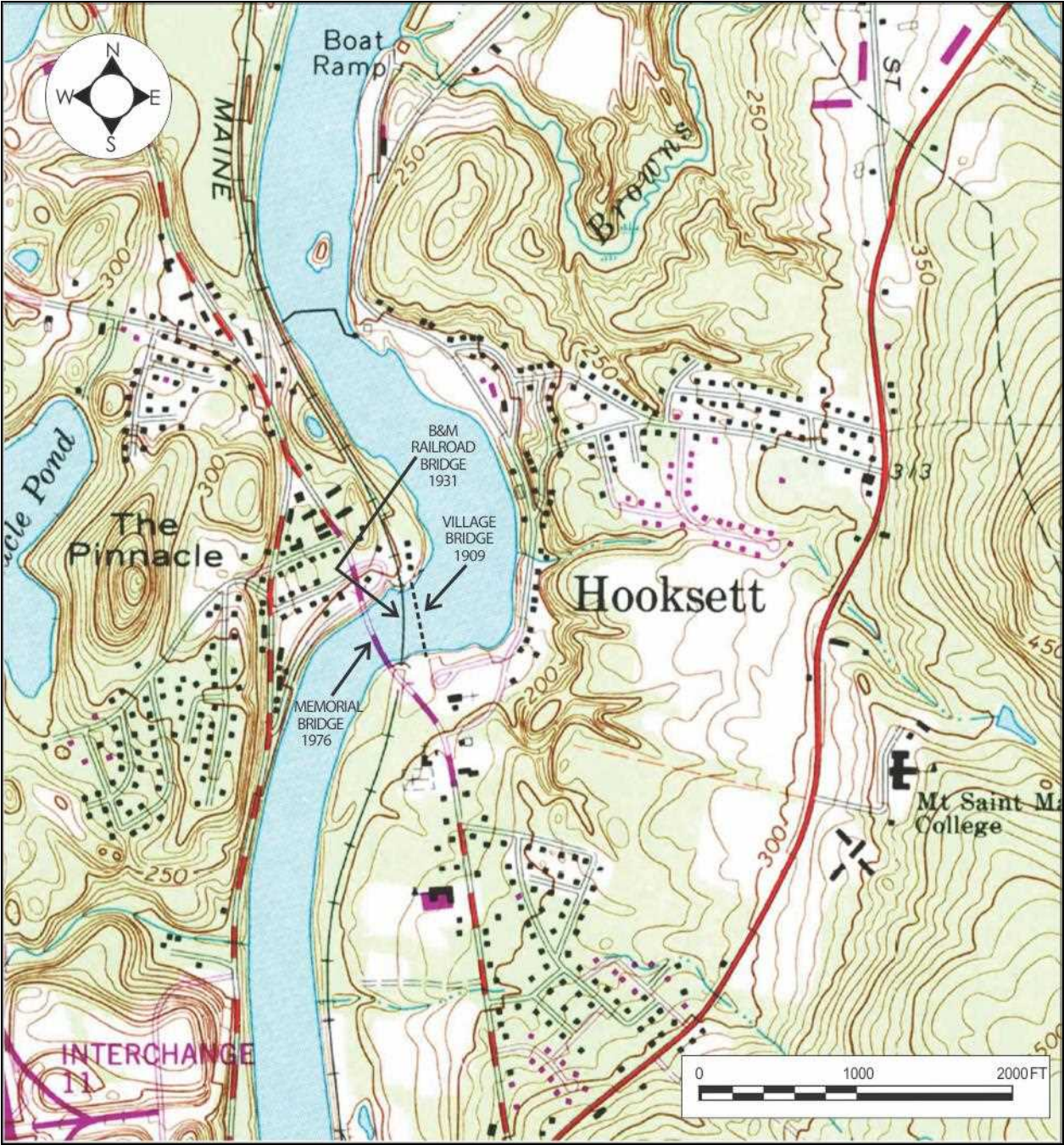


FIGURE 1: Location Map USGS quadrangle Manchester North, NH 1985. Hooksett Village Bridge shown as dashed line upstream of Boston & Maine Railroad Bridge. Memorial Bridge was built in 1976 to carry Main Street traffic following the closure of Village Bridge for safety reasons.

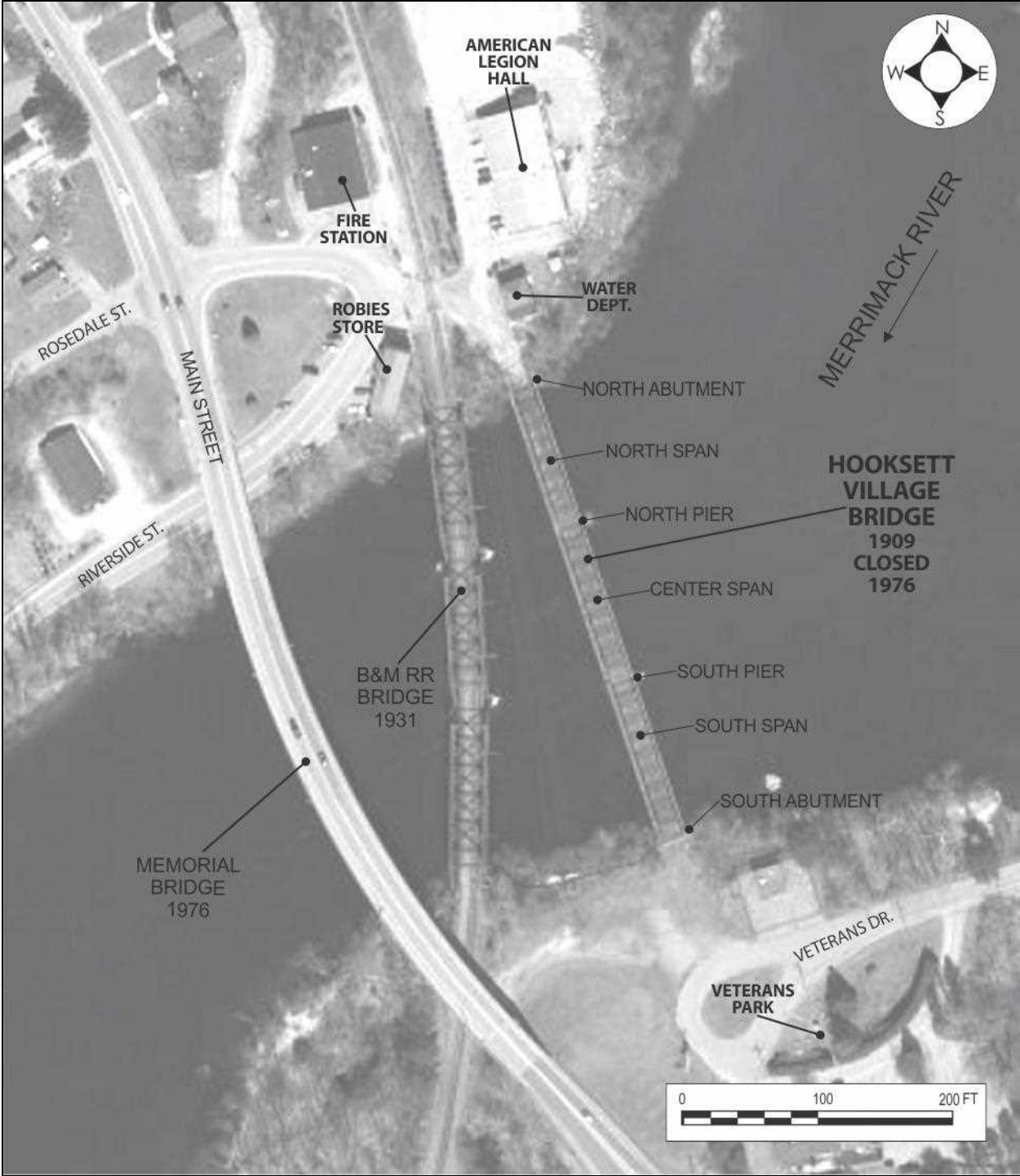


FIGURE 2: Site Sketch overlaid on Bing aerial photograph.

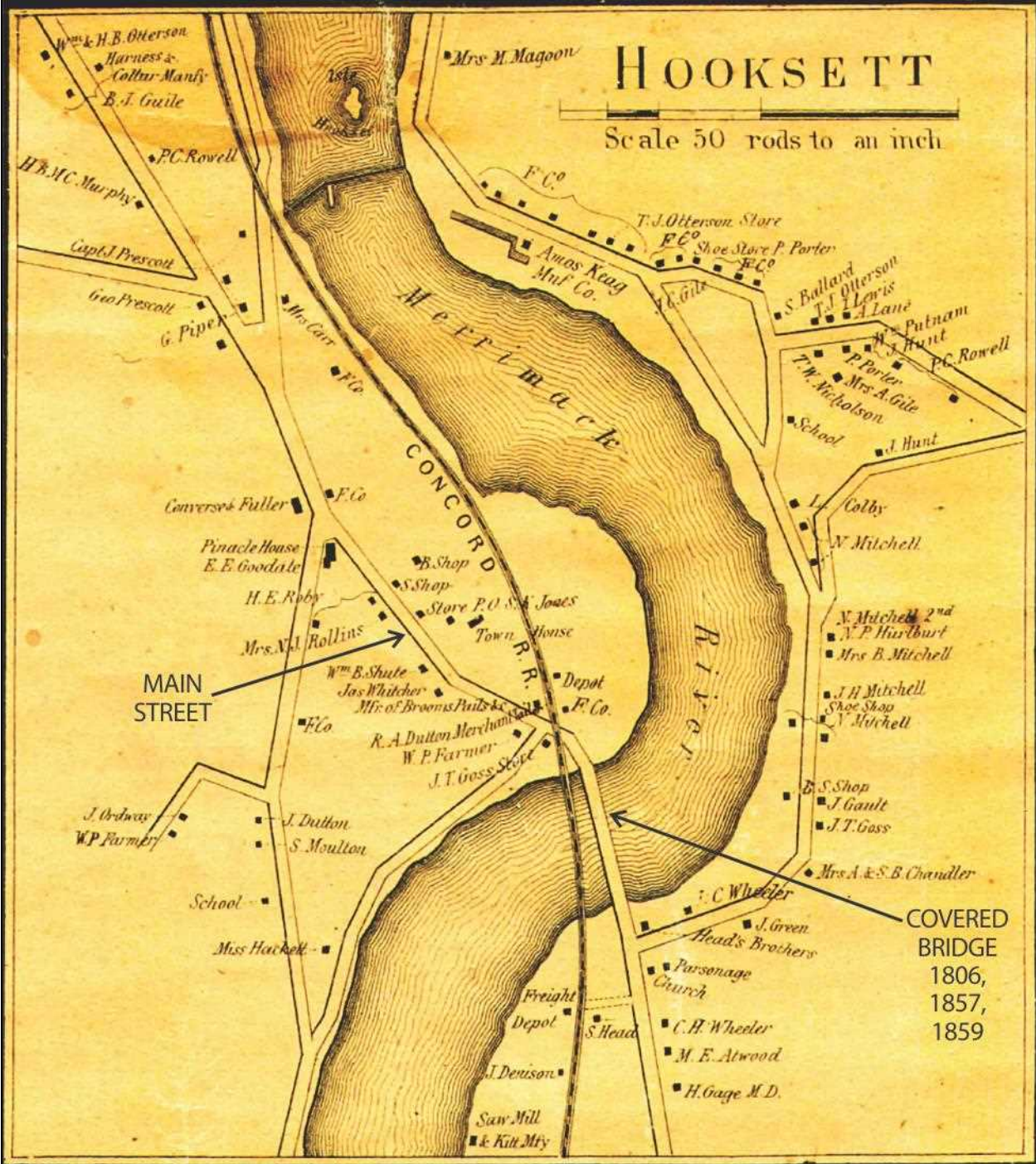


FIGURE 3: Map of Hooksett Village in 1858 showing Main Street crossing former Londonderry Turnpike wood covered bridge originally built 1806, rebuilt in 1857 and 1859 by Town, replaced 1909 with steel truss Village Bridge (Walling 1858).

