Bridging the Generations:

The Evolution of Metal Truss Bridges in Michigan

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Links to the Past

As far back as I can remember old bridges have always fascinated me. I can remember being a little boy, perhaps only five years old, riding around in the car with my parents. Our family would frequently take pleasure drives around the area, just for fun. I would always get excited when we crossed some old bridge, and I often had childish nicknames for some of the bridges that we crossed often. I grew up near Port Huron Michigan, and so the original Blue Water Bridge, connecting Port Huron to Sarnia, Ontario was a favorite bridge of mine. However, I always liked the smaller bridges on local roads the most. I liked the bascule bridge in downtown Port Huron, with its ornate railings. The bridge would lift up to let boats pass under and travel down the Black River. When my family would go downtown to see the sailboats during the Port Mackinac to Mackinac race, I always enjoyed seeing this bridge. I also enjoyed other bridges around the area as a kid, including old concrete bridges, such as the Wadhams Road Bridge over the Pine River in St. Clair County, that many people probably do not give a second glance when they cross. Other bridges, the sort that people might notice were unusual when they crossed them, captured my imagination. One such bridge was the Indian Trail Road Bridge over the Belle River, in St. Clair County, Michigan. I roughly guess I was around five years old when I first saw this bridge, which was on a road we did not take often.

Another bridge I remember as a kid was an abandoned steel bridge in a nearby state game area, which we would sometimes end up at for a brief visit. It used to carry Ford Road over Mill Creek in St. Clair County. This

bridge had been there probably since the turn of the century, and it had been a landmark of sorts for the area. My mom once showed me one of her high school yearbooks, which had a class photo taken on that bridge. Years passed by, and I grew older, and became a high school student myself. There would be no Class of 2004 photos of this bridge, however. In the spring of 2002, Mill Creek flooded, which it frequently would do. However, this was one too many floods, and the bridge finally collapsed into the creek. This hit me as a shock, and I found myself wondering if there were any more bridges left like it. It was about a year later that I discovered the Michigan Department of Transportation (MDOT) had a website dedicated to historic bridges, and I found that there were many more bridges like the Ford Road Bridge, including one other in St. Clair County, the Frith Road Bridge over Pine River. I discovered an old memory on that website, as I immediately recognized the Indian Trail Road Bridge, and was surprised it was still around after what was perhaps ten years later. I learned that although they looked different, the Indian Trail Bridge and the Frith Road Bridge are both as truss bridges. A few days later, I visited and photographed three bridges, the Frith Road Bridge, the Wadhams Road Bridge, and the Indian Trail Bridge, and started a hobby that has grown to be my passion today.

Top left: Frith Road Bridge over Pine River, St. Clair County, Michigan. Top right: Indian Trail Bridge over Belle River, St. Clair County, Michigan. Bottom: Wadhams Road Bridge over Pine River, St. Clair County. (Nathan Holth)

It turns out that, without knowing it, my first historic bridge trip outlined an important time in the history of bridge development in Michigan. This paper seeks to explore that era, and examine its implications for us today. First, I will show that metal truss bridges are a unique, complex, and fascinating bridge type that Michigan built mainly between 1870 and 1940, and during that period, truss bridges came into power as the preferred bridge type by the turn of the 20th century, and then started passing that power

onto other simpler bridge types starting in the 1920s. In doing so, I will be showing and following a progression in bridge design from 1870 to the present day, that suggests a trend from complex design to simple design. I will examine bridges built today, compare them to the metal truss bridges of the turn of the 20th century, and suggest that there is an element of beauty to the truss bridges. I will then present an example of the rich history that can be behind a historic metal truss bridge, using the well-documented history of the Indian Trail Road Bridge. Finally, I will conclude that because metal truss bridges have an element of beauty, and a rich history, they are a critical feature of the cultural landscape, and because of this, their preservation is essential.

Methods of Research

Utilizing a number of resources reveals a path to determine how bridge building developed and changed in Michigan. While much of history may be limited to the study of text and archives, this is not the case with historic bridges, particularly those covered in this paper. My attempts at locating primary documents that recorded the history of old bridges, such as construction dates, contractors, money spent, and other such information was for most bridges quite difficult because it turns out these records were never made or were not retained. A historian who is accustomed to pouring over crates filled with old documents would be at a loss here. Fortunately, there is another way to learn a vast amount of knowledge about historic bridges, which is through inspections of the many bridges from the period that still stand today as part of the landscape.

The study of remaining historic bridges is a study of landscape. By examining them, it is possible to discover changes through time. When analyzing a specific type of structure, such a bridge, a comparison between the construction, design, and materials used all are important aspects to interpret and compare.[1] In my attempt to learn as much as possible about historic bridges, I have visited a large number of historic bridges, particularly metal truss bridges, throughout Michigan, but particularly in the southern half of the Lower Peninsula. [2]

Metal truss bridges are particularly complex to understand, and there are a large number of descriptions used to classify different truss bridges. Much of this information is widely available on the Internet from various sources. In order to locate, and better understand the metal truss bridges I visited, a number of government sources aided me in the process. Utilizing MDOT's *Historic Bridges* website[3], and the two parts of the 1995 Michigan Historic Bridge Inventory, which are the survey sample[4] and the detailed historic bridge inventory itself[5], I have been able to learn about the dates, locations and construction types of many historic bridges in Michigan. In addition, resources in *Historic Highway Bridges in Wisconsin* [6]*,* aided me in identifying terminology used to describe the construction of truss bridges. In addition, a number of websites maintained by individuals or small groups confirmed that these terms remain in use today by the public.[7] By reading these sources and then going out into the field and inspecting the bridges described by the Michigan Historic Bridge Inventory and the *Historic Bridges* website, I was able to compile a visual guide to the most common types of

metal truss bridges. Note that in some cases the information that I located conflicted with information found in other sources. Usually these conflicts were between a newer source such as the *Historic Bridges* website and an old source such as 1908 truss diagrams referenced in *Historic Highway Bridges in Wisconsin.* In such cases, I always went with the newer source, since these should be more representative of contemporary descriptions. Finally note that these descriptions cover only the basics for the purposes of this paper, and that further designs or variations often exist.

An excellent book called Nearby History is a resource for those interested in local history and preservation. Within this book are some suggestions for understanding the function of a structure such as a building or a bridge. It is important to attempt to piece together the original intended purpose for the structure. Noting any original design or creativity in the structure is also something to look for.[8] By visiting remaining historic bridges, and following these suggestions, a great deal is revealed regarding historic bridges. These observations often aid in revealing a pattern of progression with bridge building as the needs of the people using the bridges changed over time.

A final source for information came from experts and officials in the fields of transportation, engineering, and construction. Lloyd Baldwin is a historian for the Bureau of Transportation Planning of the Michigan Department of Transportation, and he provided me with a number of important documents that aided me in locating historic bridges, as well as identifying construction dates. Second, Michael Clark, who is County Highway

Engineer for the St. Clair County Road Commission provided me with information regarding the Indian Trail Bridge, as well as other bridges in St. Clair County. Without his assistance, I would have been unable able to create a historic picture of the Indian Trail Bridge. Another person who helped me greatly is Vern Mesler, who has a long history with metalwork and is very involved with metal truss bridges today. He worked for thirty-four years at Douglas Steel Fabrication Corporation in Lansing, Michigan. He has also spent twenty-nine years at Lansing Community College as an adjunct welding instructor. He is currently the project manager for Historic Bridge Park of Calhoun County, Michigan. Historic Bridge Park is a park that features a number of relocated and restored metal truss bridges. Vern Mesler has an unparalleled knowledge of riveting and other elements of construction used during the period in which truss bridges were built. Finally, Professor Frank Hatfield is a retired civil engineering professor from Michigan State University. He continues to be actively involved with engineering however, as he assists Vern Mesler with some of the engineering aspects of the bridges at Historic Bridge Park. He also continues to be involved at MSU, coaching a building contest. Professor Hatfield assisted me by reviewing and providing additional information for truss descriptions and configurations.[9]

The Truss Bridge: A Complex Type of Bridge

A truss bridge is a bridge that is composed of structural elements arranged in a framework of triangles. These elements are arranged in a fashion such that some will be under stretching force called tension, and others will be under a pushing force, called compression. A truss bridge could

be made of wood or metal. The metal used could be cast iron, wrought iron, or steel, with steel emerging as the most common material.

Above left: Hulton Road Bridge over Allegheny River, Allegheny County, Pennsylvania. Above right: Kimpton Road Bridge over Macon Creek South Branch, Monroe County, Michigan. Both of these are truss bridges; networks of triangles make up each bridge. (Nathan Holth)

Although the time period in which these metal bridges were built varies, these bridges were most commonly built during a period beginning a couple decades before the 20th century and continued to be built for another couple decades into the 20th century.[10] In rare cases, governments still build truss bridges today. One company that continues to build truss bridges today is the US Bridge Company.[11] These newer bridges, constructed outside of the main period of truss bridge construction, fall out of the scope of this paper. As a result, I ignore the slightly different design and construction of these bridges for the purposes of this paper.

Above: Under construction in April, 2006, the Lowell Road Bridge over Looking Glass River in Clinton County, Michigan is an example of a 21st century metal truss bridge. (Nathan Holth)

Describing Truss Bridges

Truss bridges fall into three broad descriptive categories. Through truss bridges feature trusses along either side of the deck, and have bracing above the deck, which vehicles pass under. A pony truss is essentially the same as a through truss, but lacks the overhead bracing. Finally, a deck truss is a truss bridge where all the trusses are located underneath the deck of the bridge. The shape and arrangement of their components allows for additional classification of truss bridges.[12] No further discussion of deck trusses is in this paper, since Michigan never built many and only three highway bridges remain in Michigan today, since most of Michigan's waterways do not have much of a valley.[13] Deck trusses as a result do not play a role in the development of Michigan's bridges.

The earliest common subtype of truss bridge was the bowstring truss bridge. Bowstring truss bridges have a curved, arch shaped top chord, which is the topmost and largest piece of steel that makes up the truss. Bowstrings are quite different from most truss bridges and so they fall into their own world.

