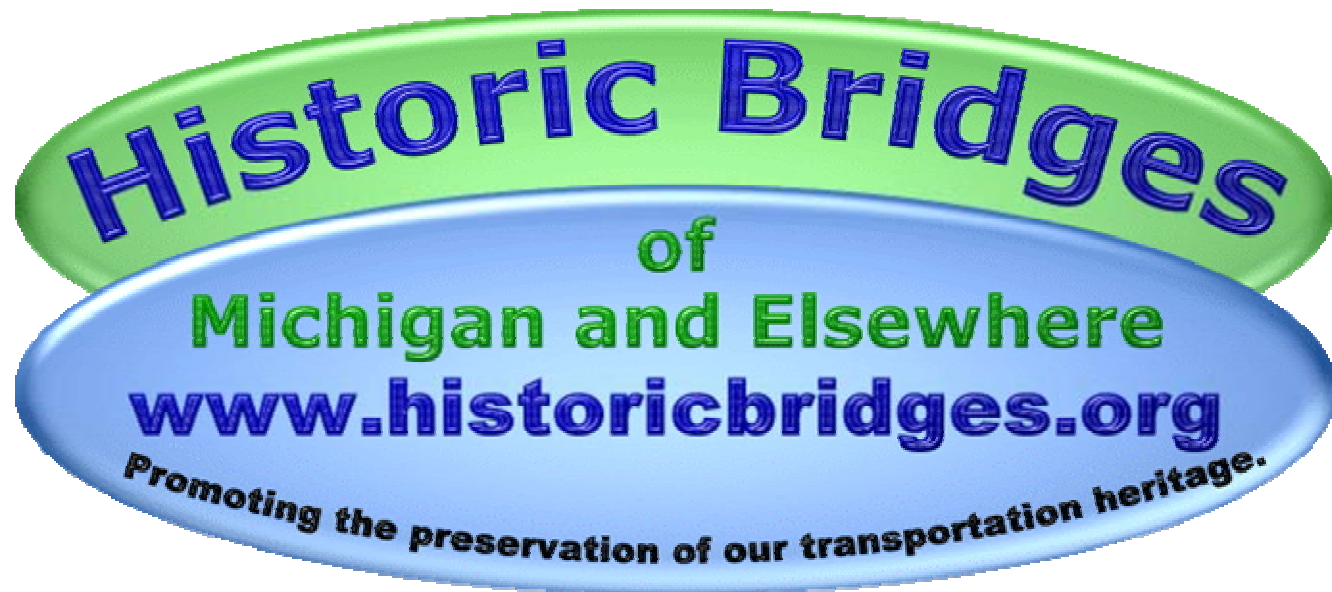
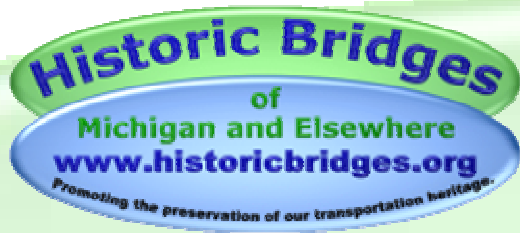


An Introduction To Historic Bridges



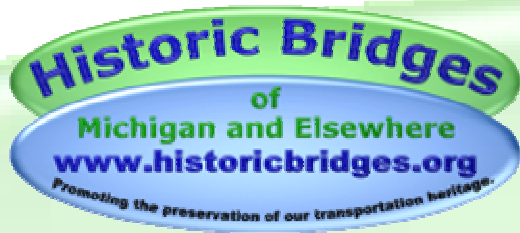
Presented By: Nathan Holth



An Introduction To Historic Bridges

- 1. Introducing Historic Bridges**
- 2. Bridge Basics**
- 3. Metal Truss Bridges and
Iron and Steel Basics**
- 4. Truss Bridge Configurations**
- 5. Bowstring Truss Bridges**
- 6. Girder Bridges**
- 7. Concrete Arch Bridges**
- 8. Stone Arch Bridges**
- 9. T-Beam Bridges**
- 10. Suspension Bridges**





An Introduction To Historic Bridges

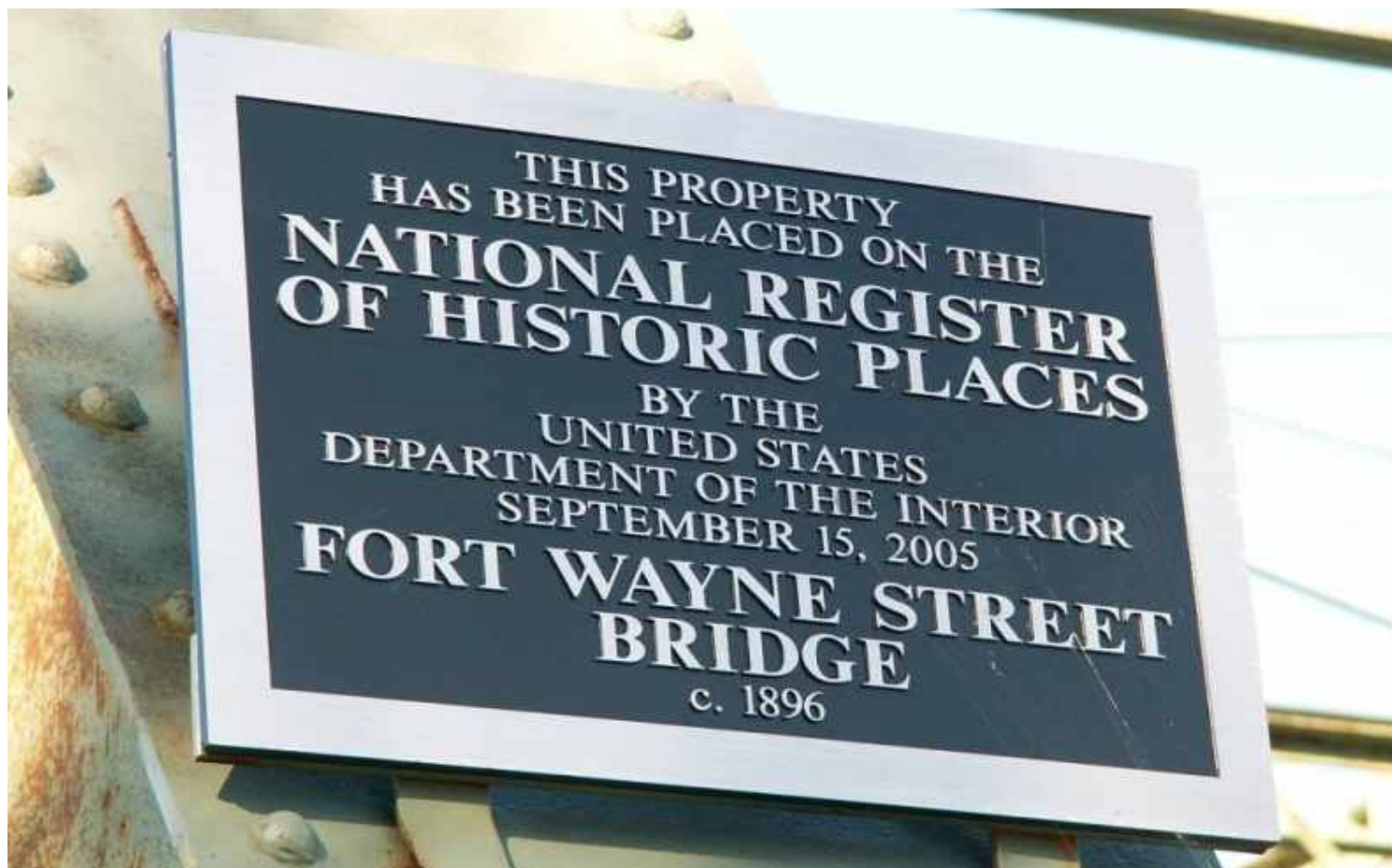
- 11. Movable Bridge Types**
- 12. Historic Bridges: A Threatened Resource**
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An Introduction To Historic Bridges

Part 1: Introducing Historic Bridges

What Is Historic?



The United States government defines a historic bridge as one that is eligible or listed in the National Register of Historic Places.

What Is Historic?

This bridge was considered ineligible for the National Register of Historic Places, however bridges like it have not been built for nearly a century.



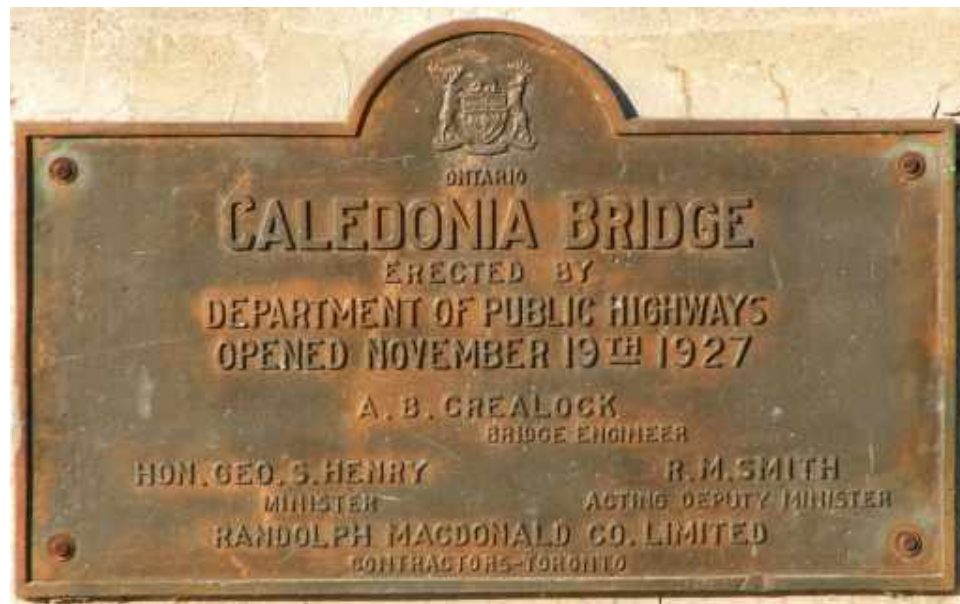
Such a system helps identify the most important bridges, but that should not mean non-eligible bridges do not deserve preservation or are not worth looking at.

What Is Historic?



Historic Bridges of Michigan and Elsewhere will sometimes have bridges not considered eligible for the National Register if they retain their original design. Any old bridge will generally tell a story about our past, and at the same time have a higher level of beauty than modern bridges.

Evolution of Historic Bridges



Finally, a key overarching fact to note is a transition from roughly the 1850s through the 1910s. Originally, bridge companies created and marketed experimental designs, but over time, they developed standard designs. Eventually, by the 20th Century, governments wanted even more consistency and took over and designed standardized bridges, which contractors could build.

An Introduction To Historic Bridges

Part 2: Bridge Basics

Superstructure, Substructure

Superstructure



Substructure

The part of the bridge that spans the obstacle is the superstructure. The part of the bridge that holds the superstructure up is the substructure.

Superstructure - Spans



This multi-span bridge has five spans.

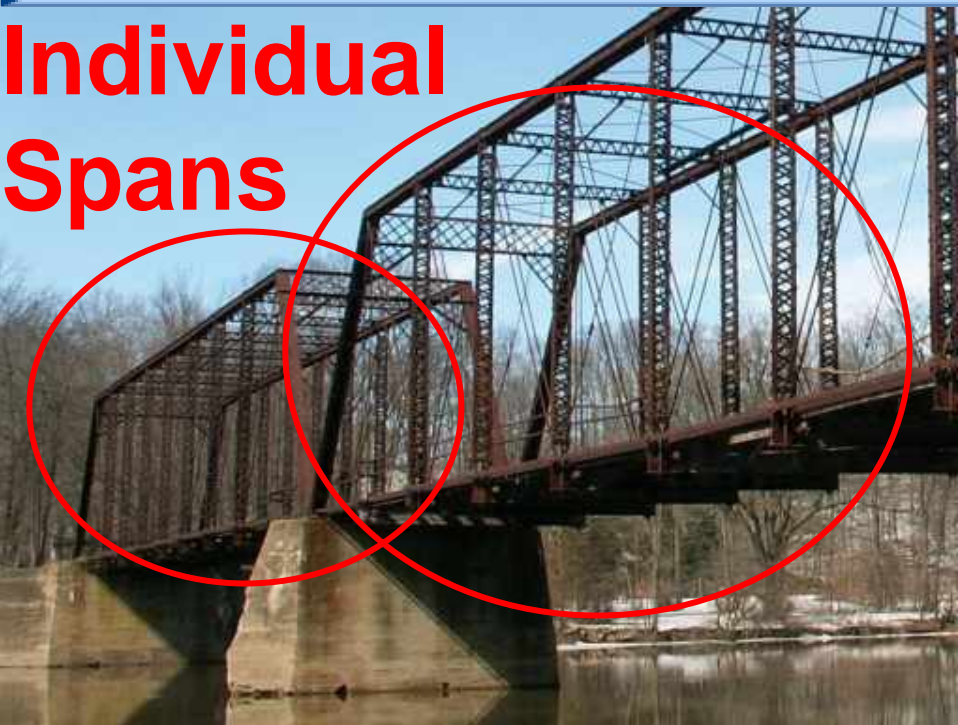


This is a single-span bridge.

Bridges may be single span or multi-span. A span is the distance between abutments and piers.

Superstructure – Span Types

Individual Spans



Simple Spans



Piers

Continuous Spans

With multi-span bridges, the spans may be continuous or simple. Simple spans are essentially a series of single span bridges lined up. Continuous spans are like long single-spans, supported by piers between abutments.

Superstructure – Skew



Bridges may be built with a skew, or angle, to them. Skewed bridges required more effort to engineer. They are also interesting to look at. With some bridge types, skew can drastically alter a bridge's appearance. The above bridge illustrates this well.

