

MATHERS BRIDGE
County Road 3 spanning the Banana River
Merritt Island vicinity
Brevard County
Florida

HAER FL-22
HAER FL-22

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
SOUTHEAST REGIONAL OFFICE
National Park Service
U.S. Department of the Interior
100 Alabama St. NW
Atlanta, GA 30303

HISTORIC AMERICAN ENGINEERING RECORD

MATHERS BRIDGE

HAER No. FL-22

Location: County Road 3 spanning the Banana River
Merritt Island Vicinity
Brevard County
Florida

U.S.G.S. Tropic, Florida, Quadrangle,
Universal Transverse Mercator Coordinates:
17.538680.3113794

Date of Construction: 1927 in Nassau County. Removed 1949. Installed at present location in 1952.

Fabricator: Austin Brothers Bridge Company, Atlanta, Georgia

Present Owner: Brevard County Public Works Department
2725 Judge Fran Jamieson Way
Viera, Florida 32940

Present Use: Vehicular transport
To be replaced 2004

Significance: One of only seven remaining pony truss swing bridges left in the state of Florida, the swing span of the Mathers Bridge is important to the history of transportation and engineering in Florida. Constructed by the Austin Brothers Bridge Company, a leader in bridge design, construction, and installation of steel truss bridges, the swing span is a well-preserved example of their work. The swing span of the Mathers Bridge is one of only three bridges constructed by the Austin Brothers remaining in Florida. Although it was removed from its original location in 1949 and relocated in 1952, the swing span has operated at its present location for over 50 years. The swing span of the bridge was determined eligible for listing in the National Register of Historic Places in 2003.

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Date: January 2004

Introduction

Located in Brevard County, Florida, the Mathers Bridge spans the Banana River, connecting southern Merritt Island to Indian Harbour Beach located on the Canaveral Peninsula on Florida's East Coast. The bridge carries County Road 3, known as Tropical Trail on the west side of the bridge and Banana River Drive on the east. The bridge consists of the historic steel truss swing span (constructed 1927), modern reinforced concrete slab approach spans (constructed 1982) and a modern control house (1982). This documentation is limited to the historic swing span portion of the Mathers Bridge. Constructed by the Austin Brothers Bridge Company, the Warren type pony truss was originally part of a moveable bridge over Kingsley Creek in Nassau County, Florida. This bridge was replaced in 1949. As a result, the swing span was removed, relocated, and installed in the Mathers Bridge in Brevard County.

The bridge is within Sections 10 and 11 of Township 27 South, Range 37 East, of the Tropic, United States Geological Survey Quadrangle (1949, Photorevised 1980).¹ Documentation of the historic swing span of the bridge was conducted in order to provide a record of the resource as part of mitigation for the bridge rehabilitation, scheduled for completion in 2004. A Memorandum of Agreement was signed between the consulting parties (United States Coast Guard, State Historic Preservation Office, and Brevard County Board of County Commissioners) stipulating the preparation of Historic American Engineering Record (HAER) Level II documentation of the historic swing span.

Historical Context

The 1920s was a period of unprecedented growth in Florida. Following World War I, tensions were relieved and the economy was revived. State road programs, which had begun in the early twentieth century, were well underway, with major road projects complete by the early 1920s. This led to a surge of tourism and increased population, resulting in a construction boom for buildings, as well as infrastructure and transportation facilities. Prior to 1926, Merritt Island and the southern end of the Cape Canaveral peninsula were accessible only by boat. This led to the construction of several new bridges. The town of Eau Gallie constructed a bridge across the Indian River, just south of Merritt Island, in 1926. Around the same time, John Mathers, a pioneer settler of Merritt Island, initiated the organization of a group of people to finance the construction of a bridge at the southern end of Merritt Island. Plans for the bridge over the Banana River had actually been approved in February 1910.² The proposed structure would connect Merritt Island to the southern end of the Cape Canaveral peninsula. The group financing

¹ United States Geological Survey, Tropic, Florida Quadrangle 1949, Photorevised 1980, produced by the United States Department of Commerce, Coast and Geodetic Survey.

