Best Kept Secrets of Michigan's Historic Railroad Bridges

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Promoting the preservation of our transportation heritage

Presented By:
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Railroads often led the way in record-setting, creative bridge design.

**Why?**
- Heavy loads.
- Need for rigid design.
- Minimal grade (incline) spanning river & valley.
- Maintenance of rail traffic during construction.
Originally carried the Milwaukee Road over the Menominee River, and is today owned by the Escanaba and Lake Superior Railroad.
The bridge was built to replace an 1885 Whipple deck truss. Only 17 years old, it was not able to accommodate increasing loads. The arch bridge was built without interrupting traffic on the old bridge. Temporary sandbox anchors held the bridge in place until it was connected at the center.
Completed in 1902, this is a Steel Three-Hinged Spandrel Braced Deck Arch. The arch span is 207 feet and the overall length is 355 feet.

Weight of steel in the arch span: 480,000 pounds

Weight of steel in approach spans: 150,000 pounds.
It is an extremely rare example of an arch bridge that does not have an “arch shape.” However the hinges and skewbacks are evidence of the arch function.
The most unusual detail is how the bridge comes to a point at the crown hinge. This design reduced the materials required for the bridge, while also avoiding unwanted stresses that were present in other designs.
Overall, this is one of Michigan’s most well-known and historically significant railroad bridges. The four most significant parts of this complex, 1 Mile long bridge is shown above from west to east.
Difficult to view is the bascule span. It is the only surviving example of a type only built twice. (the other was in California.) It was also the longest bascule span in the world when completed in 1913 with a 336 foot span.
Because they are more stable, railroads almost always built single leaf bascule spans rather than the double-leaf type more common with highway bridges, where each leaf is a structurally independent cantilever functioning like holding your arm out.
The International RR Bascule is a double leaf bascule that functions as a simple single span truss when closed, not as two independent cantilevers. Compare how the railroad bridge has a deeper (taller) truss in the center of the span.
The bascule was designed by the Strauss Bascule Bridge Company, run by famous Chicago engineer Joseph Strauss. He invented special locks at the center of the span which turn it into a simple truss when closed.
A historical photo shows the bridge with only a single leaf open. To the right, are the upper and lower locks at the center of the span.
The bascule is also one of the earliest examples of Joseph Strauss’ “heel trunnion” type of bascule, where there are two axels (trunnions) around which rotation occurs, one for the leaf, the other for the counterweight.
A movable type patented by Hugo A.F. Abt of the American Bridge Company.

Counterweight kept above the tracks so bridge could be erected in raised position while traffic continued on a former bridge.

First example: Wabash Railway over Rouge River, 1921
Only eight of this type were ever built. Two have been demolished.

The other three Abt bascule bridges are all in Michigan!

1972 Photo Credit: Craig Gardner

Photo Credit: Rick McOmber

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The Wabash Railway bridge drew attention because it was the first.

When the bascule span was completed, the old swing bridge was slid over, a new approach span installed, and the bascule open to traffic... with a closure to trains of only 7.5 hours!
Located in Detroit, this is a stone-faced concrete arch bridge, built in 1896. The oldest known concrete bridge (RR or HWY) in Michigan!
Built by Thomas J. Kennedy and designed by the W. H. Ashwell and Company. Berea stone and Amhurst buff stone used to face the bridge. Built for Mich Central RR and owned by NS today.
This concrete bridge does not have rebar rods inside, instead solid or riveted steel beams strengthen the concrete. This is called Melan reinforcing after Josef Melan, the Austrian inventor of this process. A deteriorated bridge above reveals this design.
All this information is thanks to one little news article, which also noted the 110 foot length bridge was the longest Melan arch at the time.

 Courtesy Jen Klaus from the journals of her great grandmother, Elizabeth Jacquemain Kennedy
Two of Michigan’s oldest known stone bridges are in Lenawee County.

Abandoned Bean Creek Bridge, Hudson. 1871

S. Br. River Raisin, Adrian. 1867
Grosvenor RR Bridge

Abandoned Lake Shore and Michigan Southern Over River Raisin in Lenawee County. It was called the Fayette Branch. This line reportedly once served Grosse Ile.
This two span pin-connected Pratt through truss has numerous unusual design/construction details which suggest the bridge may be VERY old! (1870s-1880s)
Unusual eyebar head shape.

Unusual cast iron inserts for end post and top chord.

Bearing: Note light weight roller nest. Unusual bracing connections.
Cast iron spacers at connection (note part number 204)
Grosvenor RR Bridge

Unusual bowed struts (sway bracing)

Compare: 1871 Highway Truss

Cast iron (not rolled channel) at connections
Lightweight floor beams with u-bolt hangers to connect to truss (more common with HWY bridges)

Compare: 1892 RR Truss with traditional heavy floor beam riveted to trusses and deck stringers.
Crossing Mill Creek in St. Clair County. Built for Flint and Pere Marquette Railroad by the Detroit Bridge and Iron Company ca. 1890s.

Remains of Detroit Bridge and Iron Works Plaque
This is a rare fishbelly shaped pin-connected deck truss bridge, and today part of the Wadham-Avoca Rail-Trail
In 1904, to strengthen the bridge, a third truss was built in between the original two.
Arrows are pointing to the third, 1904-added truss.
Similarly, additional steel bents were added around the originals to support the added superstructure.
One of the longest truss bridges in Michigan, this rare lattice truss was built in 1892 by Lassig Bridge and Iron Works of Chicago for the Chicago and Northwestern crossing of the Escanaba River. Its original design was a five span bridge.
In 1943, it was strengthened by adding piers and turning it into 10 short spans.
Comparisons between the portals

1892 Portal

1943 Portal
This bridge was deemed NOT HISTORIC by the State Historic Preservation office due to the 72 year old alterations.

As of September 2015, it is now being replaced by CN and will be demolished! This is a 2 year project.

Photo Credit: Randy Mulder
This was a rare pair of RR truss bridges (The other is CN). The NS Bridge was a rare pin-connected Baltimore truss (note the complex truss design).
Conflicting date of construction. Some sources say 1894, others 1910.
Demolished and replaced in 2015! The spans were lifted off, and new girders (not much to look at!) were set on new piers and abutments.

Photo Credit: Tom LaPrise
NS Monroe River Raisin

Beautiful heritage reduced to...

Photo Credit: Tom LaPrise
James W. and Sarah Potter donated land in 1915-1917 to Lansing for Potter Park, but required that a bridge be built at Dakin Street. It was erected in 1919 reusing 1886/87 girders from an unknown location built by Detroit Bridge and Iron Works.
This presentation will be posted online within seven days on the “Historic Bridges Encyclopedia” at historicbridges.org/info/presentations/

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