

Indian Mill Bridge Rehabilitation PID 92339



Wyandot County Engineer's Office



The Project



Indian Mill Bridge

- Built by Modern Bridge Co. to Replace Covered Bridge That was Destroyed in the 1913 Flood
- Single Span 178' OAL
- 17' Wide Face to Face of Railing



Project History

- The Existing Structure is Functionally Obsolete and its Condition is Declining Rapidly
- A New Structure is Built Upstream on a New Alignment in 2006 Using LBR Funds and LPA Process
- Explore Converting the Old Structure to a Foot Bridge and Transferring to the Historical Society
- Liability Issues and Costs Make This Impossible
- Determine That Transportation Enhancement Funds (Now called Transportation Alternative Program or TAP Funds) Could be Used to Rehabilitate the Structure for Less Than a Foot Bridge Conversion
- Three Rehab Options Defined and Selection Made
- Applied for TE Funds Multiple Times
- Plan Preparation Begins March 2012

Modern Bridge

- Built on New Alignment 0.2 Mile East of Existing Structure
- Built By R&I Construction & Ohio Bridge in 2006
- 3 Span 240' OAL - 45'-140'-45' HS25 Loading
- 32' Face to Face at 30° Skew



Project Location



Project Area



Project Obstacles

- Scenic River Coordination
 - ODNR Fish & Wildlife
 - State and Local Historical Societies
 - County and State Owned Park Lands
 - US Army Corps – Permit Determination
 - EPA
 - Right of Way (Federal, State, County & Private)
 - One Conference Call Cleared up Two Months of Back and Forth Between Agencies
 - Utilities had to be moved from Public R/W to Private Property Due Scenic River Easements and Lack of Space.
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Project Obstacles - Continued

- Wetlands Determination
- Indiana Bat Restriction
- Limited Space for Laydown and Materials
- Unpredictable Weather and Water Levels
- Mussel Survey and Mussel Relocation
 - \$28,000 Cost to Perform This Task
 - 107 Mussels Found, Tagged and Relocated Downstream of the Project.
 - Fatmucket
 - Purple Wartyback
 - Creeper

Challenging Site Conditions



Plan Prep, Bidding & Award

- After Obtaining Permits and Approvals The Plan is Approved Including the Construction of a Temporary In-Stream Work Pad and Piers to Support the Structure During Disassembly
- Bids Were Received from U.S. Bridge and Mid Ohio Structures on December 5, 2013. Both Were Under the Project Estimate of \$1.7 Million
- Low Bidder was U.S. Bridge with a bid of \$1.13 Million, \$570,000 Under Estimate Largely Due to Their Innovative Disassembly / Reassembly Approach.
- Contract Awarded to U.S. Bridge January 2014 with a Completion Date of December 1, 2014
- Construction Begins March, 2014

