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A Guide to the
Research and Documentation of
Local Texas Bridges

By Lila Knight, Knight & Associates



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INTRODUCTION TO THE GUIDE

The purpose of this guide is to provide information on how to research and document bridges built at the local level by counties and municipalities. This document is meant to appeal to an audience composed primarily of county historical commissions, local historical associations, and other historic preservation groups rather than professional consultants. Many communities are becoming increasingly aware of their historic bridges. This document provides guidance on how to research the history of the bridge and evaluate its importance within the overall transportation network of the area.

Bridges are not like buildings. It is not uncommon to find buildings in local communities that were “designed” by either local architects or an architect from a nearby city. But local bridges in Texas were fabricated by large bridge companies based on standardized designs and shipped for assembly at the site. These bridge companies operated throughout the state, and even the entire country. Thus, most bridges constructed locally will be significant for their association with some aspect of transportation in the area, rather than for their “engineering.” Bridges could be significant because they are located on a road that resulted in the direct growth of the local economy, such as the discovery of oil in the area or the arrival of the railroad. The bridge may also have been built as part of a Federal relief program that provided jobs during the Depression.

There are bridges in Texas that are important for their unique engineering design for a specific site. But these bridges are important at a state-wide level, not the local level. The research and documentation tasks for these types of bridges are very different. Bridges that are important for their engineering design must be compared with bridges across the entire state, and the research would be focused on the technical aspects of the engineering of the bridge structure. Many of these types of bridges were constructed by the Texas Highway Department which required very specific engineering solutions for larger spans on the state highway system.

Not all bridges will be significant. Just because a bridge is old doesn't necessarily make it significant for its association with transportation. It needs to be directly linked, or associated, with an important event that shaped the history of the community. This is not to say that our historic bridges are not important to us in creating a sense of place. These bridges are important to us as part of the collective memory of our communities. But when we have to justify “historic significance” to others, it is critical to be able to tell the story about our bridges on an objective and factual level.

A BRIEF HISTORY OF BRIDGES IN TEXAS

BRIEF HISTORY OF BRIDGES IN TEXAS

While many of the earliest roads and bridges in Texas served stagecoach and mail routes, they became increasingly important for the development of regional economies. The type of bridge built for a particular crossing depended on a myriad of factors, such as: soil and topographical conditions; the length of the span; the availability of materials and the skills of local labor; the price and accessibility of pre-manufactured metal structural materials, and; the political and economic forces of a region. The history of the development of bridge technology involves a great deal of overlapping of the types of bridges used at any point in time because of the variety of these factors.



Early Texas roads were undeveloped and often difficult to travel.

The dominance of railroads in the transportation of goods played a prominent role in the development of bridge technology as they required strong, durable structures that could withstand the weight of heavy rail cars. The development of the metal truss by the railroads revolutionized bridge building. Moreover, as a result of the primacy of railroads, roads served as crucial shipping avenues to railroad depots, as well as routes between farms or ranches and local agricultural markets. The bridging of streams and rivers became essential for the transportation of goods to markets. The 1876 Texas Constitution stipulated that counties would be responsible for all road and bridge improvements. But counties were often unable to afford the cost of building permanent, durable bridges until the Texas Legislature passed a number of bills in the 1870s that allowed counties to levy road taxes and issue limited bonds for the construction of roads and bridges. The construction of metal truss bridges, however, remained limited as the cost of shipping heavy metal components prohibited the use of iron and steel bridges by most counties.

The last two decades of the 19th century finally witnessed the construction of permanent bridges. The rapid population growth in the state from 1880 to 1900 demanded the construction of additional roads and bridges. By the late 1800s, railroad lines finally provided linkages across most of the state that allowed counties to ship and erect metal truss bridges capable of sustaining adequate loads. The financing of these bridges was finally adequately addressed during this period. In 1885, a constitutional amendment allowed counties to levy ad valorem property taxes to fund road and bridge projects. By 1887, the Texas Legislature permitted counties to issue bonds for up to 20 years specifically for the purpose of erecting bridges. In 1893, the bonding period was increased from 20 to 40 years, stimulating a building boom in bridge construction as it allowed counties to construct multiple bridges with a single bond issuance. As a result, hundreds of metal truss bridges were erected across the state, particularly in rural areas.



The smallest stream crossings were treacherous, even for a truck.

Some of the earliest American bridges were small-scale stone arch bridges, covered bridges, and timber truss bridges. Few of these bridge types survive in Texas today. But the metal truss bridge developed from the timber truss bridge first used during the late 18th century. Developed by the railroad companies, the metal truss bridge became popular even in more isolated parts of Texas along rural roads. Providing a lightweight, durable and easily erected bridge, these structures could be broken down and moved to other locations if necessary, allowing greater flexibility in their use. This bridge type was composed of two trusses, one on either side of the roadway, with both upper and lower chords providing tensile and compression support. Both diagonal and vertical members connected the two chords. Multiple segments, or panels, could be utilized to lengthen the truss, dependent upon the width of the river to be spanned. The structural arrangement of these components characterized the type of truss. By the late 19th century, the metal truss bridge was the most popular type used in Texas.

The name of each type of truss refers to its designer or engineer. The Howe truss, developed by William Howe, combines diagonal wooden compression members and vertical iron tension members. Commonly used by the railroads due to their inexpensive construction, they required a large amount of lumber and were not appropriate for large areas of the state of Texas.

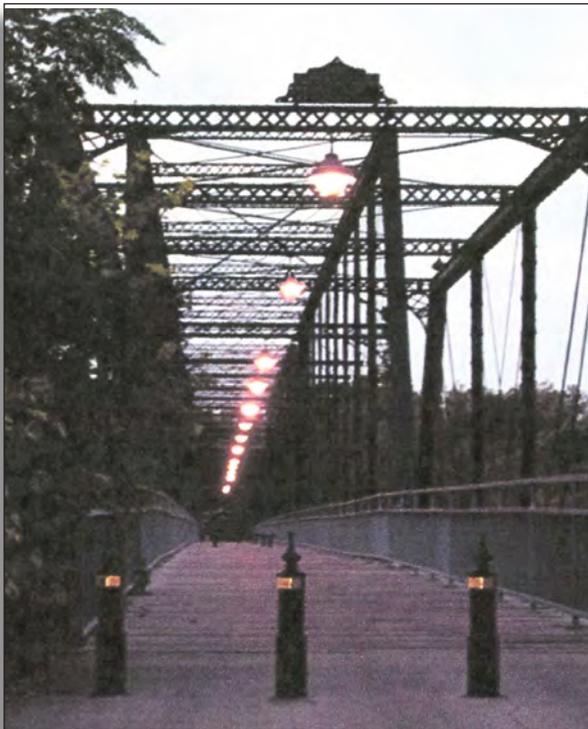


Plano Bridge, spanning the East Navidad River near Schulenburg,
Fayette county. Built in 1885.

Thomas and Caleb Pratt patented a truss for use by the railroads in 1844. This bridge type consisted of parallel upper and lower chords joined by vertical and diagonal posts. Unlike the Howe truss, the Pratt truss used vertical members in compression and diagonal members in tension. Among the variations of this type of truss are: the Lenticular, the Bowstring, the Parker, and the Camelback. The Pratt truss became increasingly utilized by the late 1880s. Available in a variety of shapes and sizes, it was easy to erect and provided for a strong and durable bridge. It was used primarily for short to intermediate span lengths of 30 to 50 feet. The Pratt truss bridge became the most popular type of bridge structure in Texas between 1895 and 1910.

Squire Whipple patented the first “bowstring arch” truss in 1841. With a semi-circular shape similar to a bow, it consisted of a curved top chord compression member held together by a bottom chord tension member. The vertical tension members hang from the top chord and support the floor beams. Although inexpensive and light-weight, the Whipple truss bridge could withstand heavy loads. Because of these characteristics, the Whipple truss bridge became popular for rural highway crossings. In 1847, Whipple patented a stronger version of the Pratt truss commonly known as a “double intersection Pratt” because the diagonal tension members cross two panels rather than just one. The Whipple truss became popular with the railroads because of its strength and rigidity. This type of truss was less common than the Pratt truss for roads, but was utilized where the span was longer than what could be accommodated by a Pratt truss.

English engineer James C. Warren patented a truss design in 1848 that resembles a “W” in shape and is characterized by rigid diagonals combining both tension and compression forces. The Warren truss did not become a popular type of span until field riveting became common in the late 19th century. Its simple configuration and lightweight members eventually led to its use superseding that of the Pratt truss for short spans of 30 to 90 feet. By adding polygonal top chords, the span could be increased to 125 feet or more.



Views of the Faust Street Bridge at the Guadalupe River, New Braunfels, Comal County. Built in 1887.



Bridges are further categorized by the location of the roadway on the bridge. If the truss structure is below the road, it is known as a deck truss. A roadway located along the bottom chords of the bridge, which are connected with lateral bracing, is called a through truss. A pony truss is essentially a through truss with no overhead lateral bracing.

Wrought iron was first employed in the manufacturing of bridge trusses in the 1840s, replacing the more brittle cast iron. Its use continued and became the most common material for bridges by 1870. With the increase in steel production after the Civil War, steel became available at a lower cost. Both wrought iron and steel members were used in bridges during the last decades of the 19th century. By the beginning of the 20th century, however, steel replaced wrought iron as the preferred material for truss bridges. Pin connections were the primary method for connecting the structural components of bridges by the 1860s. This type of connection allowed trusses to be manufactured and shipped in small pieces, and then assembled at the site. But pin connected trusses were prone to wear around the connections and subject to considerable vibrations. Field riveting replaced the pin connections by 1920 after the development of portable pneumatic riveting systems.

The early truss bridges were constructed without any standards or state regulations. Most counties did not even hire engineers to assess a particular bridge site for soil conditions or load carrying capacity, and bid specifications often consisted of merely a few sentences. Bridges were most commonly placed at right angles to the stream to minimize the possibility of damage from flooding. The preferred bridge site included high banks and a narrow stream bed to minimize the length of the bridge span. It was not uncommon for floods to destroy the timber piers or abutments of a bridge, knocking the truss spans into the stream bed.



The increased use of trucks for the transportation of goods during WWI required strong, durable bridges.

Most bridges were purchased from out of state companies who employed local agents to bid on bridge contracts with Texas counties. Bridge fabrication shops, located primarily in the northeast and midwest, could provide a bridge truss within a few weeks. The truss components would be shipped via the railroad along with bridge members and connection pieces. Among the larger bridge companies were the American Bridge Company of New York, the Chicago Bridge & Iron Company, the George E. King Bridge Company of Des Moines, and the Kansas City Bridge & Iron Company. After the 1900s, bridge companies began to operate in Texas due to the growing demand for bridges across the state. But rather than fabricating the components of the bridges, they often purchased steel trusses from out of state fabricators and merely sold them under their own name. The Alamo Construction Company is a typical example of the early Texas bridge company. Located in San Antonio, the firm was primarily a construction company, but served as agents for various out of state bridge companies. The Alamo Construction Company began providing metal truss bridges to Texas counties between 1914 and 1918. Among the engineers known to have been employed by the Alamo Construction Company are G.H. Bradford and H.L. Miles. C.G. Sheely served as president of the company until the late 1920s. Other major bridge companies in Texas included the Texas Bridge Company of Dallas, the El Paso Bridge Company, Alamo Iron Works of San Antonio, and the Mosher Steel & Machinery Company of Dallas.



Broad Street Bridge spanning Comanche Creek in Mason, Mason County, is an example of a fabricated bridge assembled on site.