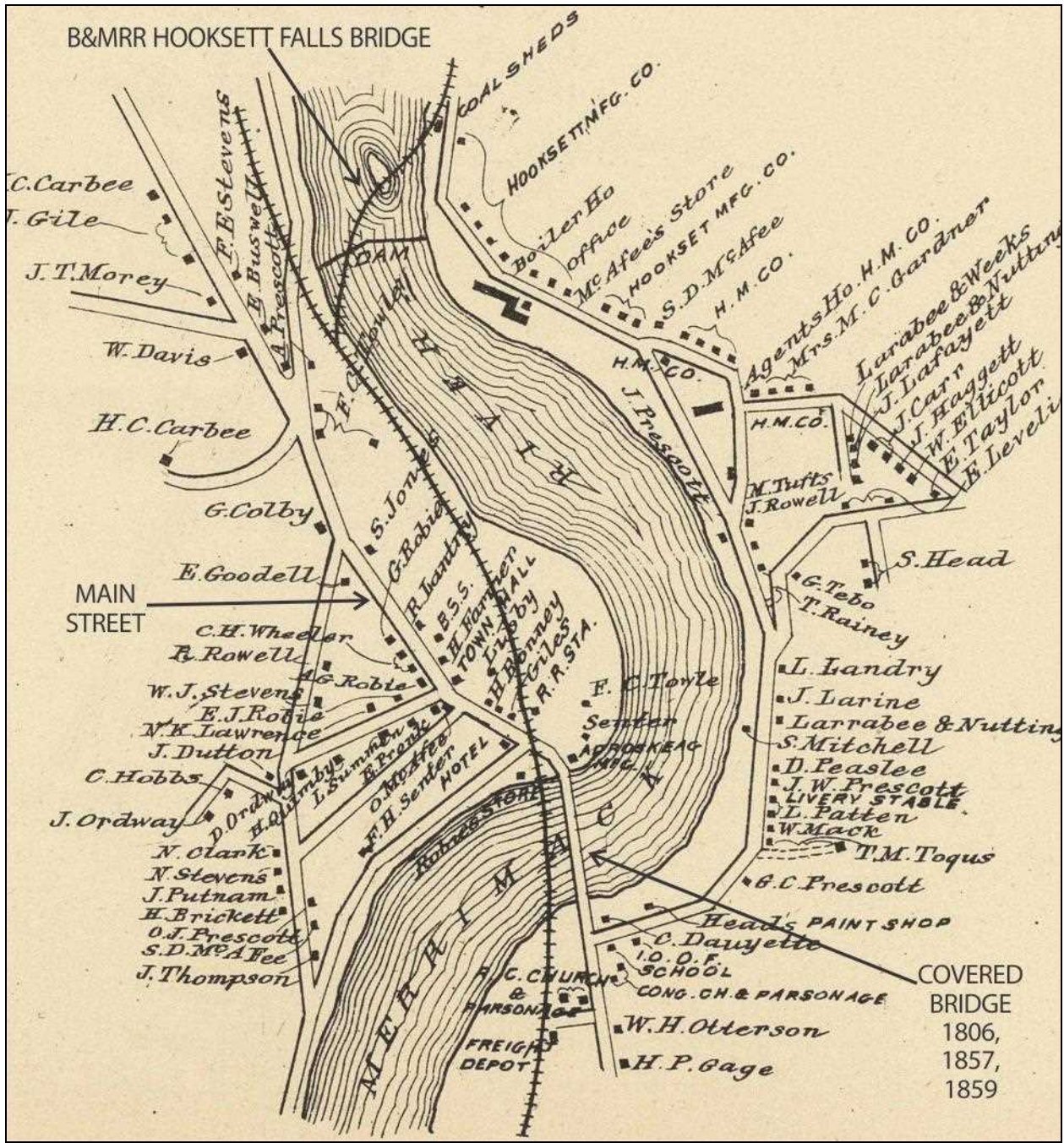


FIGURE 4: Map of Hooksett Village in 1892. Note Boston & Maine Railroad branch line to Suncook crossing the river at Hooksett Falls, passing over dam and Isle Hookset. The railroad bridge consisted of three massive timber spans, at least one of which was torn free in the 1936 flood and then demolished a span of the Village Bridge and several buildings downstream. Also see Figure 11 below (Hurd 1892).

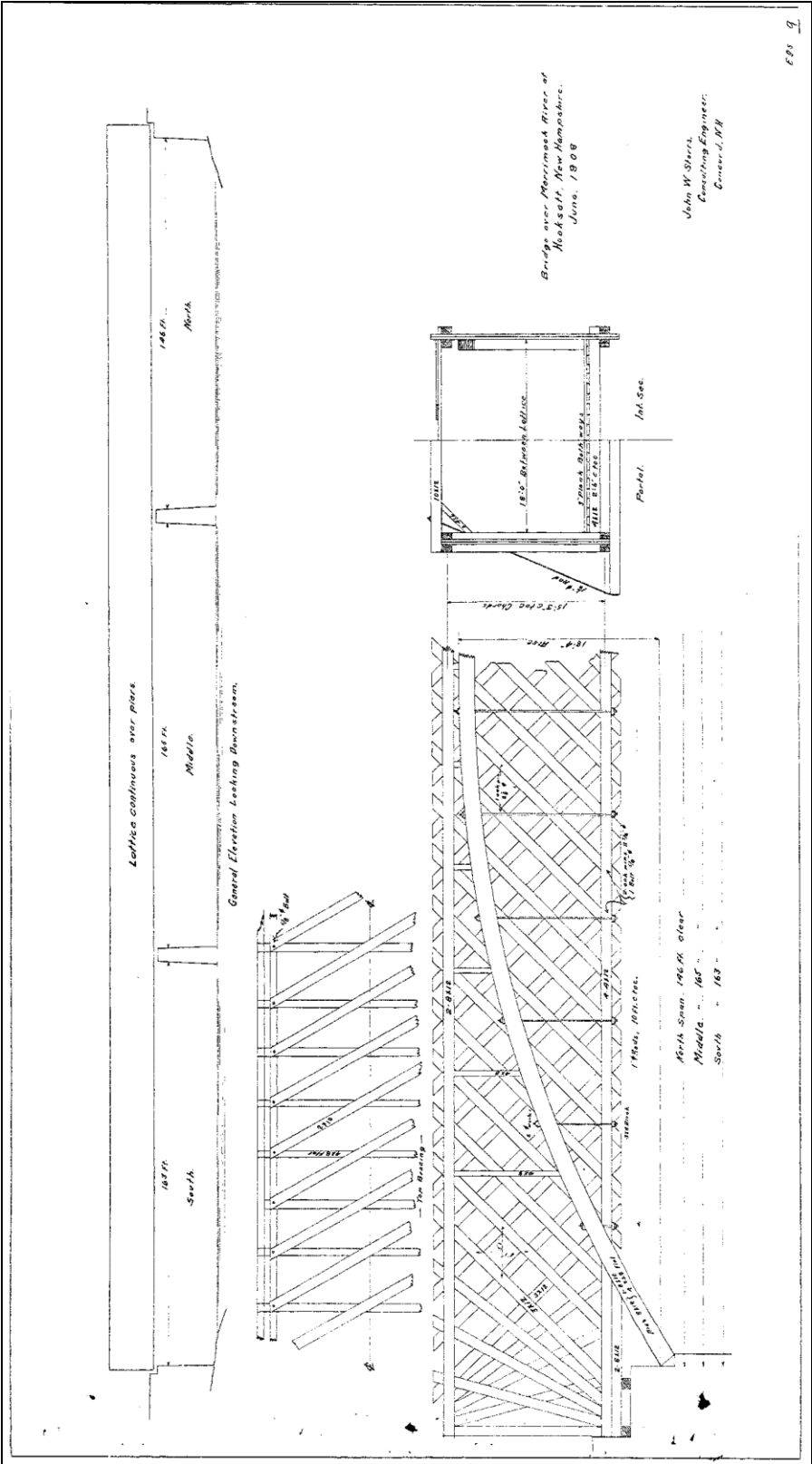


FIGURE 5: Inspection drawing of Hooksett Covered Bridge made by John Storrs for Town of Hooksett, June 1908 (Hooksett Heritage Commission).

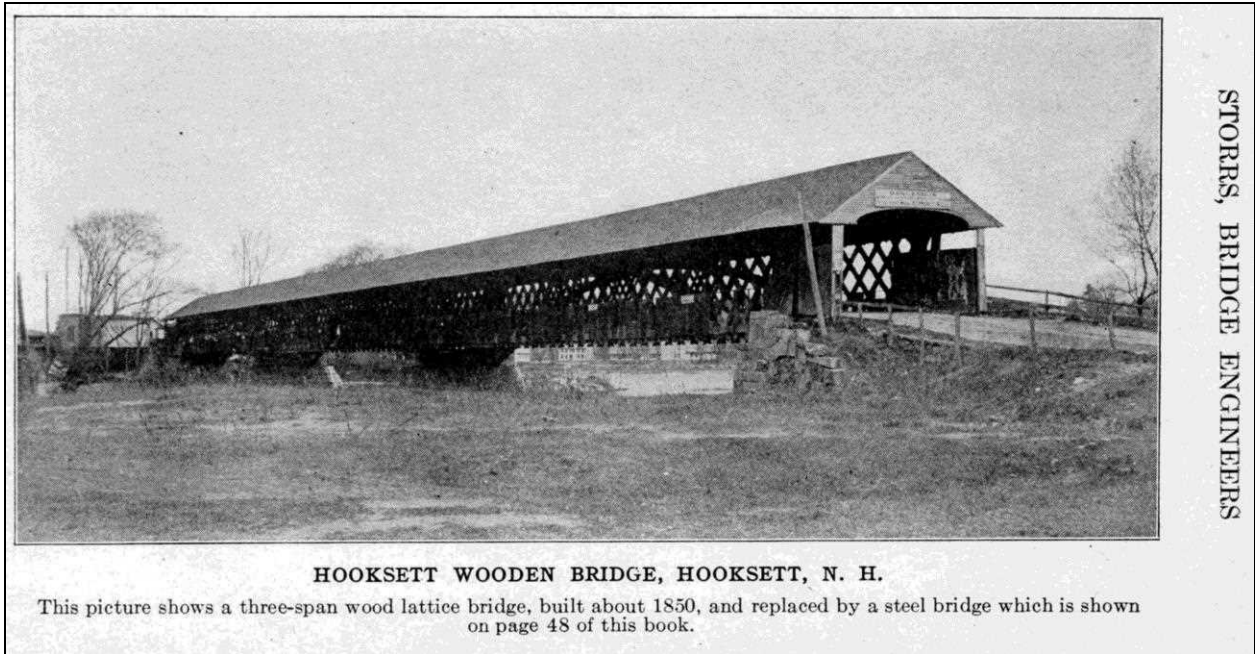


FIGURE 6: Hooksett Covered Bridge, built 1859, as pictured in Storrs & Storrs bridge construction handbook. The bridge is shown prior to its replacement in 1909 (Storrs & Storrs, 1918, p. 46).

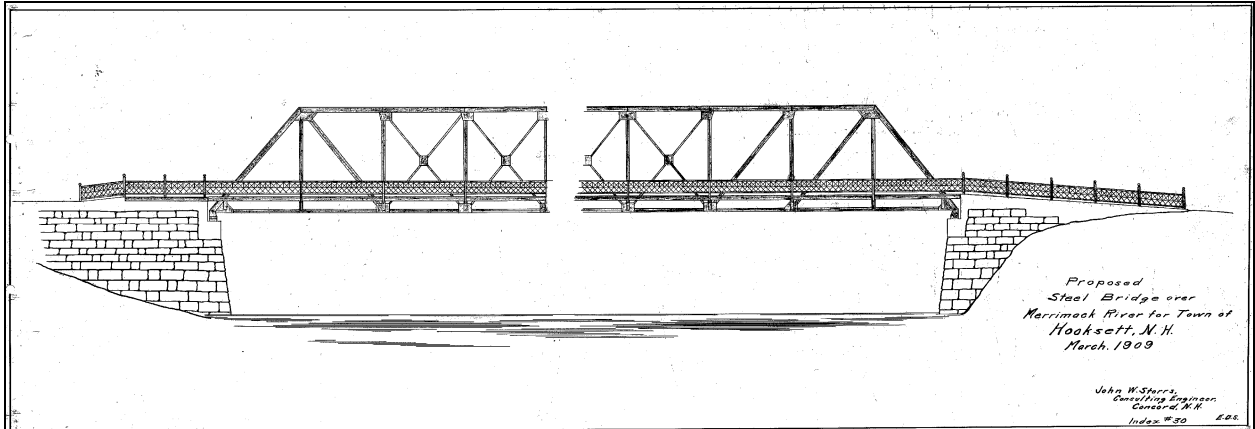


FIGURE 7: Proposal plan for new steel truss bridge to replace Hooksett Covered Bridge as submitted to the town of Hooksett by John Storrs and approved by Selectmen at the March 9, 1909 meeting. See larger image of same in Drawings Section below (Storrs & Storrs, 1909; located in NHDOT files.).

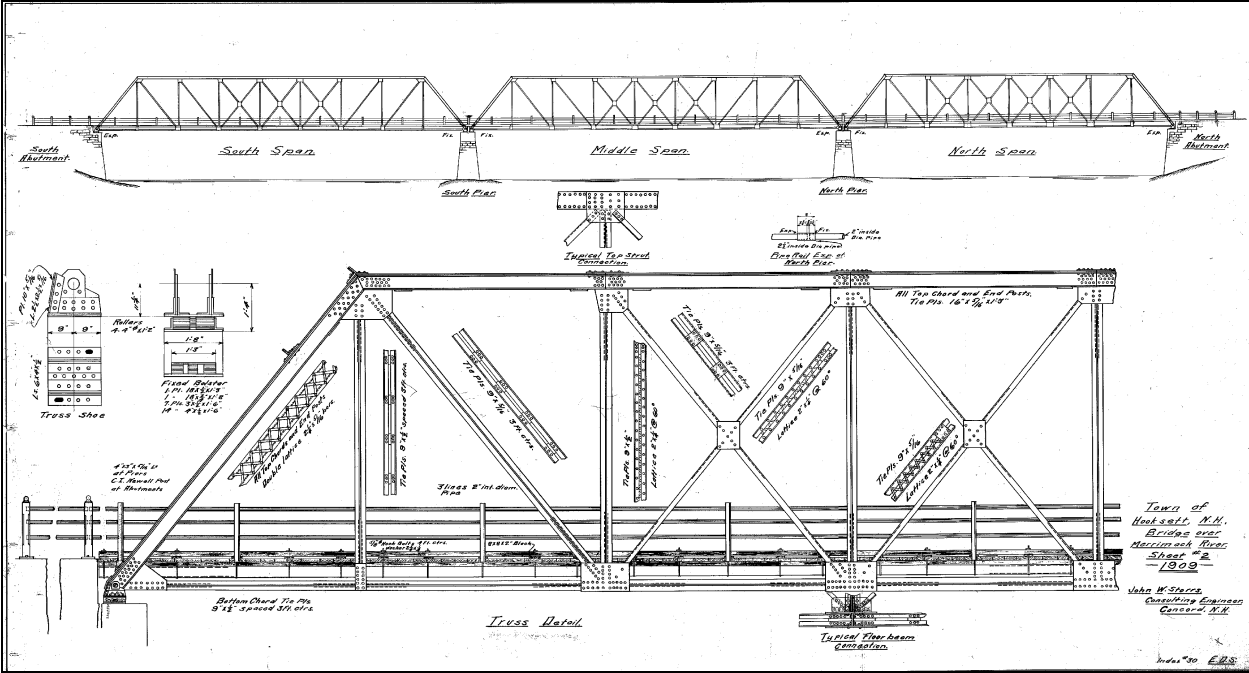


FIGURE 8: One of the plan sheets for the new steel truss bridge to replace Hooksett Covered Bridge prepared by John Storrs for the Town and United Construction Company. See larger image of same and other Storrs project drawings in the Drawings Section below (Storrs & Storrs, 1909; located in NHDOT files.).