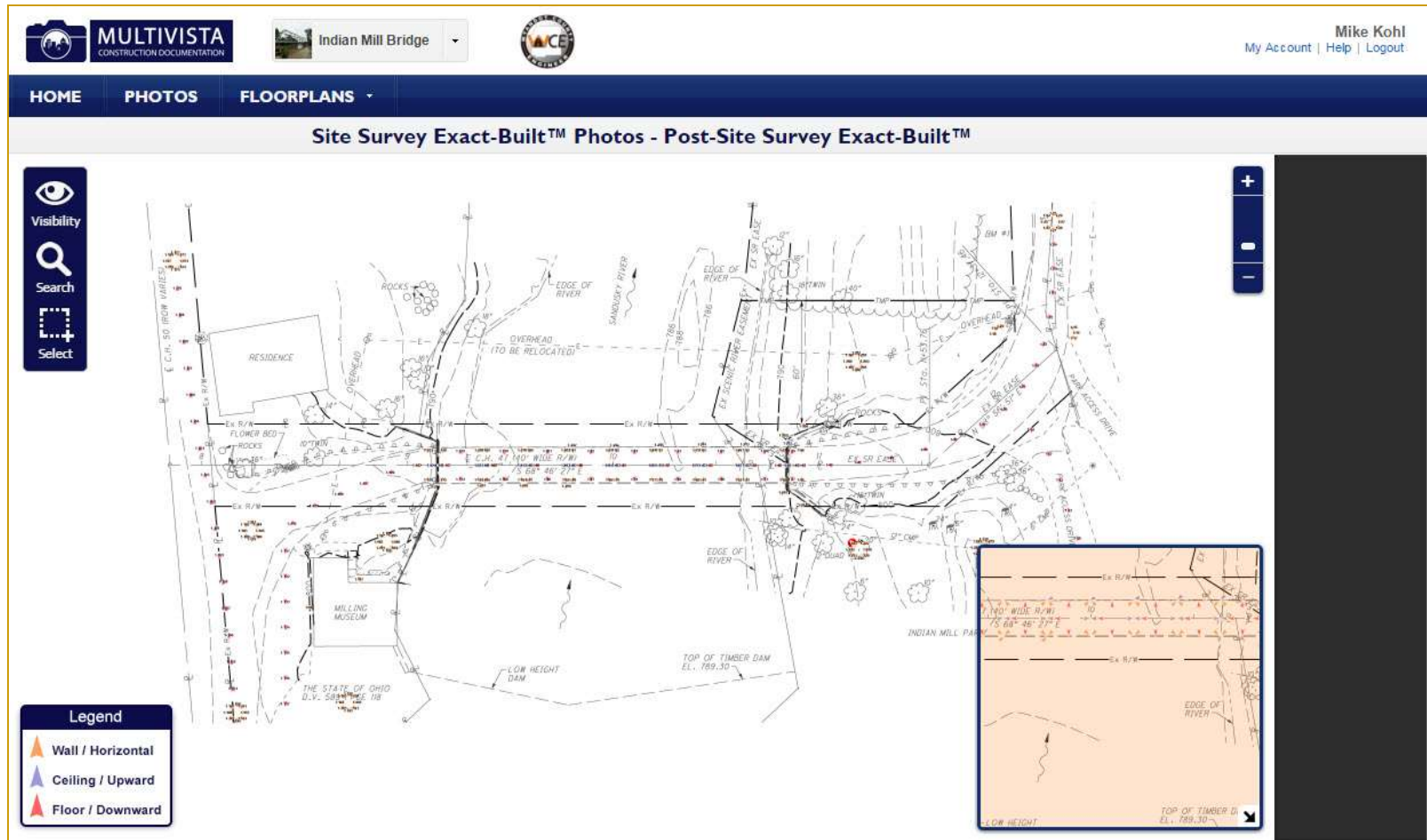
Project Approach

- U.S. Bridge Proposes to Launch Their Own Liberty Series Modular Truss Bridge Through the Existing Truss



- This Approach Eliminates All In-Stream Work Including the Construction and Removal of the Temporary Work Platform and Piers

- Contracted with MultiVista to Document Entire Project

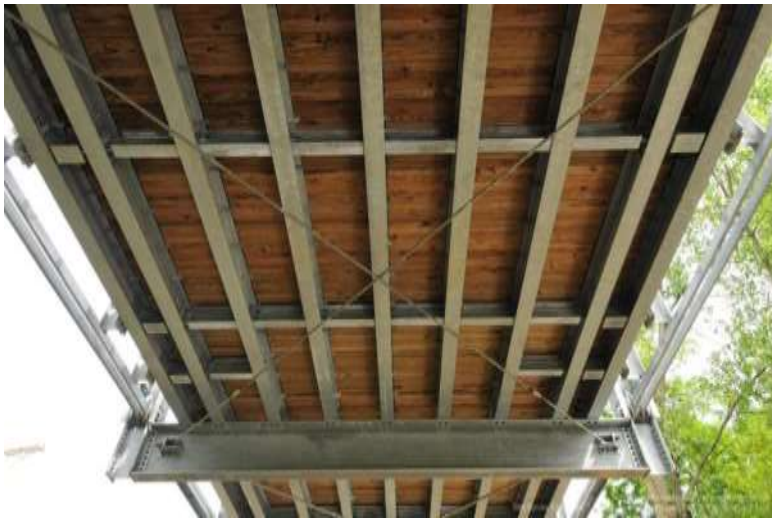




Construction Documentation



Repairs and Upgrades



Repairs and Upgrades



Repairs and Upgrades



Repairs and Upgrades



Repairs and Upgrades



Repairs and Upgrades



Heavy Lifters



Making It All Work



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Indian Mill Bridge Rehabilitation

TRUSS REMOVAL AND REINSTALLATION WHILE
PRESERVING THE SCENIC SANDUSKY RIVER

WYANDOT COUNTY, OHIO



Built in 1915



Rehabilitated in 2015



The Contract Plans proposed removing the existing bridge using temporary supports resting on a stone causeway. Construction equipment would also use the causeway.