Pier



Abutments

The part of the substructure that the ends of the bridge sit on are the abutments. Any supports in between are the piers.

Substructures



Both piers and abutments can be made of a variety of materials and methods. A few examples follow.

Concrete



Concrete piers come in various shapes and designs. Concrete is also used in abutments. It is a common material for substructures.

Caissons



Caissons are steel tubes with a fill inside, such as concrete. They are used as piers.

Steel and Iron Bents



Steel and Iron bents are used as piers and are a network of structural elements that combine to form the support.

Wood



Sometimes wood may be used for piers.



Semi-Coursed Rubble



Random Rubble

Stone abutments and piers can be made of unshaped stones. The layout can be random, or it can be coursed, which means it is lined up in rows.

Coursed Ashlar



Coursed ashlar includes square stones lined up in rows. If the square stones vary in size and do not line up in rows, it is called **uncoursed ashlar**.



Stone substructures may have iron or steel tie rods to help hold them together.

Bearings



**Rocker
Bearing**



**Roller
Bearing
(Roller
Nest)**



Bearings give the bridge the ability to make small expansions, contractions, and movements, that occur with a changing environment.

An Introduction To Historic Bridges

Part 3:

Metal Truss Bridges and the Basics of Iron and Steel

Truss Bridges



A metal truss bridge is a bridge whose main structure comes from a triangular framework of structural steel or iron.



Looking at the iron and steel on a truss bridge is a good way to learn about iron and steel on any bridge.

Wrought Iron Bridge



Steel Bridge



Metal is usually steel or wrought iron. Cast iron was used, but is rare. Wrought iron is generally on older truss bridges, and tends to rust very little. Steel is stronger, on newer truss bridges, but more susceptible to rust. Field identification of either may be difficult.

Wrought Iron



Wrought iron has an interesting appearance when looked at in cross section because it has more slag (waste material) in it. This eye bar was cut in half and you can see the slag appearing like the grain in wood.

American Standard Beams



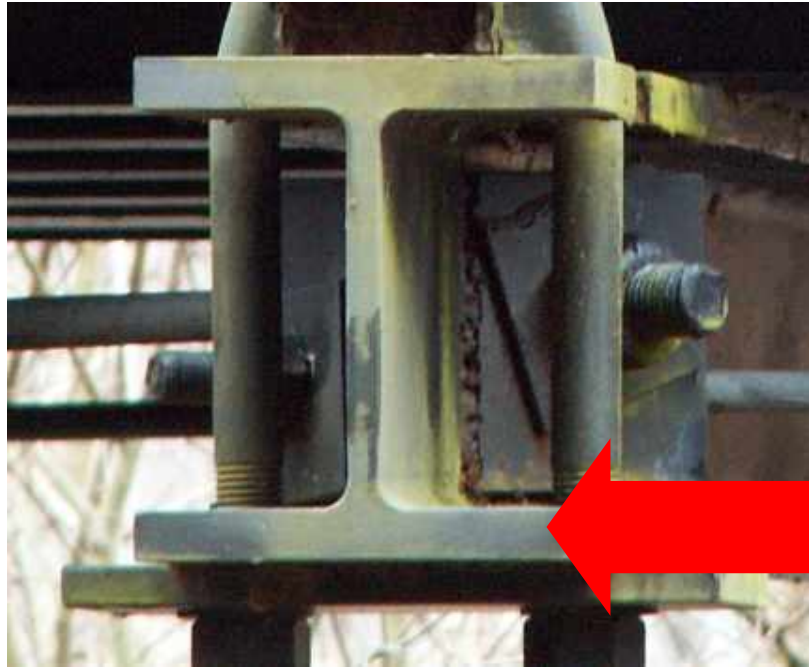
**American
Standard Beams
have a true "I"
shape.**

Sloped Flange

Rolled iron and steel can come in the form of i-beams. The traditional kind, often found on old bridges, is the American Standard Beam, and features an "i" shape. The original designs feature a sloped flange.

Wide Flange Beams

**Wide Flange
Beams have
more of an "H"
shape.**



No Sloped Flange

The American Standard Beam was later replaced by the Wide Flange Beam. Unless they have been added at a later date, old truss bridges generally should not have these beams, which feature more of an "H" shape. Wide Flange Beams do not have a sloped flange.

Iron and Steel



 **Channel**



 **Bars**



Rods 



 **Angle**

Iron and steel comes in other basic forms, including bars, angles, rods, and channels.

Built-Up Iron and Steel

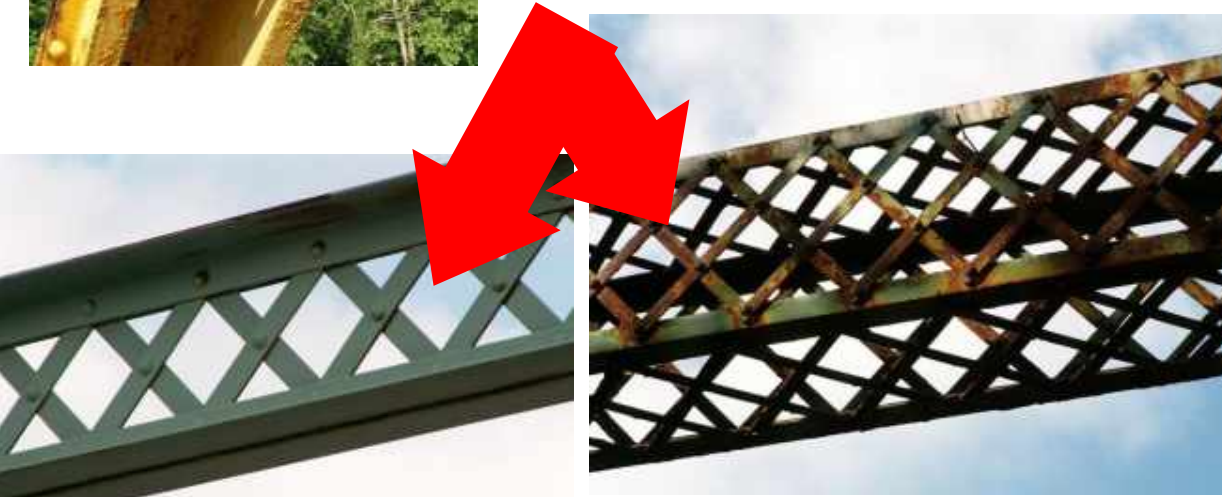


Before the ability to roll larger and stronger beams arrived, iron and steel elements were often riveted together to form larger and stronger beams. Such beams that are formed from smaller elements are **built-up**.

Built-Up Iron and Steel



Batons
V-lacing
Lattice



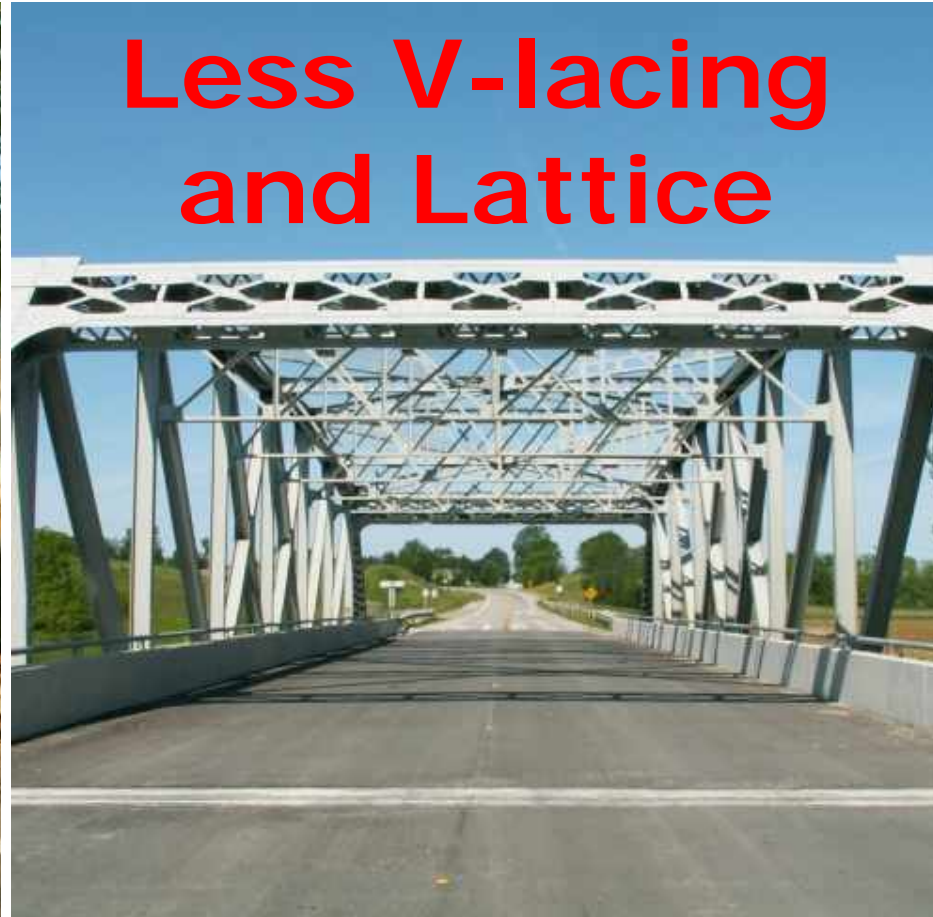
A common way to hold the larger beams such as channels and angles together was to use bars to connect them. They are usually connected in one of three ways: with batons, v-lacing, or lattice.

Built-Up Iron and Steel

More V-lacing
and Lattice



Less V-lacing
and Lattice



A side effect of v-lacing and lattice is that it adds greatly to the beauty of the bridge, creating an even more defined geometric art and complexity in the truss bridge.



A special type of built-up member was developed in the 1800s and patented by their respective companies. Together they form the two rarest types of built-up members, and are known as columns.

Keystone Columns



One type is the Keystone Column. It is noted for having a polygonal shape with flat sides and not a true circular shape. It was often used as the top chord for bowstring truss bridges built by the Wrought Iron Bridge Company, which will be discussed later.

Phoenix Columns



The other type is the Phoenix Column. These columns feature a circular shape to them. They were generally used on pin-connected truss bridges, for various members and bracing.

Eye Bars



**Loop-
Welded**

Has teardrop-
shaped hole.



Up-Set

Has circular
hole.



Finally, eye bars may be present on the bridge. They come in two forms, loop-welded and up-set.

Eye Bars



On certain eye bars, generally very long ones, and if they are in good condition, you may be able to find two tiny little indentations at a set distance apart from each other. These were used as measuring points to test the tension of the eye bar (make sure it did not stretch), at a point where two bars were forge-welded together to make it a longer bar. You might feel the slight bulge or see faint hammer marks in between the dots, where the forge weld took place.

Research Credit: Vern Mesler

Steel and Iron Fabricators



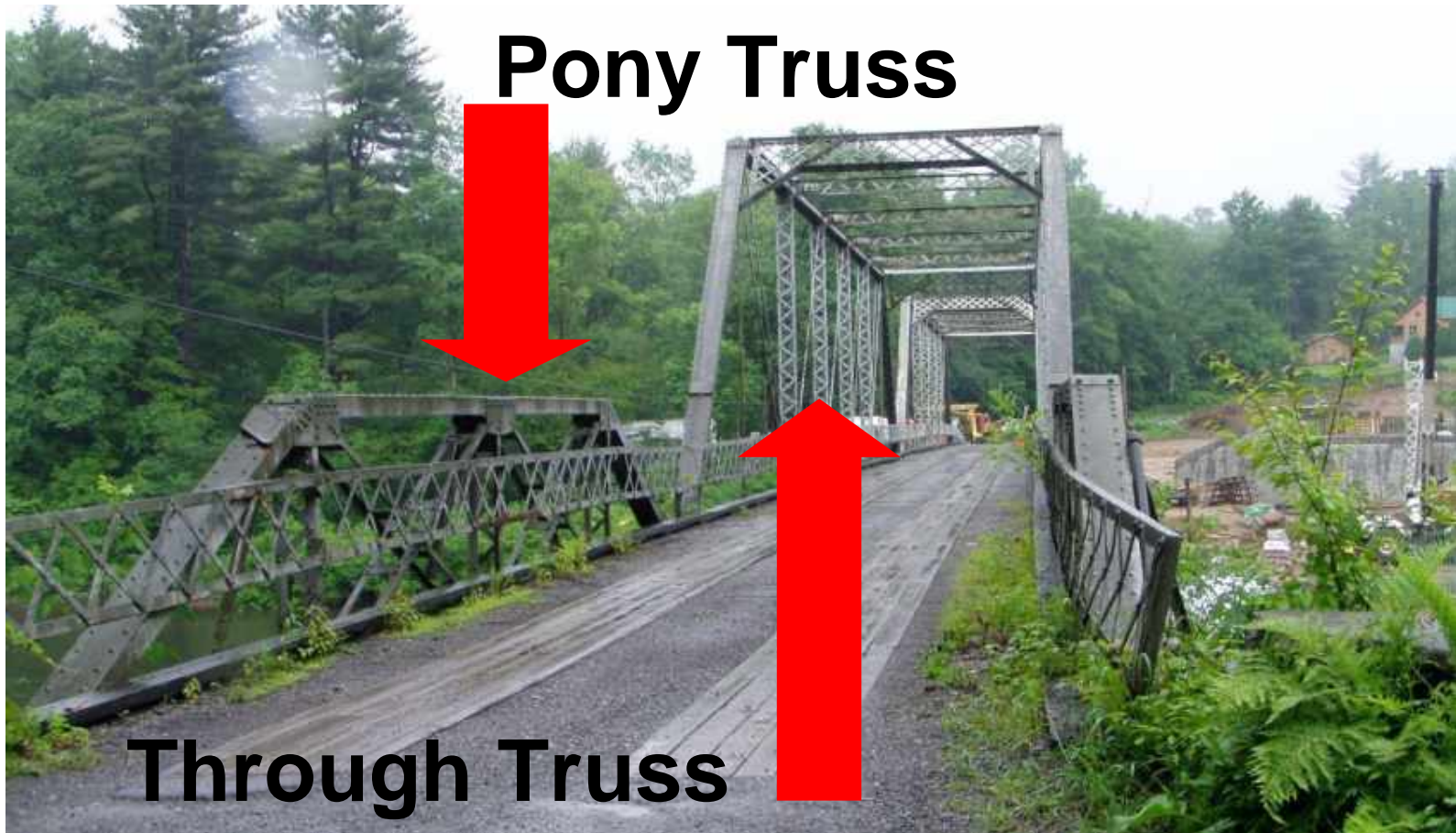
Look closely at the iron and steel on bridges and you might find the name of the mill that the metal was fabricated by on it. Common names include Carnegie, Cambria, and Jones and Laughlin (Jones and Laughlins for pre-1905 beams).