Austin Brothers of Dallas was the only major bridge fabricator in Texas. George L. Austin and his brother, Frank, opened a fabrication plant for bridge components in 1910. Previously, George Austin served as an agent for the George E. King Bridge Company of Des Moines, Iowa. Austin used his contacts from serving as an agent to establish a thriving bridge business in Texas. The Austin Brothers firm supplied Warren pony trusses, as well as Pratt and Warren polygonal chord pony trusses, to counties across the state. By developing a book of standard plans and stocking a large variety of steel products, the Austin Brothers Company could provide bridges at a lower cost and deliver spans in a more timely manner than their competitors. By World War I, the company had become the largest bridge builder in Texas. The firm was sold to Charles R. Moore, one of their agents, in 1918. He changed the name to the Austin Bridge Company and expanded its operations to the fabrication of oil pipelines, railroad bridges and other steel products after the Texas Highway Department began building concrete and steel bridges in the mid-1930s. More than 200 of the company's bridges are still in existence on Texas roads.

Even in the early years of the 20th century, most county roads were still comprised entirely of dirt roads that detoured around property lines and natural barriers, and often did not connect with the roads of adjacent counties. The efforts to improve roads at the turn of the century sprang from a variety of factors, including: the growing political influence of rural Texans in the Grange movement; the economic need to bring produce from farms to markets as quickly and cheaply as possible; the creation and expansion of rural mail service; and the influence of the Good Roads Movement. Local governments became compelled to improve and extend existing roads and highways.

The National Grange movement in 1913 promoted the improvement of local roads, emphasizing the importance to consumers, as well as to producers of agriculture, to lessen the cost of transportation of food costs. Good roads also reportedly had a positive impact on the land values of farms. The emphasis of the federal government on rural roads is reflected in the establishment of an Office of Public Roads within the existing Department of Agriculture, rather than the creation of a new agency. Closely connected with the growing political influence of farmers was the advent of Rural Free Delivery (RFD) which greatly increased the number of improved roads. Between 1897 and 1908, it is estimated that 100 streams and rivers were bridged in Texas to qualify for RFD services. The first road in Texas to receive federal funding was a postal road constructed for the Rural Free Delivery program.

The Good Roads movement became a national phenomenon growing out of the popularity of the bicycle which required smooth roads. The development of the automobile not only replaced the popularity of the bicycle, but it rapidly became an essential mode of transportation. Between 1900 and 1910, motor vehicle registrations in the United States grew by an incredible 5,500%. By 1910, over 14,000 vehicles were registered in Texas alone, prompting the establishment of the Texas Good Roads Association in 1911 that lobbied for better roads and a statewide road system. During World War I, shipping by truck became common due to the need to use railroads for supplies and munitions which took precedence over consumer goods. Trucks loaded with goods, however, caused extensive damage to existing roads. As a result, the need for adequate roads and bridges became even more essential.



Bunton Branch Bridge on CR 210 near Kyle, Hays County, was built in 1915 to facilitate RFD deliveries.



The Good Roads movement sought to improve transportation throughout the United States.

The Texas Legislature passed a number of acts during the first decades of the 20th century that broadened the ability of local funding options for road and bridge improvements. Several bills were introduced to create a centralized state highway agency, but most legislators opposed a centralized road agency, preferring local control over roads instead. Numerous bills were also introduced at the federal level to fund road and bridge construction. But the federal funding of roads was stalled by the failure to resolve the problem of local versus federal responsibility. Passage of federal legislation to provide funding for the construction of roads and bridges was finally approved in 1916. Signed into law by President Woodrow Wilson, the Federal Aid Road Act (also known as the Good Roads Bill) authorized \$85 million over a five-year period. But the Federal Aid Road Act of 1916 required each state to establish an agency specifically for the distribution of federal funds for the construction of post roads. As a result, the Texas State Highway Department was formed in 1917. Texas received \$291,000 in the initial allocation. The new state agency distributed state and federal moneys to counties, established standards for the construction of highways and bridges and designated a state highway system following existing county roads. Counties, however, maintained primary jurisdiction over roads and initiated applications for state and federal highway funds.

Although funding was still inadequate, the work of the State Highway Department continued to improve the quality of the construction of bridges during the 1920s. George Grover Wickline served as the first bridge engineer at the Texas State Highway Department from 1918 through 1943. During his tenure, the Texas State Highway Department developed standard designs and specifications for all types of bridges based on federal standards. Although local bridges were not required to use these designs, county engineers often utilized the standard plans in their design and layout of local bridges. By 1918, the state required all bridges receiving federal funds to be designed to carry a minimum of 15 tons, improving the capacity of many local bridges. As a result, the practice of hiring independent bridge companies who provided fabricated trusses gave way to the professional bridge engineer.



Designation as a state highway did not immediately improve travel conditions as early efforts often faced funding shortfalls.

Concrete bridges became increasingly popular in the early decades of the 20th century due to their strength and economy. Constructed of reinforced concrete, this type of bridge eventually supplanted the metal truss bridge in popularity. Concrete is strong in compression and, when reinforced with steel bars, provides tensile strength as well. Early reinforced concrete bridges were stone arch bridges, often referred to as closed spandrel bridges. These bridges often featured masonry piers and abutments. Concrete bridges reduced maintenance costs and used locally available materials. In addition, these bridges could be built by unskilled laborers, thus reducing construction costs.



East 12th Street Bridge (aka the Waller Creek Bridge) is located just east of the State Capitol in Austin. Built in 1933.



Blanco State Park Bridge. Built in 1934.

During the 1920s, the popularity of the automobile mushroomed as people began traveling for pleasure. But navigating the complicated system of roads was difficult at best. Trail Associations were founded to provide narrative directions. Only later were maps provided to guide travelers. Many of the routes were given names, such as the Bankhead Highway and the Old Spanish Trail. Eventually, the American Association of State Highway Offices (AASHO) developed a system of numbering the major routes. North to south U.S. highways were assigned odd numbers, beginning on the east coast and proceeding west. East to west U. S. highways were assigned even numbers. The numbering of these roadways began at the northern border of the United States and increased along the southern boundary with Mexico. This initial interstate highway system was adopted voluntarily by all the states in 1926.

The Great Depression halted most road building and bridge construction by counties in Texas. The passage of the 1932 State Assumption Highway Bond Law abolished the requirements of a county to contribute financially to a state highway, except for the purchase of right of way. Federal relief legislation did allocate funding to states for bridges and roads, providing important employment opportunities for many. The Hayden-Cartwright Act of 1934 also provided emergency funding for the repair or reconstruction of highways and bridges on the federal aid system which were damaged or destroyed by natural disasters. With the implementation of the Emergency Relief Appropriation Act of 1935, the federal government granted Texas nearly \$12 million for road and bridge construction and an additional \$11 million for railroad grade crossings. Provisions of this federal act required that at least 90% of the laborers be selected from public relief rolls and that hand labor methods be utilized as much as possible. The Public Works Administration also provided funding for the construction of roads and bridges.

With the advent of World War II, material shortages and war priorities delayed most highway and bridge construction. Following the war, metal truss bridges became obsolete except for very long spans, such as the Pecos River Bridge (1957) and the Corpus Christi Harbor Bridge (1959). Continuous girder and I-beam bridges of concrete or steel became the most widely accepted bridge type after the Federal Aid Highway Act of 1944 set new standards for bridge construction.



The term “all weather road” typically referred to graveled roadways in the early 20th century.

With the election of President Eisenhower in 1953, the interstate system of highways became a priority. Impressed by the advantages of the Autobahn he observed during World War II, Eisenhower made the establishment of a similar system a top priority in the United States. Originally conceived for national defense purposes, this roadway also improved safety, developed new construction techniques and standards for roads and bridges, increased speeds for travel, and developed standardized designs and signage. Begun in 1956, the Interstate System transformed the country and our expectations for roads.



Aerial view of Loop 610, Houston.

THE IMPORTANCE OF RESEARCH

Research provides the information you need to tell the story of a bridge and why it may be important. While you may know it is an important bridge within your community, you may need to convince others of why it is important. Research and documentation of your bridge allows you to justify why your bridge is significant to your community. In order to provide a structure for your research, this guide used the “Who, What, When, Where, Why, and How” methodology. Although this is a commonly known approach to information gathering in journalism, it dates back centuries to the philosophers Cicero and Thomas Aquinas.

- Who is it about?
- What happened?
- When did it take place?
- Where did it take place?
- Why did it happen?
- How did it happen?

By answering these questions, we can tell the story of a bridge and why it was important to your community:

What type of bridge is it?

Is it a metal truss bridge? If so, what specific type of truss?

Is it a closed or open spandrel arch concrete bridge? Or a concrete girder bridge?

Perhaps it is a concrete slab bridge? Or a low water crossing?

Where is it located?

What creek or river does it span?

On what roadway is this bridge located?

What communities did the road connect?

Who built it?

What bridge company constructed the bridge?

Did they build other bridges? Where were these located?

When was it built?

What date was it constructed?

Were other bridges built at the same time?

How did the bridge get built?

What source of funding was used to build the bridge?

Was this the first bridge built, or was it a replacement bridge due to a flood?

Why did they build it?

What events were happening that made it imperative this bridge be constructed?

Research is not always a linear process. You may have to go back and forth between the various steps as more and more facts about your bridge are revealed. For example, it is important to have a basic overview of the history of the county before beginning research in the county records. But once additional information is learned about when and where a bridge was constructed, you might have to return to the county history books to learn more specific details about a particular community or other events taking place at the time.

It is important to write up your research results, much like you would for historical marker documentation. In this way, you can easily share your research results with other people and state agencies. Be sure to include footnotes, a bibliography, photographs, and other documentation (such as copies of county commissioners minutes) that you feel might be helpful.

THE BRIDGE

What type of bridge is it?

It is important to begin with a description of the bridge. Identifying the type of bridge in its present form is important in understanding your bridge. This can also help you identify it specifically when you consult the county records. Often, county records will contain only a description of the bridge, including the location, the type of bridge and its length.

Contact the Texas Department of Transportation for a copy of any records they may have for the bridge. TxDOT has surveyed most every bridge in Texas, and these records contain technical information that will be very useful. Contact Carolyn Nelson at the Historical Studies Branch of the Environmental Affairs Division in Austin at 512-416-2555 for information on your bridge.

Examine the bridge in person and take notes as you begin your detailed description of the bridge. It is also important to take photographs as you will need to reference these later. Take photographs of the bridge from all angles, including details and the substructure underneath the bridge. You should also take photographs of the roadway approaches to the bridge, as well as the roadway leading away from the bridge. Don't forget to take pictures of the creek or river it crosses, as well as the surrounding landscape, such as the countryside or any adjacent buildings or cemeteries. If you can locate historic photographs of the bridge in your research, your photographs will be useful in comparing the bridge today as it once was.



Figure 1: Approach to the Warren Truss Bridge on Rock Creek Road over Beaver Creek, including the surrounding landscape, Wilbarger County.

Determining the overall type of bridge is not difficult as it will probably be a metal truss bridge, concrete bridge, or low water crossing. If it is a metal truss bridge, determine the specific type of truss and note the relationship of the roadway to the truss to determine if it is a through truss, pony truss or deck truss. The most common concrete bridge built is the concrete slab, but make certain by checking the guide to the various types. Masonry bridges may also be found in Texas as they were built during the Depression years.



Figure 2: Approach to the Warren Truss Bridge on Rock Creek Road over Beaver Creek, Wilbarger County.