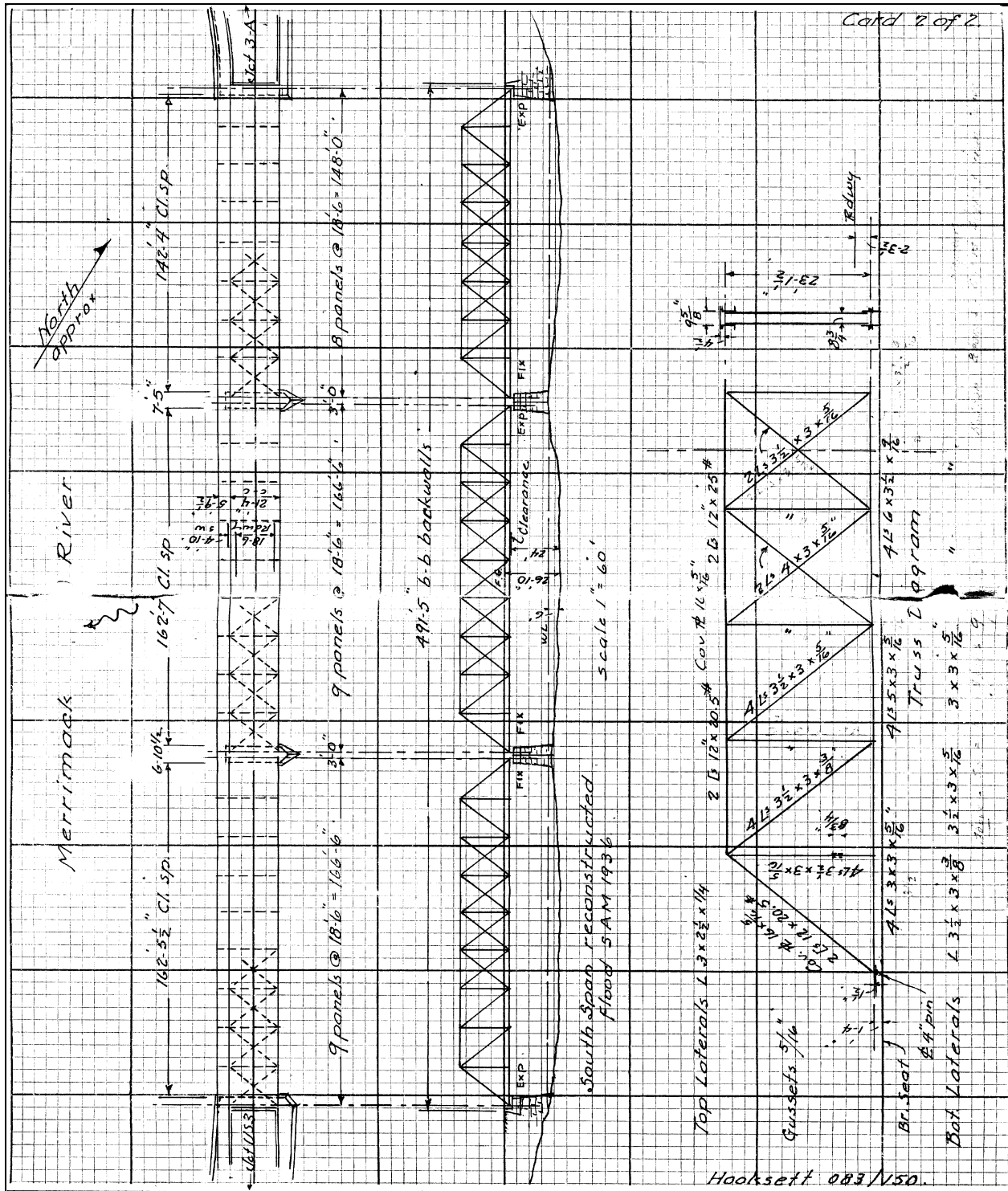


FIGURE 9: Hooksett Village Bridge, plan, elevation and truss diagram drawings. Field inspection sketches made by New Hampshire Highway Department engineer Wendell H. Piper, April 19, 1942 (NHHD Bridge Inventory Card, Hooksett 083/150).

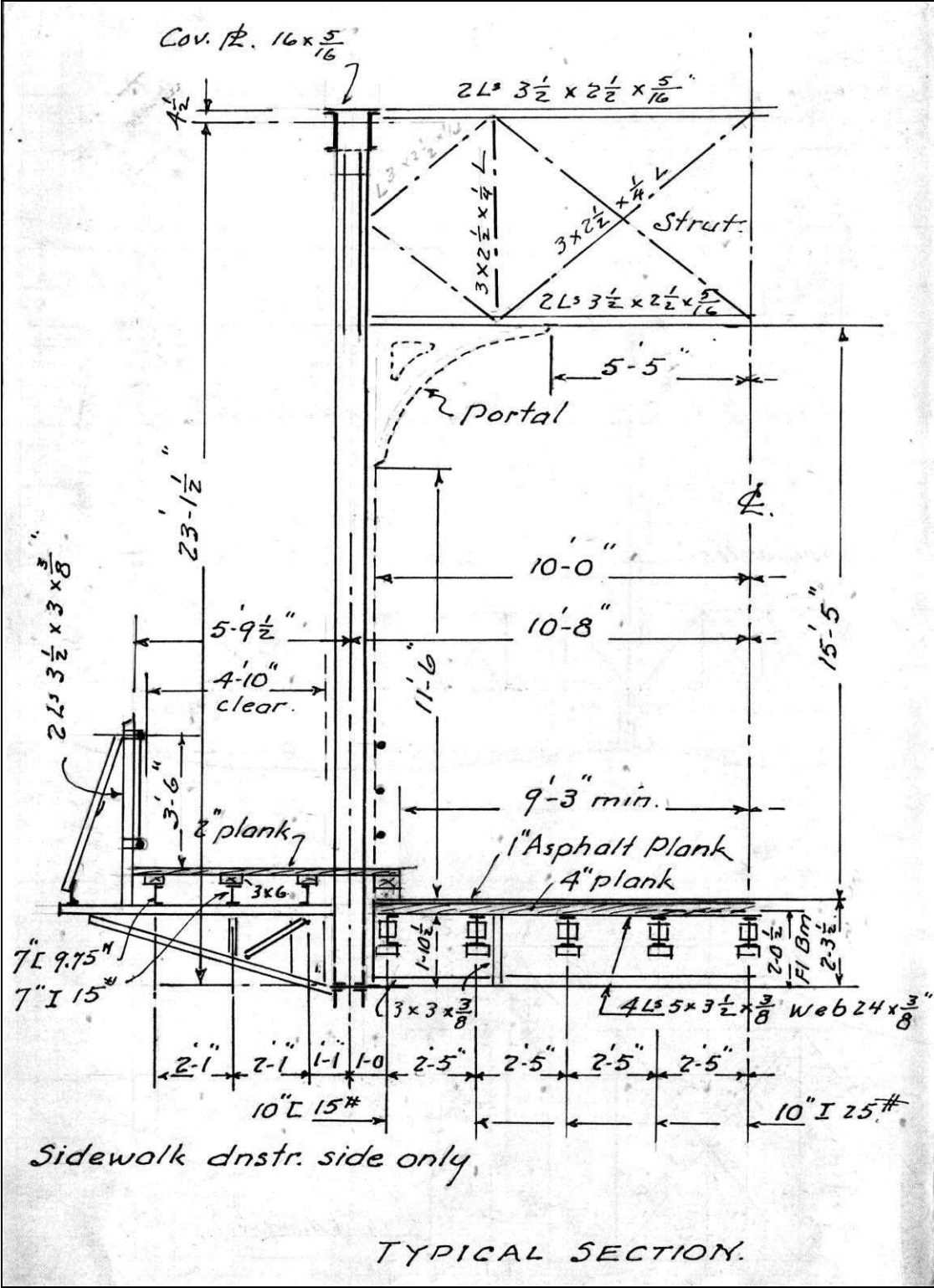


FIGURE 10: Hooksett Village Bridge, section drawing. Field inspection sketch made by New Hampshire Highway Department engineer Wendell H. Piper, April 19, 1942 (NHHD Bridge Inventory Card, Hooksett 083/150).

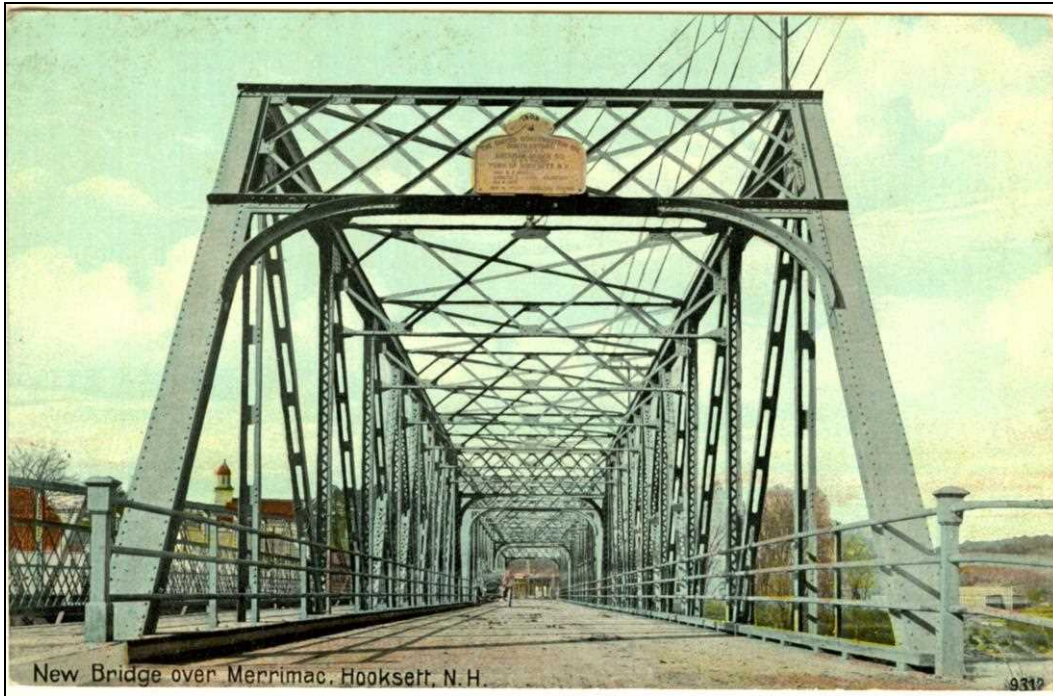


FIGURE 11: Postcard, circa 1910, commemorating "New Bridge over Merrimack, Hooksett, N.H." Leighton & Valentine Co., New York City, publisher. Note bridge plaque mounted above portal frame, now in possession of Hooksett Historical Society, as shown in Figure 13 below (Historic Documentation Company).

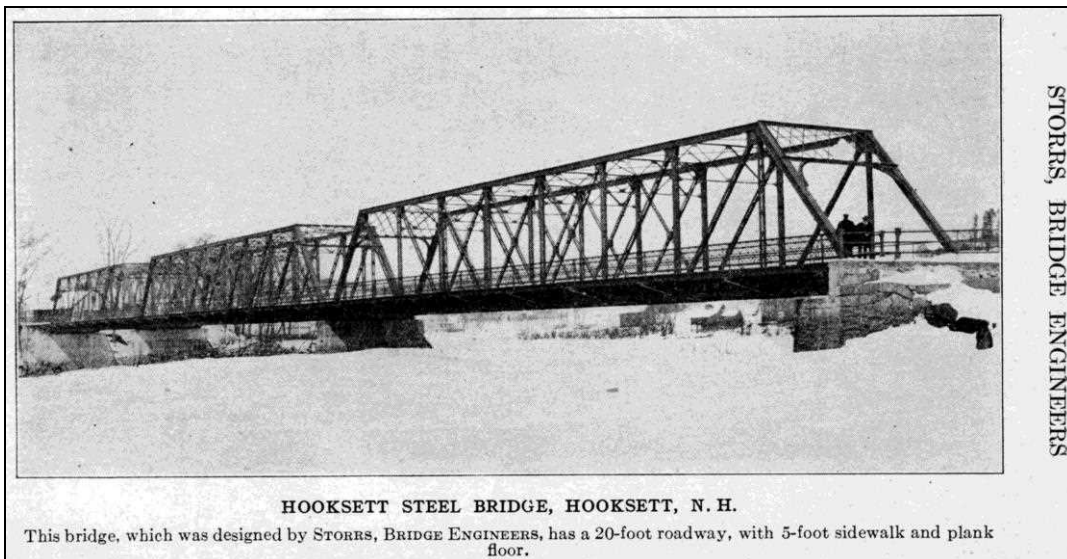


FIGURE 12: Hooksett Village Steel Truss Bridge as pictured in Storrs & Storrs bridge construction handbook, shown sometime between 1909 and 1918 (Storrs & Storrs, 1918, p. 48).



FIGURE 13: Village Bridge plaque removed from bridge, restored and mounted on granite posts in front of the Arah W. Prescott Historical Library, in the village just north of the bridge (Historic Documentation Co.).



FIGURE 14: Photograph taken before 1933 of south approach to Village Bridge, left, showing trolley line and buildings on Common Avenue before alteration of area by 1936 flood (Hooksett Heritage Commission).



FIGURE 15: "Flood Scene. Wreck & Ruin at Hooksett, NH." Postcard 1936, Tichnor Bros. Boston, MA, publisher. The south span of the Village Bridge was carried away with the impact of a span of the B&MRR Hooksett Falls Bridge that was torn free by the flood from its location just upstream. The two remaining spans of the Village Bridge are seen at upper left; a section of the lattice truss railroad bridge is seen at bottom center, grounded or continuing downstream (Historic Documentation Co.).



FIGURE 16: Village Bridge, photograph, 1936, after Flood of 1936, showing south span missing, right, and temporary sidewalk erected on B&MRR Bridge, left. Note original iron-lattice sidewalk railing on Village Bridge with sections missing and bent over. The railing was completely replaced with a more modern steel balustrade railing as part of the contract that replaced the lost span (Hooksett Heritage Commission).



FIGURE 17: Photograph, 1936, showing Village Bridge at right and wood trestle pedestrian bridge leading to a temporary sidewalk erected on the railroad bridge (Hooksett Heritage Commission).

