

BARTON CREEK BRIDGE  
Texas Historic Bridges Recording Project II  
Spanning Barton Creek  
Gordon vicinity  
Erath County  
Texas

HUCKABAY

HAER No. TX-87

HAER  
TEX  
72-HUCK.Y  
1-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

REDUCED COPIES OF MEASURED DRAWINGS

HISTORIC AMERICAN ENGINEERING RECORD  
National Park Service  
U.S. Department of the Interior  
1849 C St. NW  
Washington, DC 20240

HISTORIC AMERICAN ENGINEERING RECORD

HAER  
TEX  
72-HUCK.V  
1-

BARTON CREEK BRIDGE

HAER No. TX-87

Location:

Spanning Barton Creek, <sup>HUCKABAY</sup> Gordon vicinity  
Erath County, Texas.  
UTM: 14/561060/3596535  
USGS Quad: Gordon, Tex.  
(7.5-minute series, provisional edition, 1984).

Date of Construction:

1890

Fabricator:

Runyon Bridge Company, Weatherford, Texas.

Present Owner:

Estate of C. B. Long, Gordon, Texas.

Present Use:

Abandoned. Not open to the public.

Significance:

The Barton Creek Bridge is one of only two known examples of a Runyon patent cable-stayed suspension bridge. The bridge is one of a larger group of suspension bridges once seen throughout north central Texas.

Historian:

Mark M. Brown, Ph.D., August 2000.

Project Information:

This document was prepared as a part of the Texas Historic Bridges Recording Project II performed during the summer of 2000 by the Historic American Engineering Record (HAER). The project was sponsored by the Texas Department of Transportation (TxDOT), Environmental Affairs Division.

## INTRODUCTION

In the spring of 2000, a ruined suspension bridge in northwestern Erath County, Texas was brought to the attention of Historic American Engineering Record. This bridge over Barton Creek bears a striking similarity to the Bluff Dale Bridge, Erath County, Texas. Until this discovery, the Bluff Dale Suspension Bridge was considered not only the sole documented example of a cable-stayed suspension bridge built between 1850 and 1945, but also the only known example of E. E. Runyon's patents.<sup>1</sup>

Readers wishing to know more about Runyon, his patents, and the Bluff Dale Suspension Bridge should read the present report in conjunction with Bluff Dale documentation. The Bluff Dale documentation includes two historic photographs of, it is argued below, the Barton Creek Bridge. Additional information about Texas suspension bridges can be found in HAER No. TX-98, "Texas Suspension Bridges," and HAER TX-104, "Structural Study of Texas Cable-Supported Bridges."<sup>2</sup> HAER No. TX-98 focuses on broad questions raised by a tradition of suspension bridge construction in north central Texas, and also discusses several structures that are no longer existing. HAER No. TX-104 is a structural analysis of three specific Texas short-span suspension bridges where the author, Stephen G. Buonopane, places the Texas suspension bridge tradition in the broader national and international context. Finally, readers will want to consult the measured drawings, the large format photographs, and the field notes prepared in conjunction with this report.

---

<sup>1</sup> For more on the Bluff Dale Suspension Bridge see Historic American Engineering Record (HAER), National Park Service, U.S. Department of the Interior, "Bluff Dale Suspension Bridge," HAER No. TX-36, and "Barton Creek Bridge," HAER No. TX-87 Field Notes, and Mark M. Brown, "Nineteenth-Century Cable-Stayed Texas Bridges," in *Proceedings - Fifth Historic Bridge Conference*, ed. David A. Simmons (Columbus, Ohio: Fifth Historic Bridge Conference Organizing Committee, 1997), 38-46.

The patents are: Edwin Elijah Runyon, "Suspension-Bridge," U.S. Patent No. 394,940 (18 Dec. 1888); "Needle-Beam for Bridges," U.S. Patent No. 400,874 (2 Apr. 1889); "Device for Twisting Wire Cables of Suspension-Bridges," U.S. Patent No. 404,934 (11 June 1889); "Bent for Suspension-Bridges," U.S. Patent No. 410,201 (3 Sept. 1889); "Suspension-Bridge," U.S. Patent No. 446,209 (10 Feb. 1891); "Side Rail for Suspension-Bridges," U.S. Patent No. 493,788 (21 Mar. 1893). In addition, Runyon was also awarded: "Cotton-Cultivating Machine," U.S. Patent No. 412,980 (15 Oct. 1889) and "Lawn-Mower," U.S. Patent No. 445,616 (3 Feb. 1891). The author wishes to express his appreciation to Swan and Sparks for bringing the bridge to HAER's attention, to Hershel Gibson for helping identify the owner, and to Kyle Owen for granting permission to document the bridge.