The remaining non-bowstring truss bridges fall into categories based on the design of the top chord and the arrangement of the components that connect the top chord to the bottom chord. The bottom lower, also known as the lower chord, is the member that forms the bottom of the truss, running parallel to the deck. Components referred to as members connect the top and bottom chords. There are vertical members that run straight up and down between the chords. Diagonal members are not vertical and run at an angle. The arrangement of these members, particularly the diagonal members, gives rise to different truss configurations often named after who designed them. The most common configurations found on truss bridges are the Pratt and the Warren.[14]

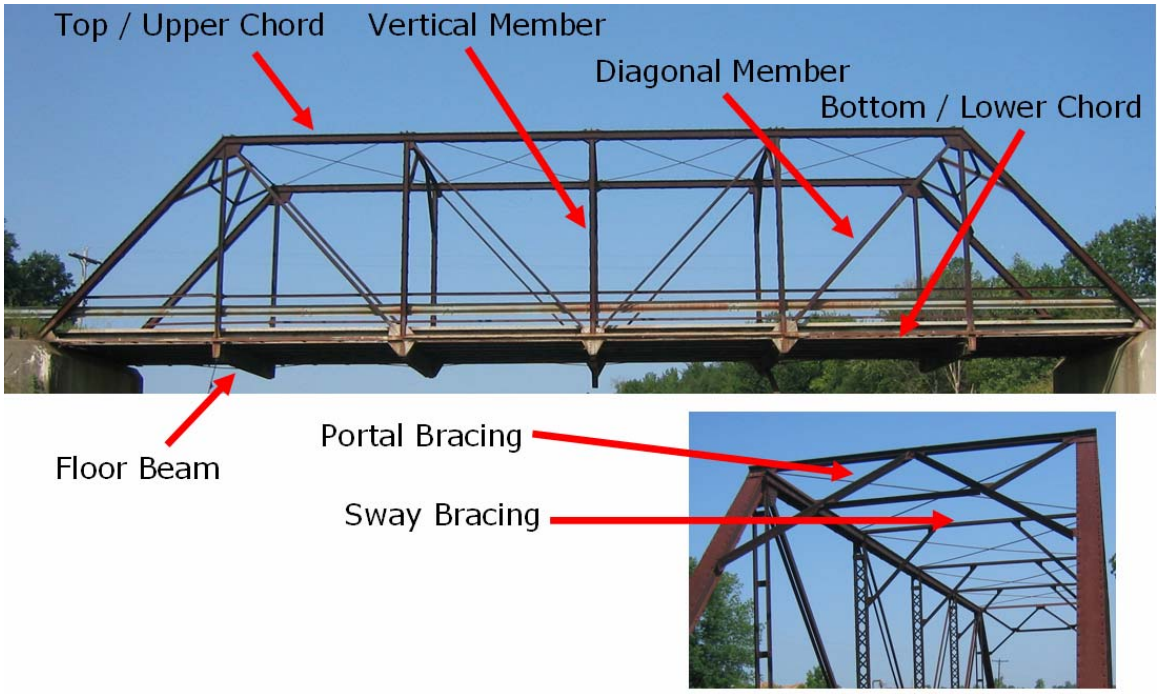
Another major method of classifying truss bridges sorts out how the members and chords hold together in joints known as connections. These connections can either be pinned or riveted. Pinned connections feature a rod, or pin that passes through the members and chords, which have holes on their ends for the pin to fit through. With riveted connections, the members and chords are riveted to a plate of metal for a secure connection. Pin connected bridges were more common earlier in the truss bridge era,

while riveted connections were more common in the later part of the truss bridge era.

Most people did not view truss bridges as beautiful structures back at the turn of the 20th century. Rather, arch bridges made of stone or concrete formed the ideal bridge in the minds of the public. Builders and designers of truss bridges cited a lack of opportunity for decoration, as well as the dominant appearance of the bridge on the landscape, as reasons that people did not like the appearance of truss bridges. However, ideas on what is beautiful and what is not often changes through the years. Today, many people view truss bridges as aesthetic structures and they may appear in calendars, books[15], and even automobile commercials on television.

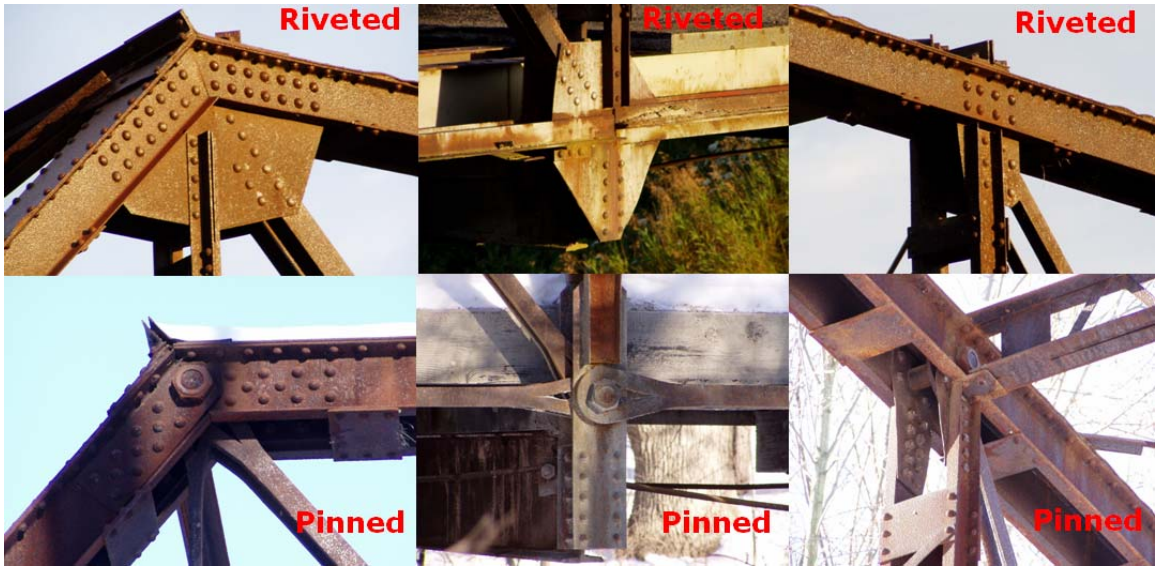
Engineers and historians alike name the many parts of a truss bridge to aid in their discussion of them. Despite the wide variety of designs present in truss bridges, the part names remain consistent from bridge to bridge, and can be applied to both through and pony truss bridges.

Parts of a Truss Bridge



A truss bridge's parts all have a name. Some of the common parts seen in the description of a bridge are shown above. Note that portal and sway bracing occurs on through truss bridges, but not on pony truss bridges. The bridge shown is the Church Road Bridge over Black River, Sanilac County, Michigan, which the county demolished on July 28, 2004. (Nathan Holth)

Truss Bridge Connections



A truss bridge's connection is what holds the parts of the bridge together, and they are either pinned or riveted. Examples of each type, shown in various areas of the bridge, show the characteristics of each. With riveted connections, a large metal plate is visible. With the pinned connections, a large bolt, which is the pin, passes through the members and chords, holding them together. The riveted connections are from the Church Road Bridge over Black River, in Sanilac County, Michigan. The pinned connections are from the Frith Road Bridge over Pine River in St. Clair County, Michigan. (Nathan Holth)

Truss Configurations: Pratt

Diagonal members on the bridge angled toward the bottom center of the bridge identify the Pratt configuration. There may be extra diagonal members in the center section or sections of the bridge that do not follow this rule, and form an X shape. Above left: The Sarnia Road Bridge over railroad, Middlesex County, Ontario, shows a Pratt truss configuration with a extra diagonal members. Above right: The Church Road Bridge again serves as an example, showing a Pratt truss with no extra diagonal members present. (Nathan Holth)

Truss Configurations: Whipple (Double-Intersection Pratt)

Above: The 2nd Street Bridge over Kalamazoo River in Allegan County, Michigan showcases the Whipple configuration, also known as the double-intersection Pratt configuration. This is like the Pratt, but each diagonal, with the exception of the extra diagonal member at either end of the bridge, crosses a vertical member before connecting the top and bottom chords. (Nathan Holth)

Truss Configurations: Parker


Above left: Station Road Bridge over Little Wabash River, Huntington County, Indiana. Above right: Kent Street Bridge over Grand River (relocated to nearby bike path next to I-96) A Parker configuration refers to a Pratt truss bridge where the bridge shape is a polygon rather than a trapezoid, which means the top chord has a curved appearance. A camelback truss is a specific type of Parker truss where the top chord is composed of exactly five straight sections. The Station Road Bridge is a camelback truss, while the Kent Street Bridge, having many smaller angles shaping its top chord, is only a Parker truss. (Nathan Holth)

Truss Configurations: Pennsylvania

The Pennsylvania truss is essentially a Parker truss that has had additional members added. The exact locations of these members may vary. Some diagonals may cross a vertical member like a Whipple truss. This is perhaps the most complex and loosely defined truss configuration. Bridges shown: Above left: Cambridge Springs Bridge over French Creek on US-6/US-19, Crawford County, Pennsylvania. Above right: Fort Street Bridge over Power Canal, Sault Ste Marie, Michigan. (Nathan Holth)

Truss Configurations: Warren

The warren configuration is composed of diagonals that alternate their angle, forming a repeating v-shaped pattern. A Warren truss has no vertical members. If there are vertical members present, it is a subdivided Warren truss bridge. Bridges shown: Above left: Nicol Road Bridge over Black River, Sanilac County, Michigan. Above right: Exchange Street Bridge over Erie Canal, Niagara County, New York. (Nathan Holth)

Some Warren truss bridges may have a polygonal shape to them like a Parker truss. Shown here with Lake Huron in the background is one such example, the Old Lakeshore Road Bridge over Cull Drain, Lambton County, Ontario. (Nathan Holth)

The Progression of Metal Truss Bridge Construction in Michigan From 1870 To 1940 and a Present Day Comparison

With knowledge of the different types of truss bridges, and how to describe them on an individual basis, it is now possible to examine the transitions over time. Throughout the United States, the later 1870s marked a period in which metal truss bridges became the preferred bridge to build.[16] Prior to the 1905 creation of the Michigan State Highway Department, the forerunner to the current Michigan Department of Transportation, the various bridge companies that designed, assembled, and erected bridges for counties, controlled most aspects of truss bridge design and construction. These companies found themselves in a position where they could freely design bridges, with no state design regulations. An unfortunate problem with this was that sometimes inept county officials were taken advantage of and bridges that were erected were less capable than the counties had expected.[17] Some of the prolific bridge companies in Michigan included the Wrought Iron Bridge Company of Canton, Ohio the Massillon Bridge Company of Massillon, Ohio, and the King Iron Bridge Company of Cleveland, Ohio. Indeed, Ohio bridge companies built many Michigan truss bridges. Some companies existed within the state of Michigan however, including Detroit Bridge and Ironworks of Detroit, and the Tunnel City Bridge and Iron Works of Port Huron.[18] While there may have been corruption part of the time, clearly many of the structures these companies built were excellent bridges and in fact served traffic into the 21st century.

