

POPE MEMORIAL BRIDGE  
U.S. Route 1 over East Machias River  
East Machias  
Washington County  
Maine

HAER No. ME-61

HAER  
ME  
15-MACH E, 1-

PHOTOGRAPHS  
WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD  
National Park Service  
Philadelphia Support Office  
U.S. Custom House  
200 Chestnut Street  
Philadelphia, PA 19106

HISTORIC AMERICAN ENGINEERING RECORD  
POPE MEMORIAL BRIDGE

HAER NO. ME-61

Location: U. S. Route 1 over East Machias River  
East Machias  
Washington County, Maine

UTM 19.627510.4954980  
USGS Quad: East Machias Maine, 1: 24,000

Date of Construction: 1902

Engineer: Leonard Metcalf

Present Owner: State of Maine  
Department of Transportation  
Augusta, Maine 04333-0016

Present Use: Vehicular bridge

Significance: The Pope Memorial Bridge is the fourth bridge in this location to cross the East Machias River, and the first to be constructed of reinforced concrete. The structure is a critical component of U. S. Route 1 as it links the central part of Washington County and the remainder of the state with the seacoast and the north-eastern reaches of Maine. The graceful design of the three-arch, closed spandrel concrete structure is the work of Leonard Metcalf, a preeminent civil engineer and bridge designer of this period. The bridge was the first reinforced concrete arch bridge constructed in Maine, and is believed to be the oldest concrete bridge of any type still in use in the state. The construction of the bridge was privately financed by three descendants of William Pope and his seven sons, early settlers and entrepreneurs of East Machias, to whom the bridge is dedicated.

Project Information: The Pope Memorial Bridge is scheduled to be widened and rebuilt to the same exterior appearance under a Federal Highway Administration/Maine Department of Transportation federally funded project.

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Narrative Description of the Pope Memorial Bridge

The Pope Memorial Bridge is a three-arch continuous deck, closed spandrel type reinforced concrete structure on U. S. Route 1 that spans the East Machias River in the town of East Machias Maine. The total length of the bridge is 140 feet. Its three spans measure 37' 7", 39' 0" and 38' 3" west to east (Maine State Highway Commission, 1924), with a 7' 1" wide stone abutment at the west shore, a 7' 0" stone abutment at the east shore and two intermediate reinforced concrete piers. The piers are 3' 6" wide at the average height of the river and taper to 2' 6" at the spring line of the elliptical vaults that support the road bed. The piers rest on 5' 2" wide continuous concrete footings that sit on the ledge rock bottom of the river. The rise of the arches forming the ends of the three elliptical vaults, from the spring line to the underside of the haunches is 6' 3". The haunches taper from 2' 0" wide at the spring line to 1' 2" at the apex of the arch. Clearance at the underside of the vaults is 16' 9" at normal water height. A continuous spandrel between the belt course of the parapet side walls and the haunches is recessed 1 1/2", and is 5' 6" deep at the spring lines of the arches, 8" deep at the belt course. The parapet walls at the bridge consist of thirteen recessed panel sections, 10' 7" center to center, 3' 1 1/2" high. The 2' 0" tall panels are recessed 5 1/2" from the 7" tall belt course at the exterior face of the wall, and are capped with a 1' 1" by 6 1/2" concrete coping. Vertical posts that separate the recessed panels are 11 1/2" wide. The parapet walls now extend at an angle beyond the bridge platform at the southwest, northeast and northwest ends of the bridge. The southwest and the northeast walls are three bays long (32' 5"), the southeast wall is two bays (21' 6"). The extended walls, while shown and labeled "wing walls" on the original 1902 drawing (Metcalf, 1902), were not built until sometime between 1910 and 1924 (3/9/1910 photo; Maine State Highway Commission 1924 report, see Bibliography ).

The bridge has a 23' 10" wide roadway, with curbs of 6" at the north and 8" at the south. A 4' 6" concrete sidewalk along the inside of the south parapet wall was removed sometime after 1924. The main body of the bridge, from the footings to the top of the road deck was constructed of poured-in-place reinforced concrete (form marks are obvious). The side parapet wall sections were pre-cast reinforced concrete and moved into place after the deck was completed. Number 10 deformed re-bars can be seen at spalled areas of the spandrel and the parapet wall). The present roadway is macadam; the original dirt road was paved sometime prior to 1932 (1910 and 1932 photos ).