² State of Florida, *Approval of Location and Plans of Bridge*, Permit 7215, 823(512)(May 10, 1926). (Signed by Hanford MacNider, Assistant Secretary of War and Edgar Jadwin, Acting Chief Engineer) Permit on file with the United States Coast Guard, United States Department of Homeland Security, Bridge Division, Miami.

the new bridge backed out of the project, but Mathers was determined and continued without them. He withdrew \$40,000.00 from his savings and began construction in 1926.³ The original design consisted of twenty-four timber frame approach spans and a swing span, to allow ships to pass through the navigable channel of the Banana River.⁴ The pilings for the new bridge were constructed from cypress lumber shipped from Jacksonville. The Mathers Toll Bridge formally opened on June 16, 1927, charging 15 cents during the week and 25 cents on the weekend.⁵

John R. Mathers and his wife, Rebecca Horne, came from Taylor County to Brevard County in 1883, when John was 22 years of age. They established their residence in City Point, a small community north of Cocoa. In addition, they purchased six acres of land, for \$1.25 per acre, on the southern end of Merritt Island. Mathers commuted by boat along the Indian River from his home in City Point to his land on Merritt Island, where he grew pineapples, beans, and citrus. Soon after his arrival on Merritt Island, a small settlement began to develop. The settlement, known as Tropic, was located approximately one-half mile north of the present-day Mathers Bridge. By the mid-1890s, John Mathers established a residence on Merritt Island in an old packinghouse; however, his family remained in City Point. Eventually the entire Mathers family, which included eight children, moved to Eau Gallie from City Point. This allowed John to be with the family and continue to farm his land on Merritt Island. While in Eau Gallie, Mathers operated the Riverview Hotel and a general store, and commuted by boat to Merritt Island. The commute grew tiresome and eventually, in 1910, plans were created for a bridge connecting Merritt Island to the Cape Canaveral Peninsula and the Atlantic Ocean. Once a bridge was erected from Eau Gallie to the peninsula, in 1926, it was only a matter of months before Mathers received his permit for the construction of the Mathers Bridge. At the time Mathers constructed the toll bridge, there was no electricity at the southern end of the island. The wooden drawbridge was operated manually from the center of the bridge with a wooden wheel, which remains on the west side of the riverbank. In 1934, John R. Mathers died at the age of 73.⁶ Immediately following Mathers' death, it is unclear who maintained the toll bridge.

A more detailed toll schedule was eventually established for the bridge. According to an article in *Florida Today*, by Jaye Wright, the schedule stated rates were as follows:

³ Jaye Wright, "1920s: An Explosion of Bridges," *Florida Today* (Melbourne, Florida, January 14, 1999); Jaye Wright, "Spotlight on Brevard History: Mathers Bridge," *Florida Today* (Melbourne, Florida, May 8, 2001).

⁴ Henry B. Smith, "Proposed Bridge Across Banana River" (March 1926). Drawings on file, Mathers Bridge over Banana River, United States Coast Guard, United States Department of Homeland Security, Bridge Division, Miami.

⁵ Jaye Wright, "1920s: An Explosion of Bridges," *Florida Today*; Jaye Wright, "Spotlight on Brevard History: Mathers Bridge," *Florida Today*; Chris Bruton, "And What a Bridge it is!" *Florida-Times Union* (Jacksonville). Article on file, Merritt Island, Brevard County Public Library, Satellite Beach.

⁶ Jaye Wright, "Spotlight on Brevard History: Tropic," *Florida Today* (Melbourne, Florida, June 26, 2000); Jaye Wright, "Spotlight on Brevard History: Mathers Bridge," *Florida Today*; Jaye Wright, "Spotlight on Brevard History: John R. Mathers," *Florida Today*.

pedestrians	5 cents
horse and rider	15 cents
horse, driver, and vehicle	20 cents
two horses pulling a vehicle	25 cents
each mule, ox, cow, donkey, or pony	5 cents
wagon, pushcart, or carriage	5 cents
motorcycle and rider	15 cents
one small runabout auto, two passenger car and driver	20 cents
four or five passenger car and driver	25 cents
six or more passenger car and driver	30 cents
two ton truck or less with a driver	50 cents
two ton truck or more with a driver	75 cents ⁷