The superstructure of the bridge is the part that is above the water that we generally see and drive over. While you have already noted the general overall type of the bridge, focus on the details now. If this is a metal truss bridge, are the individual metal elements connected by pins, or are they riveted? You will need to know how many spans there are composing the bridge and what is the length of each one, as well as the width of the bridge. Some of this technical information can be obtained from the bridge survey information from TxDOT. Note the materials of the roadway, or decking, which are generally either wood or asphalt. Also look at the type of railing along the bridge and how far it extends into the approach to the bridge. Railings of bridges are often replaced, due to accidents or the need for improved safety. You will need to know if this is the original railing or a later replacement. Describe any decorative detailing that might be used on the bridge or its railings. And look carefully for a bridge plate or plaque that will contain information on the date of the bridge and its builder.

It is important to look under the bridge at its substructure. The abutments are located at either end of the bridge at the embankments. What types of materials are used for the abutments and are the same materials used at either end? Also note the number of piers and the materials used for each of them. It is not uncommon to have to replace or reinforce piers as a result of flooding or deterioration, so examine each of them for any alterations or replacements.

Make a list of any alterations to the bridge that you have observed.



Figure 3: Substructure of a Warren Truss Bridge on Rock Creek Road over Beaver Creek, Wilbarger County.



Figure 4: Substructure of Bridge on County Road 4620 over Lake Creek, Delta County.

DISCOVERING THE DETAILS

Where did it take place?

When was it built?

Who built it?

How did it get built?

Where did it take place ?

We often admire bridges simply as beautiful structures, but bridges are just one part of a roadway as it passes over a river or creek. In order to document the history of a bridge, we need to understand the larger history of the road, the communities along the road, and the important events that may have resulted from the building of the road and its bridge.

Identifying the road that the bridge is on is an important first step. The names of roads usually change over time, and you need to collect as much information on all the various names of the road as possible. Maps are the best source for this information. A series of maps from various dates over a period of time will provide information that will answer many of your research questions. Maps can show you how a road alignment shifted over time and the construction of later routes that may have become more important and superceded the use of an earlier road. Many maps will indicate the location of farm houses and give you an idea of the density of farms in an area. They will also list the names of communities that may have disappeared and the location of schools and other important places, including other nearby bridges.

It is not always easy to find old maps in county records, but you should always ask. Often, old maps will be framed and hanging in either the public areas or private offices of county courthouses as decoration. Local museums and archival repositories might also be a source for maps. The [Texas General Land Office](#) contains a remarkable collection of county maps and many of these are available in a digitized format on their website. While they can be purchased, you can easily view them online. The [Portal to Texas History](#) is another good source for county maps. The [Texas Department of Transportation](#) began publishing county maps in 1936. These maps were updated on a regular basis and can be found online. The [United States Geological Survey](#) (USGS) online maps can also be valuable in your research.

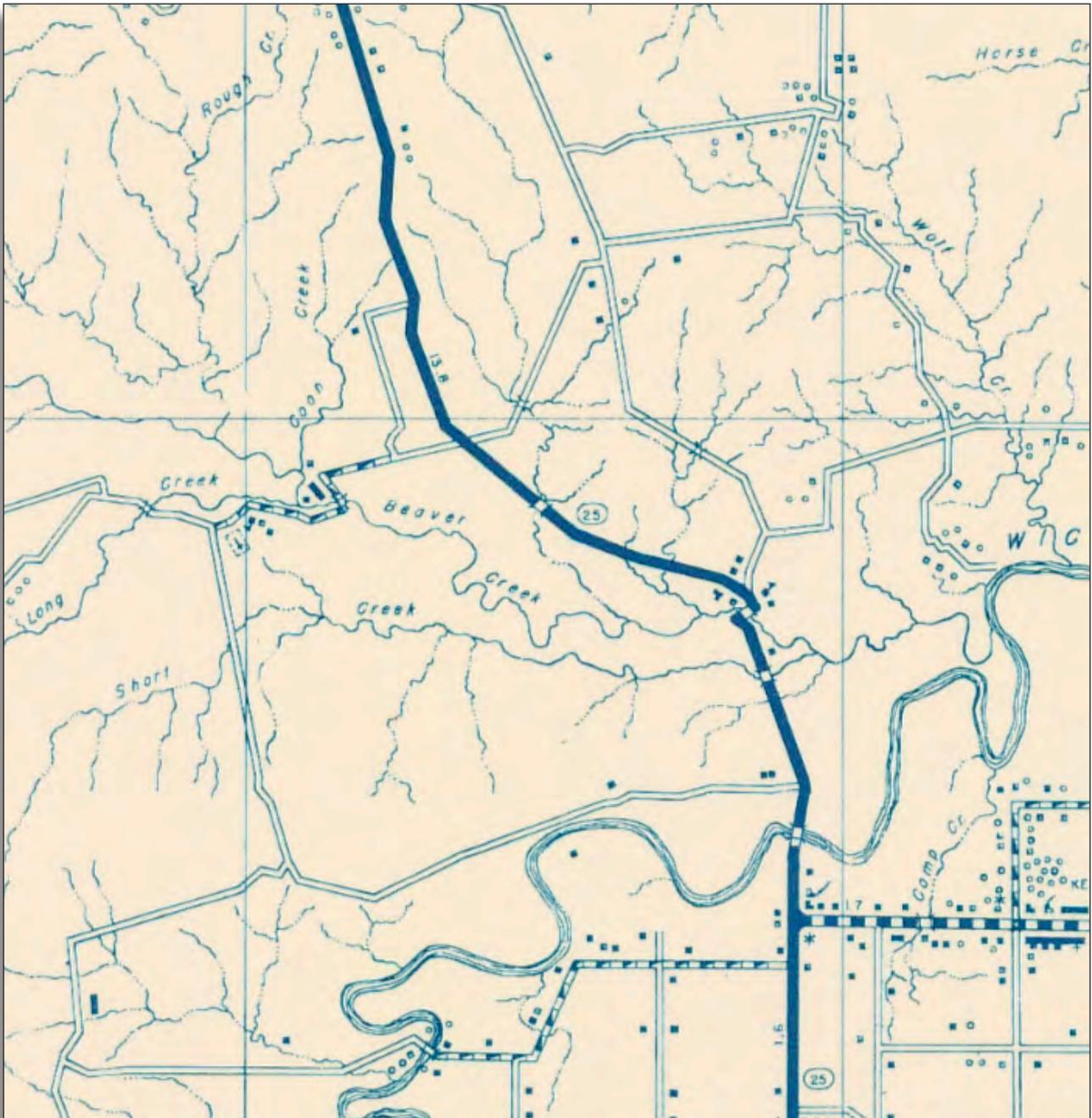


Figure 5: Detail of 1936 map from Archer County illustrating the location of bridges.
Source: Texas Highway Department

You know what river or creek the bridge crosses, but find out more about this particular point along the stream. If it was an important historical crossing, it might appear on early maps. It is more common, however, that mid-nineteenth century stagecoach crossings were bypassed when modern roads were constructed. Try to discover why this particular point along the river or creek would be selected to construct the bridge.

If your bridge is within a city, try consulting the **Sanborn maps**. Sanborn maps are not always available for the smaller towns in Texas, but you might try the maps of the Texas Department of Fire Insurance at the Texas State Library and Archives in Austin. These are not available for viewing online, but you can find a list of them online. Texas Highway Maps often contain large images of town maps in the margins.

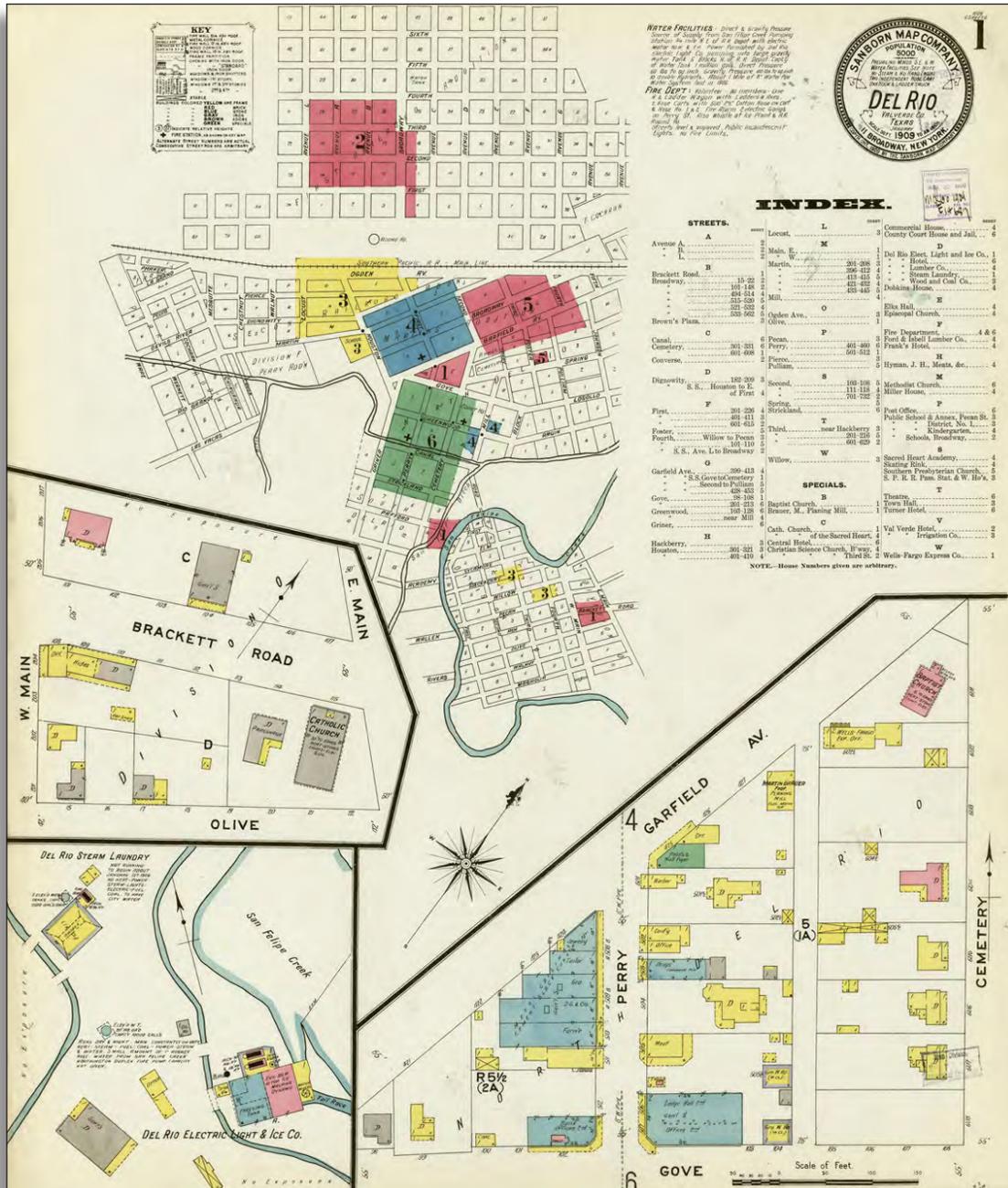


Figure 6: Sanborn Map from the City of Del Rio.
Source: Center for American History, University of Texas, Austin

A series of maps from various dates will give you additional important information, such as: shifting road alignments; the location of communities that may have disappeared; location of farms (and their density over time); location of schools and other places; construction of later routes that may have become more important and replaced the use of an earlier road; and the location of other nearby bridges.