The overall condition of the bridge is generally fair to good. While the structural integrity of the bridge appears to remain intact, there are numerous instances of spalled concrete, especially at the haunches of the elliptical arches in the south elevation, where the reinforcing bars are exposed and have started to rust. Also, a number of the copings along both parapets are deteriorated, with two sections at the west end of the south wall missing.

The Pope Memorial Bridge was designed by the Boston civil engineer Leonard Metcalf.

Metcalf ran a small private practice in construction and civil engineering, after which he formed the engineering firm Metcalf and (Harrison Prescott) Eddy. This firm was known nationally for its specialization in the design and construction of water works and sewage and industrial waste disposal plants. The firm remains active today, with offices in Boston and Providence. Metcalf was a past Vice President of the American Society of Civil Engineers, past President of the Water Works Association, the New England Water Works Association and the Boston Society of Civil Engineers. He also served on the sub-committee for Emergency Construction of Buildings and Engineering Structures, National Council for Defense, and as an advisor to the Construction Division, U. S. Army, during World War I.

The Pope Memorial Bridge was constructed in 1902 by the Pope Lumber Company, East Machias, Maine (Whittier 54a; Maine State Highway Commission Report, 1924). It was funded by John A., Warren F. and Macy S. Pope, the three sons of James Otis Pope and grandsons of William Pope (Whittier 54b; interview, Shirley E. Pope). Warren F. Pope, the grandson of co-donor Warren F. Pope, suggested that the reason the three brothers, then living in Boston, decided to finance the new bridge as a memorial and final tribute to the Machias Popes was based on two factors that occurred at the turn of the century. First, the father and mother of the three donors, the last two members of the founding family of Machias Popes, had recently passed away, James Otis Pope in 1893, his widow Olive Chase Pope in 1901 (interview, Shirley E. Pope). Second, the large scale Pope timber and lumbering interests had closed in East Machias by 1900 (moving to previously established family businesses at Puget Sound in Washington State, where it is still in existence). With the exception of the Pope Lumber Company, which remained as a retail supplier and contractor until 1907 (Whittier 54a), the Pope family had ceased to exist as a major contributor to, and influence on, the economy and well being of East Machias, where the family had been raised and its fortune made.

Warren F. Pope further speculated that either Macy or John Pope, working in Boston at that time, may have sought out a conveniently located bridge engineer (i.e. Leonard Metcalf) to facilitate discussion and review of the bridge project (interview). The dedication of the bridge to the Pope family and the selection of the engineer is commemorated in a bronze plaque affixed to the interior face of the central section of the south parapet wall. The plaque reads:

THIS BRIDGE IS ERECTED IN MEMORY OF  
WILLIAM POPE AND HIS SONS WILLIAM HENRY  
SAMUEL WARREN, JOHN ADAMS, ANDREW JACKSON  
JAMES OTIS, EDWIN AND GEORGE WASHINGTON,  
FOUNDERS OF A LUMBERING AND SHIPBUILDING  
BUSINESS WHICH BEGAN NEAR THIS SITE AND  
EXTENDED TO NEIGHBORING TOWNS, TO BOSTON,  
AND TO THE PACIFIC COAST, AND WHICH WAS CONDUCTED  
BY THESE MEN AND THEIR DESCENDANTS FROM  
1807-1901  
DESIGNED BY LEONARD METCALF, C.E. BUILT 1909

The use of 1909 on the commemorative plaque as the date of construction is unexplained, as all records, drawings and written sources are unanimous in placing the date of construction as 1902. Whittier (p. 54a) wrote "In 1902 the old wooden bridge, which of course had been rebuilt many times, was torn down and a modern, attractively designed concrete bridge now known as the Pope Memorial Bridge, was erected...": other sources which point to a 1902 date of construction include Metcalf's original drawings for the *Pope Memorial Bridge over the East Machias River, East Machias, Maine*, signed and dated June 10, 1902; a drawing made by William F. Pope entitled *Plan of the Bridge to be Erected at East Machias, as a Memorial*, dated March 28, 1902 (an early version of Metcalf's final design), and the Maine Department of Transportation Survey Report of the Pope Memorial Bridge (1924) which lists 1902 as the date of construction. Also, Macy Pope, one of the three donors, died on December 10, 1904, five years before the 1909 date given on the plaque. Whittier may have explained the discrepancy in his statement quoted above "was torn down and a modern, attractively designed concrete bridge now known as the Pope Memorial Bridge" (emphasis added), raising the possibility that the dedication itself may have taken place seven years after the construction of the bridge.

