AUTOMATION OF MOVABLE BRIDGES
Presented at AREMA
September 2005
Conrail’s operation in New Jersey requires manning of movable bridges to comply with various marine regulations

• 1/3 of former Conrail’s movable bridges were located in the Shared Assets allocated territory

• 10 were in the New Jersey area
  - 6 bridges service pleasure craft only
  - 4 bridges service commercial shipping
  - 6 bridges utilized BMWE craft (15 positions)
  - 3 bridges utilized TCU craft (13 positions)

(continued)
Conrail’s operation in New Jersey requires manning of movable bridges to comply with various marine regulations

- Code of Federal Regulations mandated specific operations for all movable bridges
  - Hours of operation based upon those requirements

- Coast Guard monitors bridge activity and Conrail’s compliance with regulations

- Increasing marine activity coupled with bridge operator attrition presented an opportunity to get serious about automation of movable bridges at Conrail
4 movable bridge candidates were identified in 2000 for automation that appeared to have the greatest potential for success

- Secondary and industrial tracks

- Marine activity was limited
  - CFR did not require 24/7 operator presence
  - Pleasure craft only
  - Bridges closed to marine traffic during winter months

- Increasing complaints from boating public caused the Coast Guard to consider expanding hours of operation
  - Increasing overtime requirement to meet demand
  - Accelerating need to hire and train new bridge operators

- Successful automation would be a win-win for all parties concerned
Between 2000-2003, new technology interfaced with old infrastructure to allow for the automation of movable bridges on Conrail

• Each bridge had unique challenges to solve

• Each automation solution was tailored to the specific marine and train operation at that location

• Electrical, mechanical, and signal modifications were necessary to support bridge automation

• Automation plans were submitted to the Coast Guard for their review and approval for each bridge

• Concurrently, Conrail finalized design and requested authorization for capital expenditures

(continued)
Between 2000-2003, new technology interfaced with old infrastructure to allow for the automation of movable bridges on Conrail

- In the end, 3 different applications were chosen for bridge control:
  - Microwave link path between one bridge and another 24/7 manned bridge
  - DTMF radio control allows train crews to operate three bridges
  - Remote control by Mt. Laurel Train Dispatch Center was the best solution for another location

- Upon completion, the automated bridges were bulletined in service and the Code of Federal Regulation for operation at each location was modified
Darby Creek Bridge
## Darby Creek Bridge

### Description
- Bridge No. B -1.67 – Chester Industrial Track
  - Thru-Girder, Open Deck, Bascule Draw
- Located in Eddystone, Pennsylvania
- Waterway – Darby Creek
- Built in 1923

<table>
<thead>
<tr>
<th>Railroad Operation</th>
<th>Marine Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Tracks – 2</td>
<td>Marine Traffic – Pleasure Craft</td>
</tr>
<tr>
<td>Track Speed – 10 MPH</td>
<td>CFR Regulation – Open April 1st thru October 31st</td>
</tr>
<tr>
<td>Train Movements Per Day - 6</td>
<td>Open with 24 hour notice</td>
</tr>
<tr>
<td></td>
<td>November 1st thru March 31st</td>
</tr>
</tbody>
</table>
Bridgeport Movable Bridge
# Bridgeport Movable Bridge

## Description

- **Bridge No. D - 20.79** – Penns Grove Secondary
- Thru-Girder, Open Deck, Swing Span
- Located in Bridgeport, New Jersey
- Waterway – Raccoon Creek
- Built in 1919

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<thead>
<tr>
<th>Railroad Operation</th>
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<tr>
<td>Number of Tracks – 1</td>
<td>Marine Traffic – Pleasure Craft</td>
</tr>
<tr>
<td>Track Speed – 10 MPH</td>
<td>CFR Regulation – Open March 1st thru November 30th</td>
</tr>
<tr>
<td>Train Movements Per Day - 6</td>
<td>Open with 4 hour notice</td>
</tr>
<tr>
<td></td>
<td>December 1st thru February 28th</td>
</tr>
</tbody>
</table>
Paulsboro Bridge
Paulsboro Bridge

