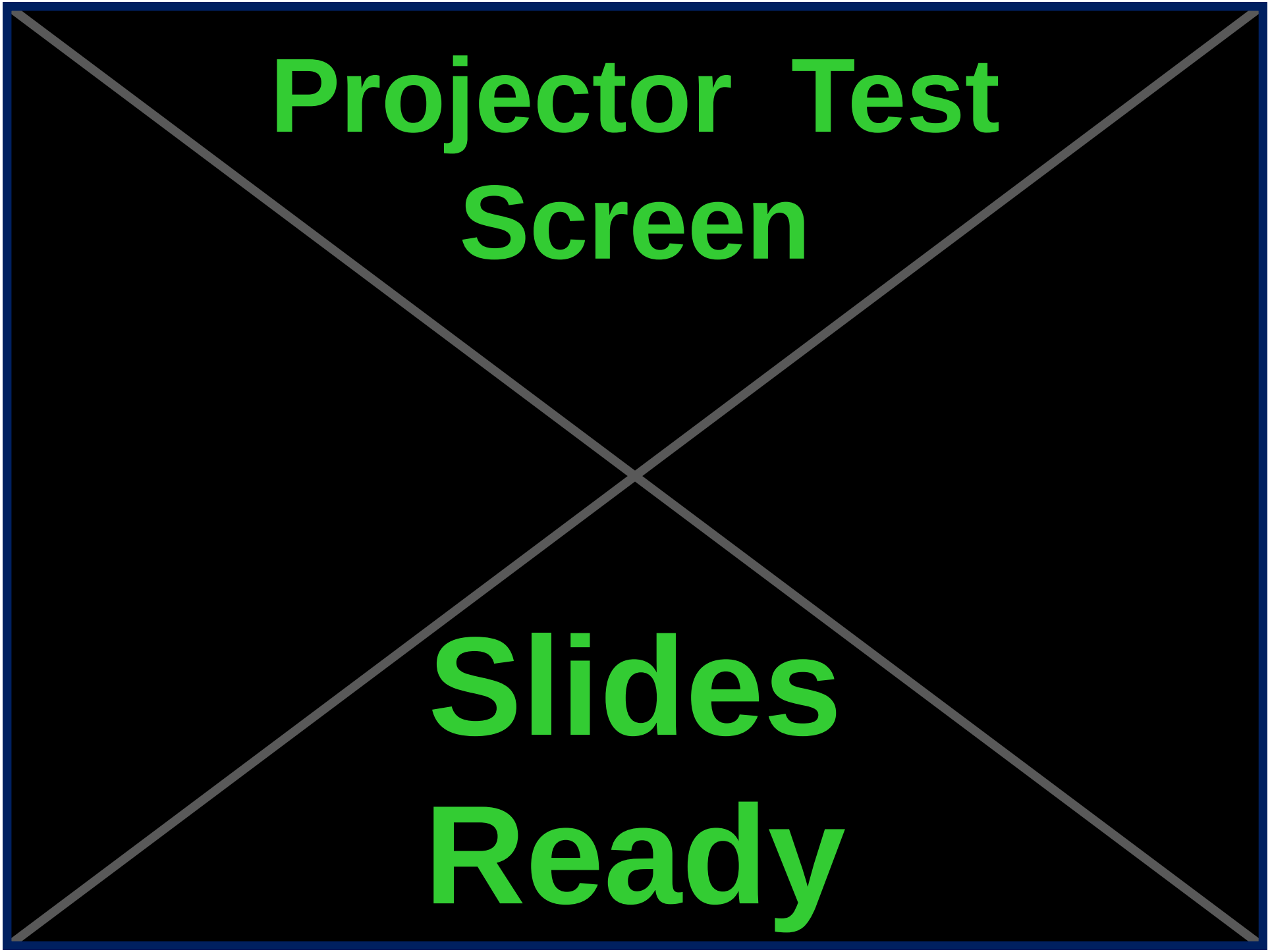

Projector Test
Screen
Slides
Ready

Michigan's Historic Bridges

With Emphasis On Grosse Ile and Wayne County

Presented By:
Nathan Holth

Substructures: Parts

Pier (Substructure)

Abutments (Substructure)

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

Grosse Ile Toll Bridge

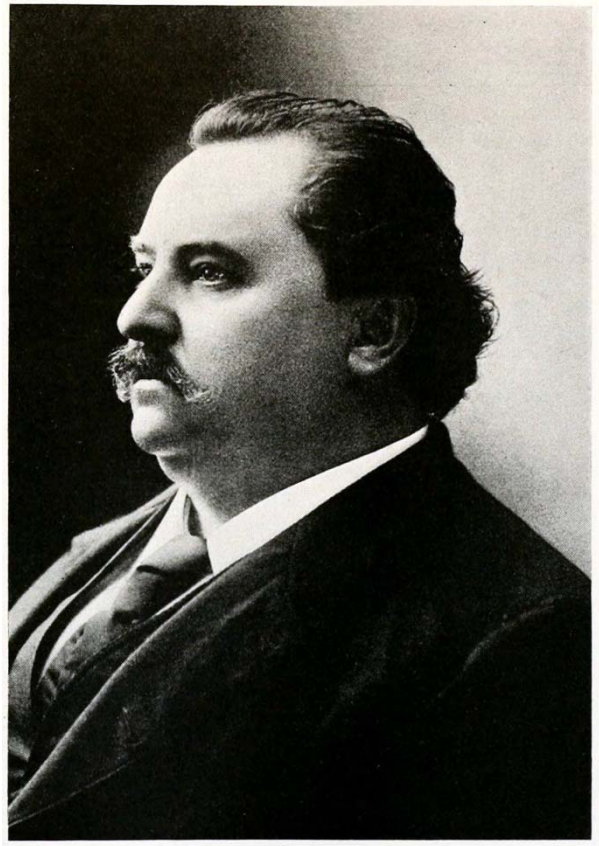
Structure Completed in November 1913

Swing Span: 304 Feet Long

Total Bridge Length: 1030 Feet

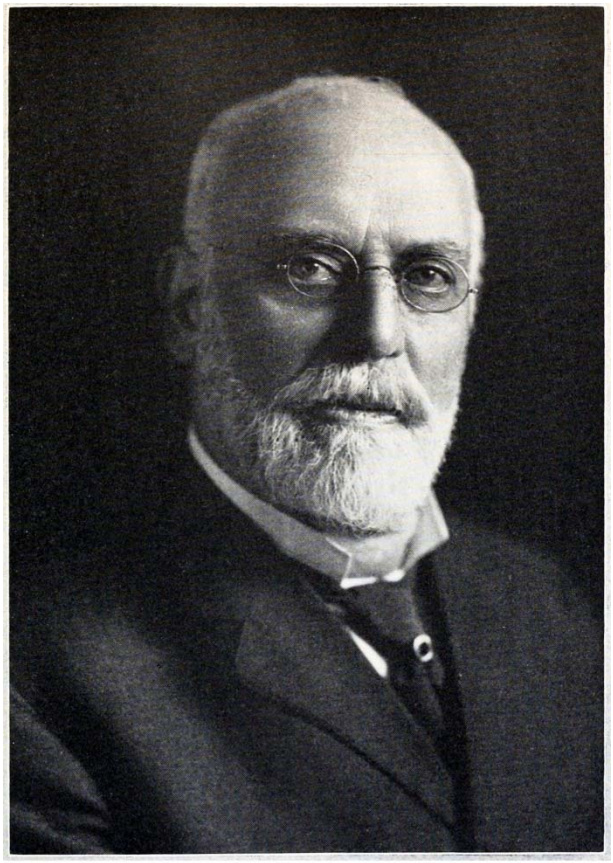
One of the longest metal truss bridges in Michigan, and one of only a few remaining highway swing bridges in Michigan

Grosse Ile Toll Bridge



Edward W. Voigt

Source: The City of Detroit Michigan 1701-1922, Volume 3, 1922. Digitized By Internet Archive



Frank A. Schulte

Source: The City of Detroit Michigan 1701-1922, Volume 4, 1922. Digitized By Internet Archive

Grosse Ile Bridge Company formed in 1912 with Edward D. Voight as President and Frank A. Schulte as Vice President

Grosse Ile Toll Bridge

1919 Advertisement

1918 Advertisement

Detroit Bridge and Steel Works of River Rouge, Michigan designed the bridge and it was constructed by Whitehead and Kales Company of River Rouge, Michigan

Grosse Ile Toll Bridge

1965 Span Collision

On August 6, 1965 John T. Hutchinson lost steering control and struck and collapsed a fixed span east of the swing span, sending two cars into the river. No one was seriously hurt. Bridge closed for several months.