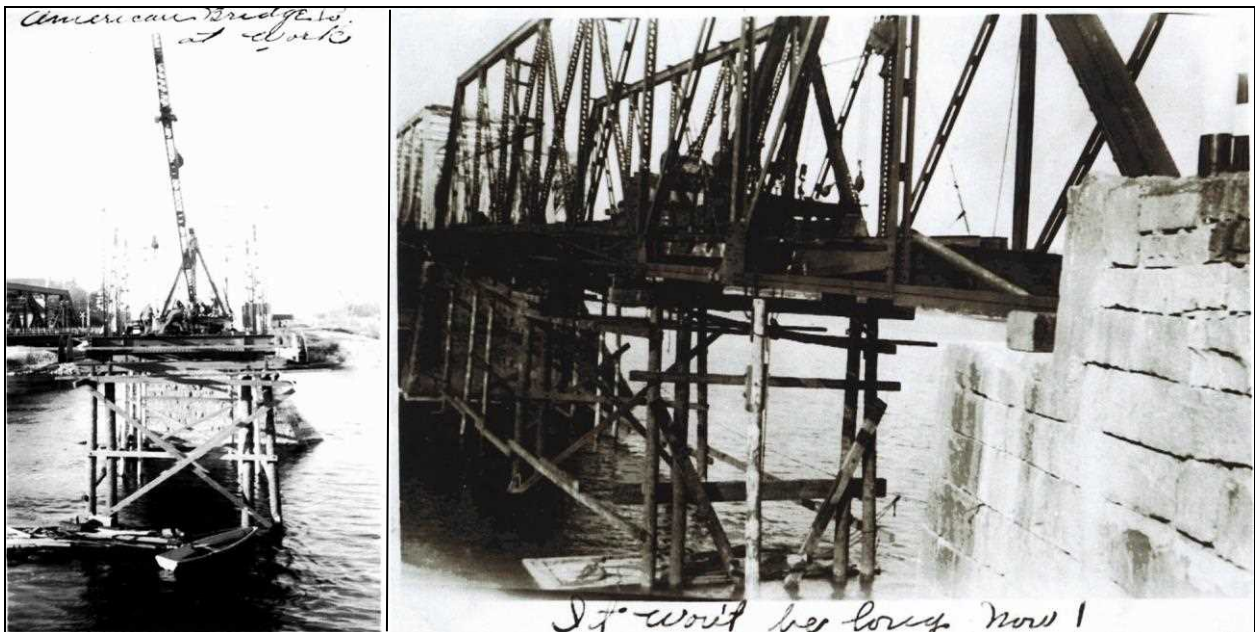


FIGURE 18: Photographs of construction of replacement south span by American Bridge Company, 1936. Left photo shows stiff-leg derrick mounted on center span and placing bridge members on timber pile falsework bents. Right photo shows replacement span completed to the south abutment with falsework still in place (Hooksett Heritage Commission).



FIGURE 19: Hooksett Village Bridge, April 13, 1942, New Hampshire Highway Department (NHHD) Bridge Inventory Card. Notation reads "south approach, looking toward junction NH 3 A" (NHDOT Bridge Files).



FIGURE 20: Hooksett Village Bridge, April 13, 1942, NHHD Bridge Inventory Card. Notation reads "north approach looking toward junction US 3" (NHDOT Bridge Files).



FIGURE 21: Hooksett Village Bridge, April 13, 1942, NHHD Bridge Inventory Card. Caption reads "Upstream side" (NHDOT Bridge Files).



FIGURE 22: Hooksett Village Bridge, July 20, 1973 NHDPW Bridge Inspection Card. Notation reads "South approach." Note suspended warning sign in portal that reads "10 FT. CLEARANCE. THIS BRIDGE CONSIDERED UNSAFE FOR MORE THAN TWO PASSENGER CARS AT THE SAME TIME." (NHDOT Bridge Files).



FIGURE 23: Wreckage of south truss span of Village Bridge, in river below Riverside Street about 300 feet south of Memorial Bridge. The remains are exposed during periods of low river levels when maintenance is performed on the Amoskeag Dam in Manchester (Hooksett Heritage Commission).



FIGURE 24: John Storrs designed bridge. Claremont 091/118, single span Pratt thru truss carrying Plains Road over Sugar River, built 1906, replaced 1974. United Construction Co., contractor. 131'-0" span between bearings. Photo August 26, 1942 (NHHD Bridge Inventory Card).



FIGURE 25: John Storrs designed bridge. Hopkinton 134/166, single span Warren pony truss carrying East Penacook Road over Blackwater River, built 1907, replaced 1967. United Construction Co., contractor. 70'-0" span between bearings. Photo June 27, 1942 (NHHD Bridge Inventory Card).

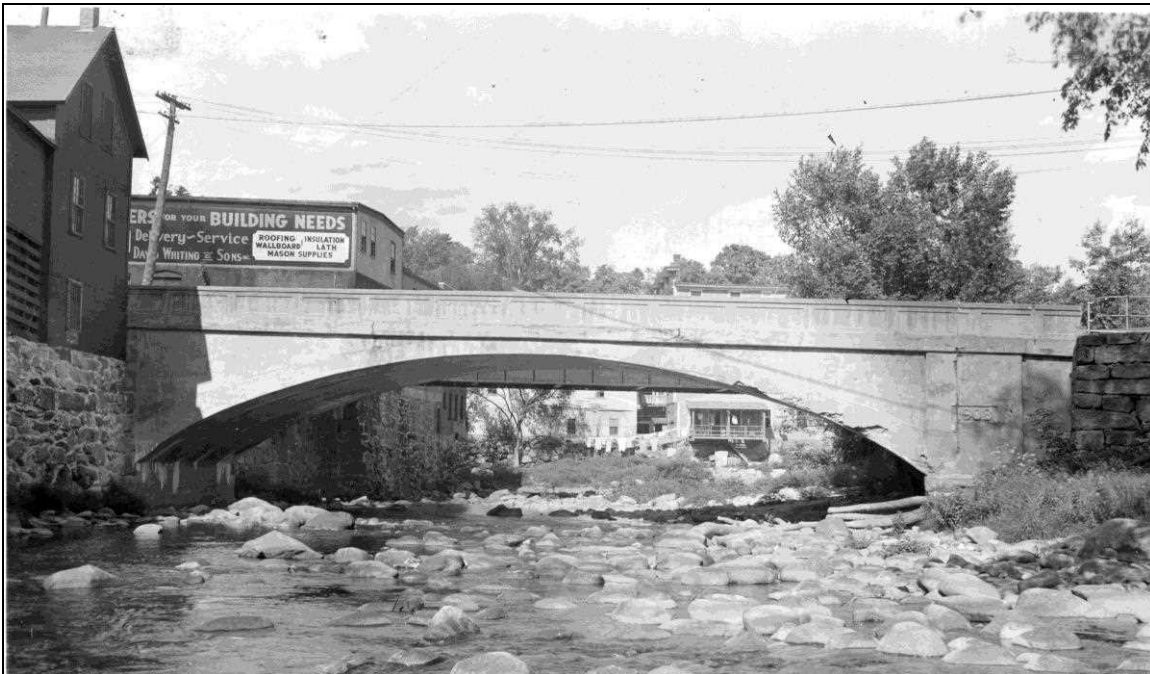


FIGURE 26: John Storrs designed bridge. Wilton 129/126, single span concrete arch carrying NH 31 over Souhegan River. Built 1908, replaced 1971. Contractor undetermined. 77'-6" clear span. Photo July 14, 1941 (NHHD Bridge Inventory Card).



FIGURE 27: John Storrs designed bridge. Milford 062/138. Jones Crossing over Souhegan River, a single span Pratt thru truss built 1910, demolished 2015. Canton Bridge Co., Canton, Ohio, contractor. 150' span between bearings. Photo November 20, 1989 (NHDOT Inspection File).



FIGURE 28: John Storrs designed bridge. Tilton-Northfield 128/158 (now 109/062), two span Warren pony truss carrying NH 140 over Winnepesaukee River. Built 1910, replaced 1968. Canton Bridge Co., contractor. 67'-7" span (each) between bearings. Photo June 17, 1942 (NHHD Bridge Inventory Card).



FIGURE 29: John Storrs designed bridge. Amherst 186/107, "Cricket Corner Bridge," single-span riveted Pratt truss carrying NH 122 over Souhegan River. Built 1912, replaced 1956. United Construction Co., contractor. 99'-9" clear span. Photo August 9, 1940 (NHHD Bridge Inventory Card).



FIGURE 30: John Storrs designed bridge. Gorham 092/058, one Pratt thru truss span, one thru plate-girder span, carrying NH 16 over Peabody River, built 1912, replaced 1950. United Construction Co., contractor. 128'-0" span between bearings. Photo August 29, 1940 (NHHD Bridge Inventory Card).



FIGURE 31: John Storrs co-designed bridge. Concord 070/117, Sewells Falls Bridge, two span Pratt thru truss carrying Sewells Falls Road over Merrimack River, built 1915, replaced 2016. W. B. Howe, city engineer, also named on plans. Berlin Construction Company, Berlin, CT, contractors. Two 165' spans. Photo May 15, 1942 (NHHD Bridge Inventory Card).

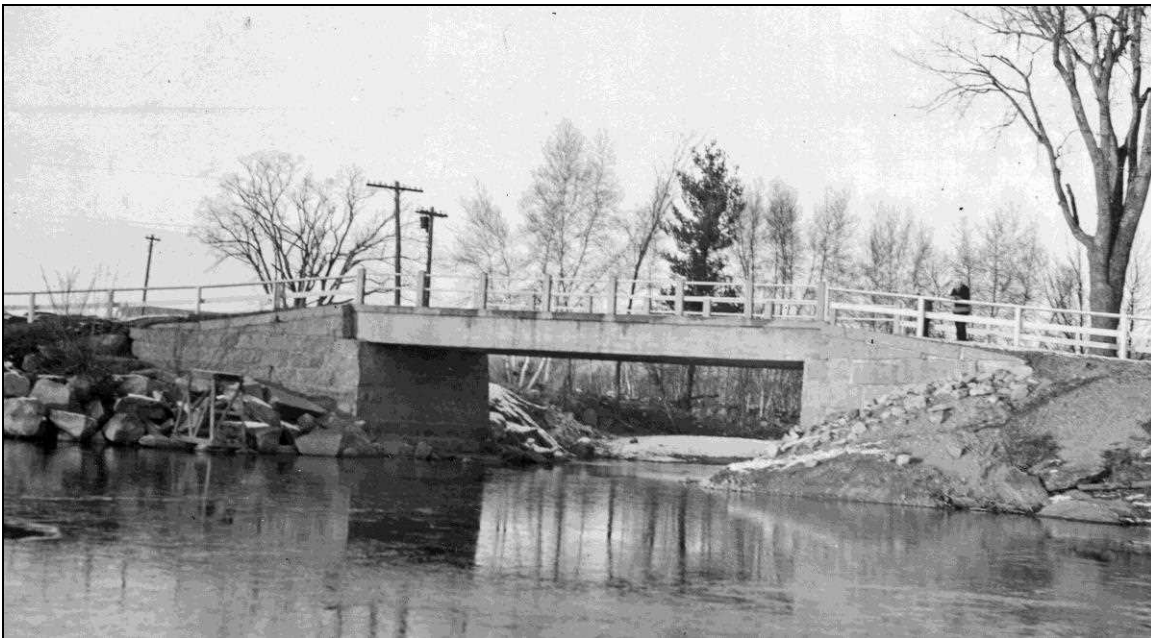


FIGURE 32: John Storrs designed bridge. Conway 062/042, single span concrete T-beam bridge carrying River Road over Lovejoy Brook, built 1917, replaced 1961. Contractor undetermined. 41'-6" clear span. Photo November 25, 1941 (NHHD Bridge Inventory Card).



FIGURE 33: John Storrs designed bridge. Milford 052/135, "County Bridge," two span stone arch carrying Wilton Road over Souhegan River, built 1917, repaired 1950, in service. Lovejoy Granite Co, Milford, contractor. 60'-0" clear span each. Photo July 29, 1940 (NHHD Bridge Inventory Card).