Stancer Road Bridge over Coldwater River, Branch County, Michigan. Above left: A truck crosses the bridge. Above right: A plaque credits the Massillon Bridge Company with building the bridge in 1888. This bridge shows that some truss bridges have really stood the test of time, and still carry vehicular traffic in the 21st century. (Nathan Holth)

Wisconsin identified its earliest common form of metal truss bridge as the bowstring truss bridge. It shows examples of bowstring truss bridges in the state, most from the 1870s, suggesting this was the climax period of construction for this bridge type.[19] This finding has shown to be true for many states, including Michigan. Iowa has an unusually high number of bowstring truss bridges, which also have a definite construction date listed as well, which makes it a good place to look for a clear picture of what this bowstring era was like. The dates for bowstring truss bridges range from 1871 to 1883. Most of the bridges fall into the 1870s. It is important to note that one Iowa county, Crawford, built bowstring truss bridges in the 1940s. The county only built these bridges because it was trying to cope with the steel shortages of World War II, and so these bridges are unrelated to the

main category of truss bridges.[20] Michigan only had two bowstrings, one in Wayne County listed with a 1900 construction date. The bridge, like the 1940s Crawford County bowstring bridges, has an appearance that is unlike the average bowstring truss bridge.

Above: Elm Circle Drive Bridge over Lower Rouge River, Wayne County, Michigan. This is the only remaining public bowstring truss bridge left in the state, and both its 1900 construction date, as well as its unusual construction set it outside of the context of other bowstring truss bridges. (Nathan Holth)

Michigan's only other bowstring truss bridge is on private property as the result of a relocation to Eaton County and was originally built in 1875. As a result, it does fall into this 1870s period.[21] With an unusual appearance, and more importantly with a 1900 date, the Wayne County bridge most likely is not a good source for analyzing Michigan bowstring construction. The Eaton County bowstring bridge, however, suggests that Michigan also constructed a number of this type of truss bridges in the 1870s.

Above: Two views of an 1870s bowstring truss bridge. This is the Blackfriars Street Bridge over North Branch Thames River in London, Ontario. (Nathan Holth)

The bridge companies continued to design different kinds of bridges, and slowly their bowstring truss bridges gave way to the Pin connected era, where the pin connected Pratt truss bridge formed the mainstay of pre-20th century metal truss bridge building in Michigan. These bridges were easy to manufacture, and more importantly, it was easy to erect these bridges on-site. These bridges continued to be built in the early 1900s also, but started to decline in popularity at that time. This decline was because field riveting machines, which made riveting and riveted connections convenient, were developed for the use by the companies.[22]

The pin connected era was a period of infinite variety in appearance, and often design as well. While structures may be grouped based on company or layout of the trusses, the visual appearance of these bridges is widely varied. Architectural treatment on these bridges included decorative finials, plaques, railings, and bracing. The arrangement of the truss itself, as well as the design of the structural steel, could vary from bridge to bridge as

well. Even bridges that were essentially the same in terms of engineering design, often had vastly different appearances.

Pin connected Pratt through truss bridges in Michigan. All of these bridges are essentially the same structure type, yet their appearance is vastly different. Differences in portal bracing and member design largely account for this. Top left: ½ Mile Road Bridge over Nottawassepee River in Calhoun County. Top right: 6th Street Bridge over Grand River, Kent County. Bottom left: Frith Road Bridge over Pine River, St. Clair County. Bottom right: Maple Rapids Road Bridge over Maple River, Clinton County. Note that these are one-lane structures. (Nathan Holth)

Pin connected truss bridges of various types throughout Michigan. Each of these bridges has a different design type, although their construction dates fall in within the 1880 through 1910 range. Top left: Six Mile Creek Road Bridge over Shiawassee River, Shiawassee County. Top right: Marion Fort Street Bridge over Power Canal, Chippewa County. Bottom left: Speaker Road Bridge over South Branch Mill Creek, St. Clair County. Bottom right: Big Hill Road Bridge over Fawn River, St. Joseph County.[23] Note that these are one-lane structures. (Nathan Holth)

The twentieth century began to bring major changes to the transportation world. It is ironic that the bicyclist, today reduced to riding on sidewalks and non-motorized paths, or on the road enduring curses from hurried motorists, was responsible to revolutionizing Michigan's transportation system. By the twentieth century, bicyclists had become

annoyed with bad roads and wanted a larger government agency to help organize and fund improvements on the roads of Michigan. With the automobile still only in its infancy, bicyclists actually took the lead and successfully fought for the creation of the Michigan State Highway Department in 1903[24], which is today the Michigan Department of Transportation. Bridge design reflected the period of standardization that the creation of this state-managed entity set into motion.

In the twentieth century, bridges began to use the Warren truss configuration, as well as riveted connections. By 1910, riveted connections had become more popular than pinned connections, which continued to decline after that date. The newly formed Michigan State Highway Department stimulated this change when it developed a standardized design for the warren pony truss with riveted connections in 1907. This period went on as late as the 1940s, but a large change occurred with the formation of a new standard plan in 1921.[25]

The result of this early twentieth century period, which represented a movement toward standardization of design, is that while bridges still included a variety of designs, some bridges started to show more similarities to each other. Pony truss bridges greatly overshadowed through truss bridges. While these bridges clearly were more similar in appearance to each other than the pin connected truss bridges, there still was a variety in the design. Railings and members often differ between bridges.

Warren pony truss bridges with riveted connections in Michigan. Top left: Van Buren Street Bridge over Augusta Canal, Kalamazoo County. Top right: Card Road Bridge over North Branch Clinton River, Macomb County. Bottom left: Lewis Road Bridge over Little Salt Creek, Midland County. Bottom right: Reed Road Bridge over North Branch Cass River, Tuscola County. Note that these are one-lane structures. (Nathan Holth)

The Michigan State Highway Department brought back to life the fading age of Pratt configurations in 1921 when it designed a standard plan for a Parker pony truss with riveted connections. Michigan never designed a standard through truss bridge, resulting in the reduced construction of this bridge type, which was once a common structure type to build.[26] While the complex nature of truss bridges continued to provide these bridges with a

geometric beauty, the variety in design dropped significantly. The remaining bridges from this period today all have a very similar appearance. They apparently are easy to move, since a number of the remaining examples in Michigan are relocated bridges, either from long ago as an economic choice, or more recently as part of a preservation effort. A primary variable in appearance of these bridges is span length. Longer bridges have taller trusses, or more than one span. An important item to note is that these bridges are two lanes wide, instead of one lane, suggesting an importance in efficiency, or anticipation of higher traffic volumes.

Standard plan Parker truss bridges in Michigan. Top left: Old M-65 Bridge over Au Sable River, Iosco County Top middle: Lilley Road Bridge over Lower Rouge River, Wayne County. Top right: Waltz Road Bridge over Huron River, Wayne County. Bottom left: Relocated bridge, currently serving as M-86 Bridge over Prairie Creek, St. Joseph County. Bottom middle: Relocated bridge, currently serving as Perrine Road Bridge over Sturgeon Creek, Midland County. Bottom right: Relocated bridge, currently serving as Burroughs Street Bridge over Flat River, Kent County.[27] Note that these structures are wider than older truss bridges, providing two lanes for traffic. (Nathan Holth)

Amidst the standard plan truss bridges of the early 20th century, another revolution in bridges was occurring. In addition to the truss bridge standards, the Michigan State Highway Department designated standard plans for concrete structures, including concrete girder bridge plans in 1913. Related to these developments was the creation of a special kind of concrete girder bridge a number of years later in 1921, which is the curved-chord

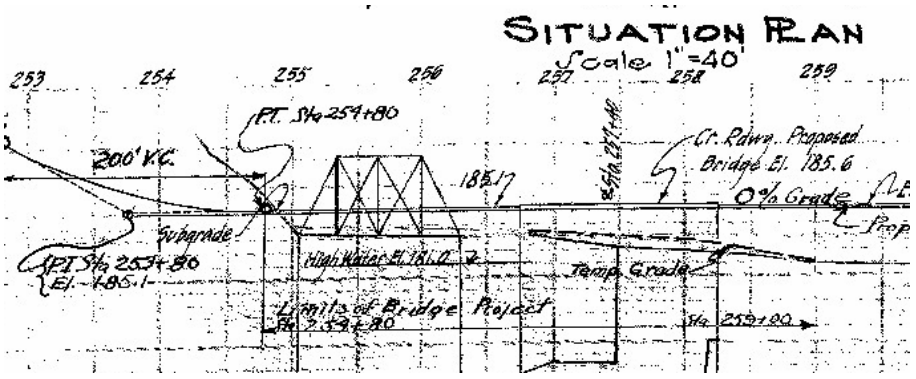
through girder, a bridge type that remained popular until other structure types with wider deck widths were developed in the 1930s. Michigan designed this structure type and only Michigan and Ontario built this bridge type, and on a national scale, surviving examples today are considered quite rare.[28] Today these bridges for convenience, earned the nickname “concrete camelback bridges.”[29] Like the standard plan Parker pony truss bridges span size dictates a lot of the appearance of this bridge type, as my field inspections revealed. The arch shape of this bridge, plus some modest architectural treatment to the bridges makes this an attractive concrete bridge design. Some bridges have unique or unusual features, such as a pedestrian sidewalk, or attractive obelisks on the ends of the bridge. I have found that there are two primary appearances for this bridge. The larger bridges have pierced openings in the girders, while the smaller spans do not feature these openings.