Grosse Ile Toll Bridge

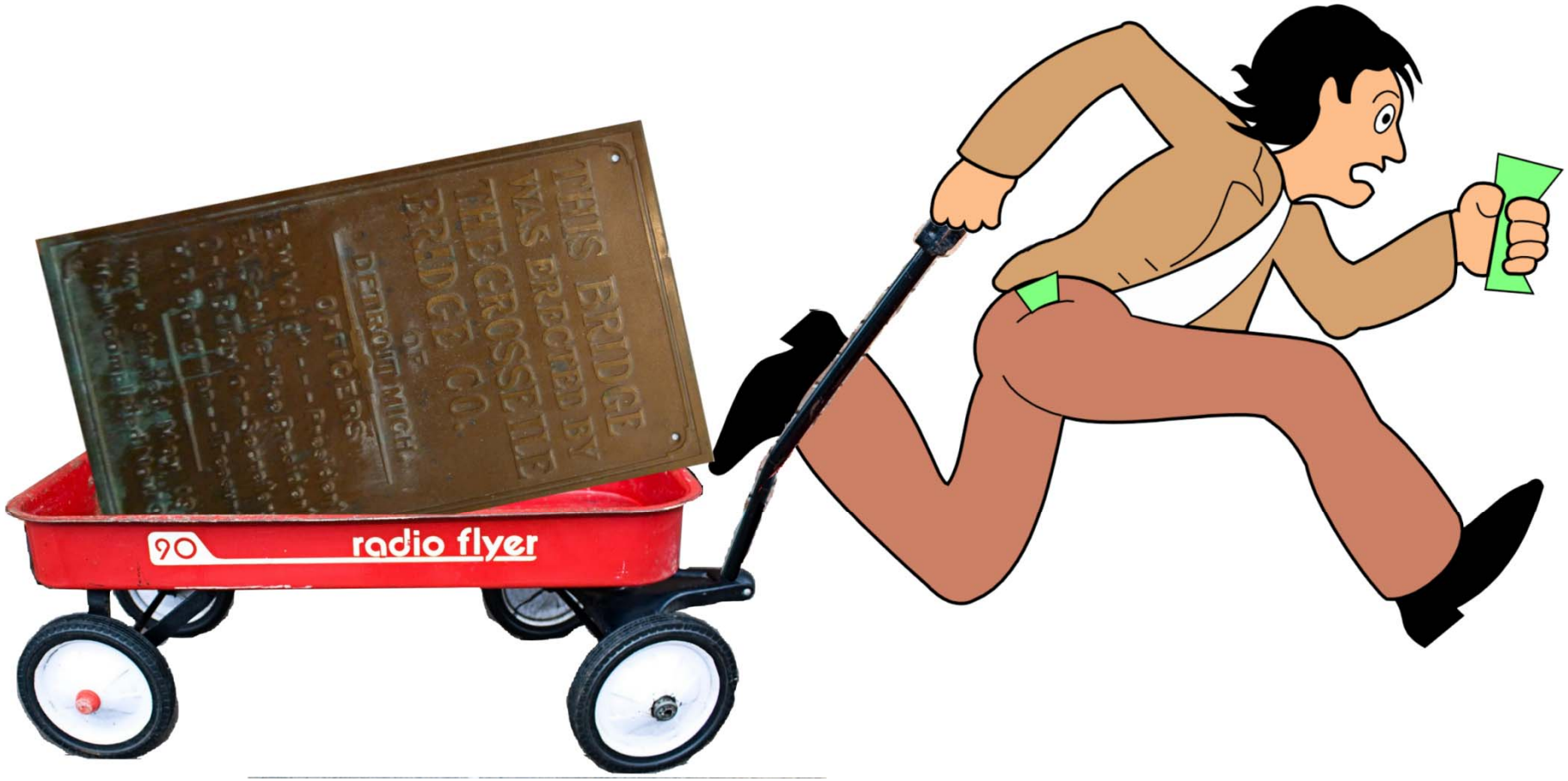
1992 Span Collision

In September 1992, the same fixed span east of the swing span was again hit and knocked into the water, this time by the freighter H. Lee White. The span was replaced with a near replica designed based on the original plans for the 1913 span.

Grosse Ile Toll Bridge

Bridge Company retains the original plaque for the bridge. It was originally mounted on the bridge until someone tried to steal it. The toll collector noticed someone trying to haul it away.

Grosse Ile Toll Bridge



Rendering of thief after being caught at the toll booth.

Grosse Ile Toll Bridge

Design Details

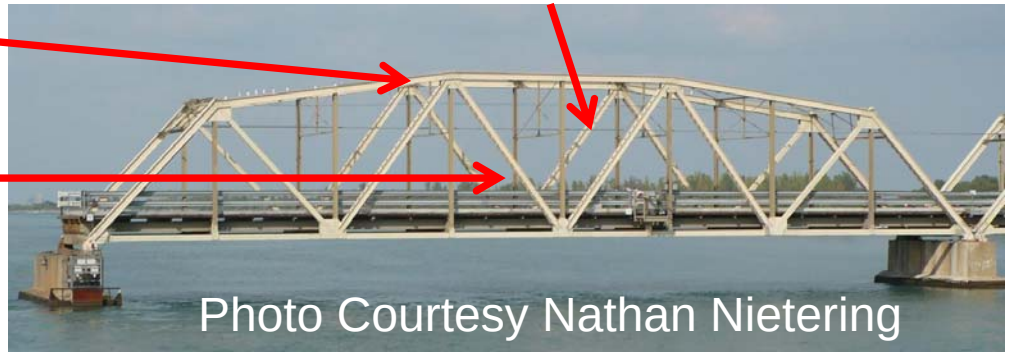
Center Pier Swing Span

Overhead Bracing: A Through Truss

Fixed Truss Approach Spans

Polygonal Top Chord

Repeating “V” pattern in Diagonal Members (Warren Truss Configuration)



A “Polygonal Warren Through Truss”

Grosse Ile Toll Bridge

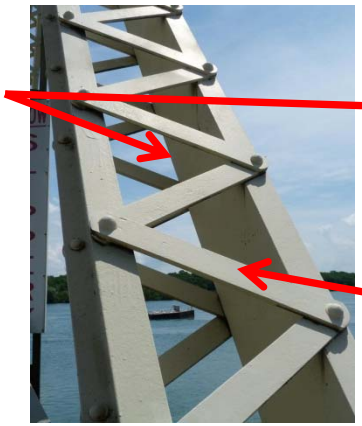
Design Details

Steel from Lackawanna and Cambria mills.