INDEX TO PHOTOGRAPHS

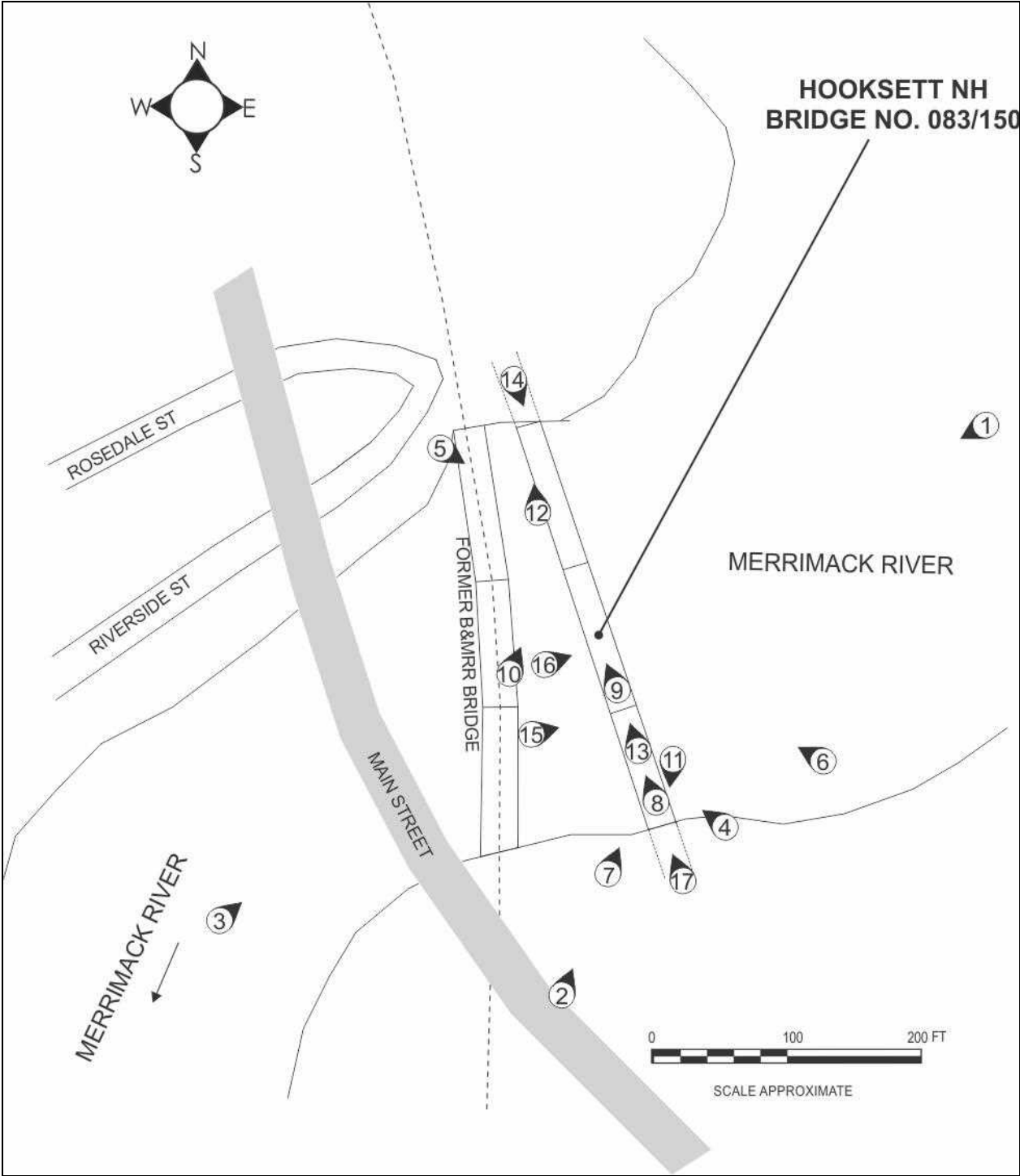
Photographer: Rob Tucher

Media: 4"x5" film negative, contact printed.

September, October 2015

- NH-737-01 Bridge in context from upstream. Looking southwest.
- NH-737-02 Bridge in context from Memorial (Main Street) Bridge. Looking northeast.
- NH-737-03 Bridge in context from downstream, just visible behind Memorial Bridge and B&MRR Bridge. Looking northeast.
- NH-737-04 Bridge in context with B&MRR Bridge from south abutment. Looking northwest.
- NH-737-05 Bridge in context, showing oblique elevation of downstream side, from under B&MRR Bridge. Looking southeast.
- NH-737-06 Oblique view of upstream side of bridge. Looking northwest.
- NH-737-07 Oblique view of downstream side of south truss and south abutment. Looking northeast.
- NH-737-08 View of underside of south span showing floor system. Looking north.
- NH-737-09 View of underside of center span and elevation of north pier. Looking north.
- NH-737-10 Oblique view of downstream side of north and center trusses and north pier. Looking northeast.
- NH-737-11 South abutment. Looking south.
- NH-737-12 North abutment. Looking north.
- NH-737-13 South Pier, south elevation. Looking north.
- NH-737-14 North portal and barrel view through trusses. Looking south.
- NH-737-15 Elevation of downstream side of south and center trusses and south pier. Looking east.
- NH-737-16 Detail of downstream side of center truss, showing sidewalk framing, railing, lower chord and floor beam connections, stringers and lower lateral bracing. Looking east.
- NH-737-17 South portal and barrel view through trusses. Looking north.

KEY TO PHOTOGRAPHS





NH-737-01 Bridge in context from upstream. Looking southwest.



NH-737-02 Bridge in context from Memorial (Main Street) Bridge. Looking northeast.



NH-737-03 Bridge in context from downstream, just visible behind Memorial Bridge and B&MRR Bridge. Looking northeast.



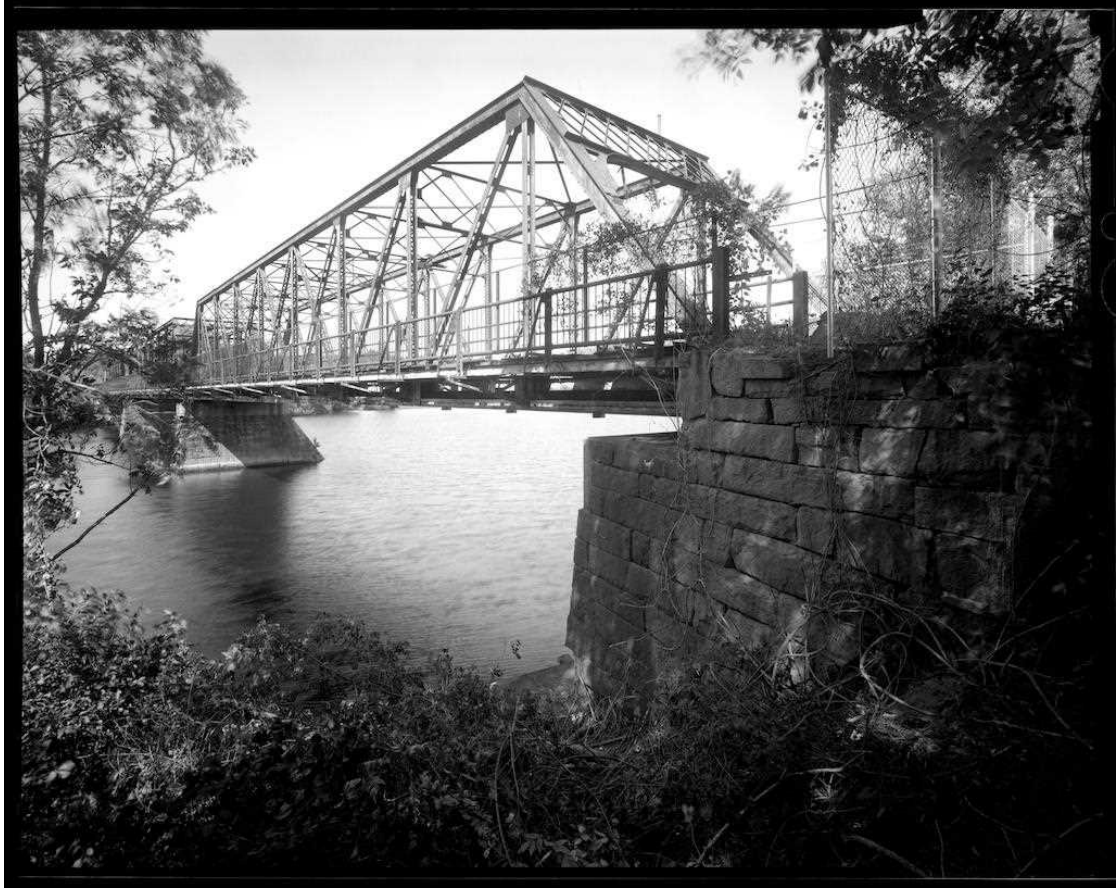
NH-737-04 Bridge in context with B&MRR Bridge from south abutment. Looking northwest.



NH-737-05 Bridge in context, showing oblique elevation of downstream side, from under B&MRR Bridge. Looking southeast.



NH-737-06 Oblique view of upstream side of bridge. Looking northwest.



NH-737-07 Oblique view of downstream side of south truss and south abutment. Looking northeast.



NH-737-08 View of underside of south span showing floor system. Looking north.



NH-737-09 View of underside of center span and elevation of north pier. Looking north.



NH-737-10 Oblique view of downstream side of north and center trusses and north pier.
Looking northeast.



NH-737-11 South abutment. Looking south.



NH-737-12 North abutment. Looking north.



NH-737-13 Detail of South Pier, south face. Looking north.



NH-737-14 North portal and barrel view through trusses. Looking south.



NH-737-15 Elevation of downstream side of south and center trusses and south pier.
Looking east.



NH-737-16 Detail of downstream side of center truss, showing sidewalk framing, railing, lower chord and floor beam connections, stringers and lower lateral bracing. Looking east.