Bridge Plaques



Bridge plaques were placed on bridges to identify the builder of the bridge. Plaques may list county commissioners, state, officials, bridge companies, contractors, and engineers. Truss bridge plaques are often very decorative.

If the trusses run beside the deck, with no cross bracing above the deck, it is called a pony truss bridge.



If cross-bracing is present above the deck of the bridge, then the bridge is referred to as a "through truss."

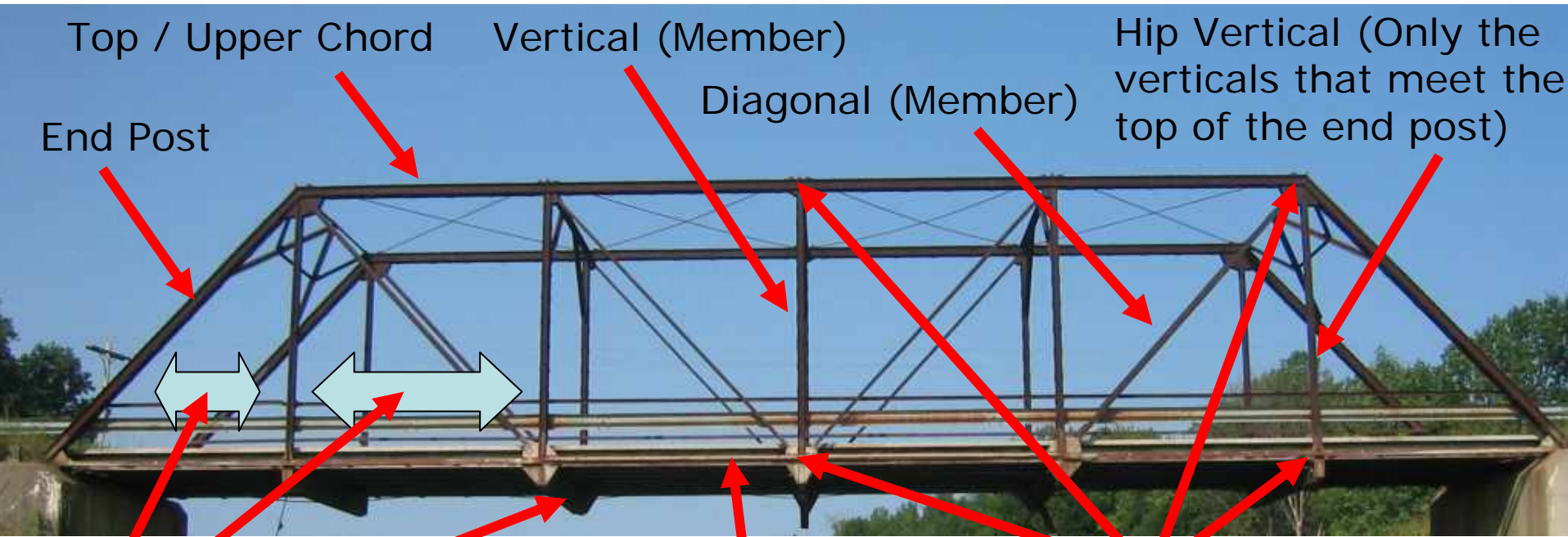
Deck Truss



Trusses may run under the deck: these are called simply Deck truss bridges.

Truss Bridge Parts

The different parts of a truss bridge are all named. Some of the parts:



Top / Upper Chord

Vertical (Member)

Diagonal (Member)

Hip Vertical (Only the verticals that meet the top of the end post)

End Post

Floor beam

Bottom / Lower Chord

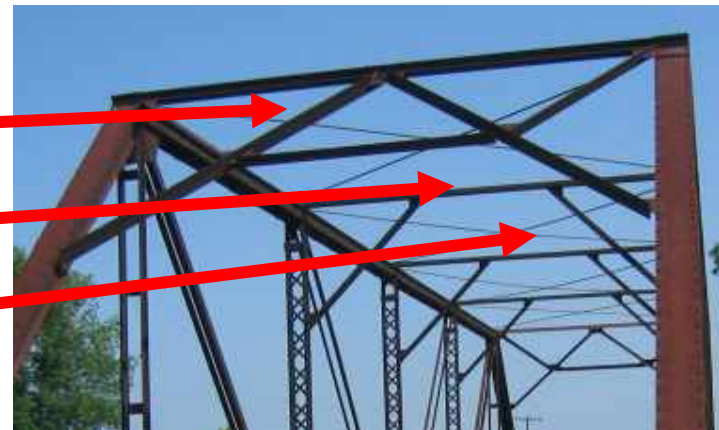
Connections

Each space between vertical members and end posts is one *panel*. This bridge has six panels.

Portal Bracing

Sway Bracing

Lateral Bracing

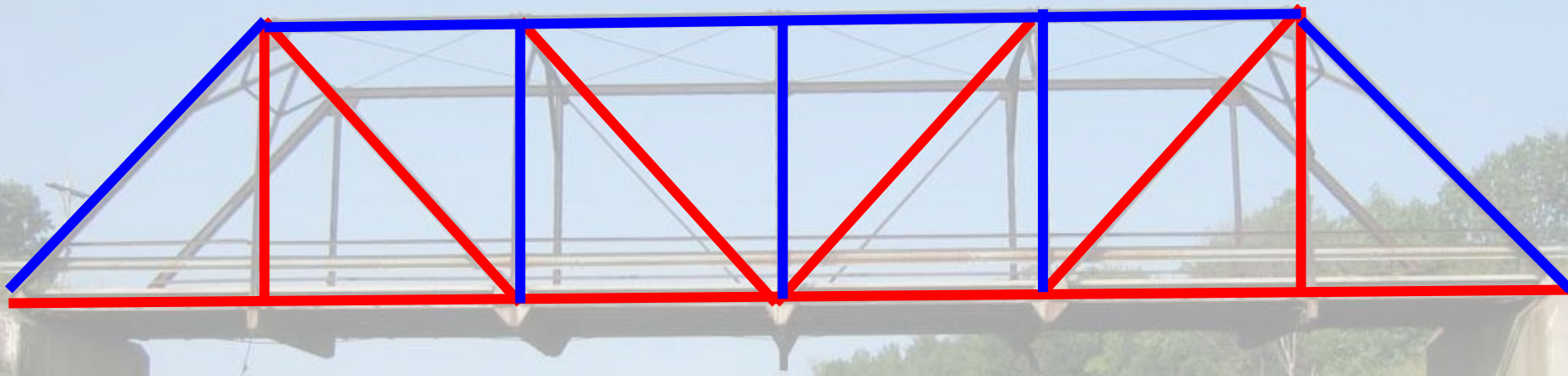


Pony Truss: Outriggers (Buttresses)



Pony trusses may have a vertical member that extends or angles out beyond the edges of the bridge. These are to stabilize the bridge and are called **outriggers** or sometimes **buttresses**.

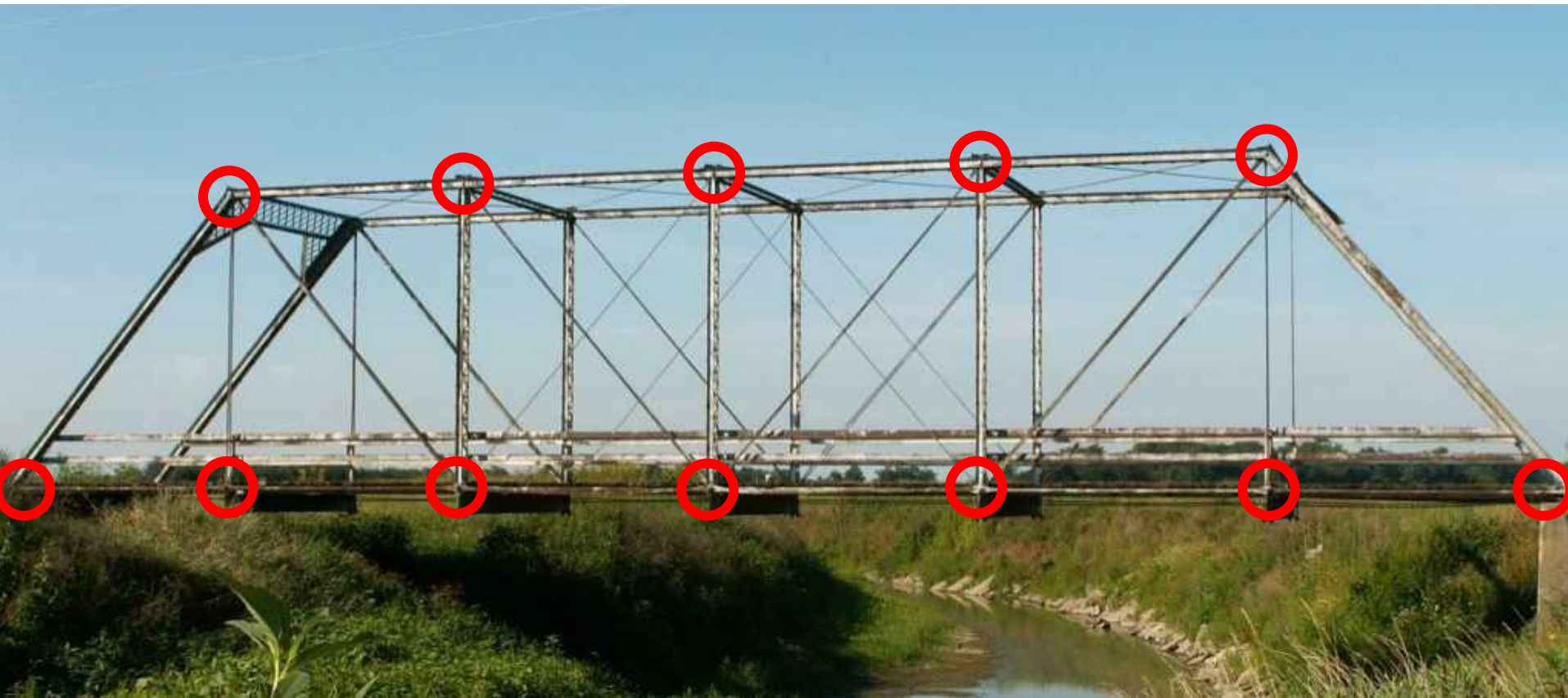
Truss Bridge Forces



The chords and members of a truss bridge experience strain in the form of tension (stretching apart) and compression (squeezing together). Engineers often picked different types of materials and designs for the different parts of a bridge based on these forces. An example is shown above.

Truss Bridge Connections

The pieces of the framework of a truss bridge are held together by **connections**. Most connections on historic bridges are either riveted or pinned.



Pinned Connections



Pin

Pinned connections can be identified by the bolt-like object called a **pin** going through the loops of the members. They tend to show up on bridges from the first half of the truss bridge era.

Riveted Connections



Riveted connections are identified by a “**gusset plate**” which diagonals and vertical members are riveted to, and no pin is present. These connections tend to show up in the second half of the truss bridge era.

Bolted and Welded Connections



Bolted



Welded

Welded and bolted connections are similar to riveted connections, and generally are only found on newer bridges or altered old bridges, although there are some exceptions.

An Introduction To Historic Bridges

Part 4: Truss Bridge Configurations

Pratt



Overview: One of the two most common configurations, it tends to occupy the earlier half of the truss bridge era, but was used throughout. Originally developed by Thomas and Caleb Pratt in 1844.

Appearance: Diagonal members angle toward the center and bottom of bridge.

Pratt – Additional Notes



The Pratt may have additional diagonal members, sometimes of a smaller size, that do not follow the standard pattern to form an “X” shape on panels toward the center.

Pratt - Half-Hip



Full-Slope



Half-Hip

Some smaller pony truss bridges may not feature a hip vertical member, and they are called half-hip Pratt pony truss bridges. Those that feature the hip vertical may be called full-slope Pratt pony truss bridges.

Whipple



Overview: The Whipple truss is also known as the double-intersection Pratt truss. It was patented by Squire Whipple in 1847 as a stronger version of the Pratt truss.

Appearance: Similar to the Pratt truss, but the diagonals pass through one vertical member before reaching the bottom chord. They tend to show up on longer spans built in the first half of the truss era, and with pinned connections.

Truss Configurations

Baltimore



Overview: The Baltimore railroad designed a truss configuration that eventually found use on both railroads and highways. It is a Pratt truss with additional members added for additional strength.

Appearance: Characterized by a Pratt configuration with extra smaller members branching off of the diagonals.

Truss Configurations

Overview: Charles H. Parker modified the Pratt design to create what became known as the Parker truss configuration. This design allowed one to use less materials to get the a similar load capacity. The downside was the more complex design.

Appearance: Characterized by an arch-shaped (polygonal) top chord, with diagonals that follow the Pratt configuration.

Parker



Camelback



Overview: Some bridges that appear to be simple Parker truss bridges but have exactly five sections of top chord are referred to more specifically as a Camelback truss.