Riveted connections

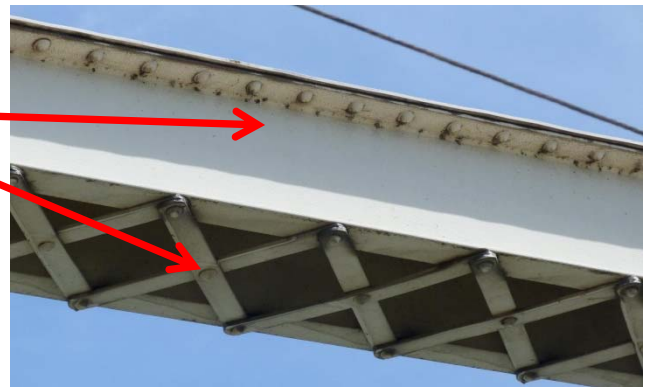
Some pinned connections on swing span.

Built Up Beams (Composed of smaller rolled beams)



Lattice

V-lacing



Grosse Ile Free Bridge

Swing Span

Pratt truss (diagonals point toward bottom center)

Deck Plate Girder Spans

Today's bridge consists of a through truss center pier swing span and fixed deck plate girder approach spans.

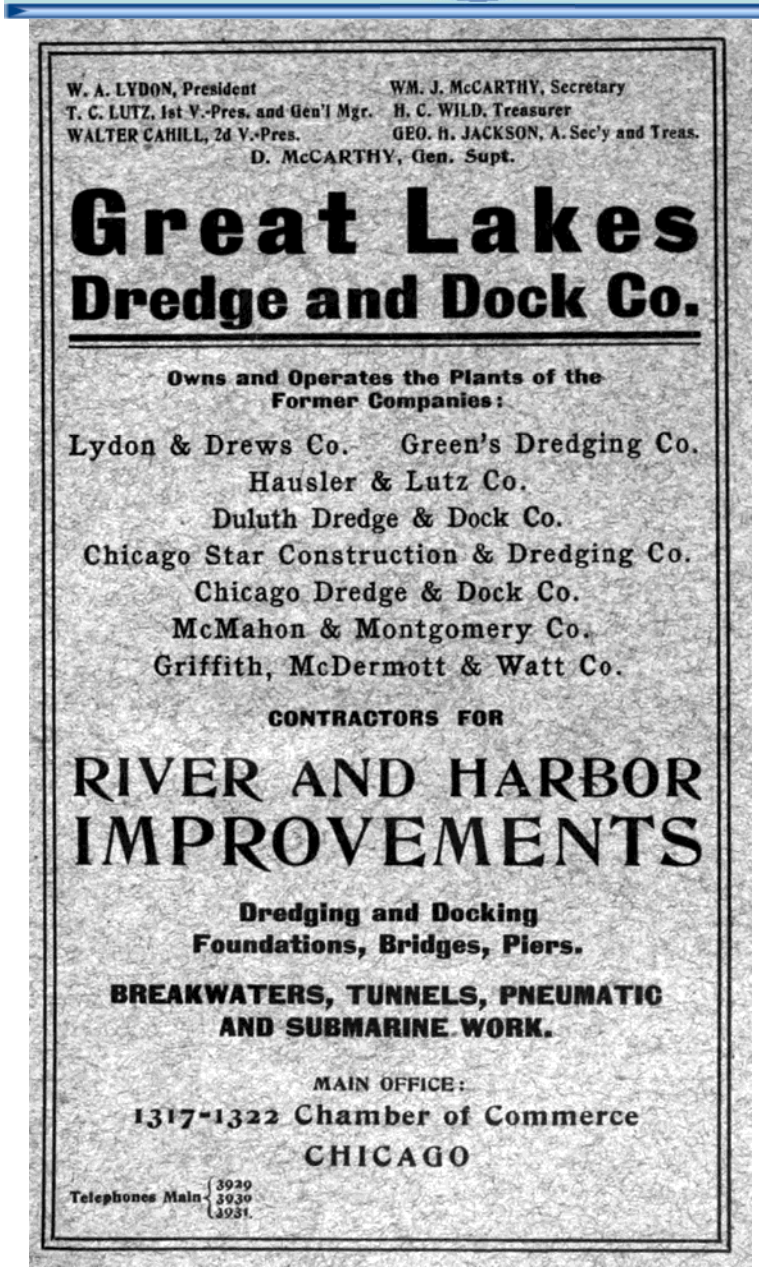
Grosse Ile Free Bridge

Built 1930-1932

Swing span: 340 feet long

Bridge Length: 1024 Feet

Grosse Ile Free Bridge



Great Lakes Dredge and Dock Company of Chicago, Illinois, a prominent contractor who worked on many bridges in Chicago built the bridge superstructure. Augustus J. Dupuis Company of Detroit, Michigan built the substructure and deck slab.

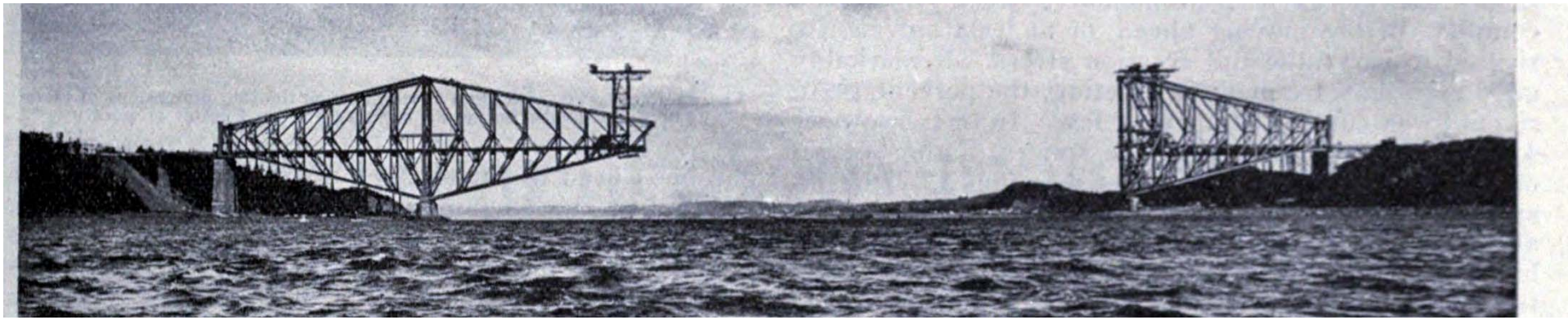
Grosse Ile Free Bridge

Previous Railroad Bridge

The previous bridge was a metal Double-Intersection Pratt (Whipple) through truss with a swing span and fixed approach spans.