Description
Bridge No. D -13.70 – Penns Grove Secondary
Deck Girder, Open Deck, A-Frame Swing
Located in Paulsboro, New Jersey
Waterway – Mantua Creek
Built in 1917

Railroad Operation
Number of Tracks – 1
Track Speed – 10 MPH
Train Movements Per Day – 10

Marine Operation
Marine Traffic – Pleasure Craft
CFR Regulation – Open March 1st thru November 30th
Open with 4 hour notice
December 1st thru February 28th
Rahway River Bridge
## Rahway River Bridge

### Description

Bridge No. B -14.49 – Chemical Coast Secondary

Thru-Girder, Open Deck, Bascule Draw

Located in West Carteret, New Jersey

Waterway – Rahway River

Built in 1921

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<td>Number of Tracks – 2 (1 active)</td>
<td>Marine Traffic – Pleasure Craft</td>
</tr>
<tr>
<td>Track Speed – 20 MPH</td>
<td>CFR Regulation – Closes only for passage of trains</td>
</tr>
<tr>
<td>Train Movements Per Day – 12</td>
<td></td>
</tr>
</tbody>
</table>
Darby Creek Bridge
# Darby Creek Bridge Operation

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<th>AUTOMATION REQUIREMENT:</th>
<th>Bridge is left in the open position</th>
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<td>TECHNOLOGY:</td>
<td>Train crew operates bridge using DTMF radio with keypad in engine or on portable radio</td>
</tr>
<tr>
<td>CLOSING BRIDGE:</td>
<td>With approach track circuit occupied, crew member enters access code on keypad</td>
</tr>
<tr>
<td>EMERGENCY STOP:</td>
<td>Enter access code and # key</td>
</tr>
<tr>
<td>OPEN BRIDGE:</td>
<td>Bridge will open automatically when track circuits are clear</td>
</tr>
</tbody>
</table>
Darby Creek Bridge Operation (before)
Darby Creek Bridge Operation (after)
Darby Creek Bridge
Paulsboro Bridge Operation (before)
Paulsboro Bridge (after)
Bridgeport Movable Bridge
**Paulsboro and Bridgeport Bridge Operation**

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Paulsboro Bridge Operation
Paulsboro Bridge Operation
Paulsboro Bridge Operation
Radio Failure Control

M&W Control Buttons

- Fault Reset
- Bridge Close

- Open Perm
- Fault Reset

- Bridge Open
- Bridge Close
Rahway River Bridge
Rahway River Bridge Operation

AUTOMATION REQUIREMENT: Bridge is left in the open position

TECHNOLOGY: Vital Processor linked to Mt. Laurel Dispatch Office

CLOSING BRIDGE: Prior to train arrival, the dispatcher operates the bridge remotely from his work station

OPEN BRIDGE: With track circuits cleared, train dispatcher can open the bridge
Rahway River Bridge
Conrail enjoys the on-going benefits and efficiencies of movable bridge automation and continues to explore future opportunities

• Each bridge automation projects produced a significant ROI

• Re-deployment of the existing bridge operators and reduction in future hiring requirements

• Elimination of train delays due to operator availability

• Reduction in complaints from boat owners regarding bridge openings

• Improved relationship with the Coast Guard

(continued)
Conrail enjoys the on-going benefits and efficiencies of movable bridge automation and continues to explore future opportunities

• Building on these successes, Conrail is reviewing the cost and benefits of our remaining, more challenging future automation projects

  – Delair Bridge

  – Upper Bay Bridge

  – Hack Bridge
Update on future opportunities

• Delair Bridge – Project is underway to remote the bridge from Mt. Laurel
• Upper Bay Bridge – Operator now controls Hack Bridge and AK Bridge
Upper Bay Bridge
AK Bridge
The success of each of the projects was primarily due to the interaction and cooperation of many agencies and organizations

- Conrail’s Communication & Signal and Bridges & Building Departments
- Conrail’s Labor Relations Department
- CSXT and NSC for their support of these capital projects
- North American Signal, Inc.
- United States Coast Guard
- Various marina owners
Questions and Answers