By studying maps of the entire county and the area around the bridge, you can begin to understand how important this particular road was in the overall network of roads. It is important to know if the bridge was constructed on a major or minor road. Major roads usually link major cities, like the county seat, or are major arteries between counties. From your maps, get the names of all the towns along the entire stretch of the road. Do not forget, there may have been communities along the road that are no longer in existence, or the names of towns may have been changed over time. This is why it is important to rely on the historic maps and not just the road as it is today.

Once you have learned the name of the road your bridge is located on, you can find more information about it in the County records. This is discussed more fully below.

When was it built?

Who built it?

How did it get built?

If you are lucky, there is a metal plaque on your bridge with the name of the builder and the date it was constructed. The bridge records at the Texas Department of Transportation contain information on most every bridge in Texas, including an estimated date, but these dates should be verified by your research. Your most valuable research tools for information on local bridges are the county commissioners records.



Figure 7: Bridge plaque for Warren Pony Truss Bridge on County Road 4620 over Lake Creek, Delta County.

Before proceeding to the county courthouse, first review the published survey of county records in your county conducted by the Texas Historical Records Survey between the years of 1936 and 1942. Your county records were also surveyed under the Texas County Records Inventory Project between 1973 and 1981. The types of records kept by counties for their roads and bridges will vary from county to county. These surveys will give you a better idea of what kind of records are available and where you might find information on roads and bridges. The earlier inventories contain good maps of the county and provide an overall history of the county. These were often reprinted in the later inventories from the 1970s. The inventories describe the different types of records created by each of the different elected officials or departments in your specific county. As the type of records kept by the county changed over the years, these inventories are a very important guide. More importantly, these inventories have an index in the back where you can look for the terms "bridge" and "road" to see exactly which record types in your county contain the information you need. If the county inventories are not available locally, you can find your county inventory online at the the [Portal to Texas History](#) website. Search by your county or city name.

The most commonly used county records are the County Commissioners Minutes and the County Road Minutes. The "Index" to the County Commissioners Minutes will guide you to the exact entry within the minutes for your particular bridge. The quality of the index will vary from county to county. Some will be hand-written entries and very broadly stated, such as bridge over the Blanco River. But many of the indexes to county commissioners minutes were prepared as a result of the state-sponsored inventory projects and are very detailed. By studying the index, you can get a broad overview of all the roads and bridges being built within the county during a particular period. This can be very helpful in gaining a broader context of the county's transportation network being constructed at the time of your bridge.

Date of Proceedings			PARTIES INTERESTED	NATURE OF PROCEEDINGS	Book	Page	Page	Page
Month	Day	Year						
Nov	15	1906	County Clerk authorized to draw warrant	Payment of Bridge on Kaus hog pen	2	206		
"	12	"	Benton & N	Warn on Road	2	200		
"	"	"	J. I. Lawrie	Hauling Bridge lumber	2	200		
"	"	"	Vickers Smith Lbr Co	Bridge lumber	2	200		
"	"	"	O. W. Alexander	Surveying Public Road	2	201		
"	"	"	J. B. Parrish	warn on Road - hauling lbr	2	201		
"	"	"	W. I. Wall saw	nails	2	201		
"	"	"	Smith J. B.	Plans & specifications for bridge	2	209		
2	11	07	Vickers Smith Lbr Co	By Scruggs	2	210		
2	16	"	Wardridge J. B.	lumber	2	210		
"	"	"	Beem C. F.	interest on warrants	2	210		
5	12	"	Vickers Smith Lbr Co	lumber	2	224		
11	11	"	W. P. Watson	Bridge work	2	260		
"	"	"	A. J. Sherman	Hauling lumber & building certificate to bridge	2	260		
"	"	"	Western Lumber Co	Lumber for bridge	"	"		
"	"	"	Wallace Bros Lbr Co	5 Bbls Cement	"	"		
7	2	08	Mason Contractors & Co	Bridge recessed & ordered rail	"	308		

Figure 8: Index to Commissioners Court Minutes, Collingsworth County.

The entries for the County Commissioners Minutes should provide the details you need about the date of the bridge and the company that constructed it. But the minutes will vary greatly from county to county, and even from year to year, depending on the aptitude of the individual county clerk. Some references will be extremely vague, such as the county purchased seven bridges from a particular bridge company with no reference as to where they would be located. Other county commissioners minutes will include a wealth of details including a transcript of the actual contract with the bridge builder and an explanation of why the bridge was needed.

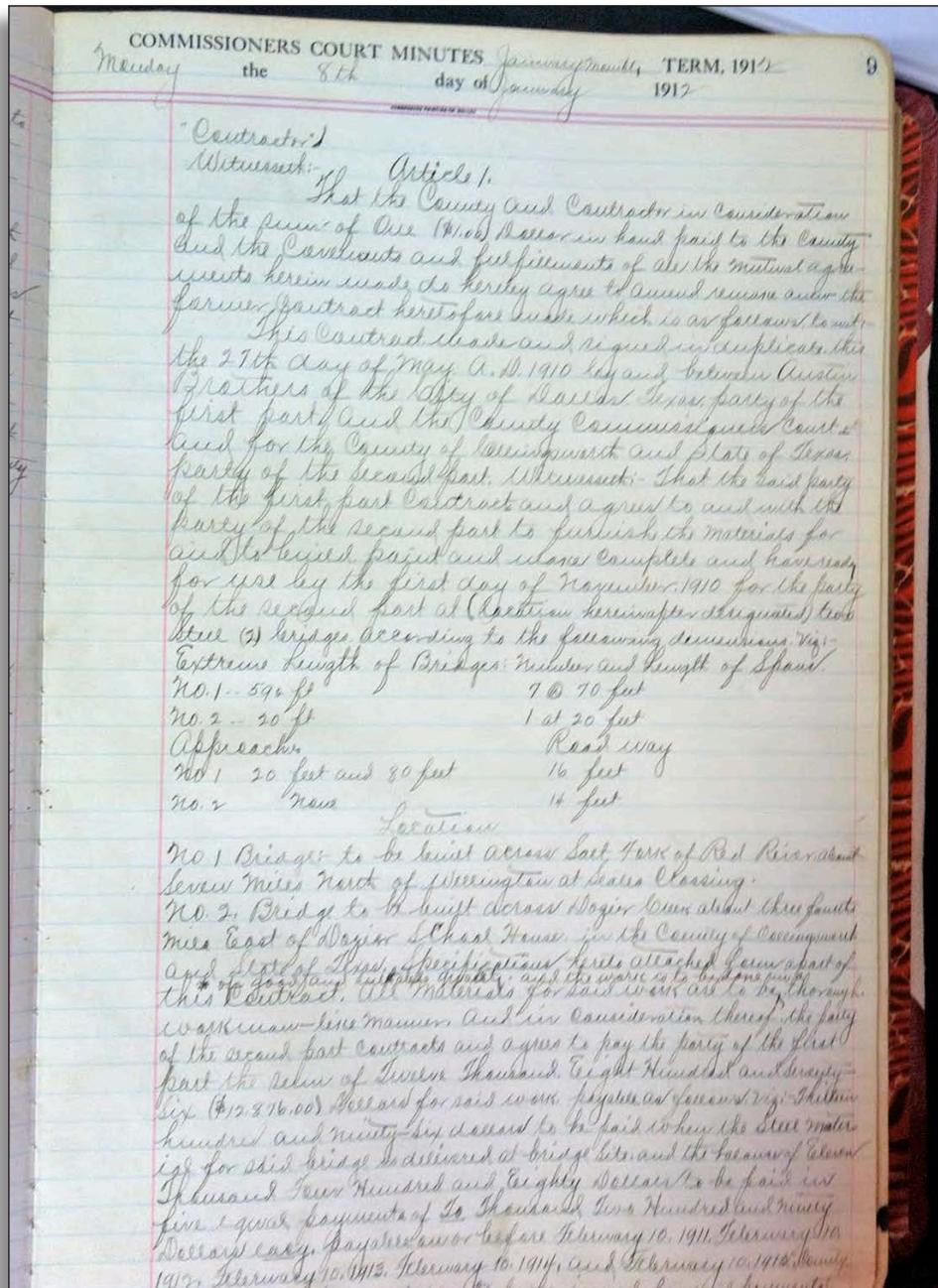


Figure 9: Commissioners Court Minutes, Collingsworth County (1911).

As you do the research on your particular bridge, do not forget to research the road on which it is located. You will be able to look up the name of the road in the same index as you did the bridge. It is not uncommon for a bridge and its road to be part of a larger transportation project in the county. There may have been a bond election to fund these projects. If so, you will want to know more about when the election was held, the outcome of the election, and the amount of the bond issuance, as well as the other roads that were constructed.

Some counties kept separate minutes for the meetings of their Road Commissioners, often referred to as the County Road Minutes. These records will often focus on the appointment of road superintendents and the roads they were responsible for maintaining, but they can also help identify the early location of road precincts. However, many counties were authorized by the Texas Legislature to form Road Districts to fund the construction of roads. These road districts kept separate minutes that can provide detailed information on road and bridge construction. While these road districts often conformed to the commissioners precincts, the boundaries of precincts have changed over time, particularly in the more populous counties, due to redistricting.

As you are looking at the county commissioners minutes for either your bridge or the road on which it is located, it helps to read the adjacent minutes to gain an understanding of what other events were taking place at the same time.

Of course, if your bridge is within the city limits of a town and not on a state-owned road, you will want to consult the minutes of the city council. If a municipality constructed the bridge, they would have voted on the funding for it. While the city secretary maintains all of the city council minutes, other municipal records may be in storage or might have been destroyed through the years. Consult with your city secretary as to what records may be available. Many times historical maps wind up framed and on walls within private city offices, but people will forget about them unless you specifically ask. It might be much harder to find this information, however, because cities rarely have an index to their minutes. You can use the estimated date from the TxDOT bridge inventory to help you pin down the date and begin searching in those years. Many smaller towns, however, just didn't have the money to build roads and bridges. They depended on the counties to help them. Inter-local Agreements (or contracts) between cities and counties, when available, can help you understand the relationship between the county and the town in the maintenance of roads and bridges. Even today, smaller towns rarely have the resources to maintain public works departments and rely on counties or TxDOT for road projects.

Be aware that towns grow over time through annexation of land within their city limits. Towns usually have a map that will document the dates when they annexed land into their city limits. If you are researching a bridge, make certain that it was actually constructed by the municipality, and not the county.

Is the bridge important?

Why did they build it and why is it important?

Now you have the basic facts of the bridge. You know what road it was built on, when it was built, who built it, and the circumstances behind how it got built. Now you must demonstrate that building the bridge at this particular point in time was an important event in your county or city. Why a road and its bridge were built pulls together all of your research and explains why that construction was important to the community.

Obviously, roads and bridges are important because they provide transportation for our communities, but some roads are more important than others. There is a hierarchy of roads within our transportation networks, with both major and minor roads. However, the hierarchy of roads can change over time as new roads are built or due to changes in the economy.

There can be many reasons that a bridge and its road were truly important to a community. A common reason for the construction of roads was to promote the economic development of an area. However, it is important to demonstrate that the construction actually resulted in a significant contribution to the growth in the economy. For example, the road and bridge may have been essential in linking agricultural lands to area depots after the arrival of the railroad, thus changing the agricultural landscape from subsistence crops to cash crops, like cotton. There may have been a specific important event that caused the construction of the road and bridge, like the discovery of an important oil field. Some roads and bridges were part of a Federal relief program that provided much-needed local jobs during the Depression. These are just a few examples. Since every community has its own unique history, there could be many reasons why a road and its bridge are important.