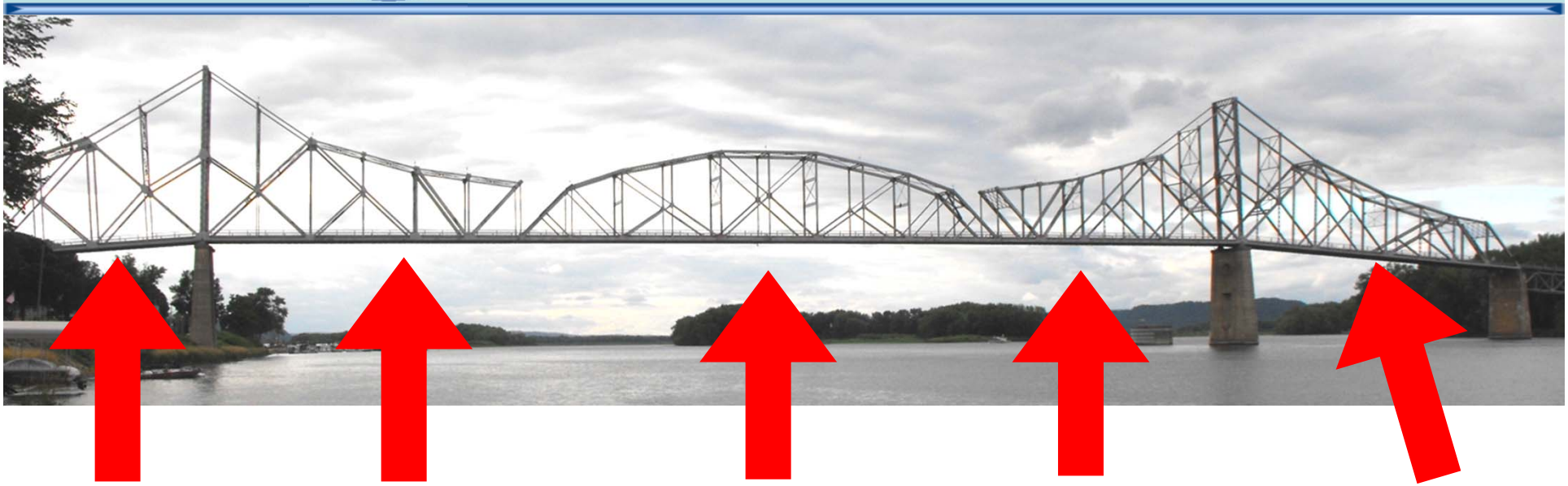
Cantilever Bridge

What is a cantilever?



Cantilevers are like holding your arms outstretched. Your arms are cantilevered from your body. Similarly, cantilever bridges have structures like arms that extend from the abutments or piers of a bridge and do not need the other end of the bridge to support them. Just like your arms could be holding something, sometimes these bridges hold additional “suspended” structures.

Cantilever Truss Bridges



Anchor Arm | Cantilever Arm | Suspended Span | Cantilever Arm | Anchor Arm

Cantilever truss bridges are a complex, continuous structure type that feature cantilevered arms that extend from a pier to normally hold a structurally independent suspended span at one end, and balance the weight out at the other end extending from the pier.

Cantilever Arch Bridges

Unique To Wayne County

Most cantilever bridges are built of steel. However, Wayne County has concrete arch bridges that are actually cantilever bridges. They are the only such bridges in Michigan. The most well-known is the Belle Isle Bridge.

Cantilever Arch Bridges

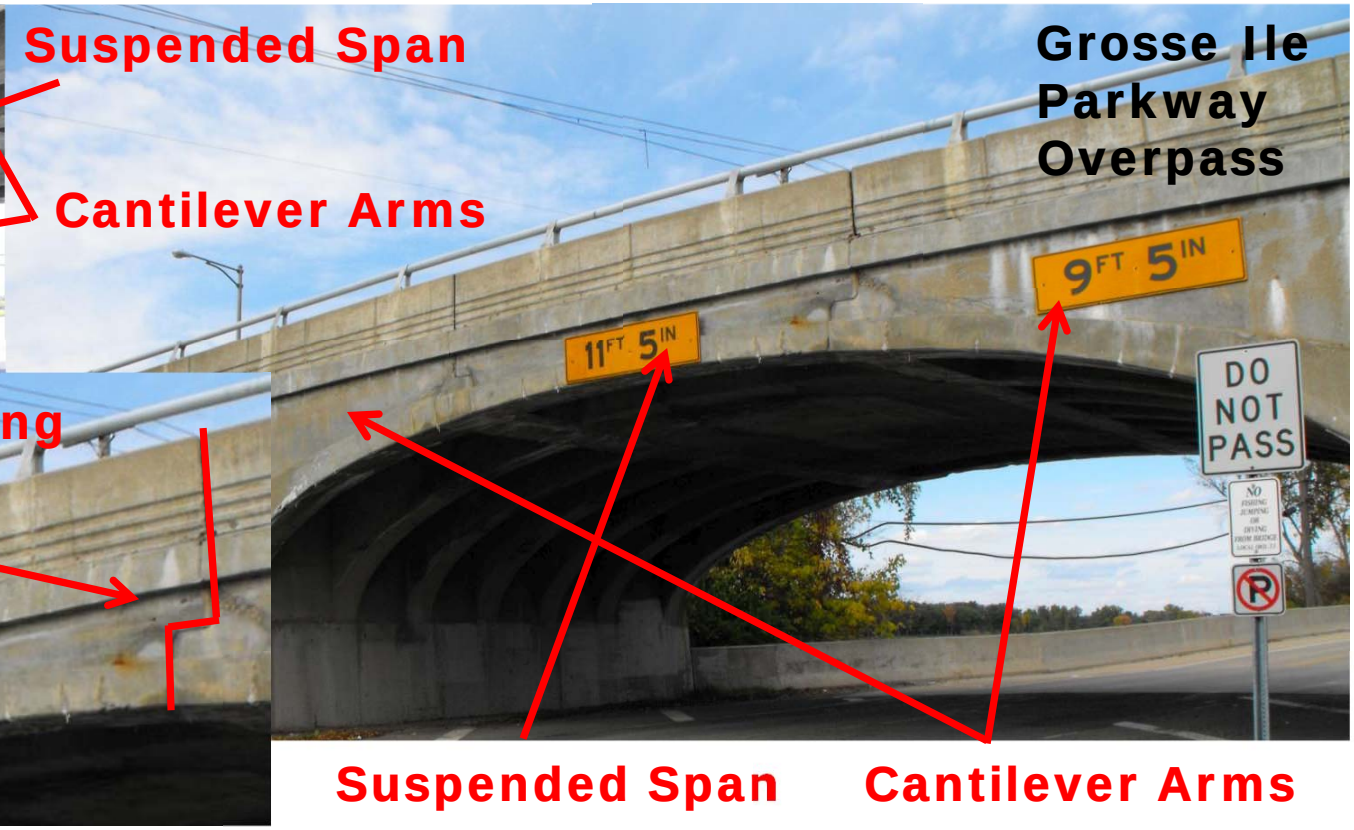
Belle Isle Bridge



The Belle Isle Bridge has arms that extend from the piers/abutments and meet in the middle. Note the gap, indicating each half is structurally independent. Decorative keystones hide this feature to casual viewers.

Cantilever Arch Bridges

Elsewhere in Wayne County



There are other smaller concrete cantilever arch bridges remaining in Wayne County. Despite being smaller, most of these spans also include a suspended span.

Cantilever Arch Bridges

Parke Lane Bridge, Grosse Ile

One of the few with original railings and also with a decent span length, this is one of the most significant concrete cantilever arch bridges. Nearly 100 feet in length, it was built in 1929 By Gosner and Flynn of Dearborn, Michigan

Swan Drive Bridge

Crossing Swan Channel, This is an 88 foot Warren pony truss with riveted connections. A pony truss bridge lacks overhead bracing.

Swan Drive Bridge

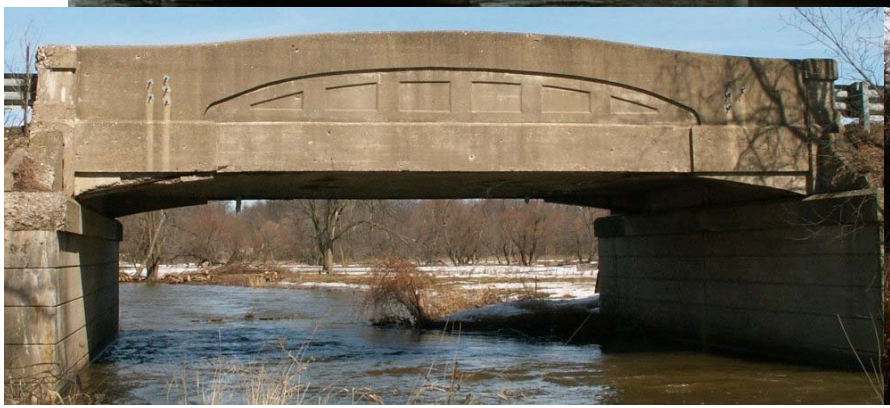
Can You Solve The Mystery?