Nearby military facilities would soon decide the future of the Mathers Bridge. In 1938, two naval bases were authorized for establishment on Florida's east coast. Intended to reinforce the Atlantic Coast Defense System, the site in Brevard County, northeast of the Mathers Bridge, was chosen. Construction of the Banana River Naval Air Station, as it was to be known, began in December 1939, and was opened in October 1940.⁸ During the period around World War II, state highway projects in Florida were eliminated with the exception of projects related to military defense. Considered part of the defense network, the Florida State Road Department continued to maintain roads and improve highways and bridges that provided access to military bases. The State of Florida also eliminated tolls on bridges and other transportation facilities to reduce delays in military construction and movement of troops.⁹ Located between Merritt Island and the Canaveral Peninsula, the Florida State Road Department purchased the Mathers Bridge in October 1944 for \$12,000.00 because it, in conjunction with the Cocoa Causeway to the north, provided access from the mainland to the nearby Banana River Naval Air Station.¹⁰ During World War II, recreational boating along the Intracoastal Waterway was eliminated due to the proximity to the Naval Air Station. The Mathers Bridge provided access to supplies for the Banana River Naval Air Station during the war. They were floated on a barge up the Banana River through the moveable bridge.¹¹

⁷ Jaye Wright, "Spotlight on Brevard History: John R. Mathers," *Florida Today*.

⁸ Cliff Lethbridge, *Cape Canaveral 500 Years of History 50 Years of Rocketry*, 10.

⁹ Joseph E. King, *The Historic Highway Bridges of Florida* (Tallahassee: Florida Department of Transportation, Environmental Management Office, 1992, p.34); National Register of Historic Places Multiple Property Documentation Form, Metal Truss, Masonry, and Concrete Bridges in Vermont, Washington, D.C., United States Department of the Interior, National Park Service (1990: Section E, Page 12).

¹⁰ Jaye Wright, "Spotlight on Brevard History: John R. Mathers," *Florida Today*.

¹¹ Chris Bruton, "And What a Bridge it is!" *Florida Times-Union*.

Although the Banana River Naval Air Station was deactivated in 1947, the base was maintained and transferred to the Air Force in 1948. In May 1949, President Harry S. Truman established the Joint Long Range Proving Ground at Cape Canaveral for missile defense testing. The Banana River Naval Air Station was reactivated as the support base and, in 1950, renamed Patrick Air Force Base.¹² The establishment of the Joint Long Range Proving Ground and the reactivation of Patrick Air Force Base led to upgrading the Mathers Bridge.¹³ It had already been decided that, due to the deteriorated state of the swing span of the bridge, it would be replaced. William E. Dean, the Florida State Bridge Engineer, advised the Commission that a good quality swing span, located near the Amelia River in Nassau County, was available for relocation.¹⁴

The Austin Brothers Bridge Company originally constructed the swing span (within the present-day Mathers Bridge) as part of a movable bridge in Nassau County. Built in 1927, this bridge crossed Kingsley Creek (a branch of the Amelia River) to connect the mainland with Fernandina Beach on Amelia Island. The Amelia Island Bridge, as it was referred to, was the only bridge which connected Amelia Island to the Florida mainland until 1949. Following the end of World War I, the superstructure of the bridge was struck by a barge, rendering it impassable. While the bridge underwent repairs, a ferry provided transport to and from Amelia Island. In 1943, another vessel hit the bridge resulting in extensive damage. In 1948, the Florida State Road Department received a permit to construct a new bridge at the same location, which required the removal of the existing bridge.¹⁵ The Amelia Island Bridge was replaced in 1949 with a bascule bridge, referred to as the “Nassau Bridge carrying the Jacksonville-Fernandina Highway.”¹⁶

On December 7, 1949, the State Road Department submitted plans for the rehabilitation of the Mathers Bridge.¹⁷ On March 18, 1952, final plans for the project were approved, and construction started in May.¹⁸ The pony truss swing span was partially dismantled, transported to Merritt Island by barge, and installed between the existing approach spans of the Mathers Bridge, replacing the old wooden movable span.¹⁹ The project was completed on October 24,

¹² Cliff Lethbridge, *Cape Canaveral 500 Years of History 50 Years of Rocketry*, 10.

¹³ “Mathers Bridge – Banana River,” *Florida Highways* (October 1949, p.29).