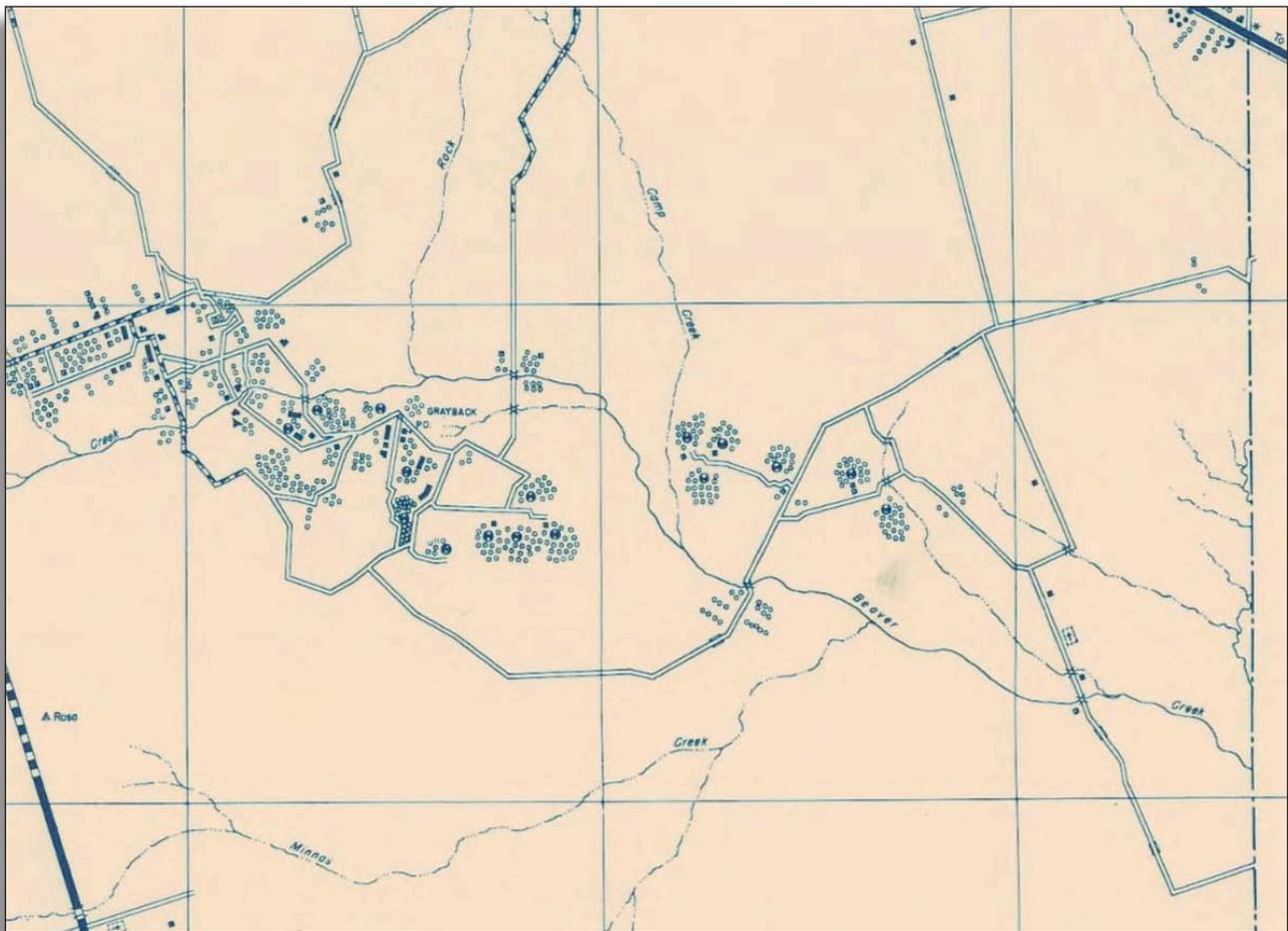


Figure 10: Detail of 1936 Texas Highway Map showing the location of oil fields in relationship to creeks and bridges.
Source: Texas Highway Department

It is essential that you understand the overall history of the area and the important historical events that occurred during the construction of the roadway and the bridge. By providing this historic context, you can link the construction of the road and its bridge to the important event that occurred in your area.

The [New Handbook of Texas](#) includes a brief history of every county and town in Texas. It also includes entries for most rivers and creeks. This encyclopedia for Texas also includes a bibliography that can guide you to local histories. County histories published at the local level are excellent sources of information on your area. These publications can usually be found at your local public library or by contacting a member of your county historical commission. The [Acadia Publishing Company](#) series called “Images of America” is an excellent source for the history of both counties and towns in Texas. There are over 250 titles on the State of Texas. Another very good source for information on county histories are the “Soil Survey” publications of the 1930s and 1940s. Sponsored by the U.S. Department of Agriculture and written by the local Texas Agricultural Experiment Stations, these publications are very good sources for an overview of the history of agriculture and livestock in the various counties throughout the state. They also contain large maps. Later editions from the 1970s onward generally do not contain the historical information.

The internet continues to be an invaluable resource for historical information. Search online using the name of your county or town. It will often turn up in obscure reports that could prove useful. [Portal to Texas History](#) is a digitized collection of materials from various Texas libraries, museums, archives, historical societies, and even private family collections. The site includes almost one million digital images of photographs, maps, books, pamphlets, newspapers, and a wide range of other materials. It is fully searchable and is a wonderful resource for Texas history. As it is being added to all the time, you should consult it often. It is headquartered at the University of North Texas in Denton. [Google Books](#) has also digitized a number of out of print publications and government documents that can be searched by keyword on their site.



Figure 11: Photograph of road construction in Bluegrove, Texas (1905).
Source: Portal to Texas History, University of North Texas, Denton

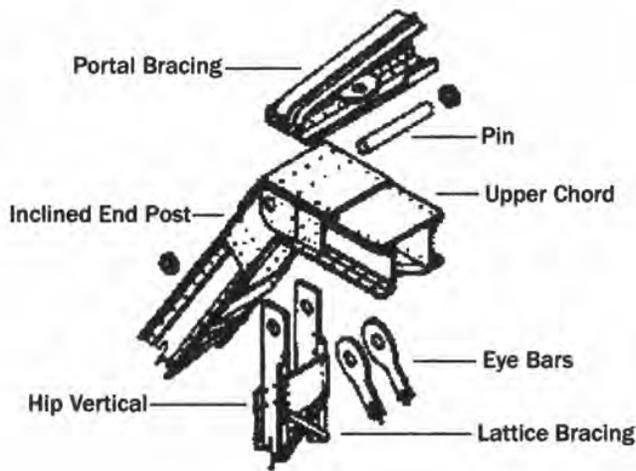
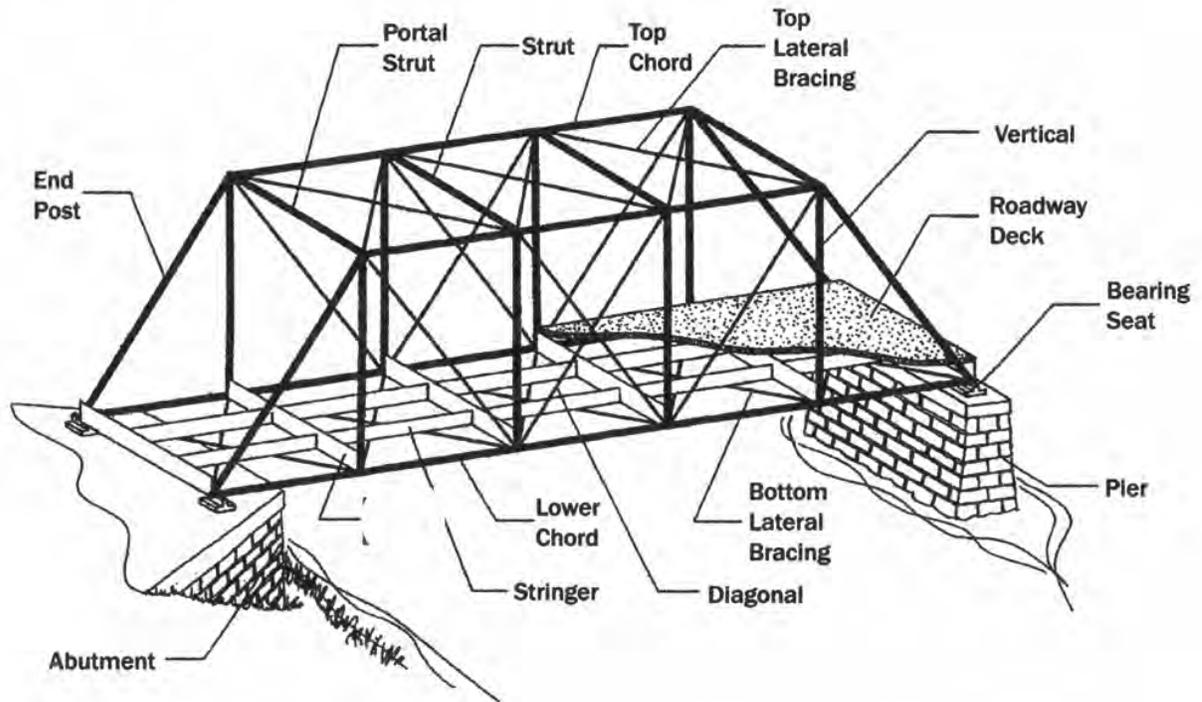
It is very important to define the dates in which these historical events actually occurred. This is referred to as “period of significance.” Many bridges were constructed as replacement bridges after a flood or to replace a deteriorated bridge after the important historical event occurred. Many of the smaller metal truss bridges were designed to be easily moved from location to location as necessary. If the bridge was moved, it is important to know the date of the move so you can place it within the proper historic context and period of significance.

Many times people claim a bridge is important because it is the only surviving example of a particular type in their county. However, it is only important today because it is the only surviving example. It is important to know if, at one time, there were many such examples of this type of bridge in the area. Exhaustive research on the construction of the bridges in the county during the period will need to be accomplished. Also, it is not enough to just be the only surviving example; it would also need to be a very good example of its particular type.