Appearance: Characterized by exactly five different angled sections of top chord, with a Pratt layout of the diagonals.

Pennsylvania



Overview: Sometimes called the Petit truss. Designed by the Pennsylvania railroad, this configuration combines the engineering ideas behind the Baltimore with those of the Parker or Camelback.

Appearance: Features an arch-shaped (polygonal) top chord with a diagonal arrangement like the Baltimore.

Warren



Overview: The other most common truss configuration, this design tended to be used in the second half of the truss bridge era, and with riveted connections. Originally developed in 1848 by James Warren and Willoughby Monzoni.

Appearance: Alternating diagonal members form a repeating “V” shape. A true Warren does not have vertical members.

Warren: With Verticals



Most Warren truss bridges do in fact feature vertical members. They may be referenced simply as “**warren with verticals**” truss bridges. Vertical members may occur at each connection, or every other connection.

Double-Intersection Warren



Overview: Often called simply the Double Warren, this is an uncommon truss configuration. Bridges with this configuration often have riveted connections.

Appearance: Looks like two Warren trusses offset and superimposed on each other, forming a repeating "X" shape.

Warren Quadrangular



Overview: Tends to show up on railroad bridges and with riveted connections. They are sometimes called a lattice truss. An uncommon truss configuration.

Appearance: Three Warren trusses offset and superimposed on each other, forming a lattice pattern.

Polygonal Warren



Overview: For greater efficiency, strength, and length, engineers changed the top chord of the bridge to run at different angles across the bridge forming an arch shape, much like a Parker.

Appearance: Features an arch-like (polygonal) shape accompanied by diagonals assuming a Warren configuration.

Queenpost



Overview: An extremely rare truss configuration, this was an early truss design used for short crossings.

Appearance: Features exactly two vertical members and an “X” pattern of diagonal members in the center panel.

Thatcher



Overview: An extremely rare truss configuration. Michigan has one of the few surviving examples, in Chesaning.

Appearance: Diagonal configuration features an unusual “W” shape that runs the entire span.

Lenticular



Overview: One of the rarest bridge designs in the country. Patented by the Berlin Iron Bridge Company of East Berlin, CT

Appearance: Both the top chord and bottom chord have an arched appearance, forming a distinctive oval or eye-like shape.

Bailey



Overview: Developed during World War II as a bridge type that was portable, quick to erect, and easy to adjust for different loads and spans. A late truss design, and still built today. Only the older and World War II surplus examples should be considered historic.

Appearance: A unique design of pony truss composed of modular X-shaped panels. Height and width varies.

Other Truss Types



Bollman Truss, Savage, Maryland

Photo Credit:
Dave Michaels

A few other truss types exist, but these are generally extremely rare and may only exist on a couple bridges nationwide.

An Introduction To Historic Bridges

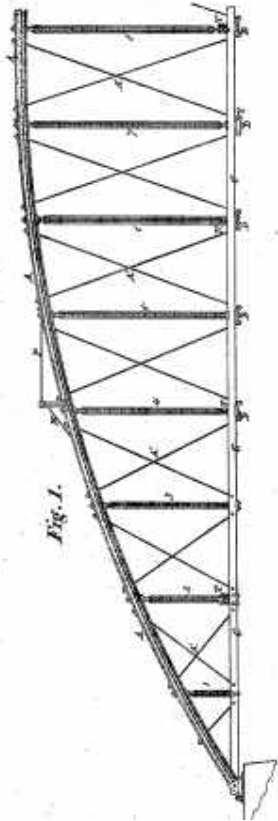
Part 5: Bowstring Truss Bridges

Bowstring Truss Bridges

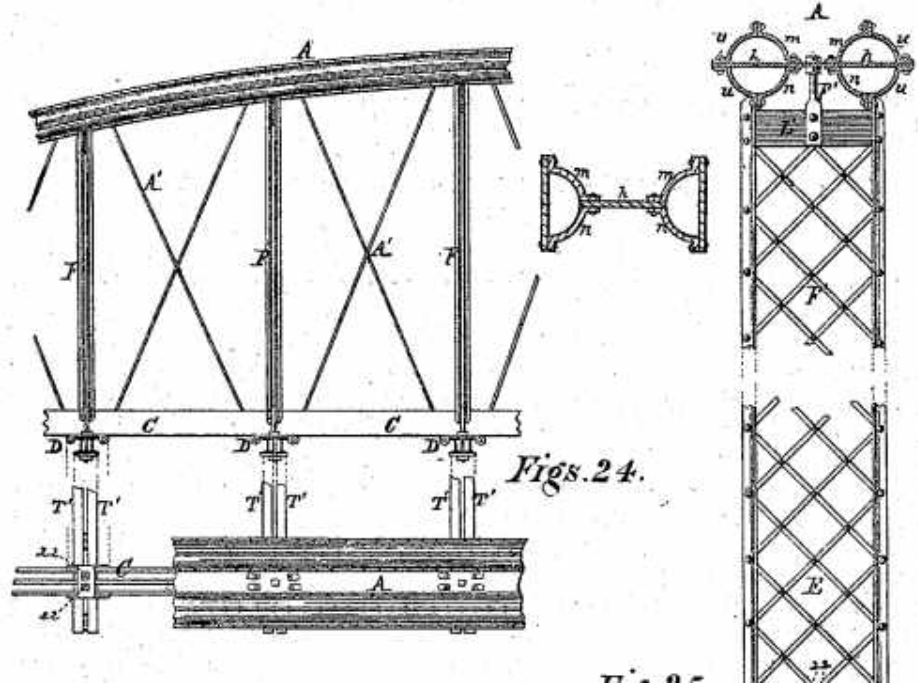


A special variation of the truss bridge is the bowstring truss bridge. It is one of the rarest bridge types around. They have a true curve to their arched top chord. They generally date to the 1870s.

Bowstring Truss Bridges



6 Sheets--Sheet 6.
D. HAMMOND, M. ADLER & J. ABBOTT.
Iron-Bridges.
No. 135,802. Patented Feb. 11, 1873.



Bridge companies at the time designed the bridges using their own ideas and patents. Thus, bowstring bridges have their own distinctive appearance based on what company built them.

Bowstring Truss Bridges



The Wrought Iron Bridge Company of Canton Ohio built bowstrings that used Keystone Column top chords, and also used a lot of lattice on built-up members for larger bridges.

Bowstring Truss Bridges



The King Bridge Company of Cleveland, Ohio used an i-beam for the top chord. Their bridges tend to have a fairly utilitarian appearance.

Bowstring Truss Bridges



The Massillon Bridge Company of Massillon, Ohio used a very unique and impressive top chord. It was a patented design they used that was composed of poles mounted between bars to form the top chord.

Bowstring Truss Bridges

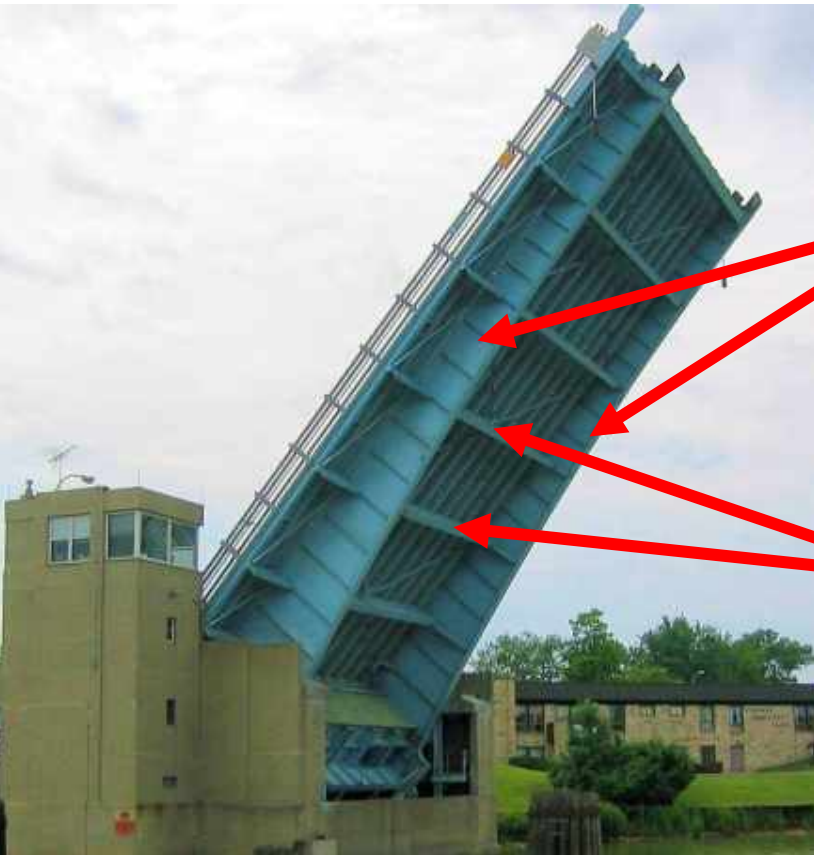


Squire Whipple, who also invented the Whipple truss, is credited with developing the bowstring truss. His special design, often called Whipple Arch bridges, also have a distinctive top chord and can date back to the 1850s.

An Introduction To Historic Bridges

Part 6: Girder Bridges

Girder Bridges: The Basics



Girder

Floor Beams

Girder bridges work like a truss bridge in that they feature structural support on the sides, with a set of transverse floor beams to hold the deck.

Materials: Metal



Metal girder bridges are often called **plate girder** bridges. They were common on railroads and some states built them on highways frequently as well. They generally date from 1900 on.

Girder Types



Deck



Through



Similar to truss bridges, the girders can be beside the road or below. Typically metal girders do not have overhead bracing, and those with girders beside the roadway are usually considered through girders.

Materials: Concrete



Concrete girder bridges were also built. They generally date from 1910 through 1935.

Materials: Concrete: Floor Beams



Visible
Floor
Beams



Floor
Beams
Integral



Concrete girder bridges may not have visible floor beams if they are integral with the concrete deck. Hidden reinforcing rods provide the strength.

Michigan's Unique Concrete Camelback Bridges



Michigan designed and built a unique bridge concrete girder design called the curved chord through girder, often called simply the concrete camelback. These were built in the 1920s.

Concrete Camelback Bridges



These bridges vary in size and design, and each remaining example is rare and significant, especially on a national scale.

An Introduction To Historic Bridges

Part 7: Concrete Arch Bridges

Concrete Arch Bridges



Concrete arch bridges were built generally after 1900 and usually are reinforced, with reinforcing rods inside to help hold them together.

Concrete Arch Spandrels

Open
Spandrel



Closed
Spandrel



Bridges with
visible vertical
members,

called **spandrels**, are **open spandrel** bridges. Those
without visible spandrels are **closed spandrel** bridges.

Earth-Filled Concrete Arches



**Earthen Fill
Visible With
Removed
Deck**



Closed spandrel bridges may have an earthen fill inside.

Rainbow Arch Bridges



Through concrete arch bridges are often called Rainbow Arch bridges, or concrete bowstring arch bridges. They are quite rare; Kansas and Ontario have a relatively fair number however.

An Introduction To Historic Bridges

Part 8: Stone Arch Bridges

Stone Arch Bridges



Stone arch bridges were generally built in the United States from the 1600s through the 1930s.

Segmental



Semicircular



Stone arches usually assume one of two shapes, segmental and semicircular.

Elliptical



A third design, elliptical, is extremely rare to find. The above concrete arch bridge illustrates the shape.

Stone Arch Bridges

Spandrel Wall

Parapet (Railing)

Keystone

Voussoir

Barrel



Some parts of a stone arch bridge.

Stone Arch Bridges



Some stone arch bridges may have tie rods in them. The above bridge appears have a tie rod that included a circular stone insert, with an iron cross-shaped piece (now missing)

Steel Arch Bridges



Steel arch bridges are generally an uncommon structure type. They tend to be used for medium to large crossings.

Steel Arch Bridges



Some arch bridges feature a trussed arch. This includes a truss design in the actual arch, much like that of a truss bridge.

Steel Arch Bridges



Some steel arch bridges use cables instead of rigid elements like i-beams for their spandrels. The West End Bridge in Pittsburgh, PA is a good, and large, example.

Stringer (Beam) Bridges

Stringer Bridges: The Basics



Stringer bridges, also called beam bridges, work by using a series of parallel beams to support the deck and load. Diaphragms may be placed between beams stabilize the beams. They vary widely in size and number of spans, and usually date from 1900 on.

Stringer (Beam) Bridges



Stringer bridges can take on a variety of appearances.

Stringer (Beam) Bridges



Concrete may be used to hide the steel beams, for aesthetic purposes or to protect the beams. Michigan, in particular had a design in late 1920s into the 1930s that covered the outermost beams with concrete.

Stringer (Beam) Bridges



On old bridges, guardrails were more than just functional, they were decorative. They play a major role in making old bridges beautiful, especially on simple bridge types like the stringer.

An Introduction To Historic Bridges

Part 9: T-Beam Bridges

T-Beam Bridges



T-Beam bridges consist of bridges that use concrete beams that are cast uniformly with the deck. They function similarly to stringer bridges.

Sizes



T-Beam bridges tend to be used on small spans, but in some cases can come in large sizes.

Curved T-Beam Overpasses



Michigan built a number of t-beam bridges in the 1950s and early 1960s on its expressways that were noted for their curved beams.

Curved T-Beam Overpasses



Those that retain their original railings remain a rare example of an expressway bridge that has a high degree of beauty. The arches were also designed for the increase in vertical clearance.

Curved T-Beam Overpasses



This is a heavily skewed example. Note the longer spans and thicker beams.