¹⁴ *Ibid*, 29; Joseph E. King, *The Historic Highway Bridges of Florida*, 35.

¹⁵ U.S. Department of Commerce, *United States Coast Pilot, Atlantic Coast, Section D, Cape Henry to Key West* (Washington D.C.: G.P.O., 1948, 266-268); Thomas J. Hall, “New Nassau Bridge Getting Last Touches, to Open Soon,” *Florida Times-Union*, Jacksonville, Florida: October 23, 1949, p.19.

¹⁶ Thomas J. Hall, “New Nassau Bridge Getting Last Touches, to Open Soon,” *Florida Times-Union*, 19.

¹⁷ State Road Department, “Proposed Reconstruction of Bridge Over Banana River (Mathers Bridge) on State Road No. 3” (December 7, 1949). Drawings on File, Mathers Bridge over Banana River, United States Coast Guard, United States Department of Homeland Security, Bridge Division, Miami.

¹⁸ R. D. Hodges, “Amendment to Bridge Permit (199-78): Bridge Across the Banana River at Indian Harbour Beach, Florida” (December 29, 1978). Permit on File, United States Coast Guard, Office of Homeland Security, Bridge Division; State of Florida, *Approval of Location and Plans of Bridge*, Permit 15016, 823(512) (March 1952). (Signed by Sherry B. Myers, for the Secretary of the Army and G.J. Nold, Acting Chief Engineer) Permit on file with the United States Coast Guard, United States Department of Homeland Security, Bridge Division, Miami.

¹⁹ “Mathers Bridge – Banana River,” *Florida Highways*, 29.

1952.²⁰ However, upon installing concrete decking on the east and west portions of the bridge at this same time, the timber supports gave in under the weight and had to be reconstructed two years later.²¹

The new swing span in the Mathers Bridge was almost twice the size of the original span. This led to the construction of a new pivot pier, protective fenders, and the removal of some spans of the timber frame approaches.²² On March 1, 1978, plans for the construction of new reinforced concrete deck approach spans, designed by Howard, Needles, Tammen, and Bergendoff, Consulting Engineers, were approved for the Mathers Bridge. At this time, modifications were also made to the swing span. This included structural repairs and the replacement of mechanical features.²³ Work on the bridge was completed in 1982, and no other major modifications have occurred since this time.

Significance

The Mathers Bridge is one of only seven remaining pony truss swing bridges in the state of Florida. Constructed during the Florida boom era, the bridge typifies steel truss construction occurring throughout the country during the first quarter of the twentieth century. The bridge represents a typical example of swing spans made by the Austin Brothers Bridge Company (now Austin Industries), leaders in bridge design, construction, and installation. Only two other bridges constructed by Austin Brothers remain in Florida.

Prior to colonial settlement, Native Americans and Spanish settlers occupied Florida and constructed trails and bridges. Following state designation, the Seminole Wars, and the Armed Occupation Act, in the first half of the nineteenth century, road and bridge construction further developed. Generally made of wood or masonry, bridges were constructed on a smaller scale. By the middle of the nineteenth century, bridge construction was at an all time high, with iron replacing wood and masonry as the primary material for bridge building. Florida, like the rest of the nation, installed railroad lines and new roads, creating a need for bridges.²⁴

By the beginning of the twentieth century, steel had replaced iron as the preferred building material.²⁵ It was less expensive, easier to manipulate, and required less maintenance. The Warren truss, patented in 1848 by two British engineers, was quickly adopted by American bridge designers. The Warren and Pratt (patented 1844) designs dominated steel truss

²⁰ State of Florida, *Approval of Location and Plans of Bridge*, Permit 15016, 823(512), (March 1952). (Signed by Sherry B. Myers, for the Secretary of the Army and G.J. Nold, Acting Chief Engineer) Permit on file with the United States Coast Guard, United States Department of Homeland Security, Bridge Division, Miami.

²¹ Chris Bruton, "And What a Bridge it is!" *Florida Times-Union*.

²² State of Florida, *Approval of Location and Plans of Bridge*, Permit 15016, 823(512), (March 1952).

²³ R. D. Hodges, "Amendment to Bridge Permit (199-78)."

²⁴ John W. Snyder, "Preserving Historic Bridges," *Information* (Washington D.C.: National Trust for Historic Preservation, 1995, p.2-3).

