Project Partners

- Indiantana Department of Transportation
- United States Department of Transportation
- Kentucky Transportation Cabinet
- Walsh Construction
- Buckland & Taylor LTD
  a COWI company
- Burgess & Niple
- Baker
- CDM
  WilburSmith Associates
Project Location

Study Area

One of two Ohio River bridges between Cincinnati and Louisville

1-65 Bridge - 46 miles
Markland Dam - 26 miles
I-275 Bridge - 65 miles
Project Purpose and Need

- Sufficiency Rating of 6.5 out of 100
- KYTC Structurally Deficient List

Functionally Obsolete  Structurally Deficient
Superstructure Replacement with Minimal Approaches

- Milton Approach re-construction
- STR 1 replace KY Approaches
- STR 2 Truss replacement
- STR 3 Replace IN Approach
- STR 4 Pedestrian Access to Park
1. Drill holes into ex. caisson
2. Grout Rebar into Caisson
3. Add Stem Reinforcement
4. 2’ thick encapsulation
5. Pier Cap Reinforcement
6. Cast new Pier cap
7. Scour Countermeasure
- Existing Bridge clear width is 20’
- 5’ pedestrian sidewalk
Selected Alternative

Existing Bridge

Proposed Bridge
Ferry Service during Construction

- 52 Mile Detour
- No Cost to Users

- Ferries would accommodate vehicles, up to 240 per hour
- Ferries would not be able to operate during high water, extreme fog, etc

- Special provisions for medical emergencies
Low Bid Formula and Contractual Dates

- **Formula for Effective Bid Price**
  - Lowest effective bid wins.
  - Const. Cost, Closure Days and Open to Traffic Date

- **[A + B - Adjustment]**
  - A = Construction Cost
  - B = Closure Days x $25,000/day.
  - Adjustment = $3.75 million (September 2012)
Design Build Proposals

Let in September 2010
Five Contractors submitted bids

Project was awarded based on:

- Cost to construct project ($102-$127 million)
- Length of bridge closure (10-365 days)
- Date to open bridge to traffic (Sept 2012/May 2013)
Awarded Design-Build Team

Walsh Construction, Inc (CONTRACTOR)
Construction firm in La Porte, IN
www.walshgroup.com

Burgess & Niple, Inc. (DESIGNER)
Engineering firm in Columbus, OH and Indianapolis, IN
www.burgessniple.com

Buckland & Taylor (DESIGNER)
Bridge engineering firm in Seattle, WA
www.b-t.com
Design-Build Process

Step 1
- Existing bridge remains open to traffic
- Detour approach ramps are built on Vaughn Dr and KY 36
- Pier strengthening and widening begins
Step 2
- Bridge closes to traffic for 3 days
- Approach ramps are connected to existing bridge
- Existing bridge reopens to traffic
- Pier strengthening work continues
Design-Build Process

Step 3
- Downstream bridge piers are constructed
Design-Build Process

Step 4

- Existing bridge remains open to traffic
- New truss superstructure is erected on downstream piers
- Permanent approaches are built
Design-Build Process

Step 5

- Downstream bridge is connected to US 421
- Traffic is rerouted onto downstream bridge
Maintenance of Traffic
Design-Build Process

Step 6
- Existing bridge is demolished
Superstructure Demolition
Superstructure Demolition
Demolition Problems
Step 7