<sup>2</sup> In addition to Bluff Dale, HAER has documented the following Texas suspension bridges. Please see: Historic American Engineering Record (HAER), National Park Service, U.S. Department of the Interior. "Waco Suspension Bridge," HAER No. TX-13; "Beveridge Bridge," HAER, No. TX-46; "Clear Fork of the Brazos Suspension Bridge," HAER, No. TX-64,; "Rock Church Bridge," HAER, No. TX- 81, ; "Choctaw Creek Bridge," HAER, No. TX-85.

## BRIDGE HISTORY<sup>3</sup>

On the matter of the Erath County Commissioners' 1890 bridge construction program, the clerk's minutes are confusing and contradictory. In early March they announced their intent to build

three Bridges on the Bosque River at the following points or as near the same has practical as follows to wit[:] on the Stephenville & Meridian Public road [above?] Beeches Mill and [Gin?], on the Upper Granbury public Road near the residence of W. [?.] Chapman, on the Stephenville and Palo Pinto Road at or near what is called the Hom Crossing.<sup>4</sup>

Part of the confusion is that neither the Upper Granbury nor the Stephenville and Palo Pinto roads are in the Bosque River basin. Subsequent events suggest that whatever the court's intent, the second bridge, on Upper Granbury road, might be the Bluff Dale Suspension Bridge, and the third, the Stephenville and Palo Pinto road bridge, is the Barton Creek Bridge – the subject of the present report. On 27 March, the court gave conditional acceptance of a \$4,200 bid from the Runyon Bridge Company for "3 Bridges in the County of Erath upon the Bosque" pending satisfactory completion of the first.<sup>5</sup> In June, the court appropriated \$275.54 for "building approaches to bridge at the Hom Crossing" and, in a separate transaction, paid E. E. Runyon and William Flinn \$1400 for completion of the first, but otherwise unidentified, "test" bridge.<sup>6</sup> July saw the acceptance of the "two last of the three Bridges contracted between the court and E. E. Runyon [&?] William Flinn composing the Runyon Bridge Company."<sup>7</sup> On the other hand, in October they accepted "the bridge built by the Runyon Bridge Company over Barton's Creek" and the "Bridge across Paluxy Creek near Bluff Dale built by the Runyon Bridge Co." in early January 1891.<sup>8</sup> If we allow the politicians and their clerk a little geographical inexactitude and a certain redundancy about accepting the bridges, then Runyon built three bridges, including one across Barton Creek and another across the Paluxy. Given the confusion about what was built when and where, the Barton Creek Bridge, received 10 October 1890, may

---

<sup>3</sup>This section is based on Erath County *Minutes of the Erath County Commissioners' Court* (hereinafter cited as *ECCC Minutes*), vol. E (Dick Smith Library, Tarleton State University, Stephenville, Tex.), 88 (7 Mar. 1890), 90 (27 Mar. 1890), 101-2 (12 June 1890), 103 (1 July 1890), 152 (5 Jan. 1891) and represents a rereading of the interpretation of the same documents made in HAER, No. TX-36.

<sup>4</sup> *ECCC Minutes*, E: 88 (7 Mar. 1890).

<sup>5</sup> *ECCC Minutes*, E: 90 (27 Mar. 1890).

<sup>6</sup> *ECCC Minutes*, E: 101-02 (12 June 1890).

<sup>7</sup> *ECCC Minutes*, E: 103 (1 July 1890).

<sup>8</sup> *ECCC Minutes*, E: 124 (10 Oct. 1890), 152 (5 Jan. 1891).

or may not have been the Hom Crossing Bridge, Hom Crossing or another location. The Runyon Bridge company completed its contract by the end of 1890. While this is a seemingly arcane discussion, it is important because the unexpected discovery of the Barton Creek Bridge, which was unquestionably built according to Runyon's patents, raises the possibility that other bridges might survive in some condition.

