REPAIR OF DAMAGED PRESTRESSED CONCRETE GIRDER

AASHTO Midwest Bridge Preservation Conference, Detroit, MI

Presented by:

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October 13, 2010

Acknowledgments:
Bridge Owner: NDOR
Retrofit Designer: HNTB
Contractor: Simon Contractors
<table>
<thead>
<tr>
<th>Bridge Data</th>
<th>Nebraska</th>
<th>United States</th>
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<tbody>
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<td>800 overhead bridges</td>
<td>91,000 overhead bridges</td>
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<tr>
<td>10 impacts in past year</td>
<td>Approx. 1,100 impacts</td>
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- Traditionally, damaged pre-stressed concrete girders are replaced.
  - Costly
  - Major traffic delay
  - Cold joints on deck

- Girder repair by splicing strands is an attractive option.
- **Wood River Interchange**
  Highway N-11 and I-80, approx. 4 miles S of Wood River

- **Gering By-Pass**
  Highway N-71, approx. 2 miles SE of Gering
Wood River Bridge

- Two lane bridge over I-80
- Two span 145’ - 145’
- Continuous for Dead Load and Live Load
- March 16 & 17, 2009
- Duration of traffic control – 3 to 4 hours
- Inspection tasks included:
  - Document damage – field notes, photos
  - Inspect impact location and load path
  - Measure extent of visible damage
  - Sounding of girder concrete
  - Measure loss of camber using level rod
Wood River Bridge

SEVERED STRAND CONFIGURATION

Comparative Camber < 1.48”
Objectives of Repair

- Regain original condition and performance by:
  - Splicing the broken strands,
  - Recovering moment capacity,
  - Preventing corrosion of strands and reinforcing steel, and
  - Using compatible grout to replace the broken concrete.
Corrosion protection is critical:

- Concrete reactivity decreases with age. New concrete has greater reactivity & corrosion potential.

To protect against corrosion:

- Blast clean exposed reinforcement.
- Use anodic protection for reinforcing
- Tensile Zone Impacts
- Non-shrink
- Compatible with Anodes, i.e., electrical resistivity < 15,000 ohm-cm.
- No Construction Joints
- Chip concrete in 90° cuts.
- Load alternate span with live load.
- Splice strands to full tension.
- Place anodes and finish forming.
- Shift live load to damaged span.
- Place non-shrink grout.
- Cure the grout and remove live load.
Design for $\phi M_n > M_u$
Calibrate the torque meter.

Practice the procedure.
Remove damaged concrete.

Cut damaged strands.
Completed forms

Forming and Placing Grout

Sample the grout.

Finished grout placement
WS DOT Guidelines

- Repair if < 25% strands are damaged.
- Check girder alignment, excessive cracking.
- There should be no cracking at harping point.
- Check strength/damage of adjacent girders.
- Repair cost is < 70% of girder replacement.

Questions?

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