Introduction

Topics To Be Considered

• Brief review of movable bridge designs.
• Noteworthy people in Chicago’s bridge history
• Interesting bridge projects, past and present.
• Chicago’s historic bridge preservation philosophy and what we can learn from it.
Chicago has many historic bridges of a wide variety of types. However the city’s movable bridges are the most well-known.
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.
Overview: The swing bridge’s movable span turns on a pier 90 degrees to open a channel for the boats. They fell from favor in Chicago in the 20\textsuperscript{th} Century because their central pier limited the width of the channel.
Movable Bridges: Swing

**Appearance:** Some bridges may have the swing pier of the bridge offshore, which increased channel width. Other examples may be shorter at one end which will also have a counterweight, and are known as bobtail swing bridges. These are uncommon.
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.
**Appearance:** Bascule bridges may have one moving section, called a single-leaf bascule bridge, or have two sections, called a double-leaf bascule bridge. Railroads liked the rigidity of single leaf bascules. Most double-leaf bascules are highway bridges.
Operation: Bascule bridges operate in different ways. There are two common methods of operation. One is to rotate around a trunnion (a large axel) to raise, called a trunnion bascule bridge. Others roll back on a track, and are called rolling lift bascule bridges.
Overview: Vertical lift bridges raise the bridge superstructure directly up, to provide the clearance for boats to pass. They can clear the entire channel, but there is always a limit to the available clearance they provide.
Bridge Engineers

Thomas Pihlfeldt

Fixed trunnion bascule highway bridges were promoted and designed in-house by the City of Chicago, under city engineer John Ericson and city engineer of bridges Thomas Pihlfeldt, during the early 20th Century.

John Ericson
Rolling lift bascule bridges were invented and patented by William Scherzer and promoted by his brother Albert Sherzer through the Scherzer Rolling Lift Bridge Company.
Bridge Engineers

Strauss trunnion and his special heel-trunnion bascule bridges were invented, patented, and promoted by Joseph Baermann Strauss and his Strauss Bascule Bridge Company.
8 Track Bridge

Crossing the Sanitary and Ship Canal, this very unusual bridge was built to serve eight railroad tracks. It consists of four parallel superstructures. It began its life in 1901 as an unusual structure that looked like a through truss and functioned as an arch bridge.
Anticipating future navigation clearance needs, the Scherzer Rolling Lift Bridge Company produced this unusual fixed bridge design so it could later be converted to a double leaf bascule.
When the need arrived for a movable bridge only a few years later in 1909, Scherzer Rolling Lift Bridge Company instead built four new rolling lift bascule spans, using the argument that new spans built to the latest standards would be a better investment. The original deck truss approach spans remained in place.
8 Track Bridge

- The unusual bridge is four parallel single leaf bascule bridges.
- The location of the machinery alternates between spans to accommodate the limited available footprint.
- Only some of the tracks remain in use today, and some of the 1901 deck truss spans were replaced.
In 1879, a swing bridge, one of the first two all steel railroad bridges erected in the country (the other being Glasgow Bridge in Missouri), was built over the North Branch Chicago River. In 1898, a replacement lattice truss center pier swing bridge was built.
To keep the previous bridge functioning during construction, while not blocking construction of the bascule bridge on parallel alignment, the swing bridge was turned into a bobtail swing bridge by cutting part of the truss out and adding a counterweight.

Rapidly changing needs led to the replacement of the 1898 bridge with a bascule bridge in 1907.
Today, the bascule bridge no longer operates, but it remains standing in the raised position as a designated Chicago Landmark. Completed in 1907, it is one of the earliest surviving examples of a bascule bridge designed by famous engineer Joseph Strauss.
Wells Street Bridge

Design/Historic Significance

One of two similar bascule bridges in Chicago that carry the CTA L trains on an upper deck and vehicular/pedestrian traffic on a lower deck.
Wells Street Bridge

Design/Historic Significance

Replaced a double deck swing bridge at this location. Bridge was carefully built around the swing bridge so trains could continue to run during construction.
Wells Street Bridge

2012: A Need For Rehabilitation

2010 National Bridge Inventory: Superstructure rated Serious (3), Substructure rated Fair (5), and deck rated Fair (5). Sufficiency rating was 19%
Wells Street Bridge

2012: A Need For Rehabilitation

Bridge had problems typical of many deteriorated metal truss bridges, such as section loss and pack rust, particularly in areas below the deck like the bottom chord.
Roughly, the five outermost truss panels of each leaf will be replaced entirely. New members and trusses will replicate the original design, except that bolts will be used instead of rivets.

Due to the design of the bascule bridge, these truss panels had less massive members and succumbed more rapidly to deterioration from winter deicing salt and moisture.
Wells Street Bridge

2012-2013 Rehabilitation

- Existing non-original railing to be replaced with a historic replica railing.
- Clean and paint structural steel and machinery.
- Rehabilitate or replace electrical/mechanical systems.
- Rehabilitate architectural elements of bridge houses including windows, doors, roofing and flashing, etc.
As of March 1, 2013, the portion of the southern bascule leaf to be replaced has been removed and sits on a nearby barge.

The replacement replicated section also sits nearby, awaiting installation on the bridge.