The greatest significance of the Barton Creek Bridge is in its technology and not in the history of the road or crossing. Nevertheless, by definition, the Stephenville-Palo Pinto road is an important local road because it connected two county seats. It is clear that the county sought to ensure unimpeded travel to its immediate neighbors. Both a 1936 county highway map and oral tradition make it clear that the suspension bridge remained in use for at least four decades before being bypassed by the current skewed welded-steel Warren pony-truss immediately downstream.<sup>9</sup> The bridge is now on private property.

## DESCRIPTION

The Barton Creek Bridge, aligned approximately southeast to northwest, is in ruinous condition. The deck and railings are long gone. One of the "needle-beams" – Runyon's term for his pipe deck-beams – is bent at a nearly ninety-degree angle. Most of the southeast tower bent has collapsed or is entirely missing, and the southernmost tower is out of alignment. The stonework of the southeast abutment is barely restrained from collapse by the approach bent. On the other hand, integrity of original fabric is very high. Exceptions include inventive repairs to portions of the cable stays and to the ends of several needle beams. Many of the following overall dimensions are approximate given the bridge's condition and the general inaccessibility of almost all but the northwest portion. Conditions at Barton Creek makes the distinctive features of Runyon's designs both more accessible and more understandable.

The Barton Creek Bridge is a cable-stayed suspension bridge. Its main span consists of ten panels, each approximately 10' long. Each of the towers supports two sets of hand-twisted wire cables. On the southeast end of one set, about thirty wires are wrapped around a horizontal pipe extending from Runyon's patented "end piers."<sup>10</sup> The end pier is about 11' from the towers, and the cables attached to it are connected solely to the first panel point. Approximately 120 hand-twisted wires, anchored 16' from the towers, connect to the remaining panel points. Each bundle of wires from the second, outermost, anchorage are untwisted and rise to the top of its tower before sub-bundles of about thirty strands branch out to the remaining panel points. The parallel wires of the outermost backstays are wrapped by a smaller gauge wire with one turn per 4" of cable. Most academically trained American engineers wrapped their cables continuously in an effort to ensure maximum contact between the wires, and thereby even out the loads carried by each wire. The wire bundles that connect the towers to the panel points are twisted and connect to the panel points in three different ways. In the case of the two panel points closest to

---

<sup>9</sup> *Earth County, Texas* [road map], Texas State Highway Department, 1936: on file, Environmental Affairs Division, Austin, Tex.; Lilly Gibson, Personal Conversation, summer 2000.

<sup>10</sup> Runyon, "Suspension-Bridge," U.S. Patent No. 446,209.

the towers, the wires are looped around grooves in the needle-beam end castings. When the bundles reach the third and fourth panel points from the towers, they slip under the grooves of the end castings and run the length of the bridge to symmetrical panel points before rising to the far towers. At the center of the bridge, the wire strands slip under the needle-beam end castings. The presence of the original suspension wires at Barton Creek clarifies confusion about the original arrangement at Bluff Dale Suspension Bridge. Bluff Dale was moved in 1935 and the original cables replaced with wire rope; it is possible that at that time, the cables were re-strung in a different way. While one historic photograph shows an unidentified Runyon-patent bridge with an alternate pattern (see HAER No. TX-36-14), the arrangement preserved at Barton Creek reinforces the argument for an identical treatment at Bluff Dale.

Barton Creek demonstrates Runyon's method of applying tension to the cables. Many of the cable segments throughout the bridge still have the small grooved castings that were placed between the wire strands. These castings were manually twisted with a special patented appliance.<sup>11</sup> A rod was placed through a hole in the casting in such a way that at least one end of the rod would strike the deck or an adjacent cable, and thereby keep the cables from untwisting. One such rod clearly reveals the distinctive fracture pattern of wrought iron. Barton Creek is the only known bridge where Runyon's method can be seen on the main cables. Variants of this tensioning system can still be seen in the needle-beams and the lower-lateral deck bracing. At an unknown date, workers replaced several of the cable-stay twisting blocks with turnbuckles. The splice included inelegant but effective metal collars and a lead-like metal to transfer the tension between the wires and the turnbuckle.