The Original Plan

Causeways are common when temporary support is needed for instream work.



Challenge: Extreme Flows are a Problem



Challenge: Flooding in 2013

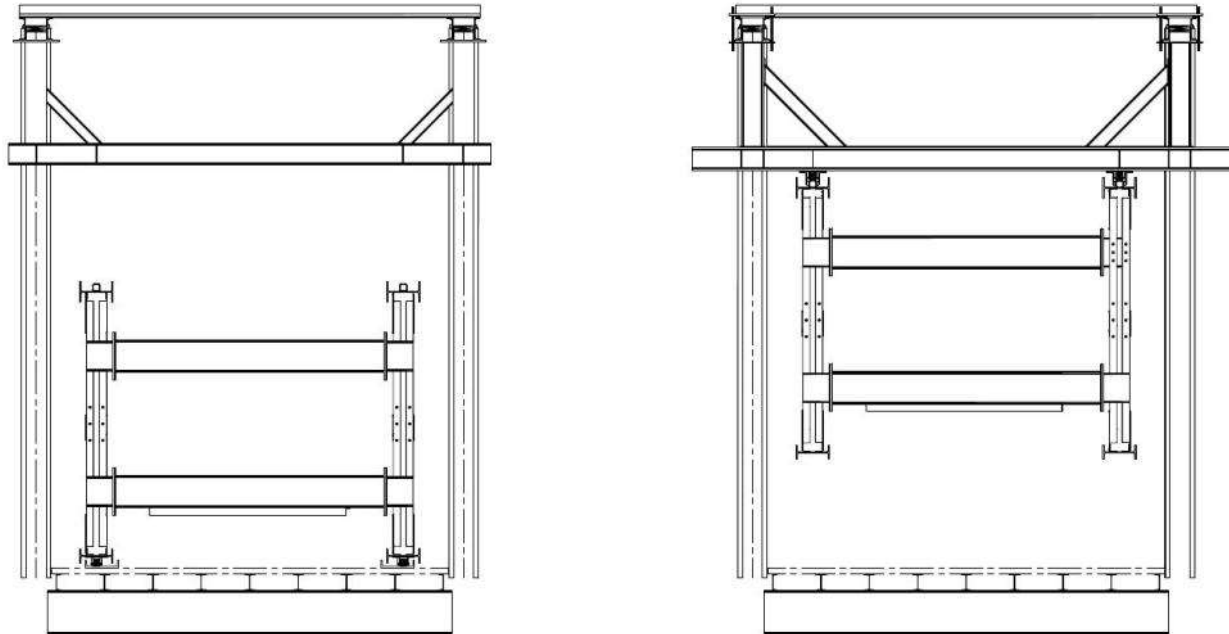


Solution: Use Internal Support




The Solution

A smaller, longer steel frame is rolled through the inside of the Existing Truss then raised to lift the entire bridge for removal.










The Internal Support


**Permanent • Emergency • Temporary
Steel Bridges**


The Most Trusted Name in Bridges™

The Liberty Series Modular Panel Bridge



- All-bolted connections eliminate the need for any pins, frequent maintenance or spare parts as required by other panel bridges.
- Built-in proportional camber is designed to correspond with the bridge's span thereby limiting


U.S. BRIDGE®
BRIDGING AMERICA SINCE 1936

The Internal Support

An ungalvanized span was available.



The Big Question?

Can Indian Mill carry the load of the Liberty bridge?

We looked at the capacity of the existing Indian Mill truss as if there was no deterioration. Then we used the last Richland Engineering inspection and load rating report to identify the weakest points due to deterioration.

The rolling load caused by the Liberty on the Indian Mill truss only used about 50% of the un-deteriorated capacity of the members.

The member stresses caused by a Liberty rolling load are about 65% of the load that would have been caused by an HS-20 loading. About 40 tons of asphalt surfacing was removed from the deck before the Liberty was installed.

The total weight of the Liberty is about 96 tons but not all of the weight is on the bridge at once.

Weak areas of Indian Mill truss were closely inspected and additional strengthening was not deemed necessary.

As the Liberty was rolled across Indian Mill bridge the members and pins were closely watched for any uncommon movements.

The Preparation

Frames were installed to transfer the existing dead load of the Indian Mill Bridge to the narrower Liberty Bridge.



The Preparation

Frames were bolted to top chord so that lift points would release dead load stresses in the bottom chord and tension diagonals.