An Introduction To Historic Bridges

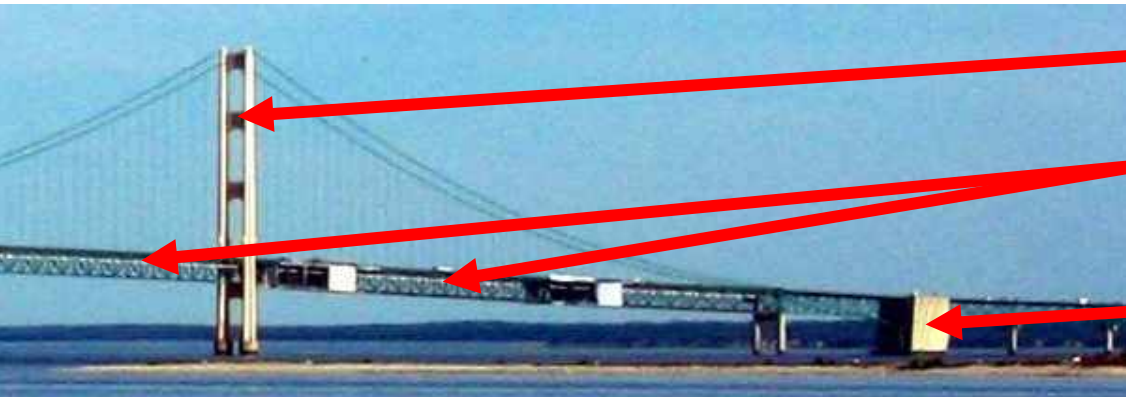
Part 10: Suspension Bridges

Suspension Bridges



Suspension bridges are usually very large landmark bridges. John Roebling made major developments in the design of these bridges in the 1800s, and this bridge type was further perfected during the 20th Century.

Suspension Bridges



Tower

Stiffening Truss

Anchorage



Main Cable

Suspender Cables

Suspension bridges feature a main cable that has suspender cables that hold the deck up. The main cable is tied into an anchorage. Stiffening helps to keep the bridge from oscillating (moving) in the wind.

Suspension Bridges



The Mackinac Bridge also features a metal deck grating in the center lanes. This was done to further decrease the effects of wind on the structure.

Stiffening Types



Through Plate Girder



Stiffening can vary in type, and is not always a truss. For instance, it might be a through or deck plate girder or a deck, pony or through truss.

Suspension Bridges



A few suspension bridges, such as the “Three Sisters” bridges in Pittsburgh, use eye bars instead of cables.

An Introduction To Historic Bridges

Part 11: Movable Bridge Types

Metal Truss



Metal Girder



Bridges may be movable, which means they are designed to open to make way for boats. Movable bridges are defined by the way they move. The actual structure type may vary, including metal truss, girder, and stringer.

Movable Bridges: Swing

Closed



Open



Overview: The swing bridge is the oldest of the common movable bridge designs. In these, the movable span turns on a pier 90 degrees to open a channel for the boats. They fell from favor because their central pier limited the width of the channel.

Movable Bridges: Swing

Closed



Open



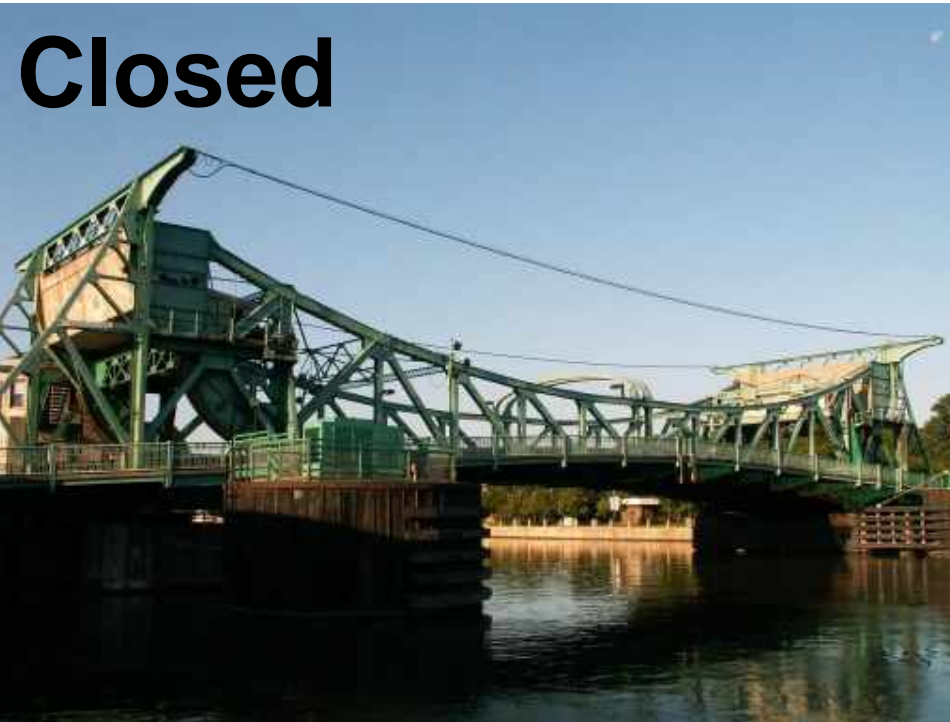
Appearance: Look for the central pier. The superstructure appears as two spans, in a continuous format, although with some bridges, they may look more like simple spans in design.

Movable Bridges: Swing



Appearance: Some rare bridges may have the center pier of the bridge offshore, which increased channel width. Other rare examples may be shorter at one end which will also have a counterweight, and are known as bobtail swing bridges.

Movable Bridges: Bascule



Overview: Bascule literally means “seesaw.” A bascule bridge operates by rotating up to open the channel. Counterweights provide the balance to make this motion possible. Offering good channel clearance, they are a popular type of movable bridge, and are still built today.

Movable Bridges: Bascule

Single Leaf



Double Leaf



Appearance: Bascule bridges may have one moving section, called a single-leaf bascule bridge, or have two sections, called a double-leaf bascule bridge. With double-leaf bascules, when closed, the bridge generally operates as a continuous structure.

Movable Bridges: Bascule

Trunnion



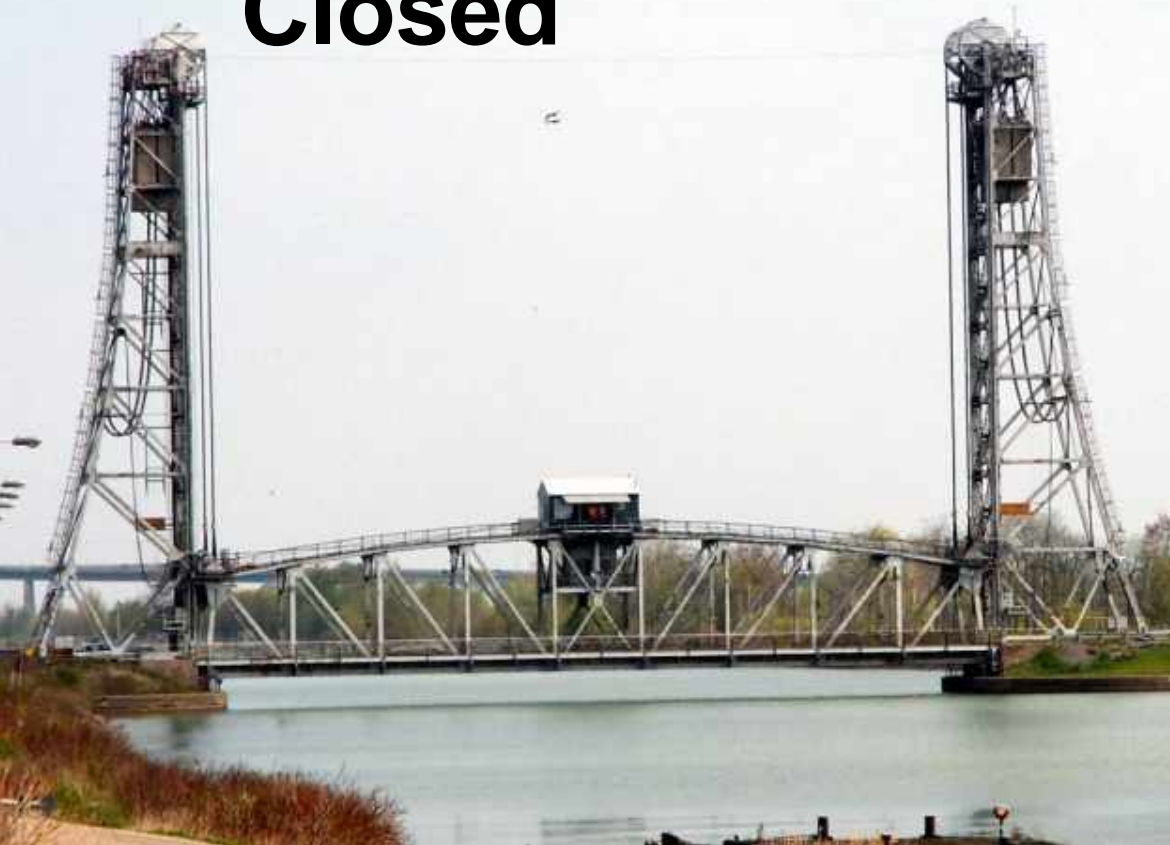
Rolling Lift



Appearance: Bascule bridges operate in different ways. There are two common methods of operation. One is to rotate around a trunnion, or large axel, to raise, called a trunnion bascule bridge. Others roll back on a track, and are called rolling lift bascule bridges.

Movable Bridges: Vertical Lift

Closed



Open



Overview: Vertical lift bridges raise the bridge superstructure directly up, to provide the clearance for boats to pass. They can span the entire channel, but are limited in terms of how tall a boat they can service.

Movable Bridges: Vertical Lift

Closed



Open



Appearance: Vertical lift bridges feature a single span. Usually, towers will be present at each end. The towers will have counterweights and cables in them to raise the span up.

Movable Bridges: Vertical Lift



Appearance: Some rare vertical lift bridges, such as those on the Erie Canal, have no towers and raise on supports that rise out of the ground to provide a limited increase in vertical clearance for boat traffic.

An Introduction To Historic Bridges

Part 12: Historic Bridges: A Threatened Resource

A Threatened Resource

Historic Bridges At Risk



Historic bridges are a threatened resource. With the exception of wooden covered bridges, only limited protections and funding exists to preserve them.

Historic Bridges At Risk



As historic bridges age, government agencies seek to replace these bridges with mundane modern structures.

Even if more expensive, it is generally easier for agencies to secure funding for replacement rather than rehabilitation.

Historic Bridges At Risk



Historic bridges are currently being demolished at an alarming rate. If legislators are not convinced to expand protection and funding for historic bridges, it may soon be too late to save the best bridges.

A Threatened Resource

Historic Bridges At Risk



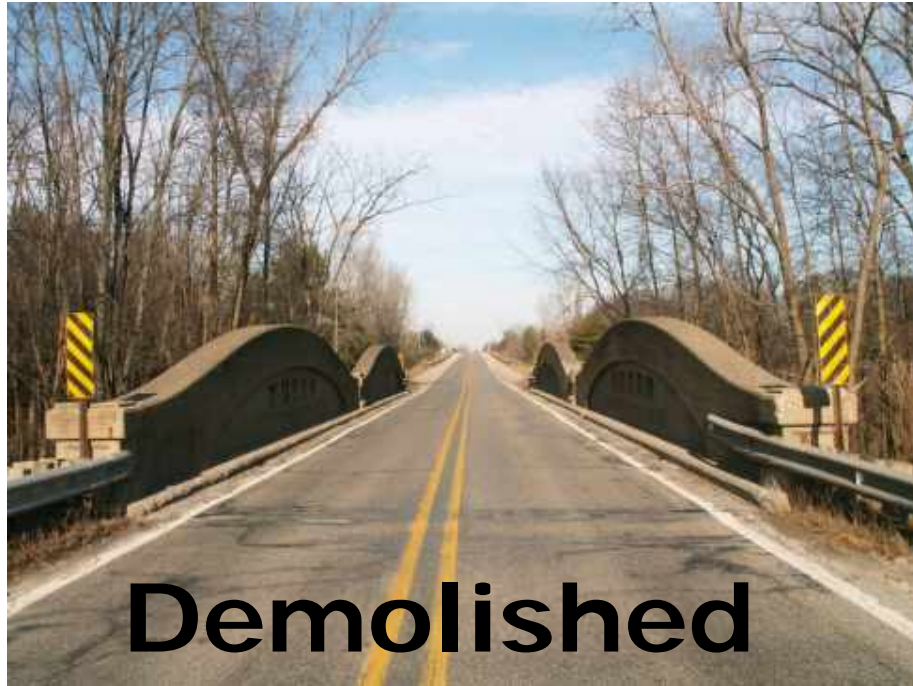
Successful preservation projects often depend on heavy local community interest. This is a serious problem since often the oldest and best historic bridges are in rural locations

Historic Bridges At Risk



Contacting federal, state, and local legislators and getting others to do the same is a key step than anyone can take to help raise awareness for historic bridges. Historic Bridges of Michigan and Elsewhere's Turning the Tide page can help.

Historic Bridges At Risk



Demolished



Preserved

Local engineers may tell you preserving a bridge is not feasible or possible due to some sort of restrictions. However, successful preservation projects elsewhere often suggest that this is not really the case.