²⁵ *Ibid*, p.3.

construction in the first quarter of the twentieth century.²⁶ The Warren and Pratt bridges allowed engineers to standardize inspections, as load distribution could be easily detected in these designs, further promoting their installation.²⁷

The Warren truss, as in the Mathers Bridge, generally consisted of triangular shapes (resembling a continuous “W”) formed by diagonal I-beam members joined to parallel chords at the top and bottom of the truss. Joints were originally pinned because this was easier to assemble. During the late nineteenth century, riveted joints became the preferred connection providing stronger rigidity. Vertical members were sometimes installed, as in the Mathers Bridge swing span, to provide increased strength and load carrying capacity. The Warren truss could extend up to 400’-0” in length. Generally, through trusses were installed for longer distances, whereas pony trusses, like the Mathers Bridge swing span, were used for shorter distances. Through trusses maintain a horizontal element at the top, providing an extra element of support, while the pony truss includes only vertical truss work at the sides.²⁸ As the surrounding fixed framework of a bridge, the Warren truss allowed for the installation of either a fixed or moveable central bridge span.

The obstruction of waterways due to bridge construction led to an innovative solution, the moveable bridge. The introduction of the steel truss made these bridges a reality during the latter part of the nineteenth century. The steel was light enough for the bridges to be lifted or moved, while providing the strength to sustain heavy loads.²⁹ The movable bridge was demonstrated in four types: bascule (most common), swing, vertical lift, and transporter. These bridge types are more common to Florida than some other states, due to the large number of navigable waters in the state. Moveable bridges were thought to be a more cost effective solution to provide waterway access to taller vessels, rather than building a monumental structure. The swing design was implemented at the Mathers Bridge site originally, of wood in 1927, and again, when it was replaced in 1952 with a steel truss. The swing bridge is less common than the bascule, due to the large pivot pier (which allows the bridge to swing) obstructing the center of the channel. The swing span provides an infinite height clearance and gained popularity in Florida due to its lower cost and ease of construction. The Austin Brothers Bridge Company of Atlanta was a leader in swing span construction in Florida during the first quarter of the twentieth century. Responsible for the swing span of the Mathers Bridge, Austin Brothers generally designed these spans in a Warren truss, with the intention that the swing span could be relocated from different sites.³⁰

Expanding into Florida during the land boom of the 1920s, the Austin Brothers Bridge Company became a leader in steel truss construction in Florida. Originally focused on bridge construction

²⁶ National Register of Historic Places Multiple Property Documentation Form, Metal Truss, Masonry, and Concrete Bridges in Vermont, , Washington, D.C., United States Department of the Interior, National Park Service, 1990, Section E, p.2.

²⁷ Arkansas Historic Preservation Program, Historic Bridges of Arkansas, National Register of Historic Places Multiple Property Documentation Form, Washington D.C., United States Department of the Interior, National Park Service, 1990, Section E, 2-6.

²⁸ Ibid, Section E, p.8 and Section F, p.5.

²⁹ Martin Hayden, *The Book of Bridges* (New York: Galahad Books, 1976).

³⁰ Joseph E. King, *The Historic Highway Bridges of Florida*, 27.

in Texas and Georgia, the company branched into Florida as funding and prosperity increased in the 1920s. In 1889, George Austin moved to Dallas, Texas, where he began working for the George E. King Bridge Company. His brother Frank joined him in 1894. Two years later George relocated to Atlanta. In 1900, Charles R. Moore was hired to manage construction at the Texas office, enabling Frank to focus on steel fabrication. In 1902, George and Frank Austin formed a partnership called Austin Brothers, Contractors, specializing in the fabrication, construction, and installation of steel truss bridges in Georgia and Texas. Bridges were in high demand as the road system was upgraded from use by horse and wagon to automobile. In 1918, Moore bought the construction business and operated it as Austin Brothers Bridge Company into the 1920s, when it changed to the Austin Bridge Company and Associated Companies.³¹

The end of the Florida land boom and decreased funding saw the end of major construction projects in Florida during the late 1920s and early 1930s. This led to the decline of the popular Austin Brothers Warren truss in Florida. In addition, further innovations in bridge construction and technological advancements in materials led to new types of bridges. By World War II, reinforced concrete had replaced steel as the preferred building material, virtually eliminating new construction of steel truss bridges.