The Preparation

Framework was constructed to establish pick points below the existing Portal Bracing.



The Preparation

Hillman Rollers would allow the existing bridge to be moved on the stationary Liberty Bridge.



Installation

The Liberty was installed by a small work crane at the East Abutment



Installation

The Hillman rollers were placed under the Liberty bridge on a steel channel so it could be rolled across the existing deck.



Installation

The Liberty floorbeams were staggered at top and bottom connection points to create additional top chord bracing.



Installation

A tubular rail was used to space the rollers away from the bolted connections of the Liberty.



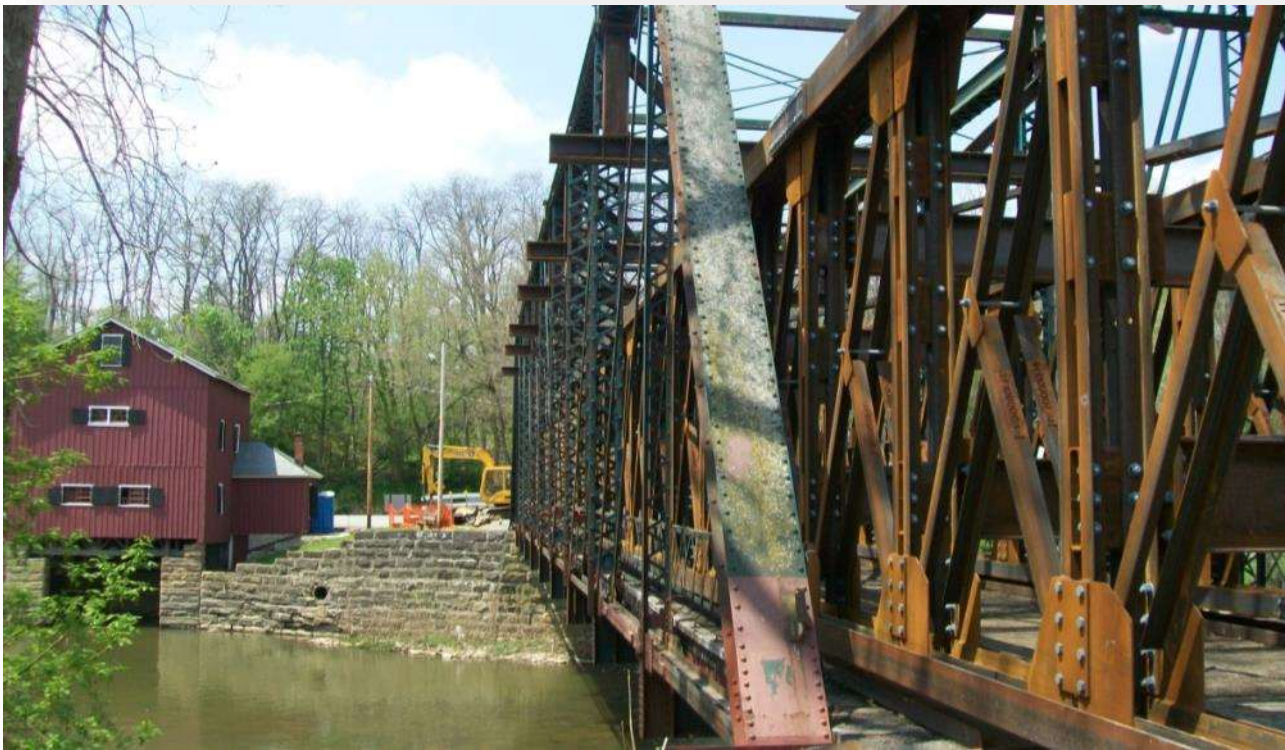
Installation

The Liberty was supported on cribbing placed about 15 feet from the West abutment and about 40 feet from the East abutment to create work space.



Installation

The Liberty was a perfect fit.



Installation

Jacks and cribbing were used to raise the Liberty.



Installation

Once the Liberty was jacked tight against the upper framing there was ample room for removal of the existing deck and stringers.



Installation

Small equipment was used to lighten the bridge by at least another 30 tons.



Ready to Lift

After the wood floor and 2/3 of the stringers were removed, the bearings were cut, and the Indian Mill bridge was ready to be lifted.



Ready to Lift

A side view of the bridge about to be lifted. The combined bridge lift was about 100 tons.



Ready to Lift

As the Liberty was raised the rollers were adjusted and additional bracing added to stabilize the transfer beams.