Michigan concrete camelback bridges with pierced openings. Top left: Wadhams Road Bridge over Pine River, St. Clair County. Top middle: 7 Mile Road Bridge over Salt River, Midland County. Top right: Okemos Road Bridge over Red Cedar River, Ingham County. Note sidewalk on bridge. Bottom left: Griswold Road Bridge over Pine River, St. Clair County. Bottom middle: Old CR-550 Bridge over Dead River, Marquette County. Shown after it survived a breaking of a nearby dam, which flooded the dirt away around the bridge. Note decorative obelisks. Bottom right: US-12 Bridge over St. Joseph River, St. Joseph County. Also known as the Mottville Bridge. This is the longest of this structure type in the state. Also note that these structures' decks consisted of two narrow lanes. (Nathan Holth)

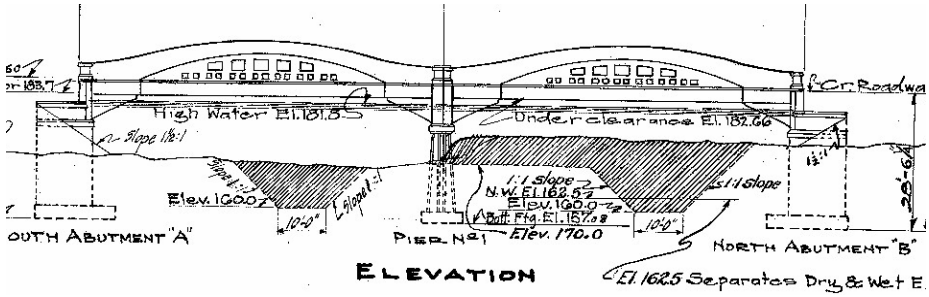
Michigan concrete camelback bridges without pierced openings. Top left: David Highway Bridge over Libhart Creek, Ionia County. Top middle: 23 Mile Road Bridge over Kalamazoo River, Calhoun County. Top right: Folks Road Bridge over Kalamazoo River, Jackson County. Bottom left: Genesee Road Bridge over CN Railroad, Lapeer County Michigan, now demolished. Bottom middle: Borden Road Bridge over Prairie Creek, Ionia County. Bottom right: Vernier Street over Swan Creek, St. Clair County. (Nathan Holth)

The introduction of this concrete bridge type to Michigan's roads suggests that in many cases, these bridges might be built where a truss bridge might have been selected a decade before. A good specific example of this pattern is shown in the technical plans for the Wadhams Road Bridge which crosses the Pine River in St. Clair County, Michigan. The plans specifically show that a concrete camelback bridge was replacing an old metal truss bridge. This situation undoubtedly repeated itself in other

locations. In other words, these bridges led to a decline in the number of truss bridges constructed in Michigan.



Above: This section of the Wadhams Road Bridge plans show the truss structure that was replaced. The plans mentioned that this bridge was to remain open to traffic until the new bridge was completed. (Courtesy St. Clair County Road Commission)



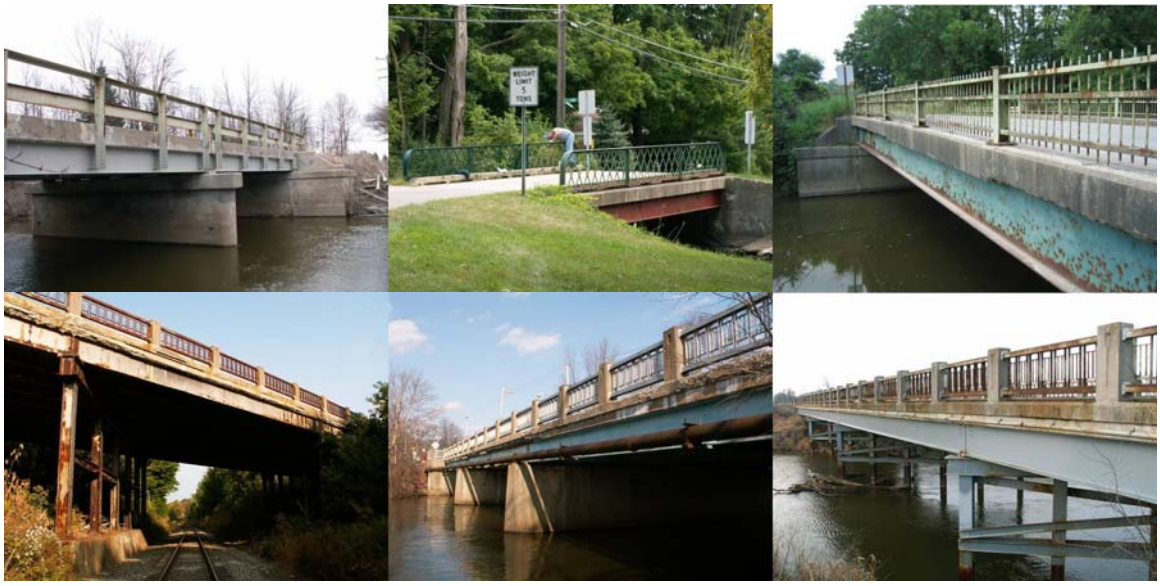
Above: This section of the Wadhams Road Bridge plans show the concrete camelback structure that was replaced. (Courtesy St. Clair County Road Commission)

Both the standard plan Parker truss and the standard plan concrete camelback bridges were two-lane structures, where the older pin connected truss bridges were most often one-lane structures. The progression of bridge building in Michigan is not an isolated progression, and its changes occurred much in line with other historic events and patterns occurring at the time. By the time of the standard plan Parker and concrete camelback, the numbers of

automobiles on the road had risen drastically. In 1899, when pin connected truss bridges were still the most common bridge, there were 3,700 passenger cars on the road nationally. By 1904, one year after the creation of the Michigan State Highway Department, the number nationally had risen to 21,281. Although this was seven times more than what was present in 1899, it was still a relatively small number. However, this rapid rate of increase continued, and by 1921, there was 1,514,000 passenger cars in the United States. This number would more than double by 1923 when 3,694,237 cars would be on the road.[30] What was occurring in this time period was a revolution in American lifestyle, where the car was becoming the commonplace vehicle, with the horse and buggy losing appeal just as rapidly. With more cars on the road and easily predictable increases, the Michigan State Highway Department likely saw the need for bridges that would handle larger volumes of traffic, as two-lane structures. There may have been a safety factor also, as the cars were faster than horse and buggy, and the threat of having an accident from someone not checking for oncoming traffic on a one-lane bridge may have been a concern. Michigan's policy in 1921 was that no new bridge built should have a roadway width that was less than sixteen feet, and any new bridge should carry at least fifteen tons.[31] This policy suggests that the Michigan State Highway Department saw a need for wider bridges as well as bridges that could support the heavier weights imposed by motor vehicles.

While the curved chord through girder bridge may have started a decline in truss bridge construction, improvements in the steel stringer

bridge, more commonly referred to as the steel beam bridge resulted in a decline in both concrete and metal truss bridges. Beam bridges are the simplest type of bridge, composed of beams simply lined up next to each other across the span. Although the Michigan State Highway Department had designed a standard plan for beam bridges in 1905, the limited capabilities of the steel mills restricted the length of steel beams for bridges. As a result long beam bridges were not economical, and so other bridge types, such as the truss bridge, found popularity. However, as technological advances in the 1920s occurred with the steel mills, larger beams became available in the 1930s. The result of this is that the steel stringer bridge became much more common. Another factor that lead to the increase in beam bridges was their ability to be built at any width. The increasing demands on the roads, likely posed by the automobile, resulted in the requirement that bridges built on state-owned highways, also referred to as trunk line roads, be at least thirty feet in roadway width. This put the concrete camelback bridge out of the picture, as that particular design was not economical at wider widths. This further opened the door for steel stringer bridges. As a result, the steel stringer bridge has remained a common bridge type to build, right through to the present day.[32] Field inspections I made of beam bridges, particularly those built before 1960, revealed bridges that were structurally similar, but still could vary from one bridge to the next by railing style. Indeed, railings were often the easiest way to guess the date of a bridge. Bronze plaques mounted on the bridge, in addition to the Michigan Historic Bridge Inventory, provided the actual dates.



Beam bridges in Michigan built before 1960. Note that many of the railings appear to be somewhat decorative. Top left: Jeddo Road Bridge over South Branch Mill Creek, St. Clair County. Top middle: Washington Street Bridge over Augusta Canal, Kalamazoo County. Top right: Braidwood Road over Belle River, St. Clair County. Bottom left: A-45 (10th Street) over Norfolk Southern Railroad, Allegan County. Bottom middle: River Street Bridge over Kalamazoo River, Kalamazoo County. Bottom right: Fergus Road over Shiawassee River, Shiawassee County. (Nathan Holth)

Although there may have been the occasional truss bridge built after 1940, the era of truss bridges had passed by 1940. Beam bridges, and other simple structure types had replaced the concrete girder bridges, as well as the truss bridges.[33] Fast forward to the present day, and bridge design has reached the ultimate in simplicity. Just as the state highway department brought standardization to the truss bridge world with the Parker truss

bridges in the 1920s, further standards and safety precautions have turned bridges into simple structures that are purely functional with little or no attention given to aesthetic design. When examined, many bridges built today have the external appearance of simple concrete slabs. The decorative railings have disappeared, and have given way to bulky, plain railings whose only purpose is to keep speeding cars on the road. Tom Byle is the Assistant Director of Engineering for the Kent County Road Commission, and has worked for the commission for nearly thirty-four years. He discussed how MDOT enforces strict American Association of State Highway and Transportation Officials (AASHTO) standards for new bridges built in the state. He admits, "Innovation and creativity isn't encouraged by 'the system.'"[34] A number of truss bridges remain on Michigan roads today, but they often face demolition and replacement with these modern structures, as one generation of bridges falls before the new generation. Comparing the truss bridge to the structure that replaced it provides a stark comparison to how bridge design has changed over the past century.