With the National Bridge Inventory listing a 1950 construction date (late for this design), unused rivet holes found on this bridge (suggesting it originally had a sidewalk on one side), and a pier under one vertical member, this bridge appears to have been moved here from an unknown location.

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

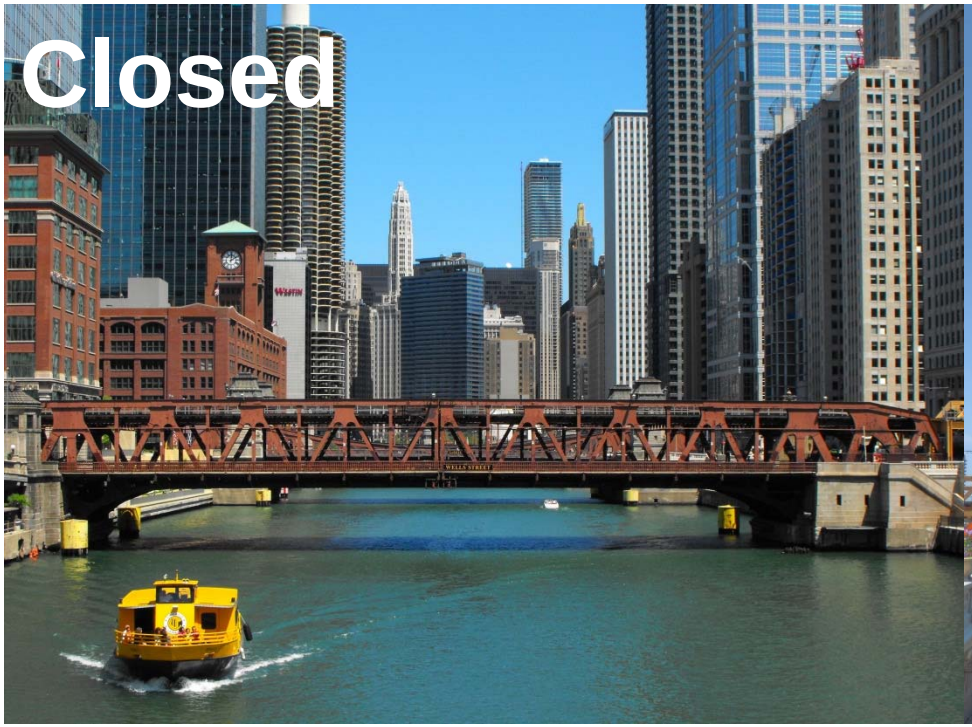


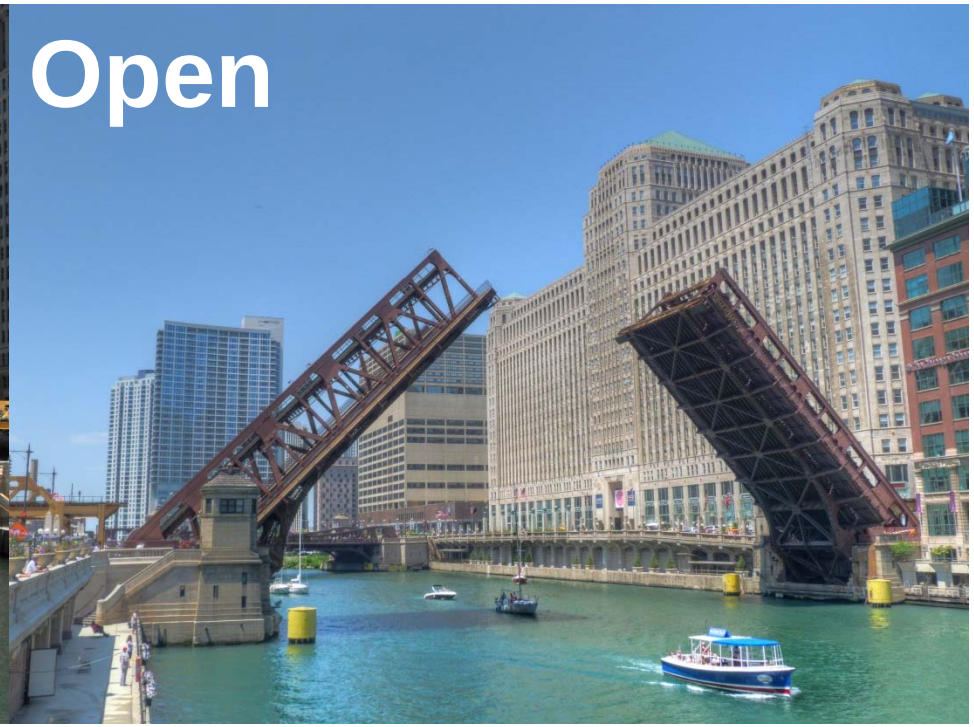
These bridges vary in size and design, and each remaining example is rare and significant, especially on a national scale.

Concrete Camelback Bridges

These bridges were built to a “state standard” plan that was a consistent design that could be adapted for various locations.

Movable Bridges: Bascule





Overview: Bascule literally means “seesaw.” A bascule bridge operates by rotating up to open the channel allowing boats to pass through. Counterweights provide the balance to make this motion possible.

Bascule Bridge Engineers

Thomas Pihlfeldt

John Ericson

In the early 1900s, Chicago city engineers including city engineer John Ericson and city engineer of bridges Thomas Pihlfeldt, developed a very reliable and cost-effect design of bascule bridge.

Bascule Bridge Engineers

Hugh E. Young

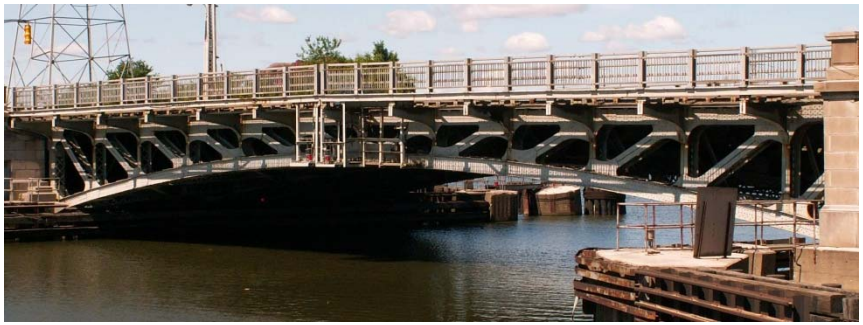
Later, another city engineer of bridges, Hugh E. Young decided that Chicago's bridges were so efficient that he opened a business on the side called the Chicago Bascule Bridge Company to design these bridges for other customers.

The Wayne County Road Commission was one of those customers, and they hired Hugh. E. Young to design three bascule bridges.

River Rouge Bascule Bridges

Jefferson Avenue

Fort Street



Dix Avenue

Up until 2013, all three remained. However, the Fort Street Bridge is to be demolished and replaced.

River Rouge Bascule Bridges

Engineering World

A Journal of Engineering and Construction

Published by the International Trade Press, Inc., Chicago

Vol. 20.—No. 2. CHICAGO, FEBRUARY, 1922. Two Dollars a Year.

Fort Street Bridge, Wayne Co. (Detroit), Mich.
Chicago Bascule Bridge Co., "Engineers"

CHICAGO, the home of more modern bascule bridges than any other city in the world, desiring movable bridges which would be **first in beauty, economy of cost, operation and maintenance,** adopted the patented **"internal rack"** and fixed **"underneath counterweight"** as necessary basic elements of their design, and has **contracted for no other type since 1912.**

The great "Boulevard Link" Bridge is a monument to the efforts of engineers who spent ten years in the concentrated study and development of Chicago's bascule bridges.