Runyon's towers consist of two 6-1/2" diameter pipes arranged perpendicular to the bridge axis; the towers are 13' apart from center to center of each pair. Their alignment in relationship to each other, and to the bridge, is maintained by a complicated arrangement of castings, cables, and bars. On top of the pipes are two castings that serve as cable saddles, the lower helps to secure the alignment. The lower saddle at Barton Creek is flared at the bottom and does not have a cradle for a pipe brace between the towers, a distinction that separates Barton Creek from Bluff Dale. Bluff Dale is 40' longer than Barton Creek, and this difference may explain the different saddle castings. Runyon may have used one set of castings and smaller size pipes for shorter bridges, and larger pipes for longer bridges like Bluff Dale. If the current conditions of the saddles represent Runyon's intentions, the connection between the two saddles deliberately provided for independent movement. While this connection is not fully accessible without removing the load from the bridge, two sheets of nonferrous, noncuprous, metal can be seen between the saddles. Presumably, they serve as bearing or wear plates. Runyon makes no mention of these sheets in his patents and they are yet to be observed at Bluff Dale.

At the northwest side of the bridge, the towers rise about 11' from a tower bent that is even more complicated. A series of distinctive castings and cables clasp the towers and pull them toward the center of the roadway. At the same time, a bar resting on a series of pipes topped with interlocking castings exerts an outward thrust on the towers. These connections demonstrate, as perhaps no others, the idea first suggested by engineering consultant Justin Spivey, that Runyon seemed realize an idea for a connection only to find that he needed second

---

<sup>11</sup> Runyon, "Device for Twisting Wire Cables of Suspension-Bridges," U.S. Patent No. 404,934.

part to keep the first in place, and perhaps a third to keep the second in place.<sup>12</sup> Distinctive to the Barton Creek tower bent's design is a special variant of the twisting block used throughout the structure. These, found only at the towers, and clearly visible in the original prints of HAER No. TX-36-12, have a horn-shaped projection that served as an attachment point for the lower lateral bracing. That they are not currently so configured suggests that the lower lateral bracing was re-strung at some point.<sup>13</sup>

The no-longer-extant deck was supported by 2-7/8" diameter wrought-iron pipes about 11' long. These needle-beams were attached near their ends to cables running the length of the bridge by "bearing" clamps. Patented castings cap the ends of the pipes and provide anchorage for the cable stays, the lower lateral bracing, and for cables that help brace the needle-beams against deflection. These terminal caps, to use Runyon's term, with their extraordinary symphonies of curves, knobs, and grooves, are masterpieces of the founder's art.<sup>14</sup> At Barton Creek several terminal caps have been lost. As a result, it is possible to determine additional information about the caps and Runyon's design method by the negative shapes cast into the bearing clamps. A flange slipped over the end of the pipe and fit into the bearing clamps. A flange wedge shaped like a truncated pyramid prevented the terminal cap from rotating. In addition, two small lugs projected from this pyramid and likewise fit into spaces in the bearing clamps. The apparent function of these lugs was to prevent the terminal caps from slipping off the end of the pipes – though that seems to have happened in several cases at Barton Creek.<sup>15</sup> Three additional sets of castings complete the needle-beam. These serve as compression members for a truss system that supports the needle-beam under live loads. Several of the castings have Roman numeral casting numbers. A cable consisting of twenty-seven twisted wires, two twisting blocks, and a metal rod keeping the strands in tension completes the needle-beam truss.

Mechanically separate from the needle beams are the remains of a third longitudinal cable that once ran the length of the bridge. It rested in a saddle that is part of the clamp that holds the needle beams' middle compression member. The presence of the third cable, but not two more – an identical clamp was used for the smaller compression members – suggests that the original configuration at Bluff Dale also had three longitudinal cables and not five.

Remains of a black bituminous-like substance is found on the structure, most particularly on the bearing clamps around the west anchorages and on parts of the pipe tower. It does not seem to be the original paint in that it covers the nails driven under many of the bearing clamp

---

<sup>12</sup> Justin Spivey, conversation with engineering consultant, fall 1997.