Above left: Church Road Bridge over Black River, Sanilac County Michigan, July 2004 Above right: Church Road Bridge, November 2004 These two photos provide a comparison of a early 20th century metal truss bridge to a bridge built in 2004 to replace it.

Above left: Shanley Road Bridge over Clarion River, Elk County Pennsylvania, June 2004 (Nathan Holth) Above right: Shanley Road Bridge, November 2004 (Lehman Engineers)[35] These events happen outside of Michigan also. These two photos provide a comparison to a bridge built in 1891, according the builder plaque on the bridge, and a bridge built in 2004 to replace it.

The Indian Trail Road Bridge: A Metal Truss Bridge Rich in History

Above: Two views of the Indian Trail Road Bridge as it appears today. (Nathan Holth)

Indian Trail Road, and its crossing of the Belle River is part of an ancient Native American trail. Because of the trail and river, speculators found the area to be a good location for a mill. In 1825, Samuel Ward and William Gallagher built a dam and a gristmill at the location. Gallagher also built a sawmill and a carding mill at Belle River Mills, as the area became known at the time. The crossing was a significant one with no other crossings for several miles. Although research turned up empty regarding the type of bridge, it is likely that a wooden bridge crossed the Belle River at the location of mill. The Belle River was prone to flooding, and annually would surpass its banks. Nevertheless, this bridge served its purpose, with the exception of a need to boat across if the river flooded rendering the bridge unusable. By 1859 a school existed south of the river. In 1863, two Germans, Henry and Wilhelmina Radike moved to the city of New Haven in the neighboring county of Macomb. Henry bought the sawmill at Belle River Mills, which was for sale,

and converted it into a gristmill. After Henry's 1868 death, his brothers took over the family operation. Local railroads helped the business by providing transportation for the flour. By 1876 the area had developed even more and two churches were present south of the river.

The need for a new bridge was apparent by 1876. It was not until nearly a year later in 1877 that work could actually begin after a number of lively arguments about what sort of bridge to build. The two types considered were an all-wooden bridge and an iron bridge sitting on stone abutments. Eventually the community selected a wooden bridge to cross the river. In 1884, the enlargements at the Radike mill occurred since business had been good. The flour made there was popular and well known, and it became known as Belle River Mills Flour. The increase of mill business undoubtedly increased the traffic and load on the Belle River Bridge. A plat atlas made in 1897 revealed that by this time Belle River Mills was essentially a little town, with the bridge being the center of the activity.[36]

Roughly around the turn of the twentieth century it was determined that the wooden 1876 bridge needed replacement. The authors of the historic overview attempted to piece together the date of construction and cost of the bridge through the review of county and township records. Although no exact data could be located, they arrived at an 1899 or 1900 construction date. They estimated the cost was around $1,050. After that time, the records become much more clear and detailed, and mention some of the maintenance done on the bridge. At the cost of just over thirty-six dollars, including labor costs, workers applied a fresh coat of paint to the bridge in

1906. In 1908, the township installed lattice railings on the bridge. It is unclear whether there was railing on the bridge prior to this date. In 1910, the wooden deck was replaced, and a year later gravel was put down on the approaches to improve the crossing. The approaches continued to maintained and graded for a number of following years.[37]

I was surprised to learn that there are actually a number of photos of this turn of the century Indian Trail Road Bridge.[38] In addition, engineering plans for the bridge built after this bridge included documentation of the turn of the century structure.[39] Because of this, it is possible to get a clear picture of what sort of bridge this was. The bridge was a pin connected Pratt through truss, and was a narrow one-lane structure. The large plaque that is unfortunately illegible in the photographs is indicative of that period where the bridge companies controlled the standards and designed the bridge mainly the way they saw fit. As a circa 1900 bridge, it fits perfectly into the pin connected era discussed earlier.

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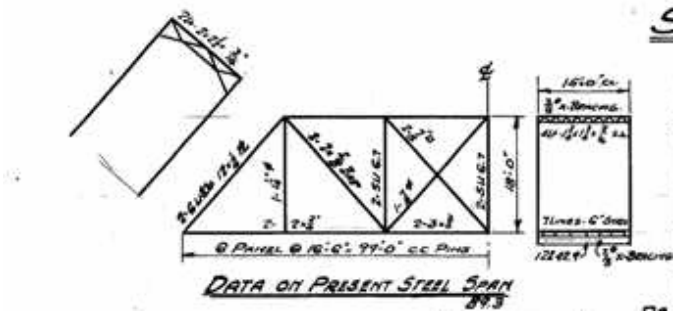
Above left: A side view of the bridge shows the Pratt configuration of the trusses. Also note the dam below the bridge. Above right: Portal view of bridge, showing the

builder plaque, and narrow one-lane structure. (Indian Trail Road Bridge Historical Overview)

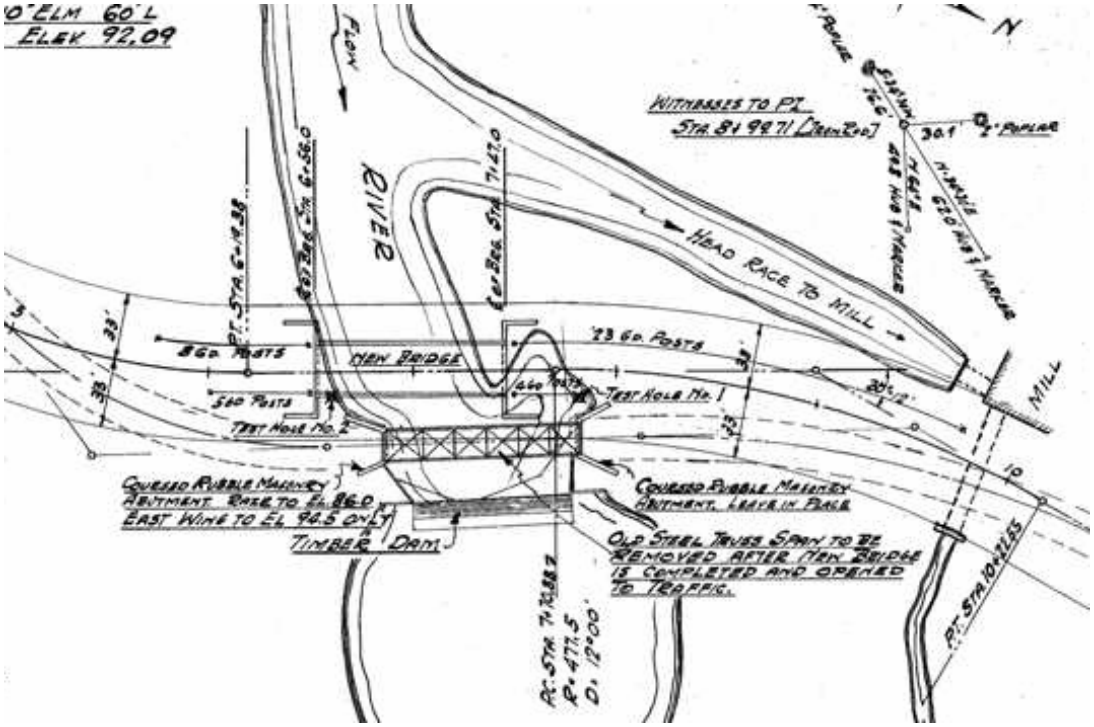


A portion of the 1937 Indian Trail Road Bridge plans show even more clearly the Pratt structure of the circa 1900 truss bridge. (Courtesy St. Clair County Road Commission)

During the 1920s, a person unrelated to the Radike Brothers purchased the Radike Brothers Mill, ending the period of family ownership.[40] Technology demands slowly increased, and in addition, the organization of the transportation system in the area changed. In 1921, the St. Clair County Road Commission accepted the township owned road and bridge into its county road system after completing appropriate improvements to the roadway. During the 1930s, during a time of recovery from the Great Depression, the St. Clair County Road Commission sought to replace the truss bridge at Belle River Mills. The bridge that was in place at this time was the truss bridge built circa 1900.

By 1935, steam threshers and trucks presented a need for a wider bridge that would also be capable of handling heavier loads. At this time, the existing bridge was 35 years old. The St. Clair County Road Commission drew up plans for a new bridge. As part of the replacement, the new bridge

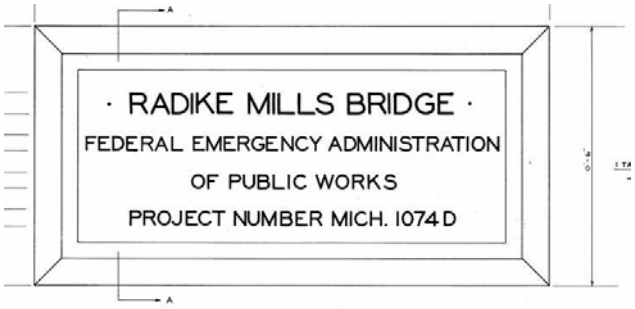
would assume a slightly different alignment across the river, and the approaches on the road to the bridge would be slightly different. This would require some small modifications to the dam at the site, which was wooden. The existing bridge was not going to be in the way of the new bridge, and so it the contractors allowed the bridge to remain open to traffic until the completion of the new bridge.[41]



A portion of the 1937 Indian Trail Road Bridge plans show the location of the circa 1900 truss bridge, with the dam east of it, and the 1937 bridge west of it. Also note the mill to the south. (Courtesy St. Clair County Road Commission)

The Indian Trail Road Bridge is a bridge that can be associated with recovery programs started by the government as a result of the Great Depression. The St. Clair County Road Commission attempted to secure