An Introduction To Historic Bridges

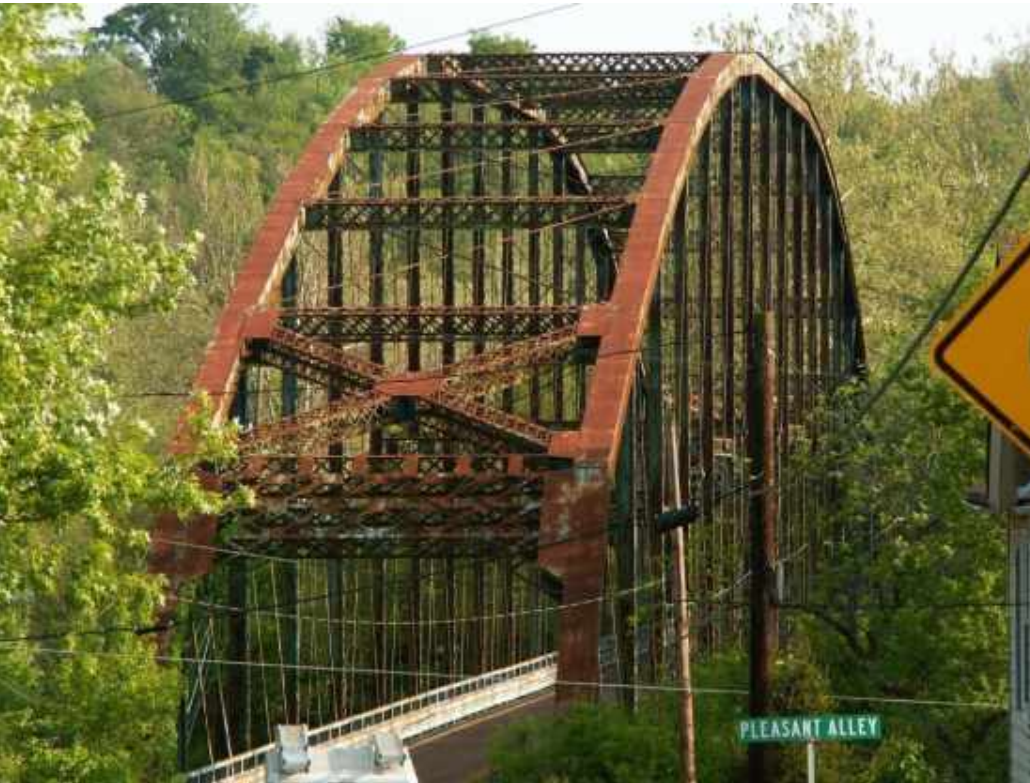
Part 13: Demolished and Doomed Bridges

Wadhams Road Bridge



The Wadhams Road Bridge in St. Clair County, MI was in excellent condition. Demolished April 24, 2007, this was one of three multi-span concrete camelbacks remaining. One of the other three is doomed too.

Blue Rock Road “Singing” Bridge



The Blue Rock Road Bridge in Hamilton County, OH was a very large and breathtaking 1914 Parker truss demolished ¼ Mile away from its replacement, October 11, 2006.

Shanley Road “Maxwell Run” Bridge



Located in rural Elk County, PA this truss bridge was noted for multi-span design with both through and pony spans, with unparalleled historic integrity. The pony spans dated to 1905, and the main spans from 1891.

Watervliet Road



With a 1916 construction date, This bridge was one of the oldest trunk line bridges in Michigan, and was designated Trunk Line Bridge #57, and was also an excellent example of an early standard plan concrete arch bridge in Michigan. To be demolished in 2007.

Ulster Bridge: Bradford County, PA



The Ulster Bridge features four large Parker main spans, and what is likely one of the longest multi-span pony trusses, that also feature unusual vertical end posts. This unique bridge will be demolished Summer 2007.

Foxburg Bridge



Built in 1921, the Foxburg Bridge, crossing Allegheny River on the Clarion-Armstrong County, PA line once carried a railroad on its upper deck, accounting for its unique appearance.



Hickory Bridge



Set in the beautiful Allegheny River valley in Forest County, PA, this stunning bridge once also served a rail line, and was a toll bridge. It features an ornate plaque and four impressive pin-connected Pratt spans, and sits on stone piers and abutments.

Pomeroy-Mason Bridge



Located on the Ohio River at Mason, OH and Pomeroy, WV this is a magnificent cantilever truss bridge that is being replaced by a mundane cable-stayed bridge.

An Introduction To Historic Bridges

Part 14: Noteworthy Historic Bridges

Noteworthy Historic Bridges

Mead Avenue Bridge



Located in Crawford County, PA, this ancient 1871 Whipple truss with Keystone columns had a Baltimore truss attached to it in the early 20th Century making it two bridges in one! The future of this bridge is uncertain.

Noteworthy Historic Bridges

Mottville Bridge



Located in St. Joseph County, MI, this is the longest concrete camelback bridge in Michigan, and will soon be the only remaining multi-span example as well. It has been bypassed and preserved.

Noteworthy Historic Bridges

Iroquois 1250 Bridge



Located in Iroquois County, Illinois, this late 1800s bridge is one of the longest remaining bedstead truss bridges known. It also features an unusual lightweight double-intersection Warren pony approach span that likely dates to the early 20th century.

Noteworthy Historic Bridges

Sugar Creek Chapel Bridge



This bizarre, unusually shaped arch bridge in Iroquois County, Illinois was erected in 1904. Research suggests that the trussed arches are reused from an unknown building at the 1893 World Columbian Exposition.

Noteworthy Historic Bridges

Cortland Street Bridge



Located in Chicago, Illinois this 1901 bridge was the first bascule bridge to be built to the Trunnion design, which means it rotates around an axel. This design went on to become one of the most common movable bridge types.

Noteworthy Historic Bridges

Ouaquaga Bridge



Located in Broome County, NY this bridge is a beautiful example of a lenticular truss built in 1888 by the Berlin Iron Bridge Company, who patented the type. It retains remarkable integrity, and is also slightly skewed.

Noteworthy Historic Bridges

Blackfriars Street Bridge



Located in London, ON, this bridge is the longest known bowstring span in North America, at a length of 225 feet. It was built in the 1870s by the Wrought Iron Bridge Company of Canton, OH

Noteworthy Historic Bridges

Caledonia Bridge



Located in Haldimand County, ON, this is the longest rainbow arch bridge in the province, and likely among the largest of North America. It was opened to traffic in 1927. It contains nine fairly large spans.

Noteworthy Historic Bridges

Wells Street Bridge



Located in Fort Wayne, IN, this Whipple truss is one of the most decorated truss bridges in existence. Extensive ornamentation and plaques are present. It has been rehabilitated for pedestrian use.

Noteworthy Historic Bridges

Triple Whipple Bridge



Located on the Dearborn-Ohio County, IN line, this large and ancient 1878 bridge is the only known example of a triple-intersection Pratt truss bridge.

Noteworthy Historic Bridges

New Richmond Bridge



Located in Allegan County, MI this 1879 bridge is the oldest known highway swing bridge in the United States. It is also the longest pony truss in Michigan, and a rare multi-span pony truss. It was rehabilitated for pedestrian use.

Noteworthy Historic Bridges

Tunkhannock Viaduct



This 2375 foot railroad concrete deck arch bridge in Wyoming County, PA in Nicholson was completed in 1915, and has held the record of largest concrete bridge in the world. It rises 240 feet above the creek it crosses.

Noteworthy Historic Bridges

Ambridge Bridge



Located in Beaver County, PA, the Ambridge Bridge is an unusually artistic design of cantilever, featuring several spans that all feature decorative finials on top.

Noteworthy Historic Bridges

Mower Road Bridge



Located in Saginaw County, this is one of the longest concrete girder bridges in Michigan, with three spans totaling 135 feet. It retains excellent historic integrity.

Noteworthy Historic Bridges

Pine Island Drive Bridge



Located in Kent County, MI, This is a large rainbow arch bridge with overhead bracing that shares some design features with Michigan's concrete camelbacks. A unique structure, it was built in 1924. Preservation is planned.

Noteworthy Historic Bridges

6th Street Bridge



Located in Grand Rapids, this is the longest pin-connected truss bridge in Michigan. This four-span structure retains excellent historic integrity and continues to serve vehicular traffic just north of downtown.

Noteworthy Historic Bridges

Trowbridge Road Bridge



This is one of Michigan's most impressive and unusual t-beam bridges, incorporating decorative arches into the design. Located in Oakland County it carries highway over railroad.

An Introduction To Historic Bridges

Part 15: Traditional Historic Bridges

Traditional Historic Bridges

Unique



Traditional



Not all historic bridges will be totally unique, or the last of their kind. What follows is a sample of the kinds of “average” historic bridges that you might expect to find on a historic bridge tour.

Traditional Historic Bridges

Pin-Connected Pratt Truss



The pin-connected Pratt truss bridge is a special but traditional find. These two examples from Iroquois County, Illinois are good examples of the design.

Traditional Historic Bridges

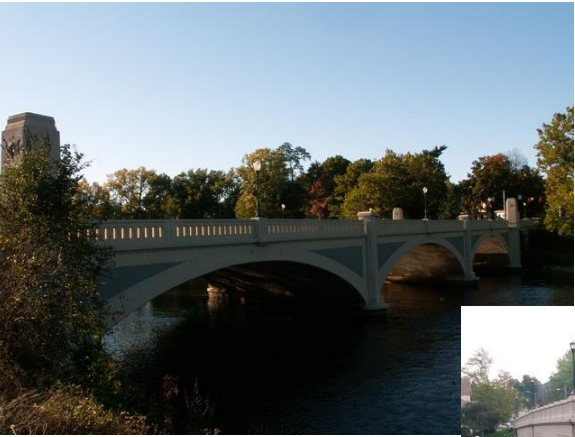
Rivet-Connected Warren Truss



The rivet-connected Warren truss bridge is another other traditional truss bridge find. These two examples from show what these traditional design bridges might look like.

Traditional Historic Bridges

Concrete Deck Arch Bridges



Concrete deck arch bridges were common for large river crossing in some urban areas where high vertical clearance was not a concern. Indiana has a lot of these.

Traditional Historic Bridges

Through Girder Bridges



Through girder bridges were built to standard plans, however slight variations are often noticeable, as these “standard” plans changed from year to year as new designs and increased traffic loads developed.

Traditional Historic Bridges

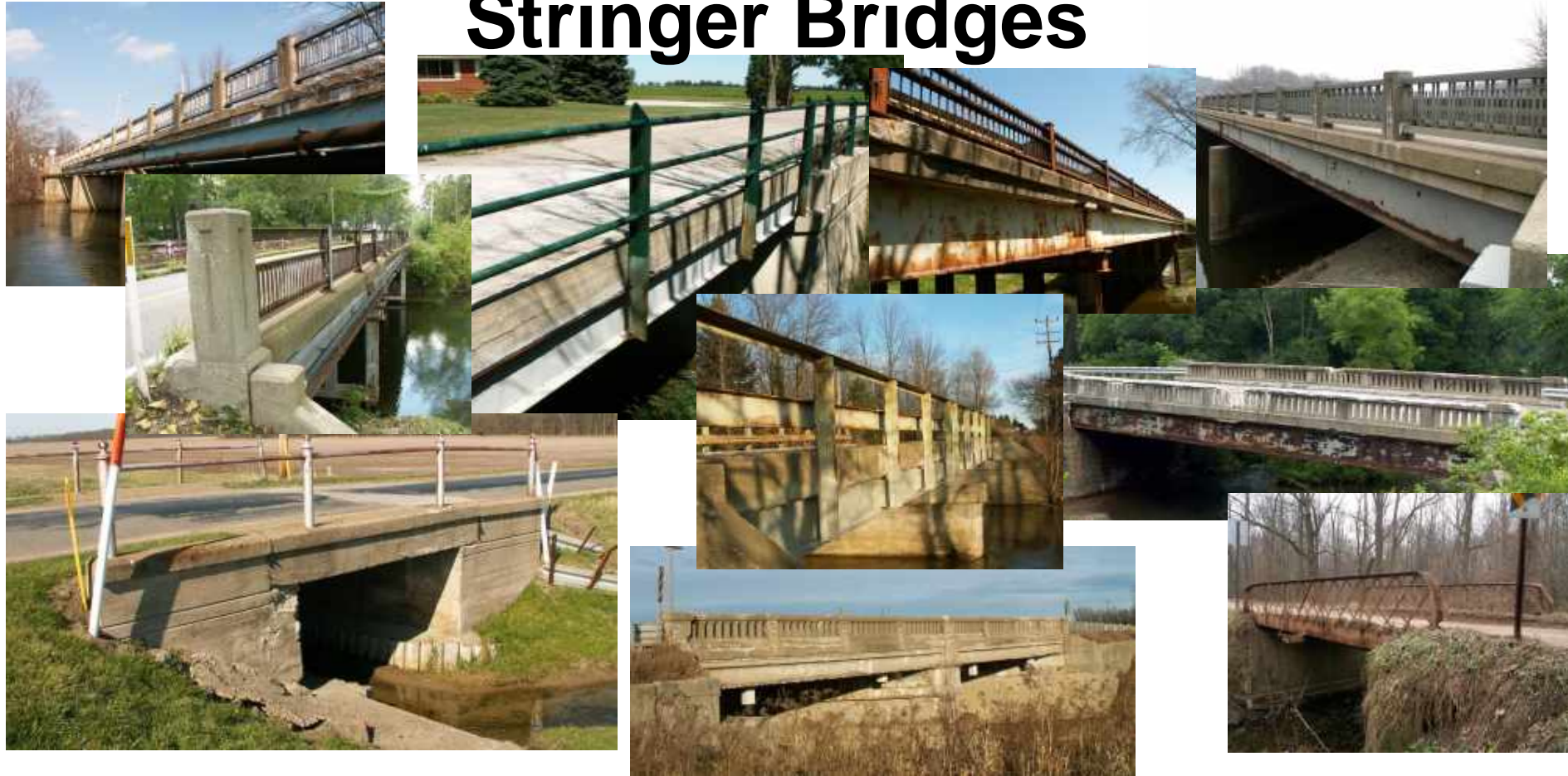
Concrete Camelback Bridges



Michigan's curved chord through girder bridges come in a variety of lengths from generally 45-90 feet, in a single span format. For these varying lengths, two general designs were used, as shown above.

Traditional Historic Bridges

Stringer Bridges



The design of stringer bridges is essentially the same over the years and in different states. The guardrail design and span length will vary widely however.