William Pope (b.3/30/1787; d. 11/6/1864) was born in Charleston, South Carolina, the eldest son of Samuel Ward and Mary (Wood) Pope. After the early death of both of his parents, William moved to Dorchester, Massachusetts in 1805 to live with two uncles, Frederick and William Pope, quickly becoming involved in his uncles' lumber business. William Pope moved to Machias, Maine Territory, in November, 1807 and immediately started in the lumber trade by constructing a saw mill just southeast of the present day bridge.

The mill produced large size dimensional lumber for the construction of commercial and industrial structures and for railroad bridges, which continued to be the primary product of the company until the East Machias mill closed in 1901. William returned very briefly to Boston in 1810 to marry Peggy (Dawes) Pope. After his marriage, he returned to Maine and his lumber business. During the War of 1812, Pope led a regiment of Maine Militia, joining with other townsmen in chasing (but supposedly failing to capture) British cruisers laying at wait off the Maine Coast.

East Machias was set off from Machias in 1821, and William Pope was elected as one of the town's first selectmen. He later served on Governor Kent's Council, and was elected a Justice of the Peace. William remained in East Machias until 1841, at which time he moved back to Boston, taking with him his wife and his three youngest sons, Andrew J., Edwin and George W. Pope. William left his four oldest sons, William Henry, Samuel W., John Adams and James Otis to run the Maine lumber business, which then included branches in Machias and Whitneyville in addition to the main operation in East Machias. He then founded a new lumber company in Boston named William Pope and Sons. In addition to his business dealings, William served one term on the Boston Common Council followed by four years on the Board of Aldermen, and then two years in the Massachusetts House of Representatives. The oldest brothers remained in Maine and reorganized the business, renaming it S. W. Pope & Co. The

& Co. The family lumber business was expanded for the final time when Andrew J. Pope was sent from Boston to San Francisco to establish a Pacific Coast branch to serve the building and other needs generated by the Gold Rush. The business was opened in 1849 under his own name.

Before leaving East Machias for Boston, William had expanded the family business interests to include shipbuilding. The company rapidly became one of the two most important shipbuilding firms (along with Micaw Talbot) in the area, launching a new barque, brig, or schooner almost every year during the mid 1830's-mid 1840's. Pope family owned vessels, built at their yard in East Machias, were used in the coasting trade as well as foreign trade to China, the East Indies, the Sandwich Islands and Australia. James Otis Pope, William's fifth son, was the last of the family to carry on the shipbuilding business, which ended in the mid-1840's. The last two vessels to be launched by the Pope's were the three masted schooners Lelia Smith and Abbie G. Cole.

Prior to 1783, when it is believed that the first bridge across the river at this location was constructed, the west bank of the East Machias River, between the present bridge and the falls, was occupied by a large grist mill. The mill was built and operated by Captain Peter Talbot (see National Register nomination). By 1881, the grist mill had been replaced with a saw mill owned and operated G. E. Burrill (Whittier 55; Washington County Atlas, Map of East Machias, 1881). In 1840 the 1807 Pope saw mill was rebuilt on the east shore of the river, opposite the Talbot gristmill and between the then standing bridge (likely the first bridge) and the falls. The saw mill was part of a complex built by the Pope family that consisted of the saw mill, a shipbuilding yard, a wharf, and a blacksmith shop. In 1841 a store was added, the second floor of which was also used as a town meeting hall. The saw mill remained under the ownership and operation of S. W. Pope & Company until 1900 when it was demolished. The store remains today, and was last operated by the Gaddis Brothers Company (see National Register nomination). The present day Pope Memorial Bridge replaced at least three bridges, possibly four at this site. The first bridge is thought to have been built circa 1783 by the citizens of Machias (East Machias had not as yet been set off from Machias), with material supplied by the Talbot Saw Mill, down river from the site (Whittier 54a; Drisko). No record of the appearance or type of construction of this bridge has been located. The first bridge at this site that can be accurately described is one shown in a circa 1865 photograph.