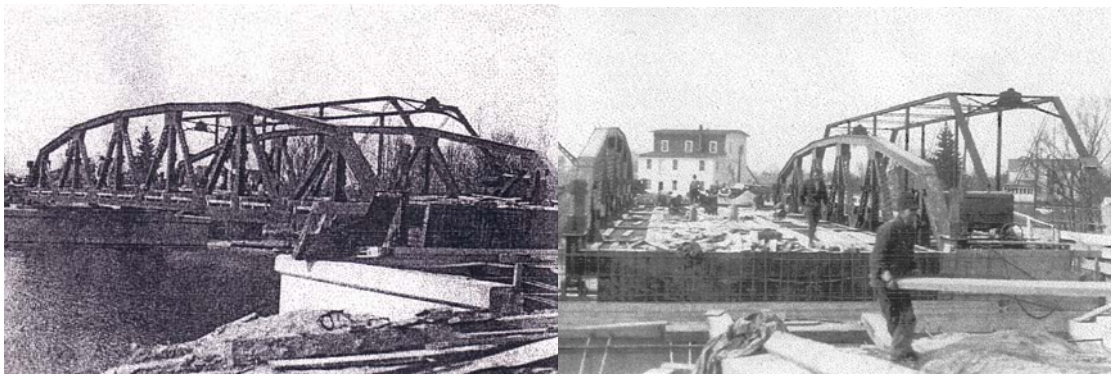
federal aid for the construction of a new Indian Trail Road Bridge through the Works Progress Administration. The application for aid was accepted, resulting in federal aid directed from the Public Works Administration. The contract for the construction of the new bridge, referred officially as the Radike Mill Bridge, was let to the low bidder, Couse and Saunders, who were based in Detroit. The bid was for $33, 200.17. Structural steel for the bridge was provided from a local company based in Port Huron, F. Yeager Bridge and Culvert Works, who completed the bridge in 1937.[42]



Above: This portion of the Indian Trail Road Bridge plans shows what one of the two plaques to be placed on the bridge, which no longer remain on the bridge, would have looked like. (Courtesy St. Clair County Road Commission)

Above: Another Federal aid plaque from 1935 appears to have the same general appearance as the Indian Trail Bridge plaque would have had. This plaque is from the Bridge Street Bridge over the St. Joseph River in Elkhart, Indiana (Nathan Holth)

This new Indian Trail Road Bridge construction occurred at the end of the truss bridge era, and its structure represents this period well. The larger members and riveted connections are what one would expect from this period. It does not follow the standard Parker plan, since its configuration is subdivided Warren, but it does have the polygonal shape to it. The structure is also a two lane bridge, which is a characteristic seen in the later portion of the truss bridge period. Together, these two bridges are a beautiful comparison to the pin connected era, and the period of design standardization that followed the pin connected era.



Above left: This photo shows two generations of the truss bridge era, the older pin connected era in the form of the circa 1900 bridge in the background, and the newer standardized design of the 1937 bridge in the foreground. Above right: Another view of both bridges. The 1937 bridge was still being built when these photos were taken, although the trusses were already erected. Also note the gristmill in shown the background. (Indian Trail Road Bridge Historical Overview)

After being completed, the 1937 bridge has required various types of maintenance over the years. A road commission maintenance document has some various notes regarding the bridge over the years. By 1942, the county realized the bridge needed paint, and dirt from the gravel road the bridge served had accumulated on the deck. The county replaced the steel beams for the deck in 1946. In 1962, the bridge received a fresh coat of paint. A project done a year later repaired the abutments. A probable cause of a five-ton weight limit sign posted in 1982 was the discovery of some major structural problems. The correction of these issues was likely the purpose of structural repairs done in 1984, and the subsequent repainting of the bridge a year later.[43]

Meanwhile, the mill in the area had continued its operations for the years after the completion of the new bridge and it continued to operate until it burned down in 1960. Up to this point, the dam in the area was in use and maintained, although local fishers disliked the dam holding up the fish and had blown it up with dynamite on two separate occasions. [44]

A newspaper article published in the Port Huron Times Herald provided some insight into this sad day for St. Clair County. It mentions that the Radike Mill was a famous landmark throughout southeast Michigan, and had stood for over a 125 years. The fire, whose cause was unknown had burned the building beyond saving by the time firefighters from St. Clair arrived fifteen minutes after a nearby resident woke up and found the building engulfed in flames. Firemen said that they could see the fire from St. Clair's fire station as they left. The fire burned so hot, due to the rye and other materials in the building that the fire truck remained 100 yards away from the flames. The owner of the mill Frank Wiencko, who had been the owner of the mill for the past 32 years, had been at the mill a day before, preparing flour to ship to Detroit. It took the building only an hour to collapse it burned so fast. During this time, the 7.5 ton grist wheel which was on an upper floor crashed down.[45]

In the years after the destruction of the mill, the features of the community immediately around the bridge slowly faded over future decades, leaving only a few trace remnants. The area around the bridge, once an open field, is today a wooded area. Remnants of the Belle River Mills community remained visible south of the bridge however.[46]

Above left: Remains of the mill near the bridge. Above right: Remains of circa 1900 truss bridge abutments. (Nathan Holth)

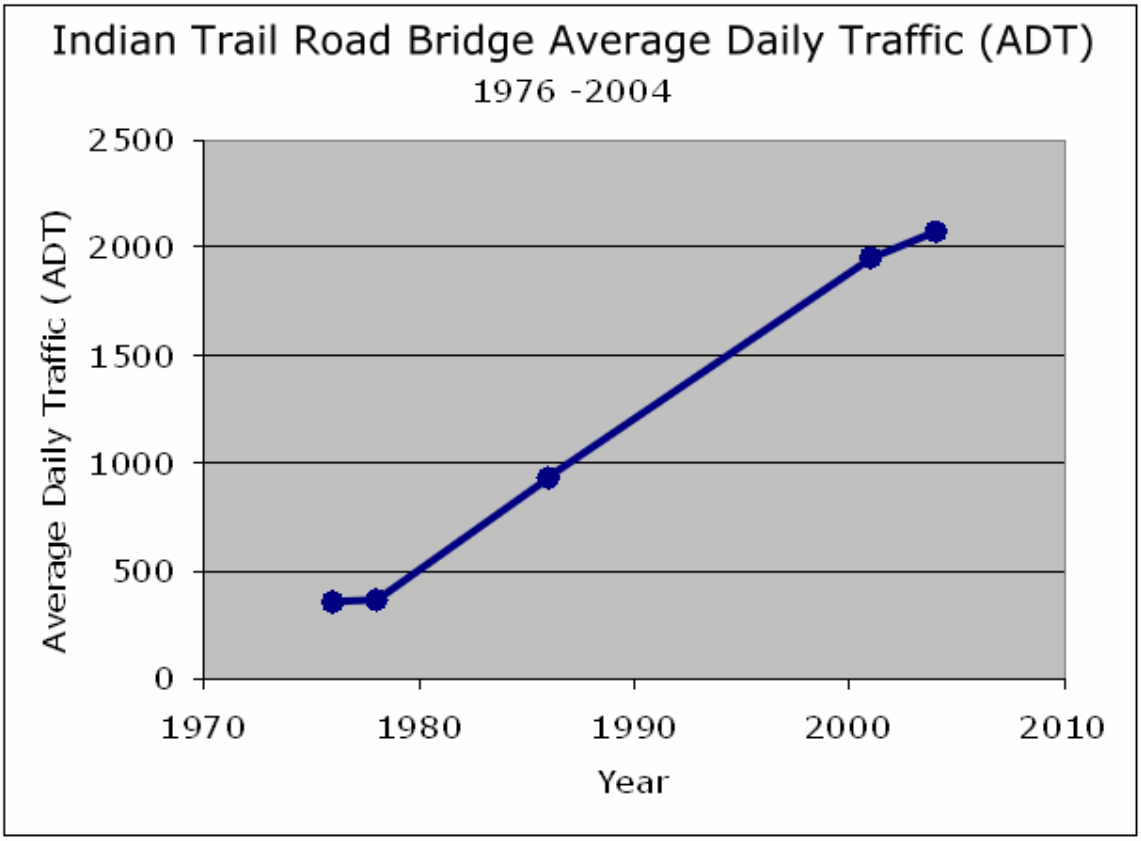
Indian Trail Road itself did not diminish with the community. Indian Trail Road, is part of a common local travel route running from Marine City Highway many miles south of the bridge, and turning into Wadhams Road, which runs as far north as Maitland Road. Along the way, it includes expressway entrances for both Interstate 69 and Interstate 94 along the way. Traffic increased steadily on this corridor in the area of the Indian Trail Road Bridge, according to traffic counts done by the St. Clair County Road Commission, who had started recording traffic counts in 1976. In 1976, the traffic at the Indian Trail Road Bridge averaged 351 average daily traffic (ADT). Two years later, it had increased slightly to 369 ADT. The paving of the Wadhams Road and Indian Trail Road corridor from St. Clair Highway to Marine City Highway in 1984, may have the cause of a much more rapid yearly increase in traffic crossing the Indian Trail Road Bridge, a trend that continued until the recent 2004 traffic count. Traffic counts were not done

regularly on this road, so determining the exact date at which large increases may have started is not possible. It is likely that the paving of the road was part of this rapid increase. By 1986, the ADT was 933, which is almost three times higher than it was a decade ago in 1976. This trend continued, and in 2004, the count had made it up to 2077 ADT.[47]

Traffic Counts at Indian Trail Road Bridge

Date of Traffic Count	Average Daily Traffic (ADT)
October 14, 1976	351
November 16, 1978	369
November 04, 1986	933
May 29, 2001	1955
November 05, 2004	2077

This chart shows when traffic counts were taken for the Indian Trail Road Bridge and what the ADT for that day was. (Data provided courtesy St. Clair County Road Commission)



This graph of the traffic counts for the Indian Trail Road Bridge shows the rapid increase in traffic that has occurred in a relatively short time. (Data provided courtesy St. Clair County Road Commission)

Historic Bridge Issues

As the 21st century arrived, and the traffic on the bridge showed no signs of decreasing, the St. Clair County Road Commission started considering the replacement of the Indian Trail Road Bridge. The bridge no longer met the standards for an acceptable bridge in Michigan.[48] The posted weight limit for double-axle vehicles crossing the bridge had fallen from 15 tons to 12 tons by 2005.[49] The physical condition of the bridge had also

deteriorated to the point that the county placed plate steel over the north approach to the bridge where the bridge and its deck had become unsafe.[50] However, by this time the Indian Trail Road Bridge, as an unusual metal truss bridge, had gained historic status. The St. Clair County Road Commission law required the recognition of the historic nature of the Indian Trail Road Bridge. As result, before the replacement of the bridge, it offered the bridge to interested parties for preservation in another location as required. It did this through single insertion ads in area newspapers and park journals. Golf courses and DNR branch offices also received notices. The process works by offering the bridge first to parties who will agree to preserve the bridge somewhere in a manner that maintains the historic integrity of the bridge in a signed agreement. If there are no such offers, than it is legal to transfer the bridge to parties without any binding contract requiring preservation of the bridge. If there are still no offers, it is legal for the road commission to authorize the demolition of the historic structure. Before the relocation or demolition, the bridge is recorded through a historical overview and a photographic documentation.[51]

There are some sources of monetary assistance for those who might wish to preserve the Indian Trail Road Bridge in a location not on a public vehicular road. Federal aid will provide funding equal to the costs of demolishing the bridge, which in the case of this bridge is $22,000. One of the other major sources of funding for groups and organizations who wish to preserve a historic bridge is through the Transportation Enhancement Grant.