- Traffic remains on downstream bridge
- Detour approach ramps are removed
- Pier strengthening and widening is completed
<table>
<thead>
<tr>
<th>By the Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wt. for Slide</strong></td>
</tr>
<tr>
<td><strong>Slide Distance</strong></td>
</tr>
<tr>
<td><strong>Length of Truss</strong></td>
</tr>
<tr>
<td><strong>Height of Truss</strong></td>
</tr>
<tr>
<td><strong>Wt. of Truss Members</strong></td>
</tr>
<tr>
<td><strong>Truss Members</strong></td>
</tr>
<tr>
<td><strong>Bolts</strong></td>
</tr>
<tr>
<td><strong>Length of Concrete Beam</strong></td>
</tr>
<tr>
<td><strong>Wt. of Asphalt</strong></td>
</tr>
<tr>
<td><strong>Wt. of Stone</strong></td>
</tr>
<tr>
<td><strong>Concrete Poured</strong></td>
</tr>
<tr>
<td><strong>Wt. of Rebar</strong></td>
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<tr>
<td><strong>Workers (Peak)</strong></td>
</tr>
<tr>
<td><strong>Workers (Average)</strong></td>
</tr>
<tr>
<td><strong>Equipment</strong></td>
</tr>
<tr>
<td><strong>Explosives</strong></td>
</tr>
<tr>
<td><strong>ADT</strong></td>
</tr>
<tr>
<td><strong>Project Cost</strong></td>
</tr>
</tbody>
</table>
Sliding
Sliding Girder Pedestal
Sliding Girder and Pedestal

Charlie Gunnoe – November 27, 2013
Transverse Movement Restraint
Span D Sliding Girder

SECTION "B-B"
(Exterior Stiffener)
Scale: 1" = 1'-0"

SECTION "C-C"
(Interior Stiffener)
(See Section "B-B" for details not shown)
Scale: 1" = 1'-0"
Pier 2 Sliding Plates for Both Slides

Charlie Gannon ~ December 17, 2013
Span D During Slide
Sliding Girder Support
Bearings for Span D
Embedments in Pier Cap

Anchor Bolt Patterns are symmetrical about line "42° and 2 Bearings"

Anchor Bolt Detail for Sliding Plates

Anchor Bolt Detail for Permanent Restraints

Scale: 1/2" = 1'-0"
Pier 2 with Restraint Bolts in Place

Slide 48
Preparing Pier Caps
**Sliding Plate**

**NOTE:**
CHECK PIER CAP REINFORCEMENT FOR ADEQUATE CLEARANCE (BY OTHERS)

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**SECTION “A-A”**

Scale: $\frac{3}{4}" = 1'-0"$

(P2 SHOWN; P3 SIMILAR; P5 AND P6 SIMILAR OPP HAND; P4 SEE DWG MS-EQ-37)
NO WELD AT THIS JOINT. SLIDING SURFACE TO BE SMOOTH

BEFORE SLIDING

BEFORE WEST BEARING PASSES OVER BRIDGE

GAP TO BE FILLED WITH WELD MATERIAL (~\(\frac{1}{4}\)"), GRIND SMOOTH

DETAIL "5"

Scale: 3" = 1'-0"
Polishing Sliding Girders
Preparing for Slide
Sliding Preparations
Disc Bearings
Product Details

Product Name:
Dow Corning 4 Electrical Insulating Compound White 3.6 kg Pail

Part#:
4 CMPD 3.6KG

Description:
Dow Corning 4 Electrical Insulating Compound is practically nonvolatile, odorless, moisture resistant, electrically insulating, excellent rubber lubrication, excellent release and sealing properties, resistant to oxidation, essentially nontoxic and non-melting and shows little tendency to dry out in service. 3.6 kg Pail.

Product Information

Typical Use: Used for making a moisture-proof seal for aircraft, automotive and marine ignition systems and spark plug connections, electrical assemblies and terminals, assembly lubricant for various metal-on-plastic and metal-on-rubber combinations.
Jack Details

SECTION "D-D"
Scale: 1/8" = 1'-0"