The swing span of the Mathers Bridge is an excellent example of a Warren pony truss constructed by the Austin Brothers Bridge Company. Although it has been relocated from its original site, the ability to relocate the swing span contributed to their popularity in the 1920s. Vehicles, pedestrians, bicyclists, and fisherman have utilized the swing span of the Mathers Bridge over the Banana River for more than fifty years. Therefore, the swing span has achieved significance at its present location. Due to the large number of navigable waterways, Florida has a higher number of bridges than most other states in the country. A rise in population and deferred maintenance have led to the replacement of many of the historic bridges in the state. As one of only seven remaining swing spans, and one of only three remaining Austin Brothers bridges in Florida (as of 1995), the Mathers Bridge swing span is significant as it represents engineering techniques popular during the first quarter of the twentieth century.

Physical Description

The Mathers Bridge consists of modern concrete deck approach spans (1982) with a central Warren type pony truss swing span. The bridge carries County Road 3, spanning the Banana River, connecting Merritt Island to Indian Harbour Beach in Brevard County (see Photos FL-22-1 through FL-22-15 and Drawings 1 through 5). The original timber approach spans were replaced in 1982 with reinforced deck slab approaches (six approach spans on the east and eight on the west). At this time, a new control house was also constructed on the south side of the east

³¹ Eventually, Austin Industries was established in 1974; Austin Industries, "Our History: More Than a Century of Building Excellence," (accessed 5 January 2004); available on-line from <http://www.austibridgeandroad.com/advantage/history.html>; Internet

approach. Constructed of poured concrete, this structure rises above the bridge, featuring a flat roof and metal windows. The swing span supports one lane of traffic in each direction (east-west), and maintains a roadway width of 18'-0". The two-lane road is narrow and not used for heavy traffic or larger vehicles. Pedestrians and bicyclists frequently use the bridge to cross the Banana River. It is also used for fishing. Although the approaches feature sidewalks, no sidewalks are present on the swing span.

The entire bridge stretches 791'-10" over the Banana River. Extending 202'-4", the swing span is a center bearing type with balance wheels for lateral stability. The steel structure is a Warren pony truss with vertical members. The truss is constructed of a rolled wide flange top and bottom chord, with diagonal and vertical members, which are light built-up members consisting of angles and batten plates. The trusses are 20'-10" apart, centerline to centerline, supported on a pivot girder. Originally, truss member joints were connected with riveted gusset plates. However, many of the rivets have been replaced with high strength bolts and welded connections during repairs over the years. Some members have been replaced as needed due to deterioration and corrosion, in addition to patch-like repairs which have occurred. The floor system of the Mathers Bridge swing span is typical steel rolled shape floor beams and stringer framing members. The deck consists of an open steel grid spanning the stringers below.³²

Located at the central pivot pier, beneath the steel truss, lies the mechanism for the operation of the swing. A center pivot bearing (bronze disc type), supported by the pivot pier, allows the heavy structure to rotate. The pivot pier consists of a reinforced concrete pile cap on timber piles. When closed, the ends of the truss lie on the reinforced concrete rest piers. The mechanism is remote operated by the controller in the control station. A single ten-horsepower electric motor, which connects to the pivot pier, allows the span to rotate. In the event of electrical failure, the swing span can be manually operated. In addition, a natural gas internal combustion engine generator is also available to operate the swing.³³

³² Hardesty and Hanover, LLP., "Preliminary Engineering Report for the Rehabilitation for the Mathers Bridge (C.R.3) over the Banana River, Brevard County, Florida Bridge No. 704063," 3-4, 78; Post, Buckley, Schuh, and Jernigan, "Final Cultural Resource Assessment Survey and Effects Analysis Technical Memorandum for the Rehabilitation of the Mathers Bridge (CR 3) over the Banana River, Brevard County, Florida Bridge No. 704063," 9.

³³ Hardesty and Hanover, LLP., "Preliminary Engineering Report for the Rehabilitation for the Mathers Bridge (C.R.3) over the Banana River, Brevard County, Florida Bridge No. 704063," 4, 33.

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