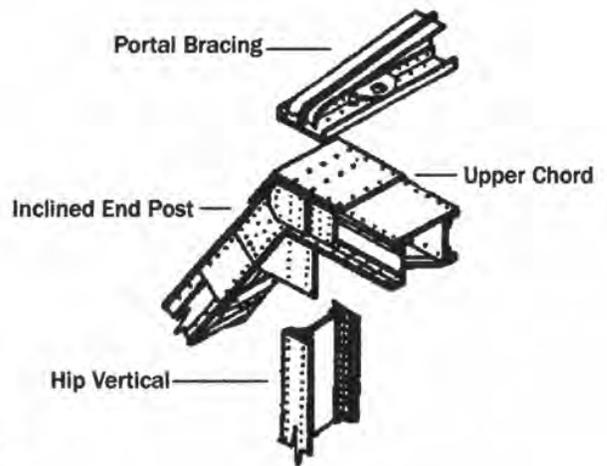
OVERVIEW OF BRIDGE TYPES

MAJOR TYPES OF METAL TRUSS BRIDGES

Metal Truss Bridge Type



PINNED CONNECTION

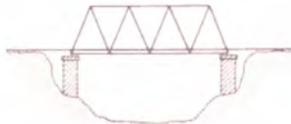


RIVETED CONNECTION

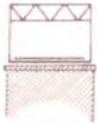
CONSTRUCTION TYPES: RELATIONSHIP OF ROADWAY TO TRUSS

Through Truss

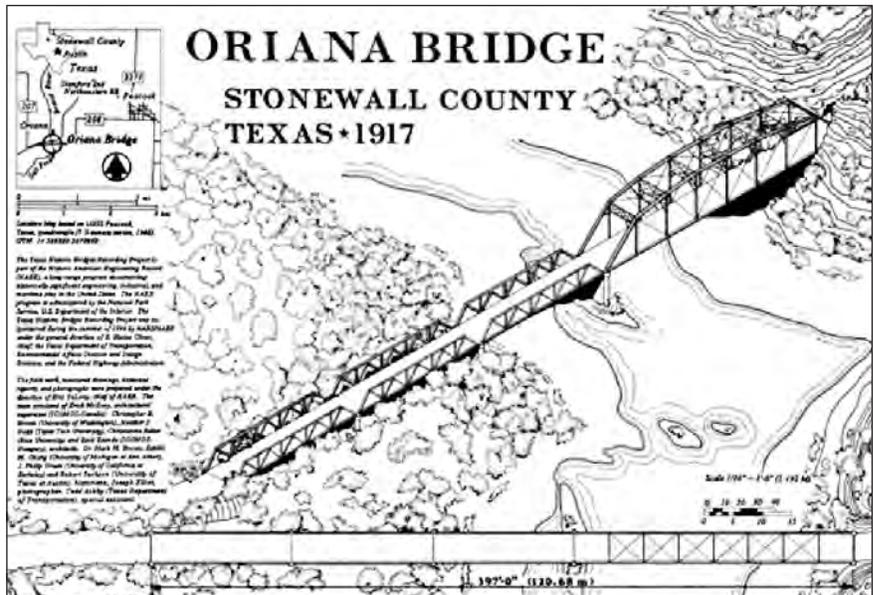
Roadway is located along the bottom chords of the truss. Chords are connected with lateral bracing.



Elevation



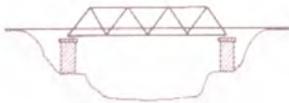
Transverse Section



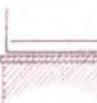
Oriana Bridge at the Salt Fork of the Brazos River at CR 207, Peacock, Stonewall County. Built in 1917.

Pony Truss Pratt Half-Hip

Roadway is located along the bottom chords of the truss. Chords are connected with lateral bracing.



Elevation



Transverse Section



Pratt Half-Hip Pony Truss on CR 301 at the Leon River, near Hamilton, Hill County. Built in 1911.

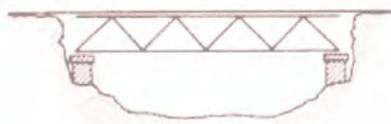
CONSTRUCTION TYPES: RELATIONSHIP OF ROADWAY TO TRUSS

Deck Truss

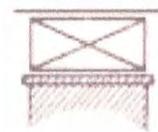
Truss is located below the roadway.



Highway 281 Bridge in Marble Falls, Burnet County.
Built in 1937.



Elevation

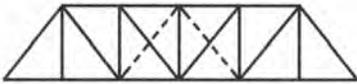


Transverse Section

DIFFERENT TYPES OF THE PRATT TRUSS

Pratt

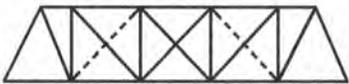
1844-20th century.
Span of 25-150 feet.
Diagonals in tension,
verticals in compression
(except for hip verticals
adjacent to inclined end
posts).



Plano Bridge spanning the East Navidad River near Schulenburg, Fayette County. Built in 1885.

Pratt Half-Hip

Late 19th-early 20th century.
Span of 30-150 feet. A Pratt
with inclined end posts that
do not horizontally extend
the length of a full panel.

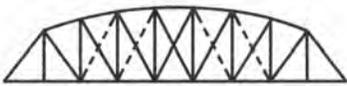


East Sweden Bridge near Brady, McCulloch County.
Built circa 1900.

DIFFERENT TYPES OF THE PRATT TRUSS

Parker

Mid-late 19th-20th century.
Span of 40-200 feet. A Pratt with a polygonal top chord.



Ron Inks Bridge spanning the Llano River, Llano, Llano County. Built circa 1935.

Camelback

Late 19th-early 20th century.
Span of 100-300 feet. A Parker with a polygonal top chord of exactly five slopes (a variation has subdivided panels).

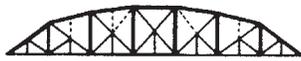


Bryant Station Camelback Bridge on CR 275 at the Little River in the vicinity of Bucholts, Milam County. Built in 1909.

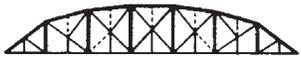
DIFFERENT TYPES OF THE PRATT TRUSS

Pennsylvania (Petit)

1875-early 20th century.
Span of 250-600 feet.



Parker with sub-struts



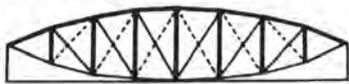
Parker with sub-ties



San Marcos River Bridge on CR 465 at the San Marcos River near Gonzales, Gonzales County. Built in 1902.

Lenticular (Parabolic)

1878-early 20th century.
Span of 150-400 feet.
A Pratt with both top and bottom chords parabolically curved over their entire length.



Bryant Station Camelback Bridge on CR 275 at the Little River in the vicinity of Bucholts, Milam County. Built in 1909.

BOWSTRING ARCH TRUSS

Bowstring Arch Truss

1840-late 19th century. Span of 70-175 feet. A tied arch with the diagonals serving as bracing and the verticals supporting the deck.



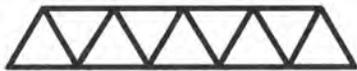
Bowstring Bridge on CR 301 at the Leon River, near Hamilton, Hamilton County. Built in 1884. Moved.



DIFFERENT TYPES OF THE WARREN TRUSS

Warren

1848-20th century. Span of 50-400 feet. Triangular in outline, the diagonals carry both compressive and tensile forces. A “true” Warren truss has equilateral triangles.



Highway 281 Bridge in Marble Falls, Burnet County.
Built in 1937.

Warren (with verticals)

Mid 19th-20th century. Span of 50-400 feet. Diagonals carry both compressive and tensile forces. Verticals serve as bracing for triangular web system.



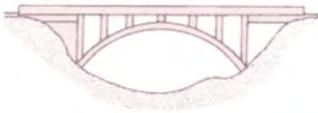
Old McDade Road Bridge, CR 106, Elgin, Bastrop County.
Built in 1922.

MAJOR TYPES OF CONCRETE BRIDGES

CONCRETE BRIDGE TYPES

Open Spandrel Arch

Visible vertical members within the open spandrel of the arch.



Elevation



Transverse Section



Scott Avenue Bridge at the Wichita River, Wichita Falls, Wichita County. Built in 1927.

Closed Spandrel Arch

Earliest type of concrete bridge in Texas, but not commonly used after the 1920s.



Elevation



Transverse Section

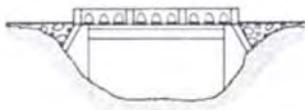


Roosevelt Bridge at Mission Parkway at the San Antonio River, San Antonio, Bexar County. Built in 1915.

CONCRETE BRIDGE TYPES

Concrete Girder (T-Beam)

Introduced in the 1910s, reinforced T-shaped beams support the roadway deck to provide greater strength for longer spans.



Elevation



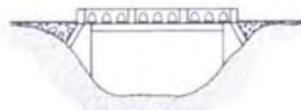
Transverse Section



Oakes Street Bridge at the North Concho River, San Angelo, Tom Green County. Built in 1930.

Concrete Slab

Popular in the 1920s as an economical and simple bridge type for small to medium spans.



Elevation



Transverse Section



Palo Pinto Snider Bridge, Palo Pinto County. Built in 1940.

FAQs ON EVALUATION OF HISTORIC BRIDGES
FOR THE NATIONAL REGISTER OF HISTORIC PLACES
- CRITERION A AT THE LOCAL LEVEL -

How do I determine if a historic bridge is eligible for listing in the National Register of Historic Places under Criterion A at the local level?

For a bridge (structure), or any historic resource, to be eligible for the National Register of Historic Places, it must (1) be at least 50 years of age or older, (2) it must be *significant* to local history, and (3) retain a sufficient level of historic integrity, or historic materials, to convey that significance.

If you believe a bridge in your area qualifies, you should send photographs with a brief history to the Texas Historical Commission for a determination of eligibility.

Where can I find information on a bridge (type of bridge, date built, contractor, etc.) ?

The Historic Bridge Foundation maintains a website with graphic information on the identification of types of bridges (www.historicbridgefoundation.com). The MPS (multiple property submission) for “Historic Road Infrastructure of Texas, 1700s-1965” also contains a great deal of information on every type of bridge constructed in Texas. TxDOT has surveyed most of the historic bridges in Texas and maintains a database and basic files on most bridges. You can contact Mark Brown at 512-416-2600 for additional information on the bridge database.

The most important source of information on the history of local bridges are the documents at the County Courthouse. The County Commissioners Court Minutes often contain information about the purchase or contracting of bridges. The early minutes were indexed by subject. These “indexes” to the Commissioners Minutes are in separate volumes. In the early years of the 20th century, many counties kept separate volumes of Road Minutes pertaining specifically to the construction of roads and bridges. Older maps of the county can help you understand what communities were linked by the early roads. Your County Clerk can be helpful in locating the records you need.

Bridges over a particular crossing were often destroyed by flooding, so there may have been multiple bridges constructed at a particular site. Also, truss bridges were often moved to different crossings so your research must be very thorough to determine when a particular bridge was placed at a particular site.

Why would a bridge be significant at the local level ?

Bridges are most commonly significant in the area of transportation for their role in conveying passengers and materials across streams and rivers as part of a particular road. A bridge does not stand alone, but is an integral part of the road with which it is associated. In order to understand the significance of a bridge, it is important to investigate “why” a particular road was important to a community or region. Did the road result in the growth of important new towns (transportation: community planning and development)? Or was the road essential in getting agricultural products to a new rail line in the county, thus allowing farmers to move from a subsistence agriculture to cash crops (transportation: agriculture)? Did the road result in the development of an important industry in the area, such as cotton gins, the oil industry, or the lumber industry (transportation: commerce)?

What is a historic context and why do I need it?

A historic context identifies the important themes or trends in the area that are essential to identifying the significance of a bridge and its associated road (see above). It is the history of the important events that give the bridge and its associated road significance. The historic context is used in the National Register nomination in Section 8: Statement of Significance. It is also important in identifying a “period of significance,” or the period of time when a bridge or road was associated with the important events that give it significance. Continued use of a bridge or road does not justify continuing the period of significance if the important events have ceased to exist. For example, the period of significance for a bridge that played an important role in transporting the area’s cotton production to a nearby rail depot would begin with its date of construction and end with either the demise of the importance of the cotton industry or the use of trucks for transportation.

How can I use the MPS historic context for “Historic Road Infrastructure of Texas”?

The historic context (Section E of the MPS) provides a wealth of information on the evolution of roads in Texas. Although it is written from a broader, statewide perspective, it provides important background information that will help you understand how local roads were built, how they evolved over time, the role counties played in their construction, the differences between local and state roads, and the many ways roads are important to the development of the history of our State.

What is historic integrity and how does it apply to a historic bridge?

There are seven aspects of historic integrity: location, design, material, workmanship, association, setting and feeling. The *National Register Bulletin No. 15: How to Apply the National Register Criteria For Evaluation* provides more information on how the aspects of integrity are defined (pages 44-48). This bulletin is available from the Texas Historical Commission and online (www.thc.state.tx.us). The MPS for “Historic Road Infrastructure of Texas, 1700s-1965” can provide guidance on how to apply the aspects of historic integrity specifically to a historic bridge and which aspects of historic integrity are most important for evaluating a historic bridge under Criterion A (see Section F of the MPS).