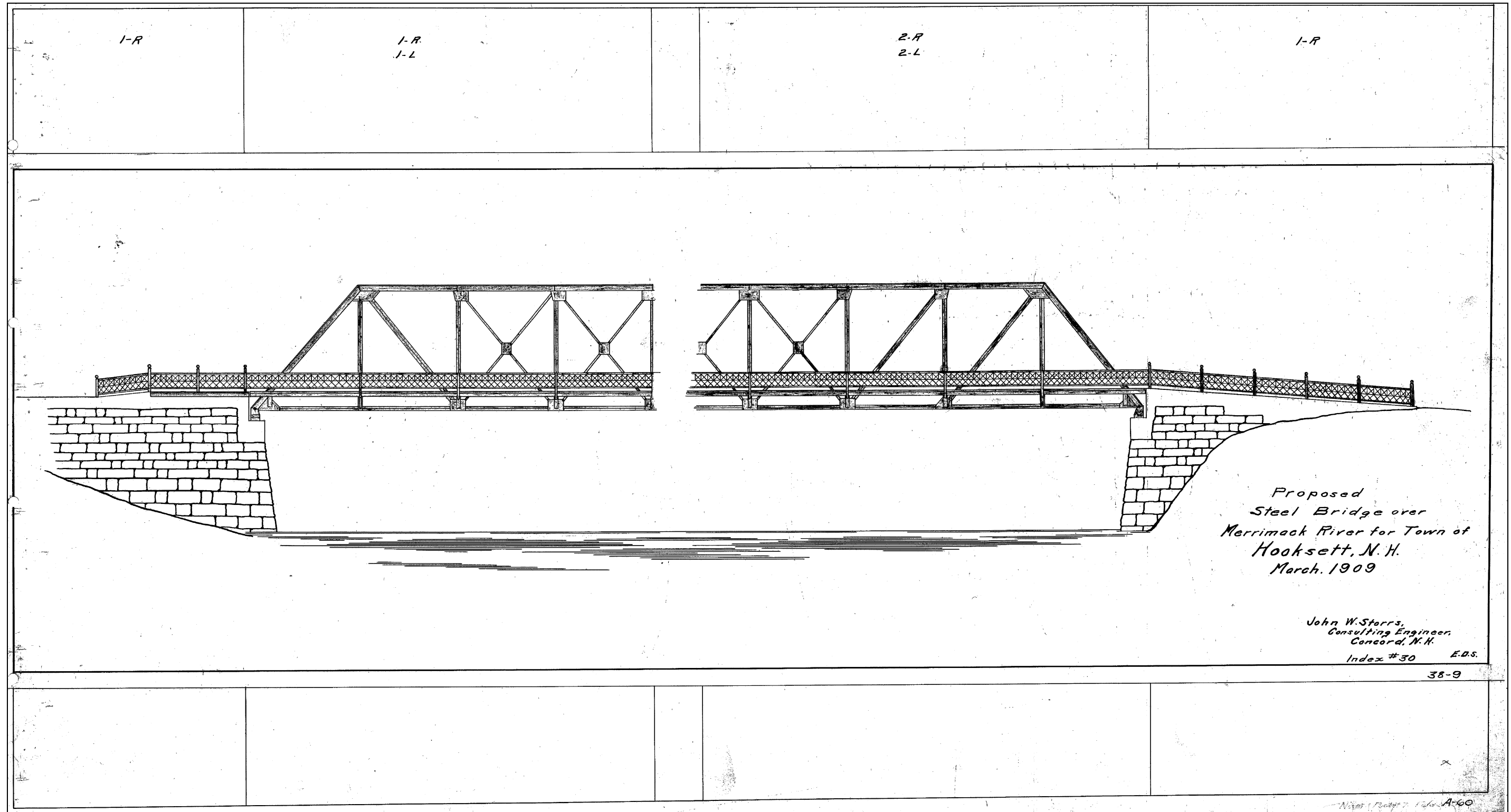


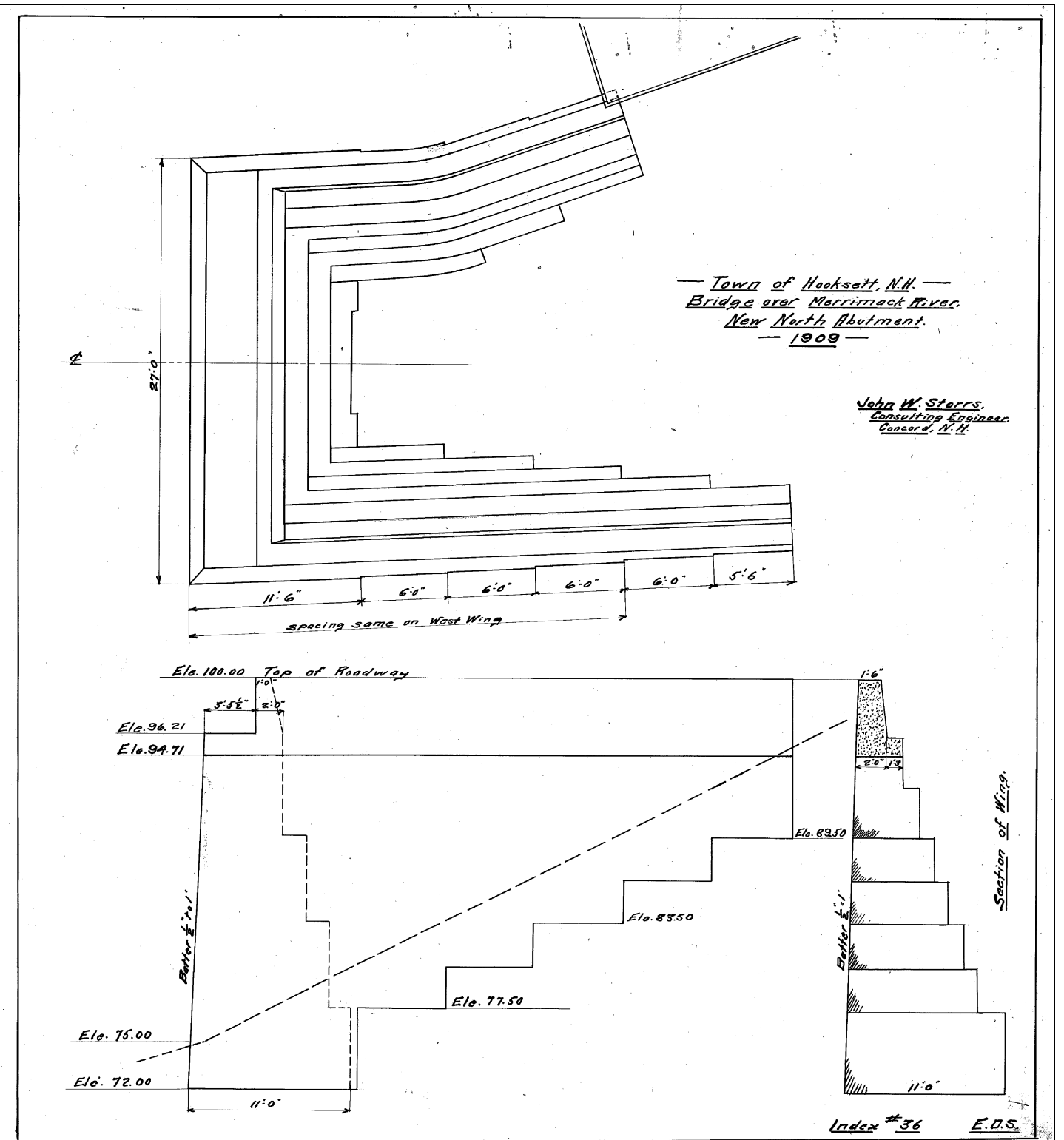
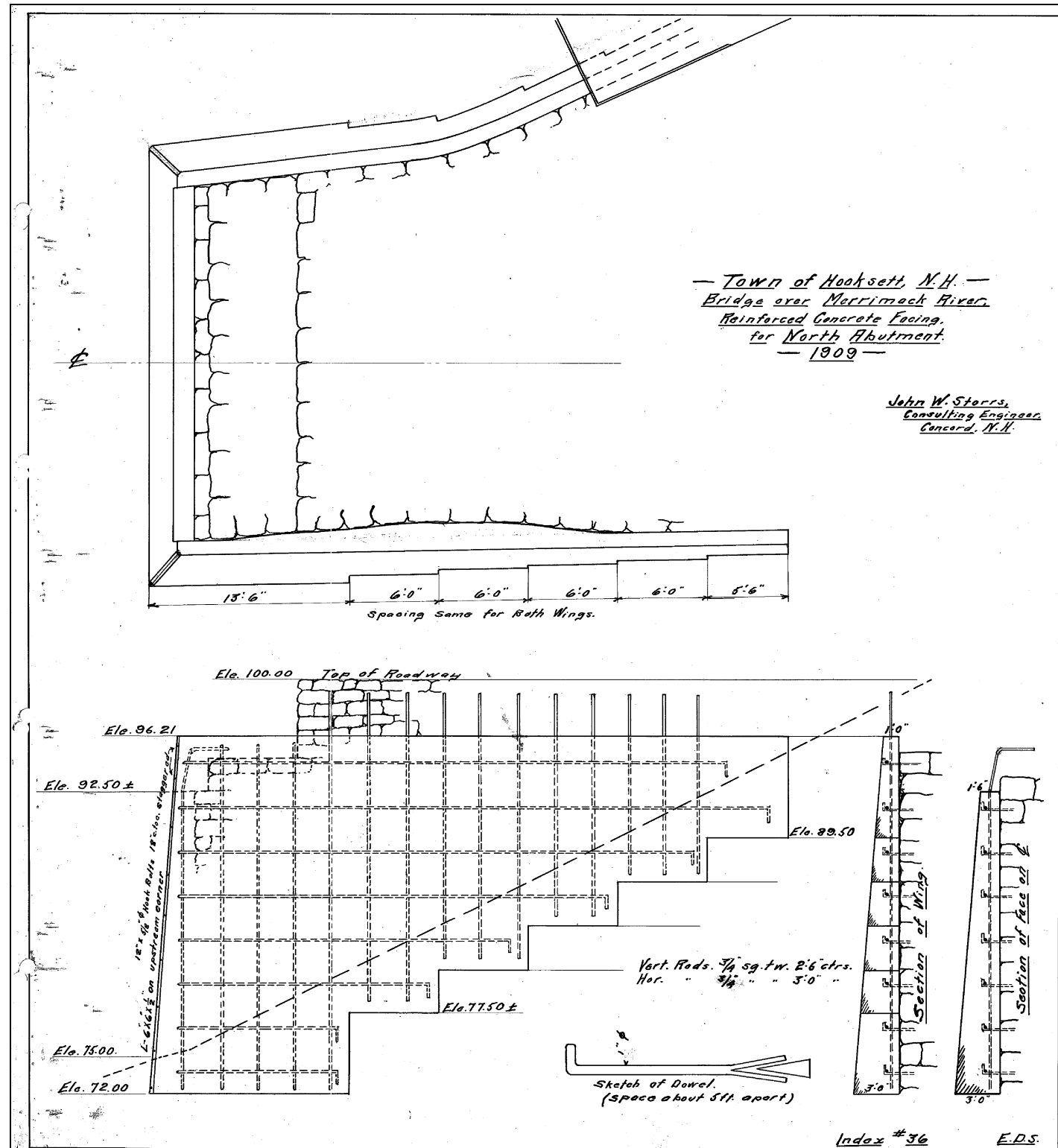
NH-737-17 South portal and barrel view through trusses. Looking north.

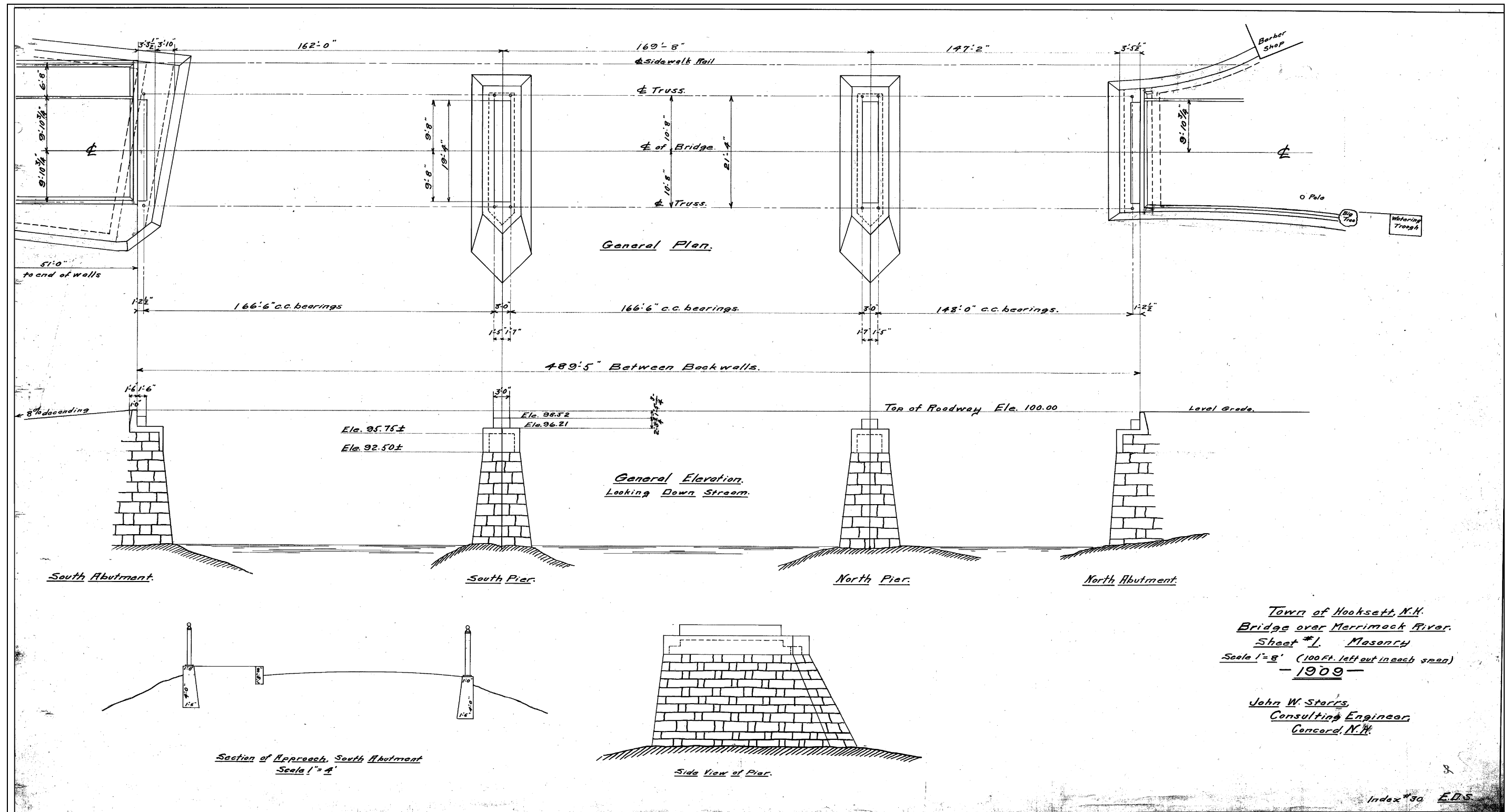
INDEX TO ORIGINAL DRAWINGS

- NH-737-DWG-01 "Proposed Steel Bridge over Merrimack River for Town of Hooksett, N.H. March 1909. John W. Storrs. Consulting Engineer, Concord, N.H. Index # 30 E.D.S." Original drawing, plan location A-60, on file at New Hampshire Department of Transportation, Concord, NH.
- NH-737- DWG-02 Two drawings on one sheet:
[1] "Town of Hooksett, N.H. Bridge over Merrimack River. Reinforced Concrete Facing for North Abutment. 1909."
[2] "Town of Hooksett, N.H. Bridge over Merrimack River. New North Abutment. 1909."
John W. Storrs. Consulting Engineer, Concord, N.H. Index # 36 E.D.S." Original drawing, plan location A-60, on file at New Hampshire Department of Transportation, Concord, NH.
- NH-737-DWG-03 "Town of Hooksett, N.H. Bridge over Merrimack River. Sheet No. 1. Masonry. Scale 1"=8" (100 Ft. left out of each span). 1909. John W. Storrs. Consulting Engineer, Concord, N.H. Index # 30 E.D.S." Original drawing, plan location A-60, on file at New Hampshire Department of Transportation, Concord, NH.
- NH-737- DWG-04 "Town of Hooksett, N.H. Bridge over Merrimack River. Sheet No. 2. 1909. John W. Storrs. Consulting Engineer, Concord, N.H. Index # 30 E.D.S." Elevation and Truss Details. Original drawing, plan location A-60, on file at New Hampshire Department of Transportation, Concord, NH.
- NH-737- DWG-05 "Town of Hooksett, N.H. Bridge over Merrimack River. Sheet No. 3. 1909. John W. Storrs. Consulting Engineer, Concord, N.H. Index # 30 E.D.S." Stresses & Details. Original drawing, plan location A-60, on file at New Hampshire Department of Transportation, Concord, NH.
- NH-737- DWG-06 American Bridge Company Fabrication Shop Drawing, originally drawn 5/17/1909, traced 6/24/1936 for New Hampshire Highway Department Hooksett Village Bridge south span replacement project. Sheet 1 of 7. "Formerly Sheet # E-1." Original drawing, plan location 1-10-3-7, on file at New Hampshire Department of Transportation, Concord, NH.
- NH-737- DWG-07 American Bridge Company Fabrication Shop Drawing, originally drawn 5/17/1909, traced 6/24/1936 for New Hampshire Highway Department Hooksett Village Bridge south span replacement project. Sheet 2 of 7. "Formerly Sheet # 1-A." Original drawing, plan location 1-10-3-7, on file at New Hampshire Department of Transportation, Concord, NH.

- NH-737- DWG-08 American Bridge Company Fabrication Shop Drawing, originally drawn 5/17/1909, traced 6/24/1936 for New Hampshire Highway Department Hooksett Village Bridge south span replacement project. Sheet 3 of 7. "Formerly Sheet # 1-B." Original drawing, plan location 1-10-3-7, on file at New Hampshire Department of Transportation, Concord, NH.
- NH-737- DWG-09 American Bridge Company Fabrication Shop Drawing, originally drawn 5/17/1909, traced 6/24/1936 for New Hampshire Highway Department Hooksett Village Bridge south span replacement project. Sheet 4 of 7. "Formerly Sheet # 2." Original drawing, plan location 1-10-3-7, on file at New Hampshire Department of Transportation, Concord, NH.
- NH-737- DWG-10 American Bridge Company Fabrication Shop Drawing, originally drawn 5/17/1909, traced 6/24/1936 for New Hampshire Highway Department Hooksett Village Bridge south span replacement project. Sheet 5 of 7. "Formerly Sheet # 4." Original drawing, plan location 1-10-3-7, on file at New Hampshire Department of Transportation, Concord, NH.
- NH-737- DWG-11 American Bridge Company Fabrication Shop Drawing, originally drawn 5/17/1909, traced 5/24/1936 for New Hampshire Highway Department Hooksett Village Bridge south span replacement project. Sheet 6 of 7. Original drawing, plan location 1-10-3-7, on file at New Hampshire Department of Transportation, Concord, NH.
- NH-737- DWG-12 American Bridge Company Fabrication Shop Drawing, originally drawn 5/17/1909, traced 6/24/1936 for New Hampshire Highway Department Hooksett Village Bridge south span replacement project. Sheet 7 of 7. Original drawing, plan location 1-10-3-7, on file at New Hampshire Department of Transportation, Concord, NH.



