Rapid Replacement of CSX’s Bayou Sara Bridge Swing Span

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Kevin Kane, PE, Project Manager

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Agenda

- Introduction
- Project Challenges
- Design Approach
- Construction Planning
- Pre-Float-In
- Float-In
- Post-Float-In
- Conclusions
Introduction

- Single Track Rail Bridge – 376 ft. Total Length
- 9-13 Trains per Day
- 162-ft Through-girder Swing Span
- Rehabilitated Pre-stressed Concrete Box-girder Approach Spans
- Over 100 Years Old at Replacement
- Complete Replacement of the Swing Span was the Right Solution for the Long Term
Project Challenges

- Permitting
  - Potential significant wetland impacts
  - Potential significant mitigation efforts
- In-Water Construction
- Harsh Environment/Low Clearance over Water

- Limited Rail Outage Time for In-Line Replacement
  - Original installation window of 48 hours
  - Installation window later reduced to 14 hours
Project Challenges

- Project Site Accessibility
  - No Roadway
  - Access only via rail or boat
  - 5.5 miles from contractor’s yard and CSX rail yard
Project Challenges

- Install Replacement Swing Span Superstructure onto Existing Substructure
Cooper E80 Live Load

Fatigue

Two-span continuous superstructure

End lift reaction
  - Exceed LL-induced uplift ‘restraint’ by 50%

Minimize span weight

Resilience
  - protective coating; elevated equipment

Remote-controlled operation
- Equipment Gantry
  - Elevated Equipment
  - Weight Reduction
    - 20,000# Counterweight reduction
Remote Operation
- Feedback Sensors
- Machinery Redundancy
- Control System Redundancy
- Enhanced Communications
- Cameras
Design

- Replacement Precast Concrete Cap
- Cutaway of existing concrete – wire saw
Design Change During Construction

- Outage Duration Reduced from 48 hours to 14 hours
- Solution: Structural Steel Grillage Replaced Precast Concrete
  - Suspended Directly from the New Swing Span During Float-in
  - Placed on Steel Plate Stacks on Pivot Pier
Construction Planning

- Site Logistics
- Outage Schedule
- Activity Scripts
- Center Pier Prep
- Machinery Prep
- Bridge Transport
- Bridge Float In
** Critical Path runs through the center pier **
# Activity Scripts

## Swing Span Float-in Work Activity Plans/Script

**Work Type (Structural, Elec, Etc.):**
- Float-In

**Activity:** Secure Center Pier Cap to Existing Bridge

**Float-in HR (0 to 14):**
- 6-2.0

**Scheduled Duration:**
- 2

**Supervisor:**
- Brandon Specic

**Project Manager:**
- Kevin Kame

### Micro-Activities

<table>
<thead>
<tr>
<th></th>
<th>Layout steel and prep for welds on girders</th>
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</thead>
<tbody>
<tr>
<td>2</td>
<td>Pre-build and fly scaffold platform in place for girdler support steel install</td>
</tr>
<tr>
<td>3</td>
<td>Feed rods through timber ties</td>
</tr>
<tr>
<td>4</td>
<td>Weld tube steel support steel to girders</td>
</tr>
<tr>
<td>5</td>
<td>Couple rods together</td>
</tr>
<tr>
<td>6</td>
<td>Set plates over top of rods</td>
</tr>
<tr>
<td>7</td>
<td>Thread on bevel nut &amp; washer</td>
</tr>
<tr>
<td>8</td>
<td>Tighten nuts &amp; tack weld</td>
</tr>
</tbody>
</table>

### Concurrent Onsite Activities

<table>
<thead>
<tr>
<th>Disengage Rail Lifters</th>
<th>Supervisor</th>
<th>Permanent Material Requirements</th>
<th>QTY</th>
<th>QC/QA Requirements</th>
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</thead>
<tbody>
<tr>
<td>Gie / Chris</td>
<td></td>
<td>Dywidag Rods 20 ft length</td>
<td>20</td>
<td>Verify coupler is evenly spaced on rod</td>
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<tr>
<td></td>
<td></td>
<td>Couplers</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bevel nuts</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Washer plates</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steel beams</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steel plates</td>
<td>29</td>
<td></td>
</tr>
</tbody>
</table>

### Crew

<table>
<thead>
<tr>
<th>Crew</th>
<th>Supplier</th>
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<tbody>
<tr>
<td>Center</td>
<td>5</td>
</tr>
<tr>
<td>Doug, Nate, Wesley, Warren, Brandon R.</td>
<td></td>
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</table>

### Major Equipment Requirements

<table>
<thead>
<tr>
<th>Equipment Requirements</th>
<th>QTY</th>
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</thead>
<tbody>
<tr>
<td>Welding machine &amp; leads</td>
<td>1</td>
</tr>
<tr>
<td>Generator</td>
<td>1</td>
</tr>
<tr>
<td>Scaffolding (loose)</td>
<td>2</td>
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</tbody>
</table>

### Small Tools Requirements

<table>
<thead>
<tr>
<th>Tool</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grinder</td>
<td>2</td>
</tr>
<tr>
<td>Grinding discs</td>
<td>Box</td>
</tr>
<tr>
<td>Face shield</td>
<td>2</td>
</tr>
<tr>
<td>Cords</td>
<td>2</td>
</tr>
<tr>
<td>Wrenches (Verify Size)</td>
<td>4</td>
</tr>
<tr>
<td>Welding Rods</td>
<td>Box</td>
</tr>
</tbody>
</table>
Center Pier Prep

- Install Cofferdam
Center Pier Prep

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Center Pier Prep

- Install Cofferdam
- Core Pilot Holes
- Wire Saw Outer Thirds of Cap
- Selective Demolition
- Jack and Block Swing Span
Center Pier Prep

- Install Cofferdam
- Core Pilot Holes
- Wire Saw Outer Thirds of Cap
- Selective Demolition
- Jack and Block Swing Span
- Wire Saw Middle Third of Cap
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Threaded Rods
Machinery Prep

- Grillage Frame Jacking/Installation
Machinery Prep

- Grillage Frame Jacking/Installation
- Initial Alignment
- Securing Grillage
Machinery Prep

- Grillage Frame Jacking/Installation
- Initial Alignment
- Securing Grillage
- End Wedge Seat Installation
Bridge Transport
Bridge Transport
Bridge Float In

- Clean & Prep Center Pier Cap Surface
- Layout & Build Shim Stacks for Grillage
- Drill and Epoxy Rebar Dowels
Bridge Float In

New span approaching final position
Bridge Float In

Global Alignment
Bridge Float In
Lower New Span On Shim Stacks
Bridge Float In

Rail Back In Service
Pivot Pier Completion
Bridge Open
Conclusions

- Service Needs/Outages Drive the Approach
- Repurposing Existing Foundations Saves Time and Cost
- Gantry Platform Minimizes Weight; Promotes Resiliency
- Pre-installed Machinery Speeds Installation
- Owner/Engineer/Contractor Collaboration Yields Best Results
- Detailed Planning of Outage Construction Schedule is Imperative
Acknowledgements
**Presenter Contact Information**

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