This bridge was a Long Panel Truss bridge, named after its inventor Brevet-Colonel Stephen H. Long of the U. S. Army Topographical Engineers. Consisting of a series of boxed timber X's the structure rested on stone abutments at the river bank and on two timber piers at the third points. As the Long Truss was invented in 1830 (Allen 16), this bridge may possibly be the replacement of the original bridge, which could conceivably have lasted 47 years. If so, the Long Truss would have been the second bridge in this location. At sometime after the circa 1865 photograph, another bridge (likely the third) was constructed by the town of East Machias. It was a variant of the Through Truss King-Post multi-span design, where the timber king posts were replaced with iron tie rods. The tie rods were similar to those used in a Howe Truss. As shown in a c. 1880 photograph (MHPC) and in a drawing *Plan of South Side of Upper Bridge, East*

*Machias, Maine*, made by William F. Pope, signed and dated October 21, 1901 (Washington County Registry of Deeds Map Book) this bridge had three king-post trusses with paneled side walls. It rested on the same stone abutments as the Long Truss bridge that preceded it, with four log piers used to support the structure. William F. Pope also made a drawing entitled *Plan of Bridge to be Erected at East Machias, as a Memorial*, signed and dated March 28, 1902 (Map Book). While the basic design of three elliptical arched vaults is shown correctly, numerous changes in details indicate that this drawing was taken from an early version of Leonard Metcalf's plans. The March 1902 drawing shows 14 panels in the parapet wall, where there are only 13, the belt course is in two pieces as opposed to the one piece that was built, the haunches of the three arches are more exaggerated in the drawing and terminate at impost blocks that were never used, and the arches have keystones, eliminated in the final design. The March drawing also indicates iron fences in the location of the present concrete wing walls, but the fences were never built.

In addition to the bridge's significance gained through its association with the Pope family, the Pope Memorial Bridge is of extreme importance to the history of bridge construction in Maine. Built in 1902, this bridge is the earliest known use of reinforced concrete for the construction of a concrete arch bridge in the state. Prior to this design, bridges were either of timber frame, stone, concrete frame, or steel. The first reinforced concrete bridges to be constructed in the United States are generally considered to be the Alvor Lake Bridge at Golden Gate Park, San Francisco, 1898-99, designed by Ernest L. Ransome, Civil Engineer, and three span Melan-type bridge across the Kansas River at Topeka, built between 1894-99, and designed by Edwin Thacher and W. H. Keepers, (Spero & Company 1991 87-88; Jackson 1988 35, 177). The 1902 Pope Memorial Bridge was at the cutting edge of the technology that produced reinforced concrete as a building material, with Metcalf producing designs well ahead of his time. His innovative design pre-dated the 1909 report of the Joint Committee on Concrete and Reinforced Concrete of the American Society of Civil Engineers, the first published attempt at standardizing concrete design, and the 1916 report of the Committee on Reinforced Concrete Highway Bridges and Culverts of the American Concrete Institute, the first to recommended appropriate design loads (Spero & Company 1991 89).

The selection of reinforced concrete as the construction technique recommended by Metcalf was likely well received by the donors, the three Pope brothers. Reinforced concrete provided the economy of construction afforded by the use of readily available materials (sand and gravel) and the use of repetitive, reusable wooden concrete forms that could be locally manufactured. Also, the bridge could easily be built by relatively unskilled workers (Jackson 37), like those at Pope Lumber Company. With grace and beauty assured by the use of low rise to span ratio elliptical vaults, the signature of a reinforced concrete, Metcalf had designed a bridge that would benefit the entire community and last for almost a century.

Sources of Information/Bibliography

- A. Engineering drawings: two halves of an engineering drawing for the bridge, *POPE MEMORIAL BRIDGE Over the East Machias River at East Machias, Maine* prepared by Leonard Metcalf, Civil Engineer and dated "(unclear) 10, 1902." The drawing is stored in the archives of the Maine Department of Transportation.
- B. Historic views: Numerous photographs of the bridge exist in the collection of the Maine Department of Transportation and the Maine Historic Preservation Commission, among other possible collections.
- C. Interviews: telephone interview with Warren F. and Shirley E. Pope, Jonesport, Maine, members of the Pope family and compilers of a written, unpublished history; interview by author, October 8, 1996.
- D. Bibliography:

1. Primary and unpublished sources:

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- E. Likely sources not yet investigated: family records held by other members of the Pope family; regional newspapers, including Bangor Daily News after November 15, 1902; Pope and Talbot Lumber Company records, University of Washington Archives.