Such experience and knowledge, insuring a bascule bridge that will embody the most modern features of design, has been available to you since 1920 through the organization by these engineers, of the Chicago Bascule Bridge Company.

Our Engineering Service Means Real Service

Although we use the "internal rack," it is not an exploitation of this or any other patent which we may use.

It will be to your advantage, whether you are considering a railroad or highway bascule bridge, to consult with us before adopting any other design.

CHICAGO BASCULE BRIDGE COMPANY
Engineers
118 North La Salle Street - Chicago, Illinois

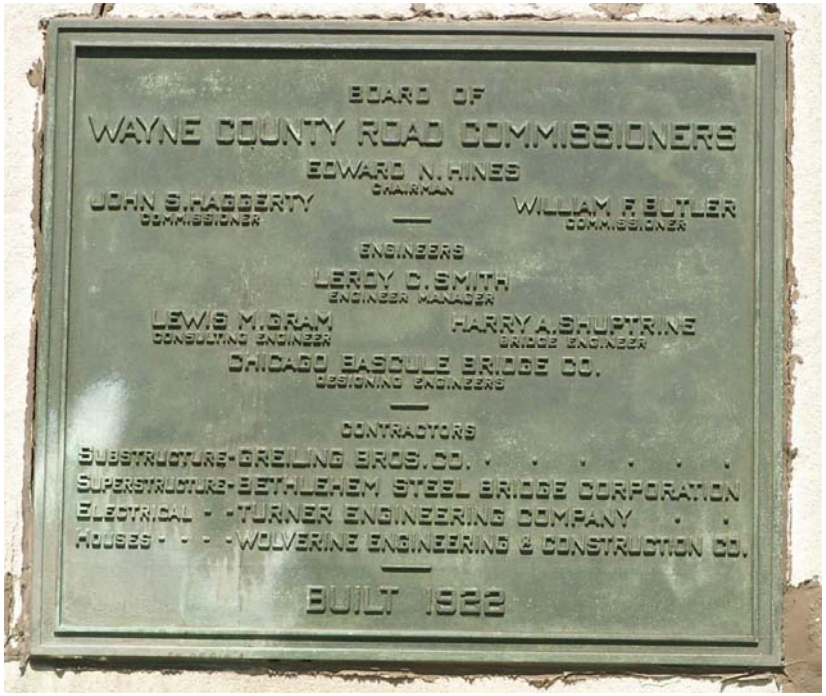
INTERNAL RACK

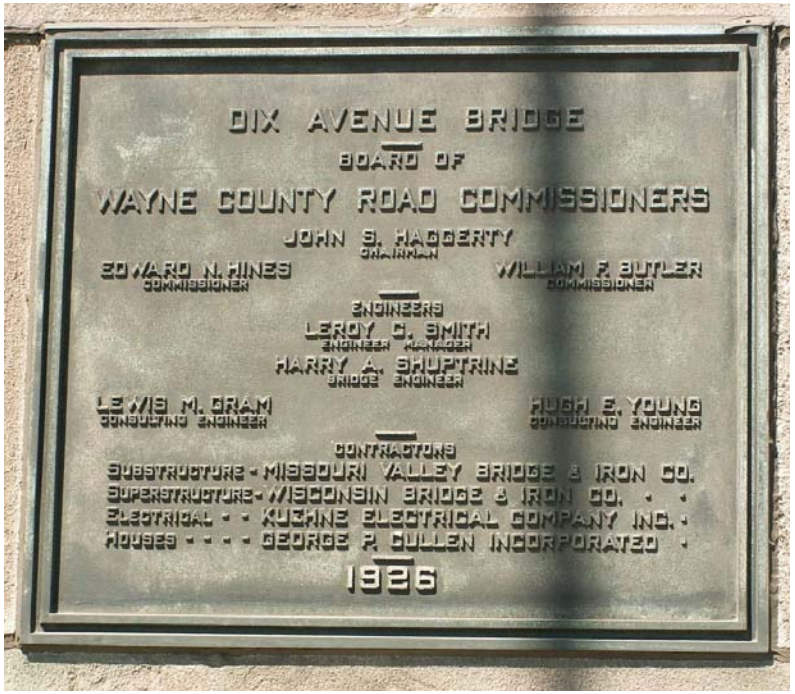
BELMONT AVE. BRIDGE

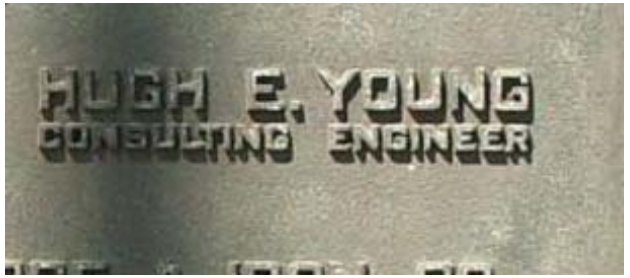
FRANKLIN-ORLEANS BRIDGE, CHICAGO

A 1922 advertisement for the Chicago Bascule Bridge Company included a drawing of the Fort Street Bridge

River Rouge Bascule Bridges

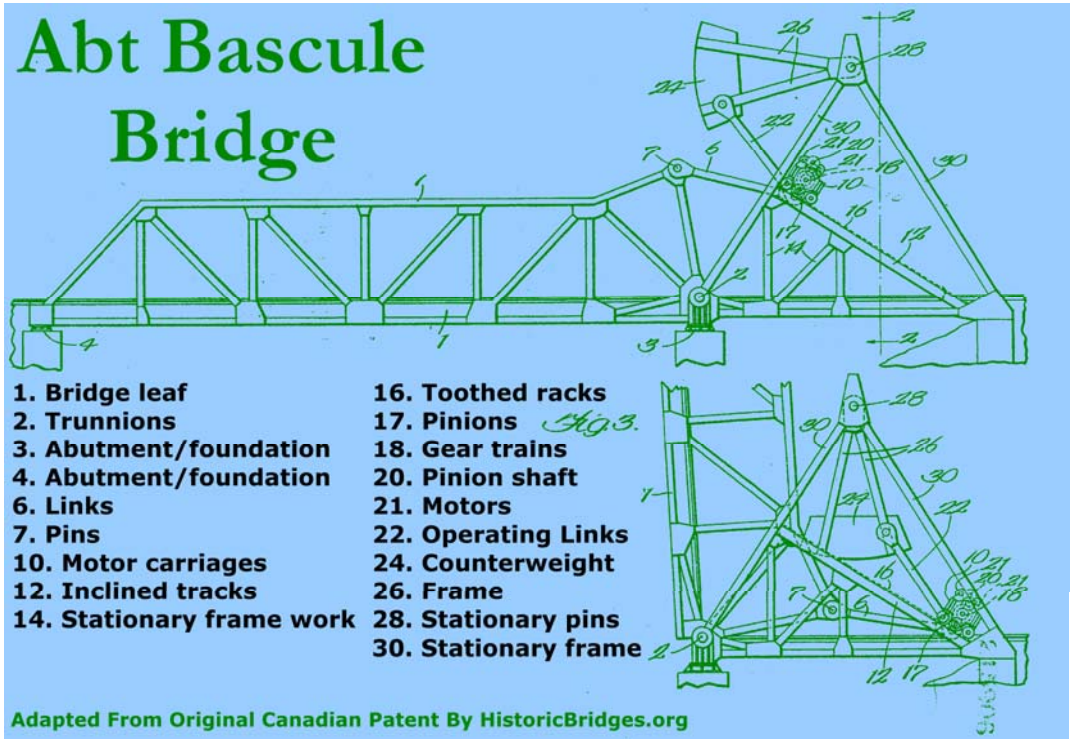






Hugh E. Young or the Chicago Bascule Bridge Company can be found on the River Rouge bridge plaques.