<sup>13</sup> Other evidence of repairs, particularly to the tension wire of several needle-beams (see below) includes strong evidence of their galvanized coating.

<sup>14</sup> Runyon, "Needle-Beam for Bridges," U.S. Patent No. 400,874.

<sup>15</sup> Repairs consisted of a smaller diameter pipe wedged into the end of the needle beam. The various cables that connect to the panel point are wrapped around the extra length.

hooks in an apparent effort to tighten the connection to the longitudinal cables.

The measured drawings that accompany this report depict the Barton Creek Bridge with a deck and a hand railing that also served as a stiffening truss. This reconstruction is based on a photograph of a Runyon patent bridge that has been identified as the Barton Creek Bridge shortly after its completion (see HAER No. TX-36-12 and HAER No. TX-36-13). The identification was made on the basis of the number of panel points in the bridge, the presence of the horn casting-block on the tower bents, the stone abutment on the steep side of the creek bed, the distinctive shape of the saddle castings, and the location of the coupling on the tower pipe closest to the right hand side of the photograph. Each of these features is found on the Barton Creek Bridge. The photographs reveal a timber king post truss with metal tension members and a top chord supported by wood compression members. This pattern is similar to one in the patent awarded to Joseph Mitchell, Montague, Montague County, Texas, in 1887.<sup>16</sup> According to the photograph, and with additional insight offered from Mitchell's patent, Runyon attached his truss to the longitudinal cables using U-bolts that went around the ends of the bearing castings and up to metal castings at the base of the truss verticals.

## E.E. RUNYON

By virtue of its location between the Chisholm and Sedalia trails, Cooke County, Texas, was cattle country in the years after the Civil War. Open-range ranching increasingly yielded to agriculture under pressure from railroads, barbed wire, and cattle-threatening droughts starting in the late 1870s.<sup>17</sup> Just as the first train arrived in Gainesville, seat of Cooke County, in 1879, Edwin Elijah Runyon seems to have appeared in the southeast corner of the county. Indeed, whether known as E. E. Runion, Ed Runyon, E. E. Runyon, or Edwin E. Runyon, the designer of the Barton Creek Bridge spent his bridge years in a series of communities on the road between Gainesville and Pilot Point, Denton County. While there were Runyons in northern Cooke County as early as 1858, the name seems to be neither especially common in Cooke County, nor source of confusion in the legal documents that survive. In 1879, Runyon was the first school teacher in Bloomfield, a community flooded by Lake Ray Roberts in the 1890s. A couple of years later, he opened a store that soon became the post office for Mountain Springs. Located in the eastern Cross-Timbers, a dense wooded area dominated by post oak, Mountain Springs is a little closer to Gainesville than Bloomfield. In the 1890s, the community grew to have a mill, blacksmith, cotton gin, and about one hundred inhabitants. Perhaps the 1883 sale of property in Bloomfield marks the move. Runyon remained associated with Mountain Springs until the

---

<sup>16</sup> Joseph Mitchell "Bridge," U.S. Patent No. 368,483 (16 Aug. 1887). Special thanks to David Simmons and Jim Cooper for bringing this patent to the author's attention. For more on Joseph Mitchell, see below and Historic American Engineering Record (HAER), National Park Service, U.S. Department of the Interior, "Texas Suspension Bridges," HAER, No. TX-93.

<sup>17</sup> Michael Collins, *Cooke County, Texas: Where the South and the West Meet* (n.p., Cooke County Heritage Society, 1981; second printing, 1998), 23-7, 36-7.



spring of 1889 when he filed two bridge patents and two agriculture related patents from Mountains Springs and Burns City.<sup>18</sup> While at Mountain Springs, Runyon and his wife Emma acquired ninety acres of land plus horses and cows valued at \$125. They also sold two houses; the last was a five room, one-story frame structure with stable worth \$550.<sup>19</sup> By August 1890, the same year the Barton Creek and the other Erath County bridges were being built, Runyon filed his fifth and penultimate patent from Pilot Point.<sup>20</sup>