RESEARCH RESOURCES

BRIDGES LISTED IN THE NATIONAL REGISTER OF HISTORIC PLACES (THROUGH 2012)

Angelina County

US 59 Bridge over the Angelina River (1988)

Bastrop County

Colorado River Bridge at CR 150 (1990)

Iron Bridge over Piney Creek (1978)

Bee County

Medio Creek Bridge at CR 241, near Normanna (1988)

Bell County

Missouri, Kansas & Texas Railroad Bridge across the Leon River at Taylor's Valley Road (1990)

State Highway 53 Bridge over the Leon River, 2.5 miles east of the junction with FM 93 (1996)

Bexar County

Dionicio Rodriguez Bridge, Brackenridge Park, 400 N. St. Mary's Street, San Antonio (2004)

Hays Street Bridge over the Union Pacific Railroad, San Antonio (2012)

State Highway 3-A Bridge over Cibolo Creek at the Bexar and Guadalupe County line, Schertz (2011)

Burnet County

State Highway 29 Bridge over the Colorado River, located at the Llano County Line
at Buchanan Dam (1996)

Caldwell County

State Highway 3-A Bridge over Plum Creek, 5 miles west of the junction with I-10 (1996)

Clay County

State Highway 79 Bridge over the Red River, at the Texas State Line (1996)

Collingsworth County

US 83 Bridge over the Salt Fork of the Red River, 16 miles south of the Wheeler County Line (1996; demolished 2012)

Colorado County

State Highway 3 Bridge over the Colorado River, .6 miles east of the junction with Loop 329 (1996)

Comal County

Faust Street Bridge over the Guadalupe River, New Braunfels (2009)

Dallas County

Houston Street Viaduct, between Arlington Street and Lancaster Avenue, Dallas (1984)

Denton County

Gregory Road Bridge over Duck Creek, at the Denton County line (2004)

Old Alton Bridge over Hickory Creek, Copper Canyon Road (1988)

Rector Road Bridge, 7501 Teasley Lane, Denton (2004)

DeWitt County

State Highway 27 Bridge over the Guadalupe River, .13 miles south of junction with US 183, near Cuero (1996)

Erath County

Bluff Dale Suspension Bridge, located on Berry's Creek Road (1977)

Fanin County

State Highway 78 Bridge over the Red River, located at the Texas State Line near Ravenna (1996)

Fayette County

State Highway 71 Bridge over the Colorado River, .8 miles east of the junction with FM 609 (1996)

Cummins Creek Bridge over Cummins Creek, 2 miles northwest of Round Top (1975)

Mulberry Creek Bridge, 2.5 miles southwest of Schulenburg on the Old Praha Road (1975)

Galveston County

Galveston Causeway over Galveston Bay, Galveston Island (1976)

Harris County

State Highway 35 Bridge over the West Fork of the San Jacinto River, US 59 approximately 1.4 miles north of junction with FM 1960 near Humble (1996)

Almeda Road Bridge over Brays Bayou, Houston (2007)

Telephone Road Bridge over Brays Bayou, Houston (2007)

Hill Street Bridge over Buffalo Bayou, South Jensen Drive, Houston (2007)

Sabine Street Bridge over Buffalo Bayou, Houston (2007)

San Jacinto Street Bridge over Buffalo Bayou, Houston (2007)

Yale Street Bridge over White Oak Bayou, Houston (2011)

McKee Street Bridge, Houston (1988)

Hays County

Bunton Branch Bridge on CR 210 in Kyle (2002)

Hill County

Nolan River Bridge 303-A of the Gulf, Colorado & Santa Fe Railway, CR 1127 at Nolan River (2012)

Jasper County

US 190 Bridge over the Neches River, at the Jasper and Tyler County line (1996)

Jefferson County

Port Arthur-Orange Bridge, TX 87 at Jefferson and Orange County line (1996)

Kaufman County

State Highway 34 Bridge over the Trinity River at the Ellis and Kaufman County line (1996)

Kimble County

State Highway 27 Bridge over the Johnson Fork, .6 miles west of junction with FM 2169 (1996)

State Highway 27 Bridge over the South Llano River, .2 miles east of 6th Street, Junction (1996)

Knox County

State Highway 16 Bridge over the Brazos River, 6 miles south of junction with US 82 (1996)

Lamar County

State Highway 5 Bridge over High Creek, 1.8 miles west of junction with FM 38 (1996)

State Highway 5 Bridge over Big Pine Creek, 1.4 miles east of junction with FM 38 (1996)

Lampasas County

US 190 Bridge over the Colorado River, at the Lampasas and San Saba county lines (1996)

Liberty County

State Highway 3 Bridge over the Trinity River, 1.3 miles west of junction with FM 2684 (1996)

Mason County

State Highway 9 Bridge over the Llano River, 10 miles south of TX 29 (1996)

McLennan County

Waco Suspension Bridge over the Brazos River, Bridge Street, Waco (1970)

Washington Avenue Bridge over the Brazos River, Washington Avenue, Waco (1998)

Mills County

Regency Suspension Bridge over the Colorado River, .75 miles south of Regency (1976)

Newton County

Burr's Ferry Bridge, at the Louisiana State line (1998)

Deweyville Swing Bridge over the Sabine River, SH 12 at the Louisiana State line (2011)

Orange County

Cow Bayou Swing Bridge, SH73/87 approximately 13 miles northeast of juncture with FM 1442 (2010)

Palo Pinto County

US 281 Bridge over the Brazos River, 2.2 miles north of I-20 (1996)

Parker County

State Highway 89 Bridge over the Brazos River, 1.7 miles west of junction with FM 113 (1996)

Shackelford County

Hubbard Creek Bridge, FM 601 approximately 7.5 miles east of the junction with TX 6 (1996)

State Highway 23 Bridge over the Clear Fork of the Brazos River, US 283 approximately 2.3 miles south of Throckmorton County line (1996)

Fort Griffin Bridge over the Brazos River, northeast of Fort Griffin (1979)

Starr County

Roma-San Pedro International Bridge, near Hidalgo Street and Bravo Alley, Roma (1984)

Tarrant County

Henderson Street Bridge over the Clear Fork of the Trinity River, Fort Worth (2010)

Paddock Viaduct, Fort Worth (1976)

Tom Green County

Lone Wolf Crossing Bridge, Avenue K extension, San Angelo (1988)

Travis County

Lamar Boulevard Bridge over the Colorado River, Austin (1994)

Montopolis Bridge over the Colorado River, US 183 approximately 8 miles south of junction with I-35, Austin (1996)

Uvalde County

State Highway 3 Bridge over the Nueces River, US 90 approximately 13 miles east of junction with Kinney County line (1996)

Walker County

Riverside Swinging Bridge, located northeast of Riverside, Texas (1979)

State Highway 19 Bridge over the Trinity River, Walker County line (2004)

Wharton County

Texas and New Orleans Railroad Bridge over the Colorado River, .25 miles west of Old US 59 (1993)

Bridge over the Colorado River, South Richmond Road (Old US 59), (1993)

Wheeler County

Route 66 Bridge over the Chicago, Rock Island & Gulf Railroad, I-40 south frontage road over the former railroad right of way, Shamrock (2007)

Wichita County

FM 2326 Bridge over Beaver Creek, 1 mile west of juncture with TX 25 (1996)

Wilson County

Mueller Bridge over Cibilo Creek, CR 337, La Vernia (2007)

GLOSSARY OF TERMS

Terms for Describing the Features of a Bridge

Abutment

The part of the substructure of a bridge that supports the ends of a single span, or the extreme ends of a multispan structure. An abutment also supports the approach embankment and carries the load from the deck.

Beam

A linear structural member designed to span from one support to another. A rigid and horizontal structural element.

Bent

A substructure unit made up of two or more columns /column-like members connected at their top-most ends by a cap, strut, or other member holding them in place.

Bracing

A system of secondary members that maintain the geometric configuration of primary members.

Cast Iron

Relatively pure iron, smelted from iron ore, containing 1.8% to 4.5% free carbon and cast to a particular shape. It is a brittle alloy that has been melted and can be made into any shape.

Chord

The upper or lower part of a truss, usually horizontal, that resists compression or tension

Column

A vertical, structural element strong in compression.

Component

A general term reserved to describe a bridge deck, superstructure, or substructure. Subcomponents, such as floor beams, are called “elements.”

Cross Girders

Girders supported by bearings which supply transverse support for longitudinal beams or girders.

Deck

The roadway surface of a bridge.

Decking

A term specifically applied to bridges with wooden floors; it is used to designate the floor only. It does not include the members serving to support the flooring.

Design Load

The force for which a structure is designed.

Diagonal

A structural member of a truss or bracing system that runs obliquely across a panel.

Diaphragm

A member placed within a member or superstructure system to distribute stresses and improve strength and rigidity.

End Post

The end compression member of a truss, whether vertical or inclined in position and extending from top chord to bottom chord.

End Span

A span adjacent to an abutment.

Girder

A large beam that acts as a primary support, receiving loads from floor beams and stringers. It usually receives loads from floor beams and stringers.

Lateral Bracing

The bracing assemblage engaging a member perpendicular to the plane of the member. Its function is to resist lateral movement.

Longitudinal Bracing

Bracing that runs lengthwise with a bridge and provides resistance against longitudinal movement and deformation of transverse members.

Lower Chord

The bottom horizontal member of a truss.

Member

An individual angle, beam, or plate intended to become an integral part of an assembled frame or structure.

Panel

That portion of a truss between adjacent posts or struts in Pratt truss bridges. It is also called a "bay."

Pier

A vertical supporting structure like a pillar. The part of a bridge substructure that supports the ends of the spans of a multi-span superstructure at intermediate locations between the abutments.

Rib

Curved structural member supporting a curved shape or panel.

Secondary Member

A member that is carried by other members and does not resist traffic loads.

Slab

A flat beam, usually of reinforced concrete, which supports a load.

Span

The distance a bridge extends between two supports.

Structural Member

An individual piece, like a beam or strut, which is an integral part of a structure.

Substructure

The abutments, piers, bents and footings that alone or in combination support the superstructure of the bridge.

Superstructure

The portion of a bridge that receives traffic loads, in turn transferring those loads and its own load to the substructure. The superstructure may consist of girders, slabs, or other types of construction.

Truss

A bridge support whose framework is composed of members forming a triangle or system of triangles that support both the weight of the bridge (dead load) and the traffic (live) loads. The tension and compression members are arranged to transmit loads from intermediate points to the ends.

Transverse Bracing

The bracing assemblage engaging the columns of bents and towers in planes transverse to the bridge alignment that resists the transverse forces tending to produce lateral movement and deformation of the columns.

Web Members

The intermediate members of a truss, not including the end posts. They are usually vertical or inclined.

Common Engineering Terms

Axle Load

The load borne by one axle of a vehicle.

Compression

A type of stress involving pressing together. It tends to shorten a member (the opposite of tension).

Compression Members

Generally, stiff, heavy members that withstand pressures that tend to push them together. These members may be made of timber, iron, steel or concrete.

Cyclic Stress

The variation in stress at a point from initial dead load value to the maximum additional live load value, and hence back to dead load value with the passage of a live load.

Dead Load

A static load due to the weight of a structure alone.

Distributed Load

A load uniformly applied along the length of an element or component of a bridge.