Source: Ian Freimuth, CC BY-NC-ND 2.0, http://www.flickr.com/photos/ifmuth/8526175110/
Cherry Avenue Bridge

Design/Historic Significance

Built in 1902 this is a bobtail swing railroad bridge.

Early use of a concrete counterweight.

Chicago landmark designation in 2007.
Cherry Avenue Bridge

2008-2009 Rehabilitation

- Existing traditional railroad deck and cantilevered pedestrian sidewalk was replaced with a unique shared pedestrian and railroad deck.

- Rails are flush with surrounding deck including a rubber-filled flangeway, allowing for safe pedestrian usage. A fiberglass deck surface was used.
2008-2009 Rehabilitation

- Miscellaneous truss member repairs: plating members, selective member replacements, selective rivet replacement (with bolts). Relatively few original materials were actually replaced.

- A fire on the bridge had damaged some members.

- Counterweight concrete repaired.

- Bridge cleaned and repainted.
Railings were added to the deck, outside of the truss lines, allowing pedestrians to easily walk up to view and even touch the members of the bridge.
Cherry Avenue Bridge

2008-2009 Rehabilitation

• Helped encourage construction of the Wrigley Global Innovation Center on Goose Island. Improves transportation for employees. (CTA Red Line Access).

• Won 2009 Chicago Landmark Award for excellence in preservation, adaptive reuse and bridge restoration.
Cherry Avenue Bridge

2008-2009 Rehabilitation

Globetrotters Engineering Corporation provided Phase III Engineering services

Rausch Construction Company – On-site contractor for the project.
Torrence Avenue Bridge

A Brief Glance: 2012 Rehabilitation

• Comprehensive rehabilitation of the only operable vehicular vertical lift bridge in Chicago.

• A parallel abandoned railroad vertical lift bridge is a designated Chicago Landmark
During the project, the railroad bridge was re-decked to carry construction vehicles, and its towers also served as an access to the historic highway vertical lift bridge.

In this way, one historic bridge has helped rehabilitate another historic bridge.
The Optimal Scenario:

- National Register of Historic Places Listed/Eligible (must meet specific Criterion requirements)
- In-Kind Restoration: Retain as much original material, remove modern additions, replace beyond-repair elements with exact replicas.
Preservation Philosophy

Less is Better Than Nothing:

- Old bridges not National Register eligible/listed: Often not worthless in terms of heritage value.
- Old bridges that have been rehabilitated in a way that alters the original materials and design: Often not worthless in terms of heritage value.
Preservation Philosophy

Chicago’s Guiding Principals

- City recognizes the historic value of the bridges.
- Safety concerns: For example, falling/tripping into gaps in the deck around the trusses, etc.
- Focus on acceptable changes: Improve safety or function without changing general bridge appearance.
Preservation Philosophy

Preservation In Practice: Examples

- Chicago replaces members in kind. This includes built-up beams with lattice/v-lacing, details not part of typical modern steel fabrication.

- Major rehab projects tend to favor member replacement versus existing member repair.

- City does replace failed rivets with modern bolts.
Preservation Philosophy

Preservation In Practice: Examples

- Plates may be added to cover up gaps where members pass through the sidewalk.
Preservation Philosophy

**Preservation In Practice**

- Fencing or barriers may be added.
- Adding low profile two tube railing to separate roadway from sidewalk on deck trusses.
- Replacing non-original sidewalk railing with replicas of the original railing.
Preservation Philosophy

Take-Home Ideas…

Continue to…

• Fight first and hardest for a National Register Eligible/Listed Bridge.

• Fight first and hardest for an in-kind restoration.

• Be creative! Find a preservation solution for your bridge!
Preservation Philosophy

Take-Home Ideas…

But Also Consider…

• The heritage value of some non-eligible bridges. They may still be worthy of preservation.

• That a rehabilitation with alteration is worth fighting for as an alternative to complete demolition and replacement.

• Be creative! The preservation solution is waiting to be discovered!
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

Available Now!

• 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.
Available Now!

Order direct from the publisher at:

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CONTENTS

<table>
<thead>
<tr>
<th>CONTENTS</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRIDGES THAT MOVE</td>
<td>4</td>
</tr>
<tr>
<td>COMPETING RASCULE BRIDGES AND THEIR BUILDERS</td>
<td>9</td>
</tr>
<tr>
<td>NORTH BRANCH CHICAGO RIVER TOUR</td>
<td>15</td>
</tr>
<tr>
<td>MAIN STEM CHICAGO RIVER TOUR</td>
<td>26</td>
</tr>
<tr>
<td>SOUTH BRANCH CHICAGO RIVER TOUR</td>
<td>35</td>
</tr>
<tr>
<td>CHICAGO SANITARY AND SHIP CANAL TOUR</td>
<td>47</td>
</tr>
<tr>
<td>CALUMET RIVER TOUR</td>
<td>53</td>
</tr>
<tr>
<td>HISTORIC MOVABLE BRIDGES</td>
<td>59</td>
</tr>
<tr>
<td>PLACES TO VISIT</td>
<td>61</td>
</tr>
<tr>
<td>FURTHER READING</td>
<td>63</td>
</tr>
<tr>
<td>INDEX</td>
<td>64</td>
</tr>
</tbody>
</table>