Overcoming Challenges

The river flooded several times during the operation.



Overcoming Challenges

Movement was easy with small equipment.



First Rolling

A view from the West abutment after first rolling.



Removal

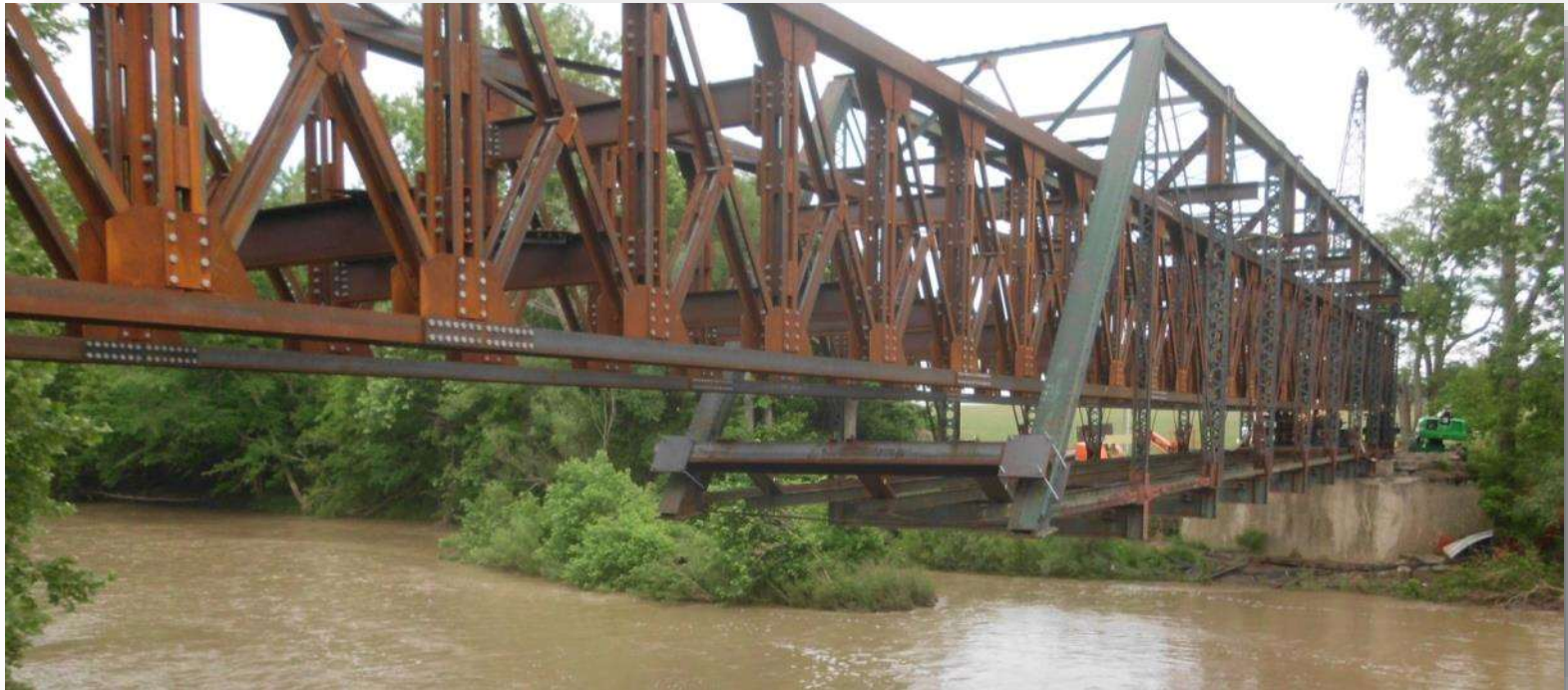
Components were removed as the bridge was pulled east.



Removal

No issues were experienced. High river flows would have stopped work at several stages if a causeway had been used.

At the halfway point wind loading from a passing storm caused some scary movement but nothing was moved out of place.



Discoveries

As the components were disassembled, previously unknown factors were discovered. Some pins showed heavy deterioration that was hidden from view.



Discoveries

Floorbeam flanges were found to be worse than anticipated and the county decided the floorbeams should be replaced.



Disassemble

As components were removed the support frames were removed and stored onsite for later use.