MDOT provides this grant through the Intermodal Surface Transportation Efficiency Act of 1991.[52]

The Transportation Equity Act for the Twenty-First Century created the National Historic Covered Bridge Preservation Program to provide federal funding to states for preserving historic covered bridges.[53] Regardless of the historic significance of the Indian Trail Road Bridge, this program will provide no financial aid toward preserving metal truss bridges, since it will only fund covered bridges. No twin program provides money in this way to preserve metal truss bridges, or any other type of historic bridge. While this program has saved many covered bridges, it has done nothing to save other historic bridges in the United States from demolition, many with just as much significance as covered bridges. There is no word on whether this program will be reorganized to include other historic bridge types, nor whether the covered bridge program, as it stands, will be re-approved by Congress when it expires.[54]

This program undoubtedly provides a way for the Indian Trail Road Bridge to be preserved, but it also provides the road commission with a clear path to demolishing the bridge. It requires that a separate public or private individual have enough money and resources to restore the bridge in a new location. This program suggests that importance is placed on historic preservation of a bridge like the Indian Trail Road Bridge, but perhaps not a priority.

The existence of parks such as the Calhoun County Bridge Park, which features restored truss bridges relocated to the park from their original

locations to make way for new highway bridges, suggests that people in Michigan are at least beginning to develop an appreciation for the history and beauty of these structures.[55] Indeed, the Calhoun County Historic Bridge Park intends to take the Indian Trail Road Bridge, when its replacement occurs.[56] In contrast, the efforts of government entities such as the St. Clair County Road Commission, to give away or demolish the Indian Trail Road Bridge, suggest that this interest in historic metal truss bridges is not shared by all people. To them, the efficiency of the roadways is more important than preserving the memory of these bridges. This is unfortunate, because often a metal truss bridge offers more to its original location than it would in a different location. Restoration of the Indian Trail Road Bridge for vehicular traffic in its current location, where it could continue to serve as a reminder of the Belle River Mills, would be the optimal outcome for the bridge and St. Clair County.

Historic Bridge Park and the Indian Trail Road Bridge's anticipated relocation there constitute a happy story compared to the fate that has befallen many of Michigan's historic bridges. A large portion of the truss bridges listed on the 1995 Michigan Historic Bridge Inventory Survey Sample are gone today, as my attempts to visit and photograph them have revealed. Modern bridges have replaced some, while others appear to have collapsed into the river on roads no longer used today. While the fact that there has been little interest at the county, state, and federal levels of government to preserve these bridges, the problem has only been made worse by the fact that many of the bridges evaluated in the 1995 Historic Bridge Inventory

were found to be non-historic, despite the fact that there are so few of these bridges remaining. While a new bridge inventory is planned, which might help somewhat to save the remaining bridges, the worst of the damage has already been done. With so few bridges remaining today, it is essential that each truss bridge be preserved. It is imperative that the government, at either the state or federal level or both, develop an aggressive program that will provide funding for the preservation of Michigan's remaining truss bridges.

The Church Road Bridge over Black River in Sanilac County, Michigan moments after it was knocked into the river as part of its replacement. Despite the fact that this was the last through truss in the upper thumb area of Michigan, and one of only a handful in the entire thumb region, it was not determined to be historic in 1995. (Nathan Holth)

The fight for preservation should not be restricted to a single bridge type. As was mentioned earlier, extensive funding programs have saved many wooden covered bridges in the United States, while letting other

structure types fall before the bulldozer. Similarly, to preserve just metal truss bridges alone is not enough. The other structure types covered in this paper are also significant and are worthy of preservation. In particular, the concrete camelbacks are especially significant, as a structure type unique to Michigan. Despite this, and fewer than 50 remaining in the state as of 1995[57], these road commissions and MDOT continue to be demolish them, and only a few are preserved.

This photo taken on April 21, 2006 showing the demolition of the Portsmouth Road Bridge over Cheboyganing Creek, Saginaw County, Michigan shows how road agencies deal with much of our nation's transportation heritage. This bridge was a good example of Michigan's unique concrete camelback bridge design. (Anonymous photographer)

Options for Preservation

Although current organization of funding and/or policy may restrict it, there are always a number of options that the government could be pursuing that would maintain the safety and efficiency of roadways while also retaining these important historic artifacts. The simplest option, which also has the

result of retaining the best combination of original appearance and function of the bridge and surrounding area, is to restore the bridge at its original location. Washtenaw County restored the Maple Road Bridge over the Huron River in Washtenaw County Michigan, which serves local residential traffic, in this way. An interesting note is that it actually cost only $525,000 to restore the Maple Road Bridge to serve one-lane light vehicular traffic while a total replacement would have cost at least $1,000,000 and as much as $4,000,000. Yet, if citizens had not organized against replacing this bridge, it is likely that the county would have taken the more expensive replacement option, since if it did, the state would have funded the majority of the project. [58] Although the state is revising some of the programs, [59] the state funding program in place for counties at the time, the Critical Bridge Program, would only fund bridges that were up to present day standards, meaning to get the money the county had to build a new bridge.[60] At this time, I am unsure if Michigan's new funding program, the Local Bridge Program, will be for better or worse in regards to saving historic bridges.

Above: The restored Maple Road Bridge over Huron River, in Washtenaw County, Michigan. (Nathan Holth)

Sources of funding aside, another option that counties could consider to save a historic bridge, is one that only works for roads that for whatever reason are no longer needed, which is to restore the bridge, but restrict traffic to pedestrians only. The Beyer Road Bridge over Cass River in Saginaw County underwent restoration in this manner.

Above: Beyer Road Bridge over Cass River in Saginaw County, Michigan, after completion of a restoration for pedestrian traffic in its original location. (Nathan Holth)

If a bridge needs replacement because it is dangerously narrow for two-way traffic, an option is to build a second one-lane bridge next to the historic bridge and create a one-way couplet. Two concrete bridges in Michigan highlight this option well.

Above left: Okemos Road Bridge over Red Cedar River in Ingham County, Michigan. This is a one-way couplet that turned a single two-lane bridge into a four-lane crossing, with two lanes of one-way traffic on each bridge. Judging by the newer bridge, I would say this addition occurred at least several decades ago. Above right: Pine Island Drive Bridge over Rogue River, Kent County, Michigan. Kent County plans to turn this crossing into a one-way couplet in the future, rather than tear down this rare and unique through arch structure.[61] I was unable to locate an example in Michigan of a one-way couplet where a metal truss bridge was involved. (Nathan Holth)

There are still more options which involve moving the historic bridge. Truss bridges, which are made of separate parts held together by connections, are easy for contractors to dismantle and relocate. It is necessary to note that these options might not work so well for a large concrete bridge however. One of the relocation options involves moving the bridge to a new location, such as the Historic Bridge Park for restoration to serve pedestrian traffic. Another choice is when in some cases, a bridge that is not sufficient for one roadway, might be just fine for another. In this case, the project would

involve relocating the bridge from its original spot to a new roadway to serve vehicular traffic.


Above left: Belleville Road Bridge, over Huron River in Wayne County, Michigan, after being moved to its current location on Burroughs Street over Flat River in Kent County, Michigan. Above right: The Belleville Road Bridge relocation was particularly unusual, because it displaced another historic truss bridge, shown here after it was in turn moved to the Portland Rail-Trail over Looking Glass River in Ionia County, Michigan. This bridge now serves pedestrian traffic only.[62] (Nathan Holth)

With so many options, and many actually less expensive or about the same as replacing the whole bridge, it would seem like there was never a reason to send a historic bridge to the dumpster. Nevertheless, county road commissions in Michigan seem to find reasons to deprive the public of these beautiful historic artifacts.

Throwing the Burden on Others

All of the options previously discussed have seen use at least one time in Michigan, but are usually rare, isolated occurrences, and in some cases,

spurred on by the pocketbooks of private individuals, or at least a very large public outcry. Unfortunately, most truss bridges are not located in dense or wealthy communities, and are more often part of the rural landscape, where too few people live near the bridges, or the few people that do are unaware of their significance, as counties move to replace them. It is important to restore a bridge using options such as those discussed, regardless of how many people live around the bridge or are aware of it. Preservation of these bridges is essential, not just for the sake of the locals, but also for people who might travel to the bridge to see it. Further, restoration of historic bridges is imperative for simply for recording a period in our history. In addition, the burden of preserving a public structure should not fall onto private individuals. Private donations, in addition to government funds ultimately resulted in the restoration of The Maple Road Bridge in Washtenaw County.[63] Preservation of a bridge should not occur just because wealthy people live near the bridge. Nor should a town of lower or middle class people, who cannot afford to throw money at everything, feel obligated to spend money in addition to their taxes, to save a historic bridge. In the case of the Maple Road Bridge, where it cost half as much to restore the bridge than it would have to replace it, the existing taxpayer money available, regardless of what government level that money was at, should have been more than enough to pursue the less expensive restoration option.