Live Load

A dynamic load, such as vehicular traffic, that is applied to a structure suddenly. Vibration and movement affect its intensity.

Load

Weight distribution through a structure.

Moving Load

A live load which is moving, such as vehicular traffic.

Tension

A type of stress tending to elongate a body. It tends to lengthen a member (the opposite of compression).

Tension Members

Members of a bridge that resist forces tending to pull them apart; usually made of iron or steel due to superior tensile strength.

Terms for Describing the Condition of a Bridge:

Appraisal Rating

A judgement of the condition of a bridge component in comparison to current standards.

Bridge Deficiency

A defect in the bridge component or member that makes the bridge less capable or less desirable for use.

Brittle

Characteristic of a material that fails without warning. Brittle materials do not stretch or shorten before failing.

Condition Rating

A rating of a bridge component condition in comparison to its original, as-built condition.

Corrosion

The general disintegration of surface metal through oxidation.

Delamination

Subsurface separation of concrete into layers.

Efflorescence

A white deposit on concrete or brick caused by the crystallization of soluble salts brought to the surface by moisture in the masonry or concrete.

Fatigue

The tendency of a member to fail at a lower stress when subjected to cyclical loading than when subjected to static loading.

Fracture Critical Member

A member in tension or with a tension element whose failure would probably cause a portion of the entire bridge to collapse.

Hairline Cracks

Very small cracks that form in the surface of concrete due to tension caused by loading.

NBIS National Bridge Inspection Standards

First established in 1971 to set bridge inspection frequency, standards and procedures for inspection, and report formats.

Scaling

The gradual deterioration of a concrete surface due to the failure of the cement paste caused by chemical attack or freeze and thaw cycles.

Additional Useful Terms

Alignment

The relative horizontal and vertical positioning with the approaches or roadways.

Anchor Bolt

A shaft-like piece of metal commonly threaded and fitted with a nut and washer at one end only. It is used to secure the components of a bridge to the substructure.

Approach Slab

A reinforced concrete slab placed on the approach embankment adjacent to and usually resting upon the abutment back wall. The function is to carry the weight of a load directly to the abutment thus preventing any roadway misalignment due to embankment settlement.

Aqueduct

A bridge or channel for conveying water, usually over long distances.

Arch

A curved structure in compression.

Arch Bridge

A curved structure that converts the downward force of its own weight, and the weight of the bridge, into an outward force along its sides and base.

Bank

Sloped sides of a waterway channel or approach roadway.

Bascule Bridge

A bridge over a waterway with a section that rotates from a horizontal to a vertical position to allow passage of boats under the bridge.

Base Plate

A rectangular slab of steel connected to a column, bearing or other member to transmit and distribute its load to the superstructure.

Battered Pile

A pile driven in an inclined position to resist horizontal forces as well as vertical forces.

Beam Bridge

A simple type of bridge composed of horizontal beams supported by vertical posts. A continuous span beam bridge is one in which beam bridges are linked to another. Some of the longest bridges in the world are this type of bridge.

Bowstring Truss

A general term applied to a truss of any type having a polygonal arrangement of its top chord members conforming to the arrangement required for a parabolic truss.

Box Beam

A hollow structural beam with a square, rectangular, or trapezoidal cross-section.

Box Culvert

A culvert in a rectangular or square form.

Brush Curb

A narrow curb, 9 inches or less in width, which prevents a vehicle from brushing against the railing.

Caisson

A rectangular or cylindrical chamber for keeping water or soft ground from flowing into an excavation. Used during the construction of a bridge's piers or abutments

Cantilever

A projecting structure supported only at one end, like a shelf bracket or a diving board.

Cast-in Place

Constructing a concrete component by pouring the concrete within a formwork.

Closed Spandrel Arch

A stone or reinforced concrete arch span having spandrel walls to retain the spandrel fill or to support (entirely or partially) the floor system when the spandrel is not filled.

Continuous Beam

A general term applied to a beam which spans uninterrupted over one or more intermediate supports.

Continuous Truss

A truss having its chord and web members arranged to continue uninterrupted over one or more intermediate points of support.

Covered Bridge

A term applied to a wooden bridge having its roadway protected by a roof and enclosed sides.

Culvert

A drainage structure beneath an embankment.

Deck Bridge

A bridge in which all the supporting members are beneath the roadway.

Double Intersection

The style of truss where the diagonals cross the posts at the middle of their length.

Embankment

A bank of earth constructed above the natural ground surface to carry a road or to prevent water from passing beyond desirable limits.

Fascia Girder

An exposed outermost girder of a span sometimes decorated.

Field Riveting

Riveting done in the field during construction. It is the poorest and most expensive kind of riveting.

Footing

The enlarged lower portion of a substructure which distributes the load either to the earth or to supporting piles. The most common form of footing is a concrete slab.

Girder Bridge

A bridge type in which the deck is supported by longitudinal structural members, or girders. The superstructure consists of two or more girders supporting a separate floor system.

Girder Span

A span in which the major longitudinal supporting members are girders.

Hanger

A tension member serving to suspend an attached member.

Hip Joint

The juncture of the inclined end post with the end top chord member of a truss. Also known as the hip truss.

Howe Truss

A truss of the parallel chord type with a web system composed of verticals (tension) rods at the panel points with an X-pattern of diagonals.

Iron

One of the cheapest and most commonly used metals.

King Post Truss

Two triangular panels with a common center vertical. It is the simplest of the triangular system trusses.

K-Truss

A truss having a web system wherein the diagonal members intersect the vertical members at or near the mid-height. The assembly in each panel resembles the letter "K."

Lattice Truss

A truss with its web members included. Also refers to a truss having two or more web systems composed entirely of diagonal members at any interval and crossing each other with reference to vertical members.

Lenticular Truss

A truss having parabolic top and bottom chords curved in opposite directions with their ends meeting at a common joint. Also referred to as a fish belly truss.

Masonry

A building material including stone, clay brick or concrete.

Masonry Plate

A steel plate attached to the substructure to support a superstructure bearing and to distribute the load to the masonry beam.

Name Plate

A plate of iron placed in a conspicuous position on a bridge, containing such information as the maker of the bridge and its date of construction.

Open Spandrel Arch

A bridge which has open spaces between the deck and the arch, allowing one to look through the bridge.

Paddleboard

Striped, paddle-shaped signs or boards placed on the roadside in front of a narrow bridge to warn of narrow roadway width.

Parabolic Truss

A polygonal truss having its top chord and end post vertices coincident with the arc of a parabola. Its bottom chord is straight and its web system is either triangular or quadrangular. Also known as a parabolic arched truss.

Pin

A cylindrical bar used to connect components.

Pin-connected Truss

A type of early truss construction in which the truss members were connected by iron or steel pins, or bolts.

Pin Joint

A joint in a truss where the members are assembled upon a cylindrical pin.

Pony Truss

A low through truss that has no enclosing overhead members or lateral bracing joining the top chords of the individual trusses.

Portal

The entrance to a bridge, especially through a truss or through arch. The bridge plaque is often located at the top of the portal.

Post

A member resisting compressive stresses. It is located vertical to the bottom chord of a truss and is common to two truss panels.

Pratt Truss

A truss with parallel chords and a web system composed of vertical posts with diagonal ties inclined outward and upward from the bottom chord panel points towards the ends of the truss. Also known as an “N” truss.

Reinforced Concrete

Concrete with embedded steel reinforcing bars that bond to the concrete and add tensile strength to its inherent compressive strength.

Rivet

A metal fastener made with a rounded pre-formed head at one end and installed hot into a pre-drilled hole. The other end is hammered into a similar shaped head, thereby clamping the adjoining parts together.

Scupper

An opening in the floor portion of a bridge that provides for water drainage.

Simple Span

The span of a bridge or element which begins at one support and ends at an adjacent support.

Single Intersection Truss

A style of truss in which the diagonals do not cross the posts.

Slab Bridge

A type of bridge, usually short, in which the deck and its support are integral. The superstructure is composed of a reinforced concrete slab constructed either as a single unit or as a series of narrow slabs placed parallel with the roadway.

Steel

An alloy of iron, carbon and various other elements and metals. It is a hard, strong and malleable material.

Stiffener

A small member attached to another member to transfer stress and to prevent buckling.

Stiffening Truss

A truss incorporated in a suspension bridge to distribute the traffic loads uniformly among the suspenders.

Stringer

A longitudinal beam supporting the bridge deck.

Suspension Bridge

A bridge type with the roadway suspended from high towers, using a combination of cables, chains, or eyebars.

Sway Anchorage

Diagonal bracing located at the top of a through truss, perpendicular to the truss itself and usually in a vertical plane. It resists horizontal forces.

Swing Span Bridge

A movable bridge in which the entire span rotates to permit passage of marine traffic.

Through Truss

A bridge with overhead bracing. A truss in which the deck is nearly at the bottom of the superstructure, with traffic passing between the trusses.

Tie

A member carrying tension.

Tie Rod

A rod-like member in a frame functioning to transmit tensile stress. Also known as a tie bar.

Trestle

A bridge structure consisting of spans supported upon frame bents.

Truss Bridge

A bridge having a pair of trusses for a superstructure.

Viaduct

A series of spans carried on piers at short intervals.

Vierendeel Truss

A Pratt truss without diagonal members and with rigid joints between top and bottom chords and the verticals.

Vousoir Arch

An arrangement of wedge shaped stones forming an arch.

Warren Truss

A triangular truss consisting of sloping members between the top and bottom chords and no verticals.

Weephole

A hole in a concrete retaining wall to provide drainage of water.

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Websites

National Bridge Inventory

www.nationalbridges.com

This website contains technical information on bridges across the United States, including Texas, such as length of bridge and span and its current condition. If your bridge is not listed, contact your area engineer's office of TxDOT.

Historic Bridge Foundation

www.historicbridgefoundation.com

Established in 1998, this non-profit foundation provides educational programs and offers consultation with public officials on alternatives to the demolition of historic bridges. They welcome inquiries on historic bridges and provide information on potential sources for the restoration of bridges.

Historic Bridges

www.historicbridges.org

The Historic Bridges website contains information and documentation for bridges across the United States. Although few Texas bridges are included at this time, the site includes a good introduction to the different types of bridges and how to identify them.

Bridges and Tunnels of Allegheny County and Pittsburgh, Pennsylvania

www.pghbridges.org/basics.htm

Although this site focuses on the documentation of bridges in Allegheny County, it contains useful diagrams for identifying the different types of bridges, as well as a comprehensive glossary for bridges and engineering terms.

Digital Bridges

www.bridges.lib.lehigh.edu

This website provides information on books, technical information and bridge catalogs for 19th century bridges.

Texas Historical Commission

www.thc.state.tx.us

(Texas Historic Sites Atlas can be accessed from the home page)

The Texas Historical Commission is the “official” state agency for historic preservation in Texas. In addition to administering the county historical commissions program, the agency processes National Register of Historic Places nominations for the National Park Service. The History Division is a repository for all past National Register nominations for historic bridges, most of which are available through the Texas Historic Sites Atlas.

Portal to Texas History

<http://texashistory.unt.edu>

The Library at the University of North Texas in Denton is currently digitizing a wide range of materials on Texas history, including historic photographs, maps, newspapers, and books. This collection is continually growing and is a very useful resource for Texas history across the state.

Dolph Briscoe Center for American History, The University of Texas at Austin

<http://www.cah.utexas.edu>

The Briscoe Center at The University of Texas contains a wide range of materials on Texas history. The range of digital materials available on the internet is increasing. In addition, the General Libraries of The University of Texas has digitized copies of Sanborn maps and other historic maps of Texas available on their website.