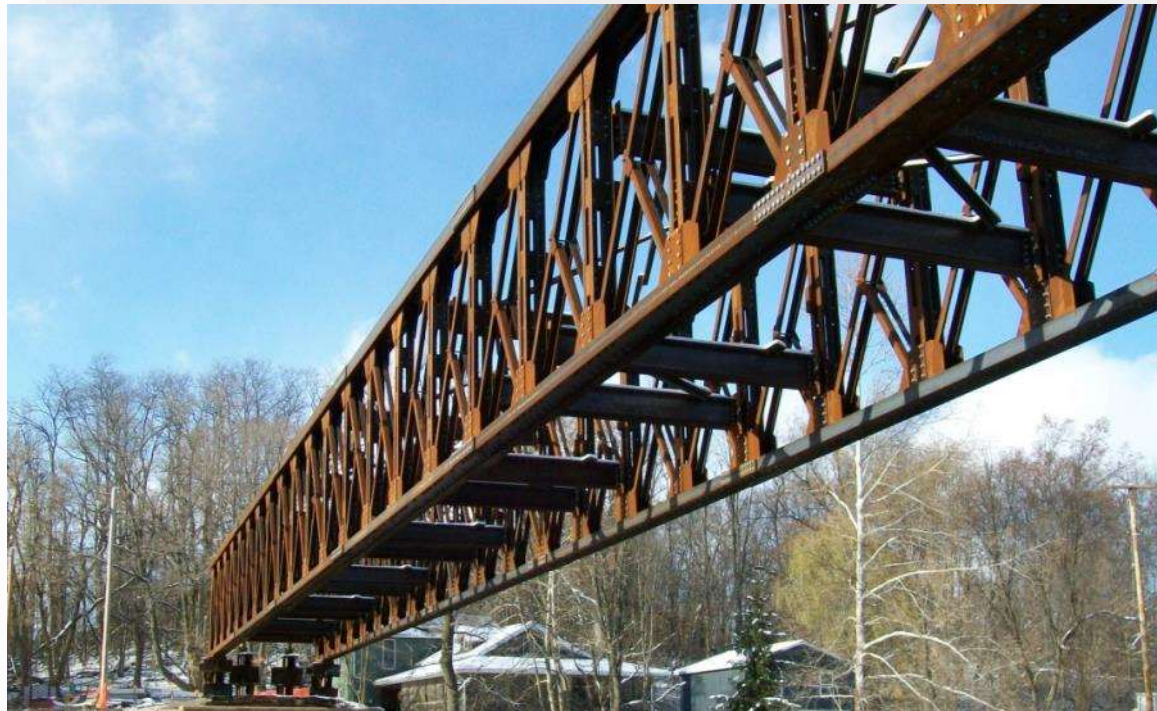
Disassemble

The components of the Indian Mill bridge were shipped to Cambridge for evaluation, sand blasting, and rehabilitation.



The Liberty Remained

The Liberty remained in place during abutment rehabilitation.



Reinstallation Preparation

The Liberty was raised slightly to keep the new floor beams above the abutment seat and to correct settlement caused by freezing and thawing.



Reinstallation Preparation

The rehabilitated and galvanized components were delivered to the East Abutment.

The eyebars and bracing rods were replaced with new Grade 50 shapes with identical dimensions. The new pins were fabricated from stainless steel .



Reinstallation Preparation

End frame sections were assembled from components.



Reinstallation

Reinstallation began with carefully placing and anchoring the support frames on the Liberty.



Reinstallation

The pre-assembled end sections were placed on the support frames.



Reinstallation

Portal bracing was added to stabilize frames.



Reinstallation

Manlifts at the abutments gave access to all connections.



Reinstallation

The first section had to be square and in line for movement.



Reinstallation

As each section was installed, the bridge was moved forward with a skid steer.



Reinstallation

Progress was steady, consistent, and uneventful.



Reinstallation

Unequal sag of the Liberty and uniform camber of the Indian Mill truss was accommodated with shims between the rollers and the support frames



Reinstallation

Trusses were set on the abutments in early February 2015.



Reinstallation

Another flood caused zero interruption. The new stringers and wood floor was installed with the Liberty still in place.



Liberty Removal

Steel channels were placed on the new floor to protect it from the steel rollers during removal.



Liberty Removal

The Liberty was lowered onto the deck and rolled toward the East abutment.



Liberty Removal

The Liberty sections were removed in truckable sections and returned to Cambridge.

The support frames were removed and remaining bridge components were installed from the deck. Paving and guardrail installation followed.



Rehabilitated Indian Mill Bridge