On 29 June 1888, the same day that Runyon filed his first suspension bridge patent, Joseph Mitchell of Montague County, Texas, immediately to the west, was paid \$600 for a bridge by Cooke County.<sup>21</sup> While the nature of the bridges Mitchell sold to Cooke County and elsewhere is unknown, in 1887 he patented a bridge using hand-twisted wire cables to support a deck without deck beams.<sup>22</sup> Again on 10 September 1888, when another of Mitchell's bridges was accepted,<sup>23</sup> Runyon received a contract for a bridge across Indian Creek on the Valley View to Collinsville (Grayson County) road. The bridge was "to be built of iron and galvanized wire. Known as Needle Beam Steel wire Bridge" cost \$10 per linear foot. Runyon was paid \$820 two

---

<sup>18</sup> Cooke County, *Deed Books*, vol. 5 (County Clerk's Office, Cooke County Courthouse, Gainesville, Tex.; here in after cited as *CC Deeds*), 950-1; A. Morton Smith, *The First 100 Years in Cooke County* (San Antonio, Tex.: The Naylor Company, 1955; second printing 1976), 68, 74; Odessa Morrow Isabel, "Bloomfield, Texas," in *The New Handbook of Texas*, vol. 1 (Austin: The Texas State Historical Association, 1996), 597-8; Delsie Lillard, "Mountain Springs Community," in *Cooke County History: Past and Present*, William F. Powell, project director, (Dallas, Tex.: Cooke County History Book Committee, 1992), 16-17; *CC Deeds*, 31: 328; Runyon, "Device for Twisting Wire Cables of Suspension-Bridges," U.S. Patent No. 404,934 (1 Apr. 1889); Runyon, "Bent for Suspension-Bridges," U.S. Patent No. 410, 201 (1 Apr. 1889); Runyon, "Lawn Mower," U.S. Patent No. No. 445, 616 (1 Apr. 1889); Runyon, "Cotton-Cultivating Machine," U.S. Patent No. 412, 980 (3 May 1889)

<sup>19</sup> *CC Deeds* 33: 196-7, 352; *CC Deeds* 34: 138; *CC Deeds* 36: 52; *CC Deeds* 39: 548-9; *CC Deeds* 45: 290-1; *CC Deeds* 46: 138-40; *CC Deeds* 48: 225-6; *CC Deeds* 81: 306-7.

<sup>20</sup> It is interesting to note that the while the Erath County minutes recorded Weatherford, Parker County, Texas, as the place of business for the Runyon Bridge Company, an undated business card found in William Flinn's house places the company in Pilot Point. A copy of the business card, which identifies the Runyon Bridge Company of Pilot Point, Texas, as contractors for "needle-beam combination suspension" bridges is in the collection of Dr. Timothy L. Flinn, Strawn, Tex.

<sup>21</sup> Cooke County, *Minutes of the Cooke County Commissioners' Court* (hereinafter cited as *CCCC Minutes*), vol. 4 (County Clerk's Office, Cooke County Courthouse, Gainesville, Tex.), 615 (29 June 1888).

<sup>22</sup> Joseph Mitchell, "Bridge," U.S. Patent No. 368,483.

<sup>23</sup> The fact that both Mitchell and Runyon had county business on the same day dramatically emphasizes the issue of mutual influence – especially since Mitchell is documented as having built a bridge reminiscent of Runyon's Erath County bridges. See "Bridges Over the Whitewater River at Richmond, Ind.," *Engineering News* 41, no. 25 (22 June 1899): 390; and Historic American Engineering Record (HAER), National Park Service, U.S. Department of the Interior, "Texas Suspension Bridges," HAER No. TX-98

months later for what is his first known contract.<sup>24</sup> With the seeming success of his first contract and possibly resources from the sale of property, Runyon launched into a series of elaborations of his initial wire and pipe suspension bridge concept. Driven by a desire for a simple, light, strong, durable, economic, longer span bridge, Runyon experimented with a pure cable stay system when few academically trained engineers would. Evidently, financial success eluded Runyon, but the Erath County contract may have provided useful and ultimately remunerative experiences for his partner, William Flinn.