Coincidence? The restored Maple Road Bridge, shown at left is located near to the very wealthy community of Barton Hills, whose median household income in 1999 was $149,056, while the Church Road Bridge, shown at right was located near the small agriculture-oriented village of Carsonville, whose median household income in 1999 was $25,795.[64] The Church Road Bridge was demolished in 2004. (Nathan Holth)

Final Thoughts

The Indian Trail Road Bridge stands today as a reminder of a past landscape. The trees that now surround the bridge all but hide the ruins of the mill that once brought prosperity to the area. This bridge is rich with history, and the documentation of the history of the area that has survived proves it. It is likely that many of the other metal truss bridges surviving in Michigan also have rich histories, even though documentation may not be readily available. Even without documentation, the structures of the truss bridges themselves stand as a record of a period of design, and they display historic significance in their own right. The world changes and moves on, but

often these bridges remain as monuments to the past. Metal truss bridges are thus important to understanding our past.

Preserving historic bridges is important for more reasons than the mere fact that the bridge plays a role in a historical narrative. It reaches deeper into the question of why history is important. Robert Archiibald suggests the importance of preserving history for the sake of memory saying, “Through remembering, we construct an identity for ourselves and our communities.”[65] More than any paper document or record can do, a historic bridge serves as a memory for people to remember the past by, and retain a connection to a past, whether it is a community, an ancestry, or an understanding of the sacrifices made in the past to make the present day a success.

The West Hickory Bridge over Allegheny River, in Forest County Pennsylvania offers those who cross the bridge an opportunity to connect with the rich history and beauty of the Allegheny River area. Sadly, demolition awaits this bridge after the completion of a modern two-lane replacement structure whose construction began in 2006. (Nathan Holth)

Beyond history, the intricate geometry that makes up a truss bridge has an artistic look to it, and much more aesthetic value than the plain, standardized bridges built today. As a result, preservation of truss bridges is a worthy cause when based on aesthetic value alone. With so many different options available to preserve metal truss bridges, there is no reason to condemn these bridges to the dumpster. In many cases, it is economic and sensible use of taxpayer dollars to preserve truss bridges, if only government funding policy would allow the preservation to occur. Even if not economically grounded, there is still an obligation to preserve our history as well as saving elements of our world that make a simple drive something enjoyable.

What might the road ahead hold for this bridge? (Nathan Holth)

Notes

[1]David E. Kyvig and Myron A. Marty, *Nearby History Second Edition*, Walnut Creek: (AltaMira Press, 2000), 167-170.

[2] I have made a point of including photos of the bridges that I used to compose this paper. Additional photos of bridges discussed in this paper, as well as photos of other historic bridges not shown in this paper, are available through my website at www.historicbridges.org.

[3] Michigan Department of Transportation. *Historic Bridges*. http://www.michigan.gov/mdot/1,1607,7-151-9620_11154_11188---,00.html This website lists some of the most significant historic bridges in Michigan. It is useful for locating bridges, dating them, and learning about their construction type, or how common they are in the state. This website may be updated eventually, resulting in a change in the content that I used for my research.

[4] Roise, Charles K., and Clayton B. Frasier. *Michigan Bridge Inventory: The Survey Sample*. Michigan Department of Transportation, June 1995. This book provides locations and dates for the construction of all bridges older than 1956 in Michigan, as well as describing the structure type. It also provides a historical overview of bridges in Michigan, and highlights the most significant of them.

[5] Personal communication with Lloyd Baldwin, March 9, 2006. The inventory is a very large compilation, and Mr. Baldwin copied and mailed a number of specific requests for structures that I had.

[6] Wisconsin Department of Transportation, "Truss Bridges." Historic Highway Bridges in Wisconsin (Wisconsin Department of Transportation, 1998): Volume 2, Part 1: 15-52.

[7] There are a number of websites on the internet that features collections of photos and data for bridges. An examination of these sites confirmed the terms located in formal texts were still being used by people today to describe truss bridges. Some noteworthy websites I examined included bridges.midwestplaces.com www.oldohiobridges.com, okbridges.wkinsler.com, www.venangoil.com/Bridges.html, and www.pghbridges.com.

[8] David E. Kyvig and Myron A. Marty, *Nearby History Second Edition*, Walnut Creek: (AltaMira Press, 2000), 172.

[9] Personal communication with Michael Clark, Lloyd Baldwin, Frank Hatfield, and Vern Mesler. I met with Mr. Mesler and Dr. Hatfield on April 17, 2006 to review many of my findings with regards to this paper.

[10] Wisconsin Department of Transportation, 11-12.

[11] "Truss Bridges." *US Bridge* http://www.usbridge.com/bridges/truss.asp This company's website is much simpler than it once was. A couple years ago, a photo gallery provided a lot of photos and examples of their bridges. From this gallery, I was able to learn that this Ohio based company has been given many opportunities to build in Ohio. The page available today just has a few sample photos of their truss bridges.

[12] Wisconsin Department of Transportation, 14-16.

[13] Michigan Department of Transportation, *Historic Bridges*.

[14] Wisconsin Department of Transportation, 36-42.

[15] Ibid., 115-121.

[16] Roise and Frasier, 5.

[17] Ibid.

[18] Michigan Department of Transportation, *Historic Bridges*.

[19] Wisconsin Department of Transportation, 115-121.

[20] Iowa Department of Transportation. *Historic Bridges of Iowa*. http://www.ole.dot.state.ia.us/historicbridge/

[21] Michigan Department of Transportation, *Historic Bridges*.

[22] Roise and Frasier, 84.

[23] Michigan Department of Transportation, *Historic Bridges*. The historic bridge inventory was also consulted through personal communication with Lloyd Baldwin.

[24] Roise and Frasier, 5-6.

[25] Ibid., 84.

[26] Ibid.

[27] Michigan Department of Transportation, *Historic Bridges*. This page served as my resource for finding the construction dates for the bridges, as well as any history of being relocated. The Perrine Road Bridge was located through personal communication with the Midland County Road Commission.

[28] Roise and Frasier, 55-56. Additional information about this bridge type was located on an interpretive plaque posted near the Mottville Bridge, on US-12 over St. Joseph River, in St. Joseph County, Michigan. My research into locating any remaining examples of this structure in Ontario has come up empty, but I remain hopeful that there may still be a couple of this type hidden away in the province.

[29] Michigan Department of Transportation, *Historic Bridges*.

[30] Roy D. Chapin, "The Motor's Part in Transportation," *Annals of the American Academy of Political and Social Science,* 116 (1924): 1-8, <http://links.jstor.org/sici?sici=0002-7162%28192411%29116%3C1%3ATMPIT%3E2.0.CO%3B2-L> This scholarly article from the time period included a useful table conveying these numbers. In addition to passenger cars, it also shows the increase in trucks in that period, which were also increasing rapidly, although in smaller total numbers. In 1921, there were 147,550 trucks nationally.

[31] Deland, Charles J. *State of Michigan Laws Relating to Highways and Bridges, (*Lansing: Wynkoop Hallenbeck Crawford Co, 1921), 90.

[32] Roise and Frasier, 71.

[33] Michigan Department of Transportation, *Historic Bridges*.

[34] Personal communication with Tom Byle, 4-4-06.

[35] Lehman Engineers. *Elk County Bridges*. http://www.lehmanengineers.com/Elk_County_Bridges.htm

[36] Elaine C. Davis and James Warner, Historical Overview Indian Trail Road and Indian Trail Road Bridge over Belle River China Township, St. Clair County, Michigan, St. Clair County Road Commission, November 2004: 1-5.

[37] Ibid., 7-9.

[38] Ibid., Appendix 1.

[39] Digital copies of the original plans for the 1937 Indian Trail Road Bridge were provided through personal communication with Michael Clark, St. Clair County Road Commission.

[40] Davis and Warner, 5.

[41] Ibid., 7-9.

[42] Ibid., 10-15.

[43] Ibid.

[44] Ibid., 5.

[45] Solt, Bob, "Fire Destroys Radike Mill," *Times Herald*, 19 May 1960, 1.

[46] Davis and Warner, 5.

[47] Traffic Counts for Indian Trail Road Bridge and Wadhams Road at Puttygut Road. Personal Communication with Michael Clark, March 1, 2006.

[48] St. Clair County Road Commission, *Indian Trail Road Bridge over Belle River Relocation Information and Marketing Plan*, St. Clair County Road Commission, January 2004.

[49] Personal visit to bridge.

[50] Personal communication with Michael Clark, March 2, 2006.

[51] St. Clair County Road Commission, *Indian Trail Road Bridge over Belle River Relocation Information and Marketing Plan*.

[52] Ibid.

[53] Federal Highway Administration. *National Historic Covered Bridge Preservation (NHCBP) Program*. http://www.fhwa.dot.gov/BRIDGE/covered.htm

[54] Personal communication with Edgar Short, Ph.D., July 12, 2005. Dr. Short works for the Federal Highway Administration's Office of Bridge Technology.

[55] Calhoun County Community Development, *Historic Bridge Park*, http://www.cccd.net/departments/parks_hbp.htm

[56] Personal communication with Vern Mesler, April 13, 2006.

[57] Roise and Frasier, 56.

[58] Washtenaw County Road Commission, *The Historic Maple (Foster) Road Bridge Rededication*, <http://www.wcroads.org/NEWS/
NEWS ARTICLES/Archived/Maple Foster Bridge4.pdf>

[59] Personal communication with Lloyd Baldwin.

[60] Washtenaw County Road Commission.

[61] Personal communication with Tom Byle, 4-4-06.

[62] Wayne County, *Belleville Bridge: APWA Project of the Year, 1996*, <http://www.waynecounty.com/dps_roads/bridges/apwa_project.html>

[63] Washtenaw County Road Commission.

[64] United States Census, *American Factfinder*, <http://factfinder.census.gov> This resource included income data for communities in the United States, including Carsonville and Barton Hills.

[65] Robert R. Archibald, *A Place To Remember: Using History to Build Community*, Walnut Creek: AltaMira Press, (1999): 133.

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