SECTION "E-E"
Scale: 1/8" = 1'-0"
## KEY DATA FOR VSL LIFTING UNITS

<table>
<thead>
<tr>
<th>Type</th>
<th>Capacity$^{(2)}$</th>
<th>Max. numbers of strands</th>
<th>Cable diameter $^{(1)}$</th>
<th>Overall dimensions</th>
<th>Weight$^{(3)}$</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>kN</td>
<td></td>
<td>D (mm)</td>
<td>H x W (mm)</td>
<td>kg</td>
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<tr>
<td>SLU-10</td>
<td>104</td>
<td>1</td>
<td>16</td>
<td>970 x 200</td>
<td>60</td>
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<tr>
<td>SLU-30</td>
<td>312</td>
<td>3</td>
<td>54</td>
<td>1130 x 250</td>
<td>120</td>
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<td>SLU-40</td>
<td>416</td>
<td>4</td>
<td>67</td>
<td>1275 x 250</td>
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<td>SLU-70</td>
<td>728</td>
<td>7</td>
<td>82</td>
<td>1122 x 400</td>
<td>230</td>
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<tr>
<td>SLU-120</td>
<td>1248</td>
<td>12</td>
<td>116</td>
<td>1400 x 400</td>
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<tr>
<td>SLU-220</td>
<td>2288</td>
<td>22</td>
<td>167</td>
<td>2100 x 520</td>
<td>1520</td>
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<tr>
<td>SLU-330</td>
<td>3224</td>
<td>31</td>
<td>190</td>
<td>2140 x 600</td>
<td>1820</td>
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<tr>
<td>SLU-440</td>
<td>4368</td>
<td>42</td>
<td>228</td>
<td>2050 x 610</td>
<td>2220</td>
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<tr>
<td>SLU-580</td>
<td>5720</td>
<td>55</td>
<td>254</td>
<td>1780 x 790</td>
<td>3250</td>
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</table>

Piston strokes vary between 160mm and 550mm, depending on the type of unit.

1. The figures given in the table are also valid for Strand Moving Units of type SMU.
2. Capacity is based on grade 270 strands, according to ASTM A 416-90/A and a safety factor of $s = 2.5$ with respect to the minimum breaking load of the strands.
3. Weights quoted are for the basic version of the lifting units.
Pulling Assembly
VSL Strand Setup
VSL Strand Setup
Strand Jacking

<table>
<thead>
<tr>
<th>PIER</th>
<th>LOAD PER JACK AT 10% FRICTION (NOMINAL DESIGN LOAD)</th>
<th>JACK LOAD NOT TO EXCEED</th>
<th>No. OF STRANDS PER JACK</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>281 KIPS (141 TONS)</td>
<td>400 KIPS (200 TONS)</td>
<td>22</td>
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<tr>
<td>3</td>
<td>431 KIPS (216 TONS)</td>
<td>700 KIPS (350 TONS)</td>
<td>31</td>
</tr>
<tr>
<td>4</td>
<td>405 KIPS (203 TONS)</td>
<td>700 KIPS (350 TONS)</td>
<td>31</td>
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<tr>
<td>5</td>
<td>462 KIPS (231 TONS)</td>
<td>700 KIPS (350 TONS)</td>
<td>31</td>
</tr>
<tr>
<td>6</td>
<td>174 KIPS (87 TONS)</td>
<td>400 KIPS (200 TONS)</td>
<td>22</td>
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</tbody>
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Bearing Pulling Harness
Bearing Pulling Harness
Strands through Upstream Bearing
Strand Anchor and Rod between Bearings

Charlie Gannon - March 8, 2014
Rods at Downstream Bearing
Step 8

- Downstream bridge closed for 7 days
- Using steel rails and plates, new truss superstructure is moved from downstream piers to its permanent place
- New Milton-Madison Bridge opens to traffic
- Downstream piers are removed
Expansion Joint
Link Slab - Top Bar Plan

- **Span 'C'**
  - 6' lap
  - 2' - 7' lap
  - 6' length

- **Span 'D'**
  - 6' length

- **11'-0" Link Slab**
  - 2 x 5 bars x 8'-6" @ 4' spacing between each #4 bar
  - 4' - 0" lap
  - 5'-4"

- **Pier No. 1C**
  - 5 x 7'-6"
  - *4 bars @ 1'-0" full length

- **Construction Joint**
  - 3" dia. conduit for pull strands
  - Elastomeric bearing pad
  - Bearing

- **Wall Spacers**
  - Provide thi3d spacers on the ends of the top long reinforcing.
  - Long, Rein."