An Introduction To Historic Bridges

Part 16: Tour Destinations

Bridge Tour: Pennsylvania

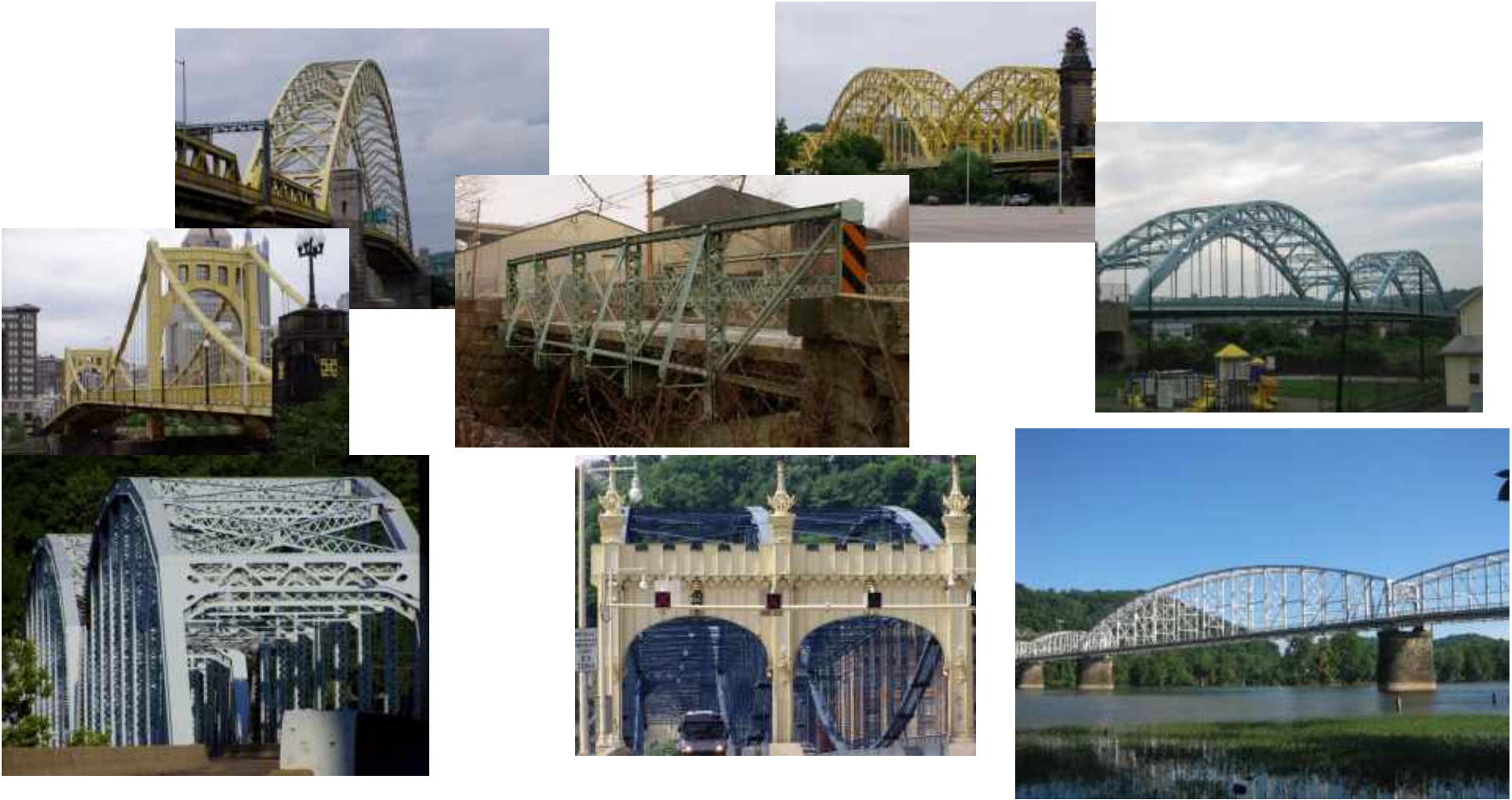
Crawford County



Crawford County, PA has one of the largest collection of pin-connected truss bridges in one county, plus a steel arch bridge.

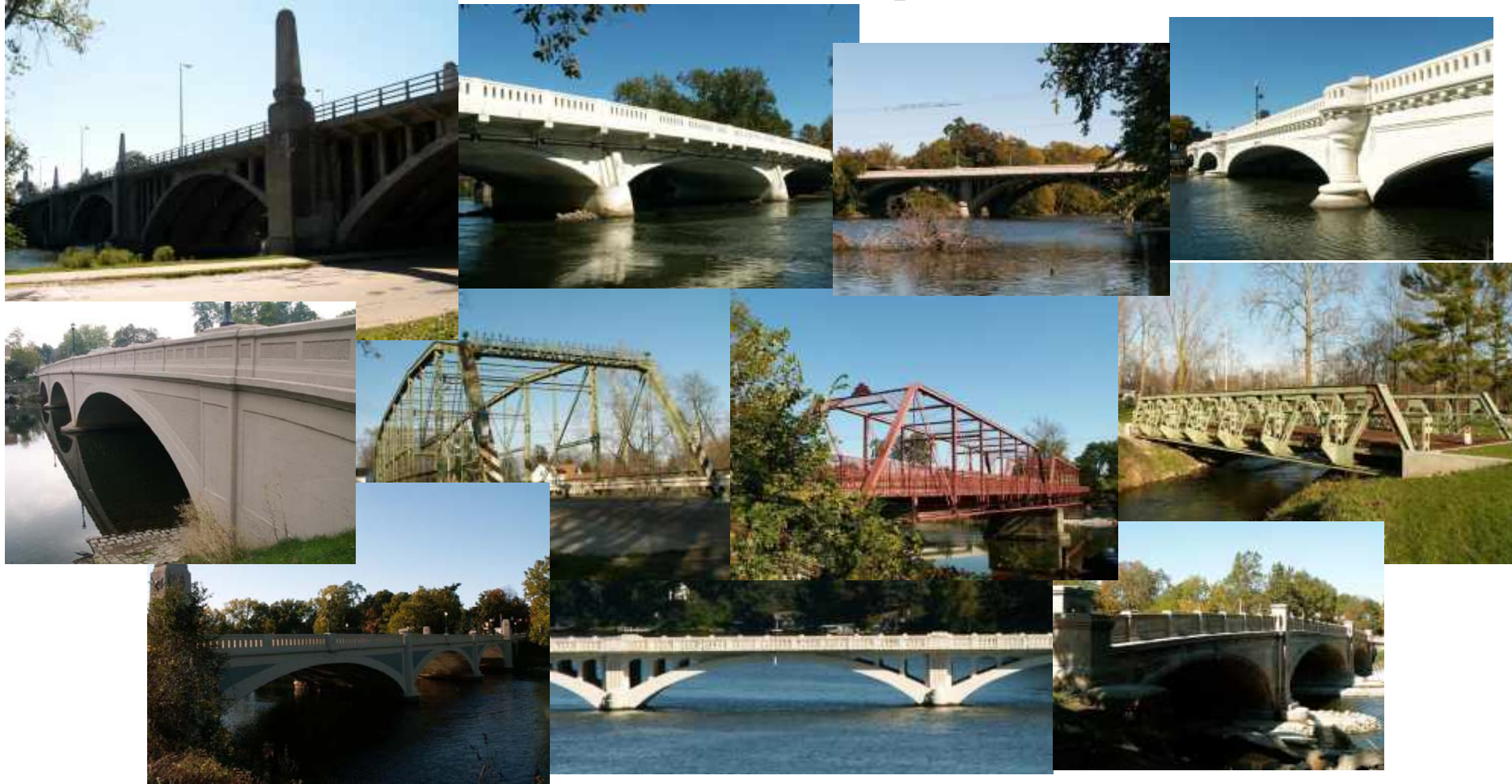
Bridge Tour: Pennsylvania

Pittsburgh / Allegheny County



Pittsburgh is well known for its record number of bridges. The majority of their major bridges are historic.

Elkhart and St. Joseph Counties



“Michiana” has a large number of concrete arch bridges, with a couple spectacular truss bridges thrown in for good measure.

Preble County



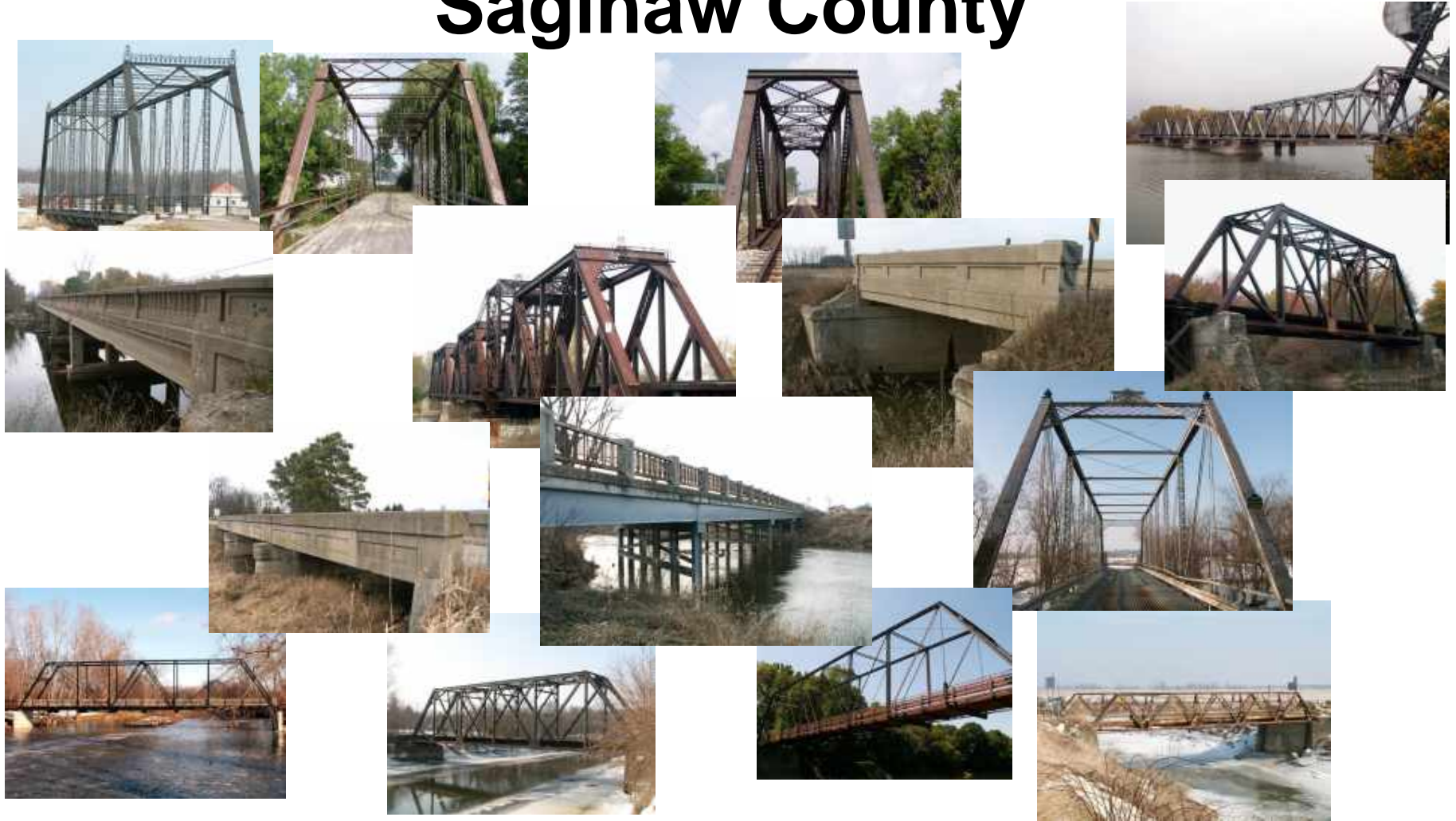
Preble County has a large number of metal truss bridges, including a couple very old and rare ones.

Chicago / Cook County



No other location in the world has so many movable bridges.
There are a few stationary structures of note too.