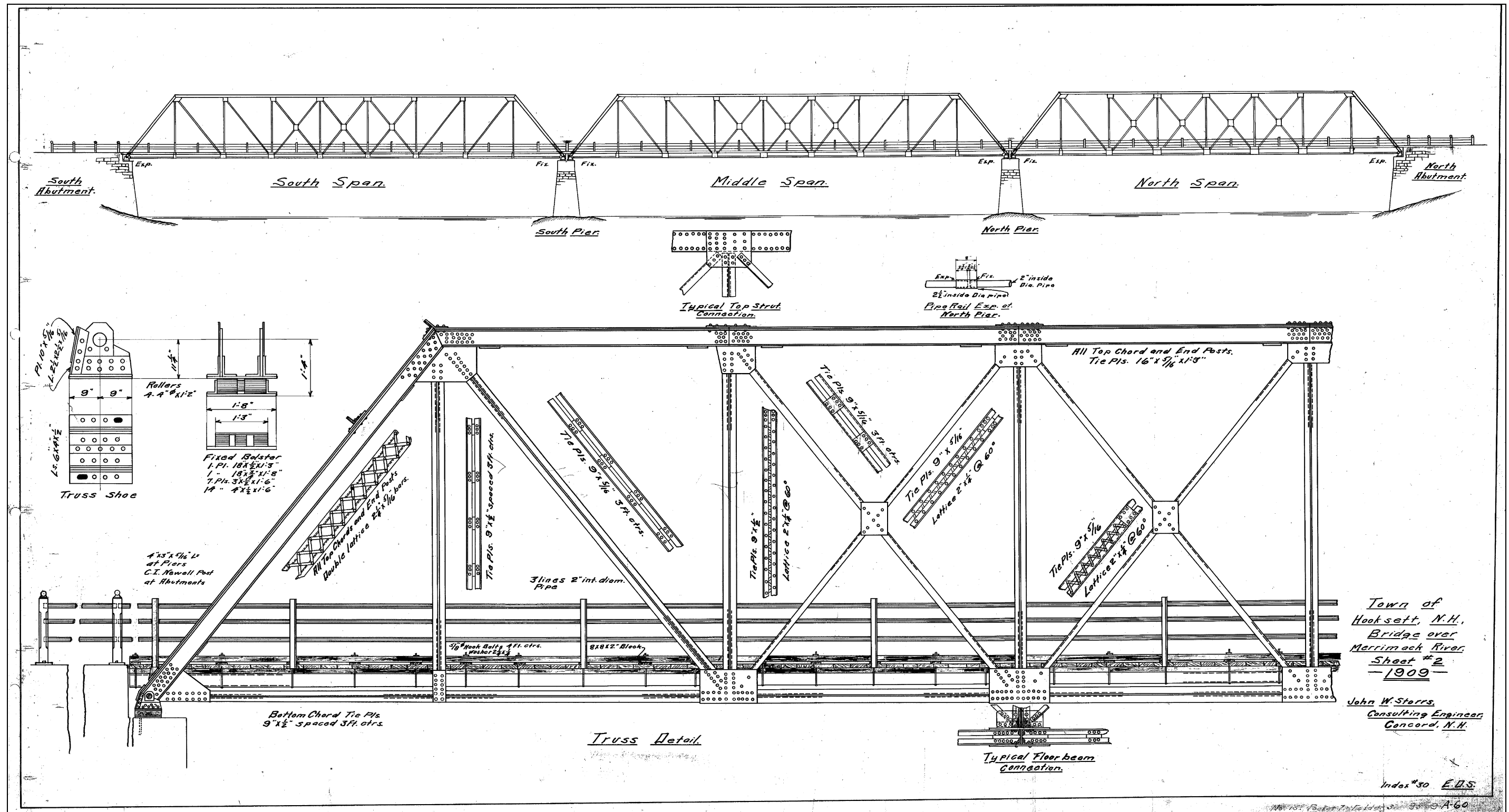




Town of Hooksett, N.H.
 Bridge over Merrimack River.
 Sheet #1. Masonry
 Scale 1" = 8' (100 ft. left out in each span)
 - 1909 -

John W. Starrs
 Consulting Engineer
 Concord, N.H.

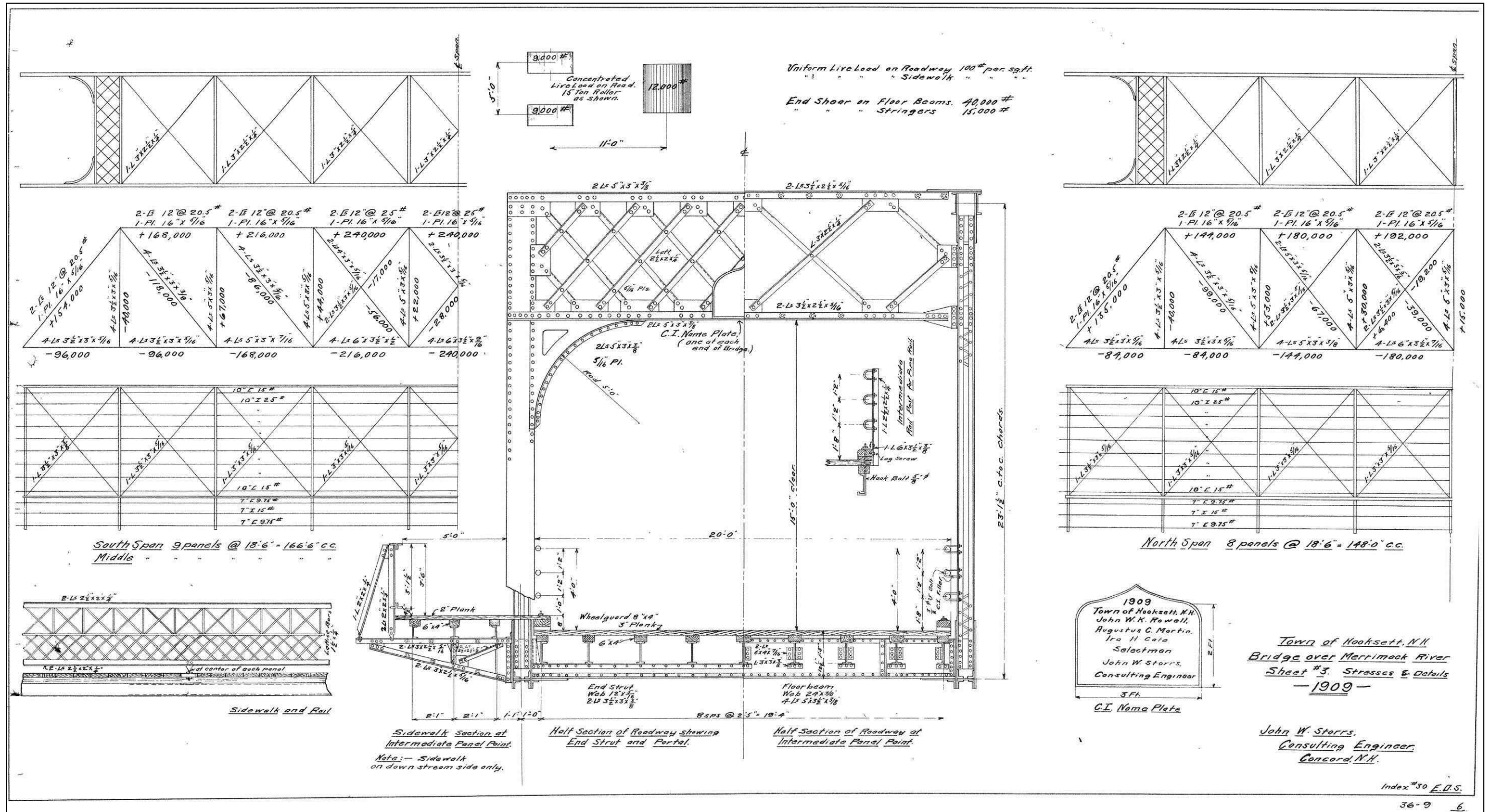
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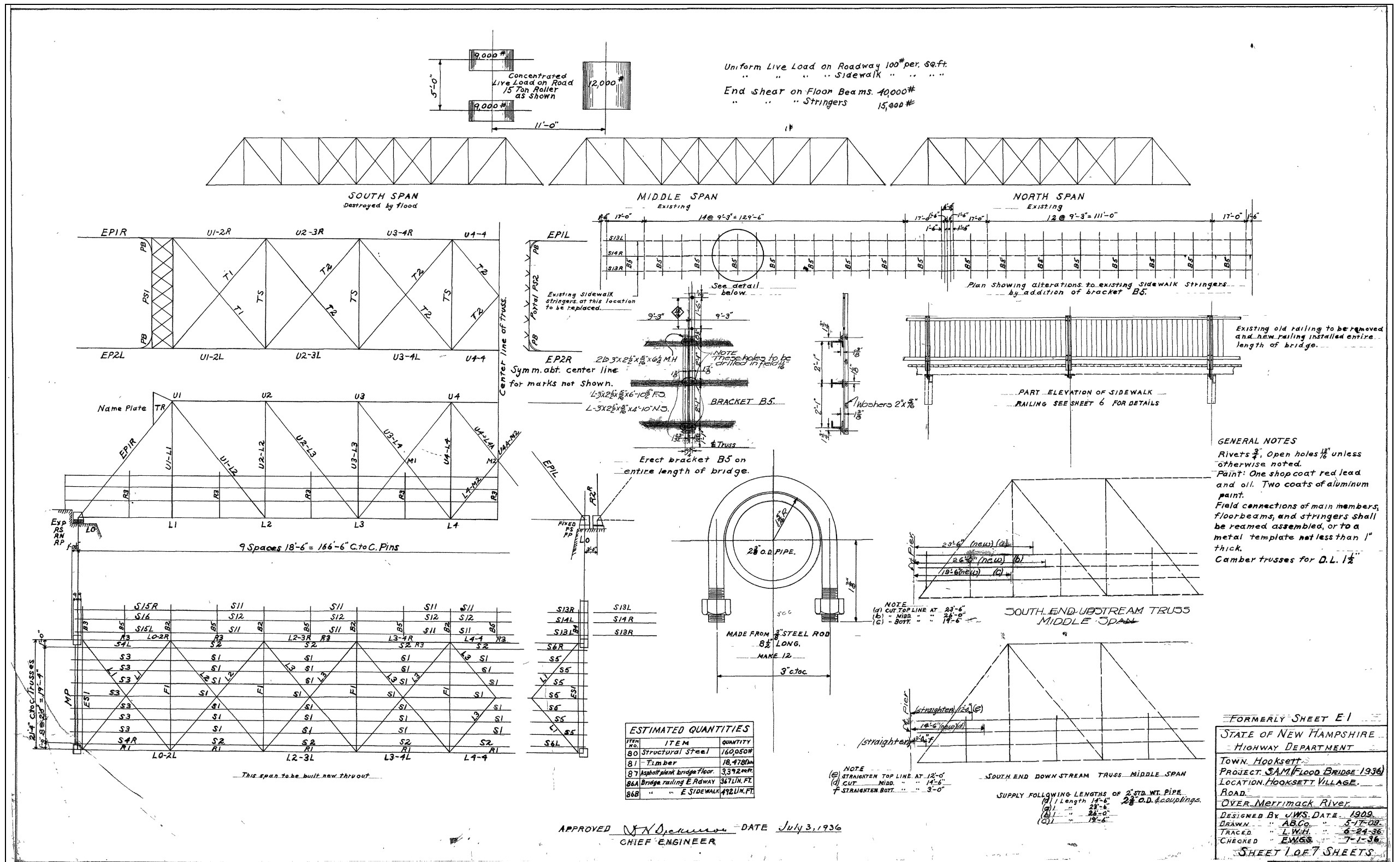


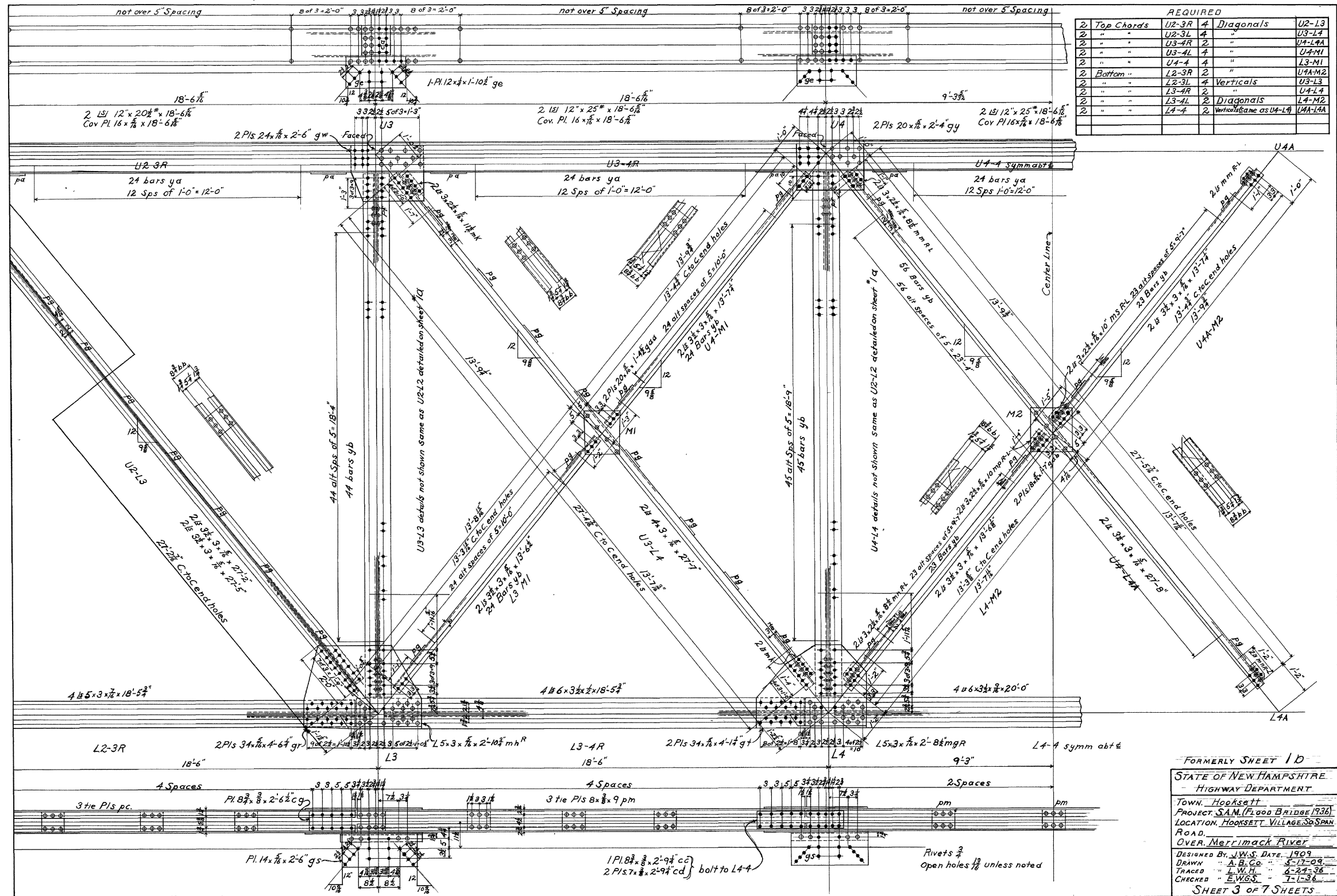
Town of
 Hooksett, N.H.,
 Bridge over
 Merrimack River.
 Sheet # 2
 1909