Abt Bascule Bridge



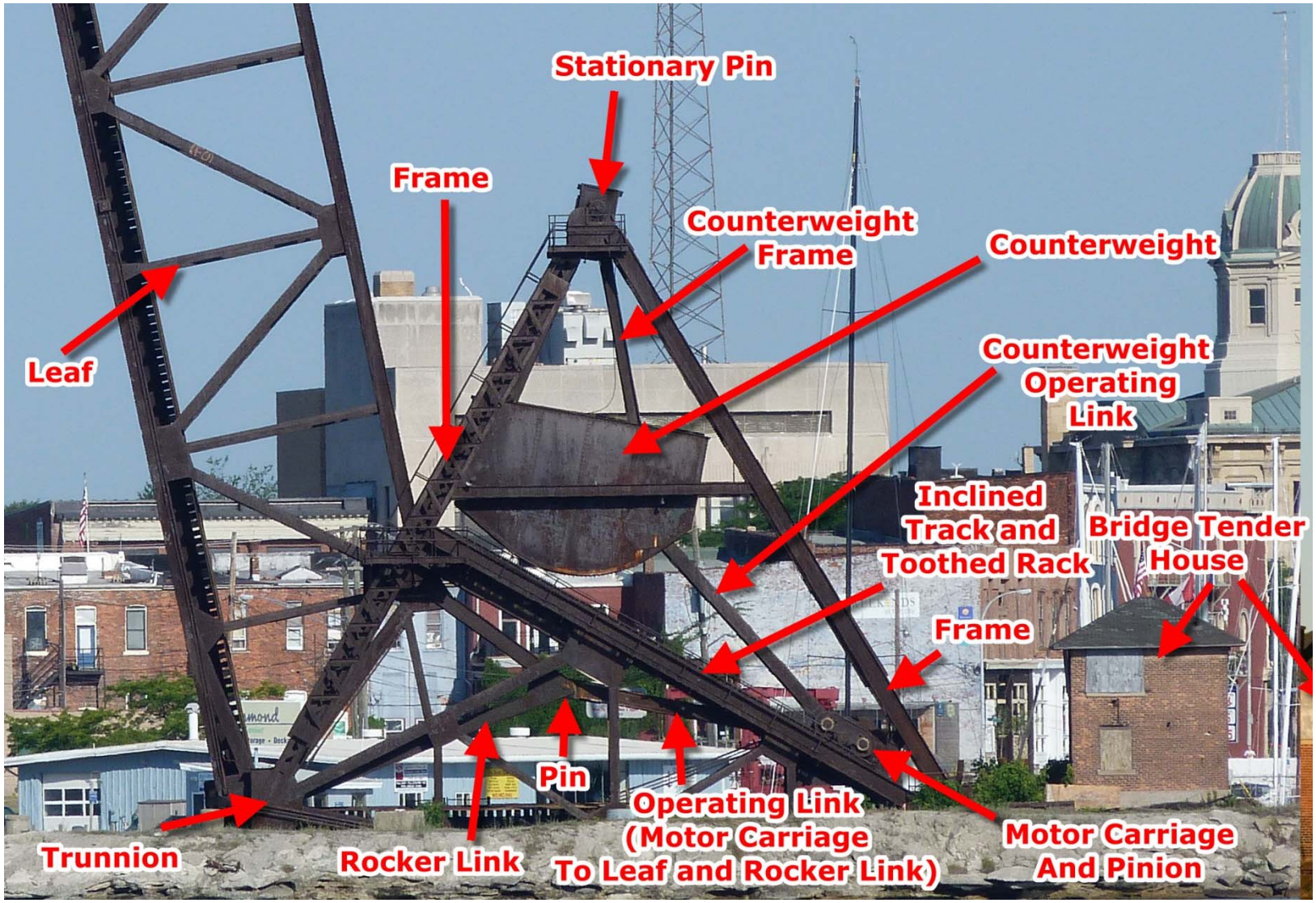
Michigan is home to three of six remaining unusual “Abt” type bascule bridges. Only eight were ever built. The design with an unusual counterweight that rotates in the opposite direction of the bridge “leaf” was invented and patented by Hugo A. F. Abt who worked for the American Bridge Company.

Abt Bascule Bridge

The Pere Marquette Railroad Bridge, crossing the Black River in Port Huron is abandoned in the raised position and at risk for demolition.

It is a good example of an Abt bascule bridge.

Abt Bascule Bridge



Abt Bascule Bridge Diagram

Abt Bascule Bridge

The first Abt bascule ever built crosses the River Rouge in Detroit and remains in use today. It was built in 1921 and has a 162 foot span and its overall length is 291 feet.

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.

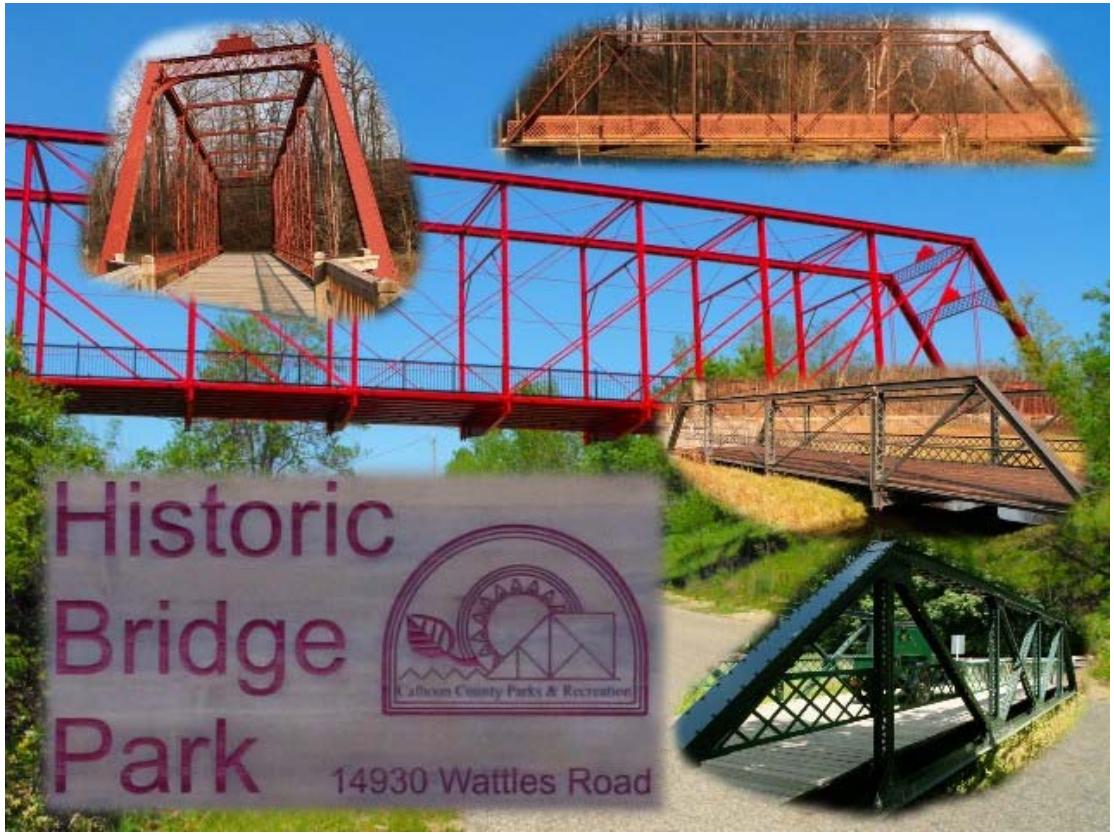
Curved T-Beam Overpasses

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.