Saginaw County



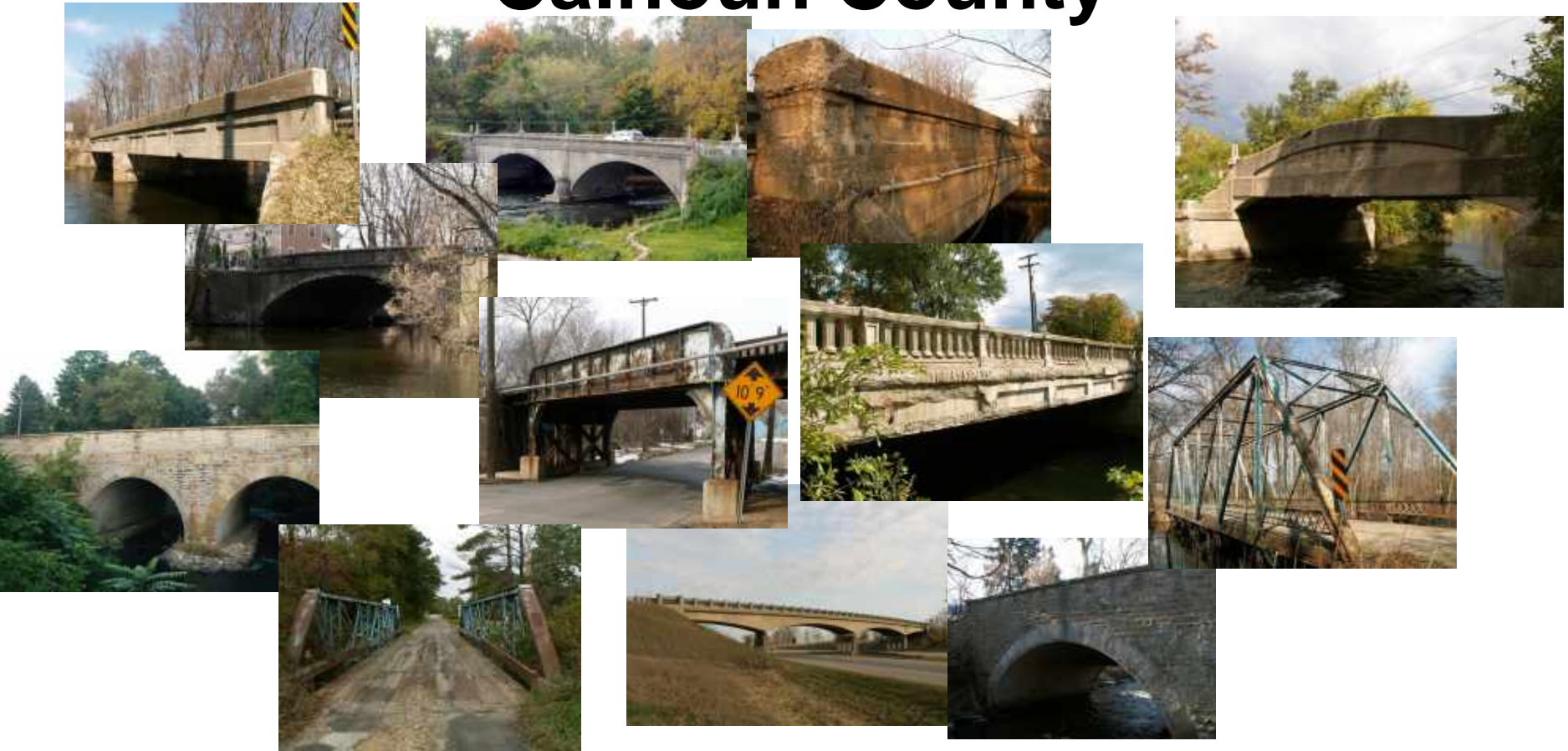
Saginaw County is one of Michigan's top counties for truss bridges, and also has some other types too.

Calhoun County – Historic Bridge Park



Historic Bridge Park features beautifully restored truss bridges. There is also an unusual railroad stone arch bridge. Admission is free.

Calhoun County



The rest of Calhoun County offers a rich diversity of bridges, making it perhaps the top place in Michigan for a well-rounded historic bridge experience.

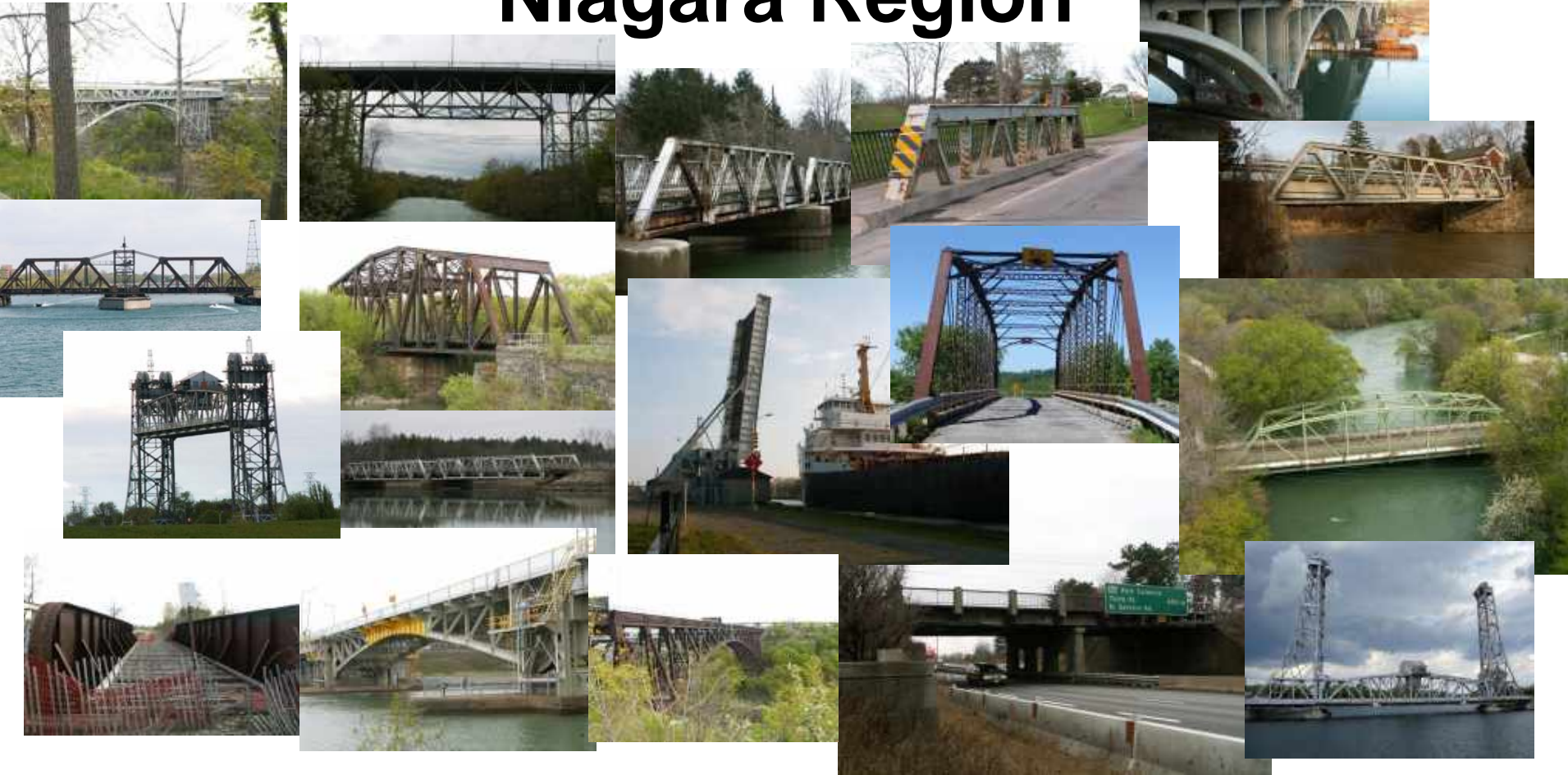
Bridge Tour: Michigan

Southeast Michigan



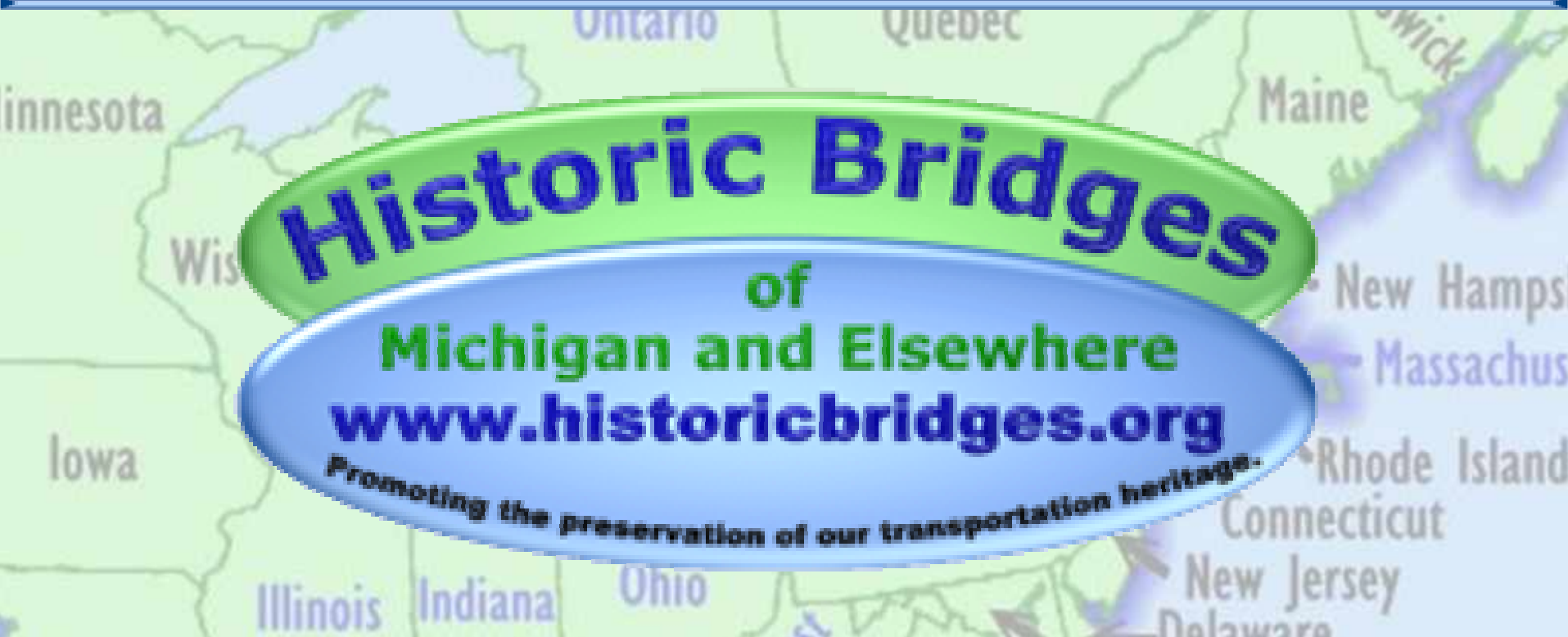
Lenawee, Monroe, and Wayne Counties each offer a wealth of historic bridges of a variety of types, including high numbers of truss bridges.

Niagara Region



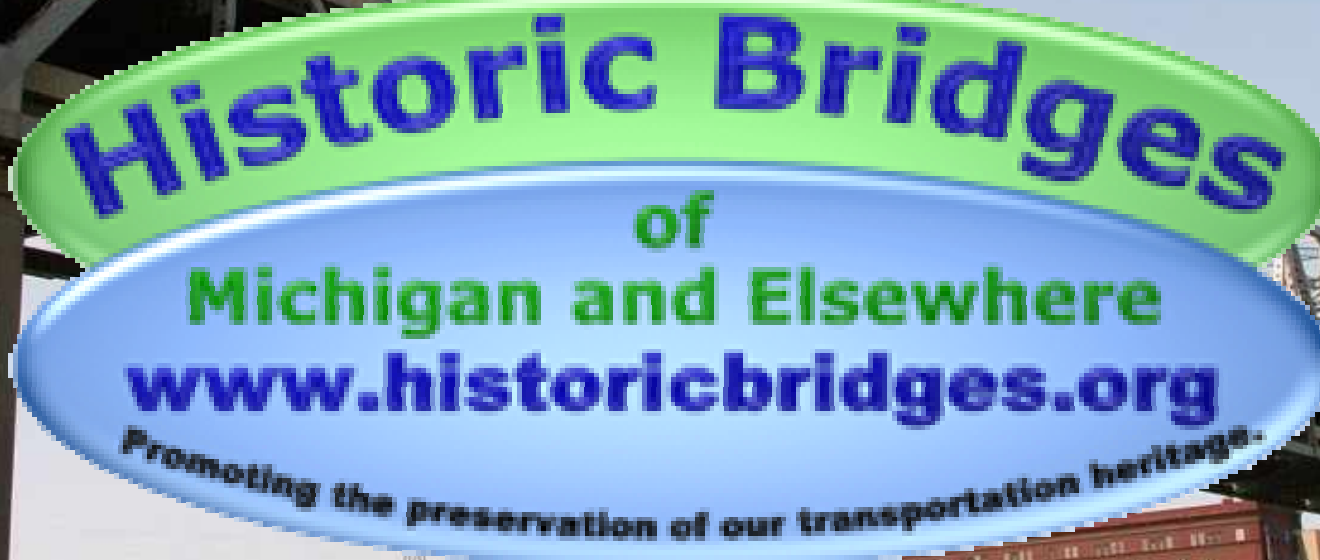
The Niagara Region offers numerous historic movable bridges on the Welland Canal, along with many stationary historic bridges on the various area creeks, and also historic expressway bridges.

Bridge Tour: Your Area



Historic Bridges of Michigan and Elsewhere may have historic bridges listed for your area that you are not aware of. If your area is not covered, check the “Links” page for other historic bridge websites that might cover your area.

Bridge Tour: Your Area



Please note that currently, coverage for areas outside of Michigan and Ontario is biased towards metal truss bridges. This is because they are the most threatened (and thus important to document), and also because available travel time and money prohibits a longer trip to cover other structure types.

Wooden Covered Bridges

But What About Wooden Covered Bridges?!



Covered bridges have been sensationalized by the media and by tourism organizations, even if they are not original or historic. Government programs fund covered bridges, while demolishing other types. Historic Bridges of Michigan and Elsewhere seeks to raise awareness of the rest of the fascinating historic bridge world, which has been being demolished for far too long.

Wooden Covered Bridges

Travel agents, published books, government and personal websites, and even organized covered bridge groups all can help you plan a covered bridge tour should you wish to take one.



Currently however, only historic bridge websites like Historic Bridges of Michigan and Elsewhere, and similar websites on the Internet offer you the vast, rich world beyond covered bridges.

An Introduction To Historic Bridges

Part 17: Conclusions

The Historic Bridge World



This presentation has been a sampling of the world of historic bridges. It is a seemingly endless world of variety and exploration, yet at the same time it is a limited world, endangered by the continuing demolition of countless historic bridges.



Historic Bridges of Michigan and Elsewhere is a key to the world of historic bridges. Informative narratives provide you with history, news, and technical facts for each bridge. Maps allow you to plan a historic bridge trip. Thousands of photos are offered, including large-size photos for printing or use as computer wallpaper.

Visit The Website

Enjoy the world of historic bridges. Take a trip, either far away or in your own county and see what it offers!

Be sure to let your lawmakers and government officials know that historic bridge preservation is important to you.



An Introduction To Historic Bridges

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