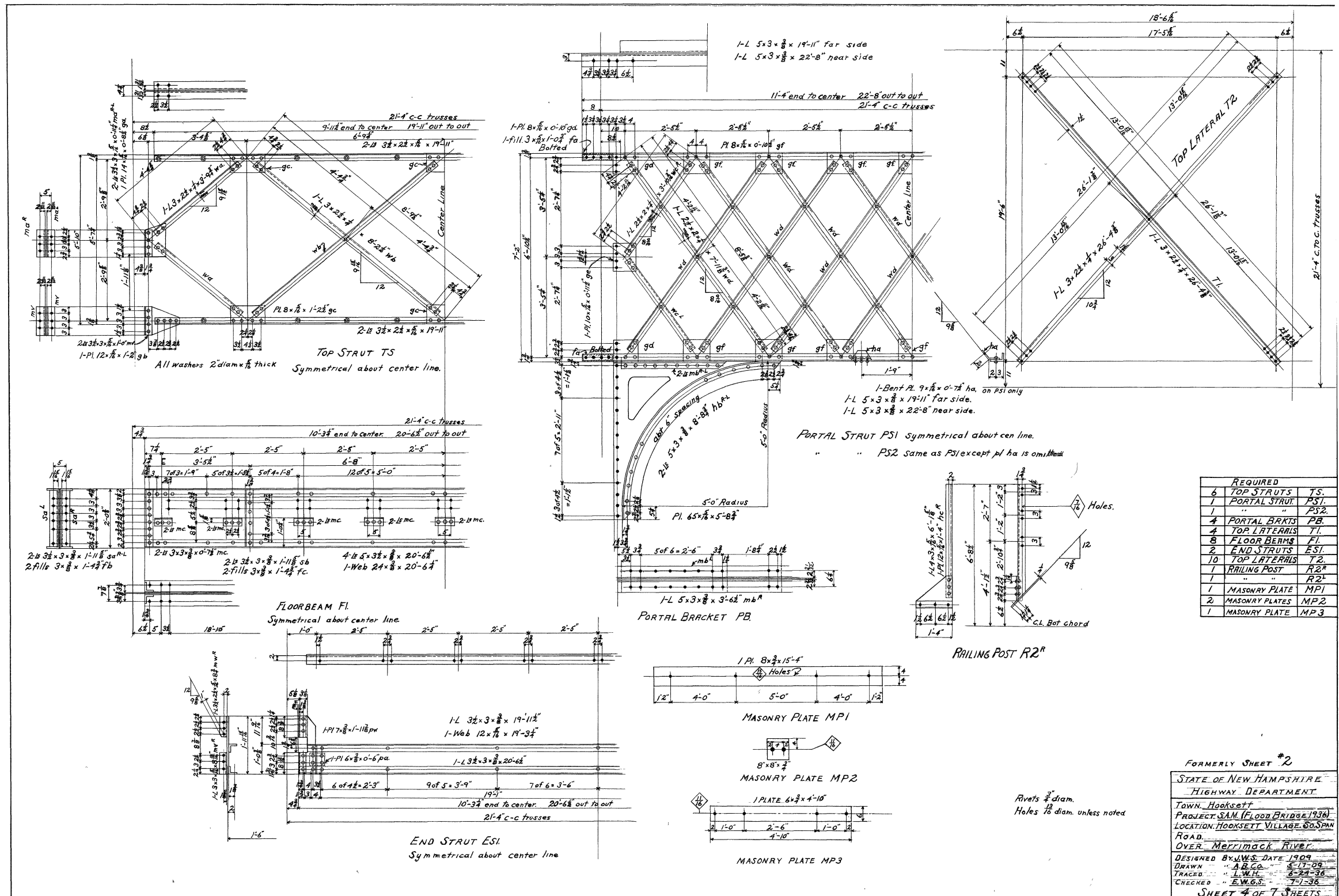
John W. Storr,
 Consulting Engineer,
 Concord, N.H.

Index #30 E.D.S.



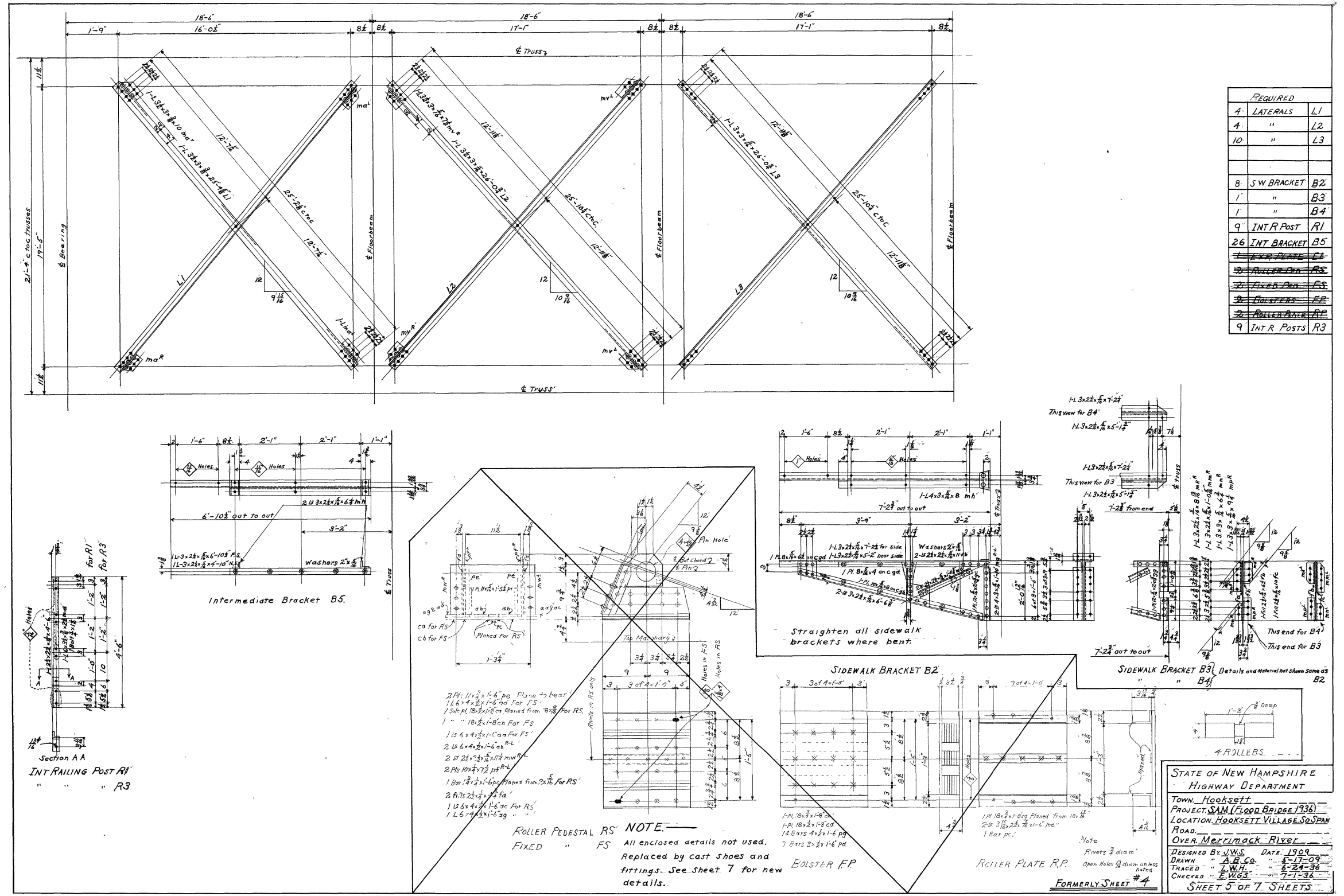


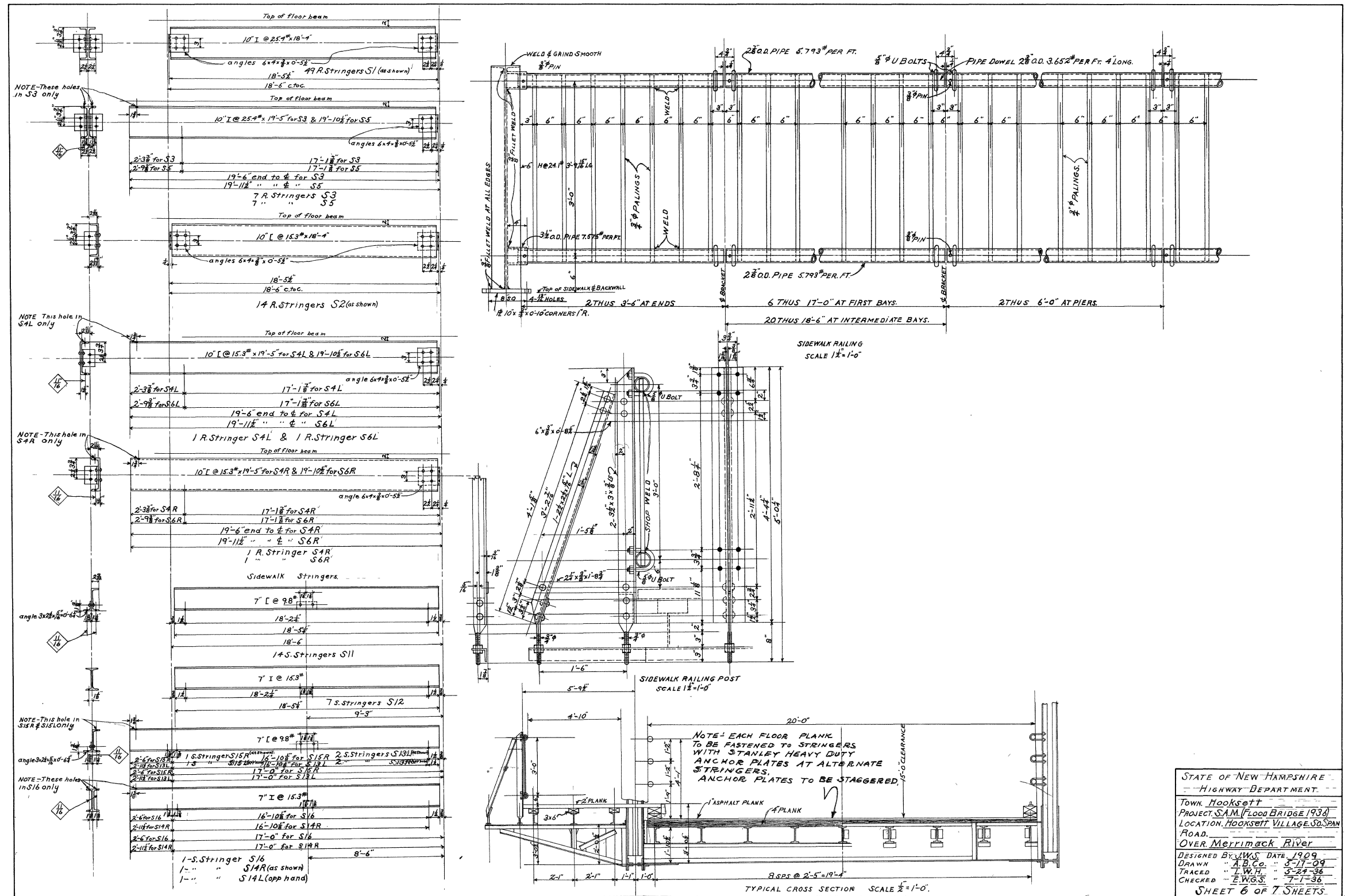




REQUIRED		
6	TOP STRUTS	TS.
1	PORTAL STRUT	PS1.
1	"	PS2.
4	PORTAL BRKTS	PB.
4	TOP LATERALS	TL.
8	FLOOR BERMS	FL.
2	END STRUTS	ESI.
10	TOP LATERALS	TL.
1	RAILING POST	R2.
1	"	R2.
1	MASONRY PLATE	MP1.
2	MASONRY PLATES	MP2.
1	MASONRY PLATE	MP3.

FORMERLY SHEET #2
 STATE OF NEW HAMPSHIRE
 HIGHWAY DEPARTMENT
 TOWN Hooksett
 PROJECT SAM (FLOOD BRIDGE 1936)
 LOCATION HOOKSETT VILLAGE SO SPAN
 ROAD OVER Merrimack RIVER
 DESIGNED BY WWS DATE 1909
 DRAWN "A.R.C." 8-17-09
 TRACED "L.W.H." 6-24-36
 CHECKED "E.W.G.S." 7-1-36
 SHEET 4 OF 7 SHEETS





STATE OF NEW HAMPSHIRE
 HIGHWAY DEPARTMENT
 TOWN, Hooksett
 PROJECT, S.A.M. FLOOR BRIDGE 1934
 LOCATION, HOOKSETT VILLAGE SQ. SPAN
 ROAD, OVER Merrimack River
 DESIGNED BY, J.W.G. DATE, 1909
 DRAWN BY, A.B. Co. DATE, 5-11-29
 TRACED BY, J.W.H. DATE, 5-29-36
 CHECKED BY, E.W.G.S. DATE, 7-1-36
 SHEET 6 OF 7 SHEETS