Historic Bridge Park



Historic Bridge Park is the first of its kind in the country.

Historic Bridge Park, located southeast of Battle Creek, is a unique park and open air museum whose focus is on the five historic truss bridges that have been moved to and restored within the park. Free admission.

Portland, Michigan

Portland, Michigan has a number of preserved historic metal truss bridges, several of which are part of the city's trail system.

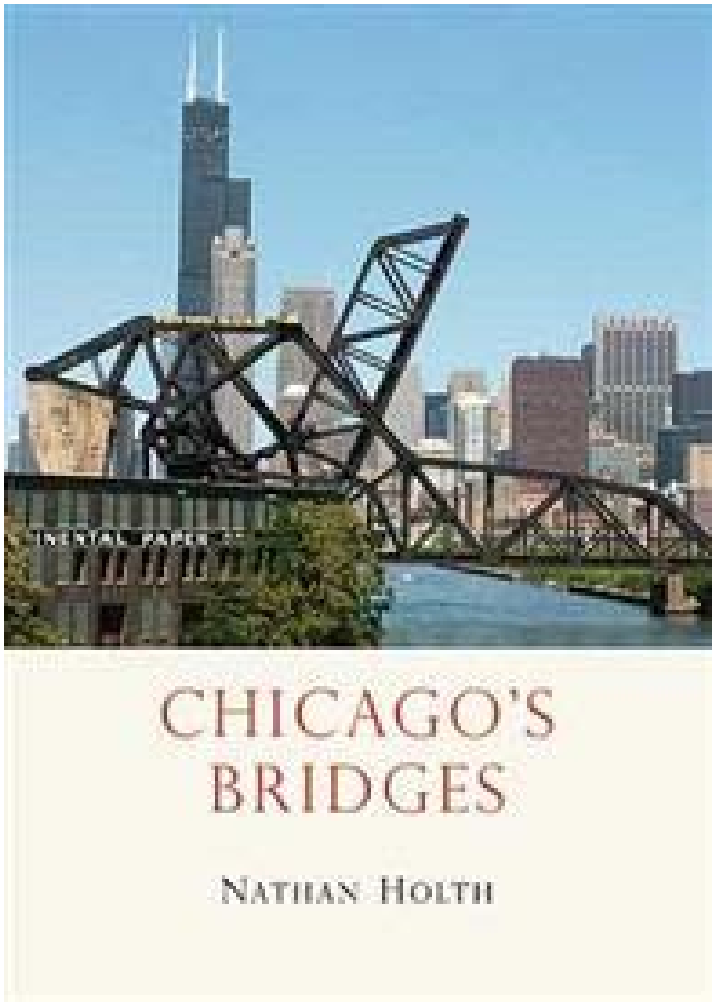
Sweetgrass Golf Course

Players who choose to play the Sweetgrass Golf Course in Menominee County will be treated to five historic pony truss bridges that were relocated to the course.

Chicago's Bridges: The Book

Available Now!

- Learn about the different types of movable bridges, and the people behind them.
- A bridge-by-bridge tour of all movable bridges in Chicago.



Chicago's Bridges: The Book

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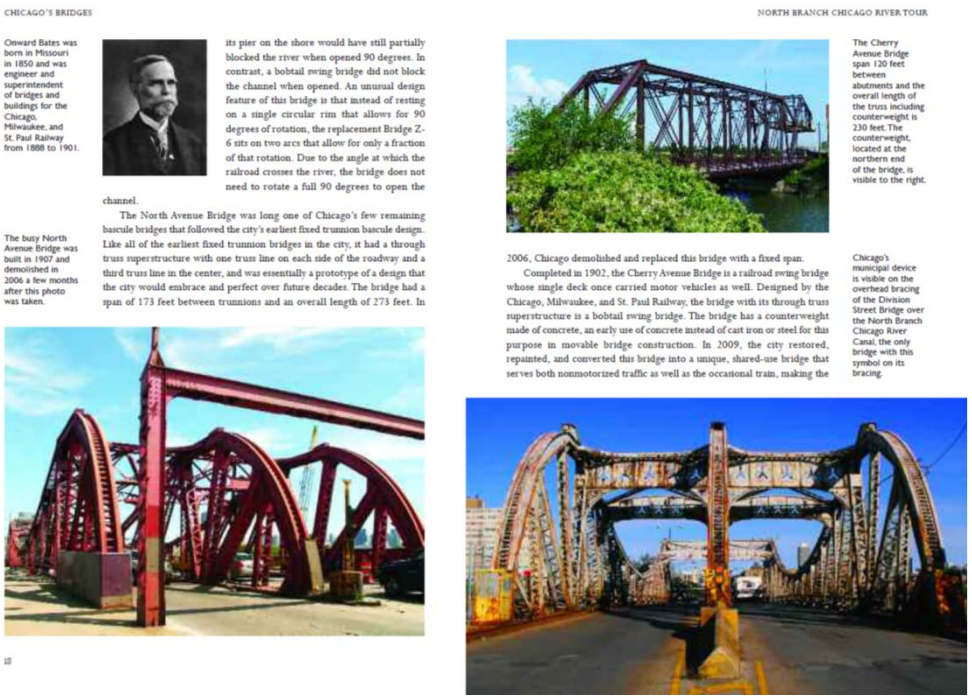

CHICAGO'S BRIDGES

Onward Bates was born in Missouri in 1850 and was engineer and superintendent of bridges and buildings for the Chicago, Milwaukee, and St. Paul Railway from 1888 to 1901.

its pier on the shore would have still partially blocked the river when opened 90 degrees. In contrast, a bobtail swing bridge did not block the channel when opened. An unusual design feature of this bridge is that instead of resting on a single circular rim that allows for 90 degrees of rotation, the replacement Bridge Z-6 sits on two arcs that allow for only a fraction of that rotation. Due to the angle at which the railroad crosses the river, the bridge does not need to rotate a full 90 degrees to open the channel.

The North Avenue Bridge was long one of Chicago's few remaining bascule bridges that followed the city's earliest fixed trunnion bascule design. Like all of the earliest fixed trunnion bridges in the city, it had a through truss superstructure with one truss line on each side of the roadway and a third truss line in the center, and was essentially a prototype of a design that the city would embrace and perfect over future decades. The bridge had a span of 173 feet between trunnions and an overall length of 273 feet. In

The busy North Avenue Bridge was built in 1907 and demolished in 2006 a few months after this photo was taken.

NORTH BRANCH CHICAGO RIVER TOUR

The Cherry Avenue Bridge span 120 feet between abutments and the overall length of the truss including counterweight is 230 feet. The counterweight, located at the northern end of the bridge, is visible to the right.

2006, Chicago demolished and replaced this bridge with a fixed span.

Completed in 1902, the Cherry Avenue Bridge is a railroad swing bridge whose single deck once carried motor vehicles as well. Designed by the Chicago, Milwaukee, and St. Paul Railway, the bridge with its through truss superstructure is a bobtail swing bridge. The bridge has a counterweight made of concrete, an early use of concrete instead of cast iron or steel for this purpose in movable bridge construction. In 2009, the city restored, repainted, and converted this bridge into a unique, shared-use bridge that serves both nonmotorized traffic as well as the occasional train, making the

Chicago's municipal device is visible on the overhead bracing of the Division Street Bridge over the North Branch Chicago River Canal, the only bridge with this symbol on its bracing.

- Dozens of full color present-day photos as well as historical photos.
- Learn about the bridges at home, or take with you as a guide during your visit to Chicago.

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