---

<sup>24</sup> *CCCC Minutes*, 5: 67-7 (10 Sept. 1888), 100 (20 Nov. 1888). To no avail, the author searched all identifiable Indian Creek crossings not flooded by Lake Ray Roberts with longtime Cooke County resident and historian the Honorable, Margaret Hayes for obvious remains of Runyon's first bridge.

**SOURCES CONSULTED**

"Bridges Over the Whitewater River at Richmond, Ind." *Engineering News* 41, no. 25 (22 June 1899): 390.

Brown, Mark M. "Nineteenth-Century Cable-Stayed Texas Bridges." In *Proceedings – Fifth Historic Bridge Conference*, edited by David A. Simmons, 38-46. Columbus, Ohio: Fifth Historic Bridge Conference Organizing Committee, 1997.

*Earth County, Texas* [road map]. Texas State Highway Department, 1936. On file, Environmental Affairs Division, Austin, Tex.

Collins, Michael. *Cooke County, Texas: Where the South and the West Meet*. n.p., Cooke County Heritage Society, 1981; second printing, 1998.

Cooke County, Texas. *Deed Books*. County Clerk's Office, Cooke County Courthouse, Gainesville, Tex.

\_\_\_\_\_. *Minutes of the Cooke County Commissioners' Court*. County Clerk's Office, Cooke County Courthouse, Gainesville, Tex.

Erath County, *Minutes of the Erath County Commissioners' Court*. Dick Smith Library, Tarleton State University, Stephenville, Tex.

Gibson, Lilly. Conversation with author, summer 2000.

Hayes, Margaret. Conversations with author, July 2000.

Isabel, Odessa Morrow. "Bloomfield, Texas." In *The New Handbook of Texas*, Vol. 1 Austin: The Texas State Historical Association, 1996, 597-8.

Lillard, Delsie. "Mountain Springs Community." In *Cooke County History: Past and Present*. William F. Powell, project director. Dallas: Cooke County History Book Committee, 1992, 16-7.

Mitchell, Joseph. "Bridge." U.S. Patent No. 368,483 (16 Aug. 1887).

Runyon, Edwin Elijah. "Suspension-Bridge." U.S. Patent No. 394,940 (18 Dec. 1888).

- \_\_\_\_\_. "Needle-Beam for Bridges." U.S. Patent No. 400,874 (2 Apr. 1889).
- \_\_\_\_\_. "Device for Twisting Wire Cables of Suspension-Bridges." U.S. Patent No. 404,934 (11 June 1889).
- \_\_\_\_\_. "Bent for Suspension-Bridges." U.S. Patent No. 410,201 (3 Sept. 1889).
- \_\_\_\_\_. "Cotton-Cultivating Machine." U.S. Patent No. 412,980 (15 Oct. 1889).
- \_\_\_\_\_. "Lawn-Mower." U.S. Patent No. 445,616 (3 Feb. 1891).
- \_\_\_\_\_. "Suspension-Bridge." U.S. Patent No. 446,209 (10 Feb. 1891).
- \_\_\_\_\_. "Side Rail for Suspension-Bridges." U.S. Patent No. 493,788 (21 Mar. 1893).
- Smith, A. Morton. *The First 100 Years in Cooke County*. San Antonio, Tex.: The Naylor Company, 1955; second printing 1976.
- Spivey, Justin, engineering consultant. Conversation with author, fall 1997.
- Timothy L. Flinn Collection, Strawn, Tex.
- Historic American Engineering Record (HAER), National Park Service, U.S. Department of the Interior. "Waco Suspension Bridge." HAER No. TX-13. Prints and Photographs Division, Library of Congress.
- \_\_\_\_\_. "Bluff Dale Suspension Bridge." No. TX-36.
- \_\_\_\_\_. "Beveridge Bridge." No. TX-46.
- \_\_\_\_\_. "Clear Fork of the Brazos Suspension Bridge." No. TX-64.
- \_\_\_\_\_. "Rock Church Bridge." No. TX- 81.
- \_\_\_\_\_. "Choctaw Creek Bridge," No. TX-85.
- \_\_\_\_\_. "Texas Suspension Bridges," No. TX-98.
- \_\_\_\_\_. "Structural Study of Texas Cable-Supported Bridges" No. TX-104.