2013 Partnering Conference

New Bridges Over Lake Barkley and Kentucky Lake

US 68/Ky 80

September 10, 2013
Design Team

- KYTC, District 1
- Baker
  - Project Management
  - Arch Design
- Palmer
  - Approach Span Design
  - Roadway Design
- Terracon
  - Geotechnical
- Specialty Firms
- Minority Firms
Purpose and Need

- Address Bridge Deficiencies
  - Lane Widths
  - Clear Zones
  - Sharp Curves
  - Steep Grades
  - Sight Distances

- Address Roadway Deficiencies
  - Lane Widths
  - Clear Zones
  - Sharp Curves
  - Steep Grades
  - Sight Distances
Project Alignment

Kentucky Lake

Proposed Alignment

Eggners Ferry Bridge

Lake Barkley

Lawrence Memorial Bridge
Navigational Clearance

- **502’ Minimum Horizontal Clearance**
- **60’ Minimum Vertical Clearance**
Kentucky Lake (Looking East)

Lake Barkley (Looking East)

FONSI Bridge Cross Section

**Kentucky Lake**
(Looking East)

**Lake Barkley**
(Looking East)

**FONSI Bridge Cross Section**

**EXISTING TYPICAL SECTION**
(Looking East)

**ORIGINAL TYPICAL SECTION**
(Looking East)

September 10, 2013
Bridge Type Selection Process

Round 1: Preliminary Concepts
- Concept Data → CAC Input → Public Meeting → Draft Concepts → KYTC → Final Concepts

Round 2: Preliminary Alternatives
- Develop Draft Alternatives → CAC Input → Public Meeting → Refine Draft Alternatives → KYTC → Alternatives

Round 3: Final Alternatives
- Refine Alternatives → CAC Input → Public Meeting → Final Alternatives → KYTC → Bridge Type

September 10, 2013
Citizens Advisory Council

16 Person Committee

- 4 Elected Officials
- 2 Industry Representatives
- 3 Chamber of Commerce, Tourism Representatives
- 3 Planning, Development Agency Representatives
- 2 Friends of L.B.L. Representatives
- 1 Ky. Western Waterland Representative
- 1 US Forestry Service Representative

Counties Represented

Calloway    Marshall    Trigg
## Preliminary Costs

### 102’-6” wide bridge

<table>
<thead>
<tr>
<th>Option</th>
<th>Kentucky Lake</th>
<th>Lake Barkley</th>
<th>(2008$)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alternative 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diamond Tower Cable Stay</td>
<td>$ 240 M</td>
<td>$ 220 M</td>
<td>$ 460 M</td>
</tr>
<tr>
<td><strong>Alternative 2</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Single Tower Cable Stay</td>
<td>$ 220 M</td>
<td>$ 210 M</td>
<td>$ 430 M</td>
</tr>
<tr>
<td><strong>Alternative 3</strong></td>
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<td></td>
<td></td>
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<tr>
<td>Girder</td>
<td>$ 200 M</td>
<td>$ 190 M</td>
<td>$ 390 M</td>
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<tr>
<td><strong>Alternative 4</strong></td>
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<tr>
<td>Median Tower Cable Stay</td>
<td>$ 250 M</td>
<td>$ 240 M</td>
<td>$ 490 M</td>
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</tbody>
</table>

Includes 20% Contingency
KYTC Practical Solutions Initiative

- Consider Lower Cost Bridge Types
- Consider Reduced Bridge Width
- Bridge Type - Be Aesthetically Pleasing
- Stay on Schedule
Alternative 5
Vertical Rib Tied Arch
Alternative 6
Basket-Handle Tied Arch
Bridge Cross Section Reduced

ORIGINAL TYPICAL SECTION

REDUCED SECTION

September 10, 2013
<table>
<thead>
<tr>
<th>Option</th>
<th>Kentucky Lake</th>
<th>Lake Barkley</th>
<th>Total (2008$)</th>
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<tbody>
<tr>
<td><strong>Alternative 1</strong></td>
<td></td>
<td></td>
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<tr>
<td>Diamond Tower Cable Stay</td>
<td>$190 M</td>
<td>$180 M</td>
<td>$370 M</td>
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<td><strong>Alternative 2</strong></td>
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<tr>
<td>Single Tower Cable Stay</td>
<td>$180 M</td>
<td>$170 M</td>
<td>$350 M</td>
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<tr>
<td><strong>Alternative 3</strong></td>
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<tr>
<td>Girder Bridge</td>
<td>$160 M</td>
<td>$150 M</td>
<td>$310 M</td>
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<tr>
<td><strong>Alternative 4</strong></td>
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</tr>
<tr>
<td>Median Tower Cable Stay</td>
<td>$200 M</td>
<td>$190 M</td>
<td>$390 M</td>
</tr>
<tr>
<td><strong>Alternative 5</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vertical Rib Tied Arch</td>
<td>$160 M</td>
<td>$160 M</td>
<td>$320 M</td>
</tr>
<tr>
<td><strong>Alternative 6</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basket-Handle Tied Arch</td>
<td>$160 M</td>
<td>$160 M</td>
<td>$320 M</td>
</tr>
</tbody>
</table>

74’-6” wide bridge
Preliminary Costs Include

• Environmental Commitments
• 6,200 Ft Roadway Approaches
• 11,700 Ft Ped/Bikeway
• Shore to Shore Bridge

NOW MAXIMUM USE OF CAUSEWAYS
Basket-Handle Arch
KY Lake

Project Lengths

- 9080 Ft Total
- 1400 Ft West Causeway
- 1000 Ft East Causeway

- 580 Ft Lagoon Bridge
  - 3611 Ft Lake Bridge
    - 1410 Ft West Approach
    - 550 Ft Arch
    - 1651 Ft East Approach

September 10, 2013
KY Lake Status

Advance Construction Letting

• Lagoon Bridge Construction
• Causeway Fill Material
• Pile Load Tests

Final Design

• Basket-Handle Arch
• Approach Spans
• Final Paving & Multi-Use Paths

December 17, 2013 Letting
Lake Barkley

Project Lengths

- 6050 Ft Total
- 650 Ft West Causeway
- 1000 Ft East Causeway

- 3805 Ft Lake Bridge
  - 1806 Ft West Approach
  - 550 Ft Arch
  - 1449 Ft East Approach
Lake Barkley Status

TS&L/Prel. Engineering Begun

Subsurface Exploration

- Main Span Piers Drilled
- Approach Span Piers - Spring 2014

December 2014 Letting
New Madrid Earthquake

It Was A BIG One!

- Dec. 16, 1811, M 7.7
- Jan. 23, 1812, M 7.5
- Feb. 7, 1812, M 7.7
- 1800 Aftershocks through Mar. 1812
- Total of 10 of M 6 or Greater
Criteria and Objectives

• AASHTO LRFD Seismic Design
• “Essential” Bridge Classification
• 1000 Year Return Period
• Elastic During Seismic Event
• Remain Open After Seismic Event
• Minor Repairs After Seismic Event
The Hula Dancer
Solutions

- Seismic Dampers
- Isolation Bearings

Corner Bearings (4)
Springs
Middle Bearings (2)

FLUID VISCOS DAMPERS & LOCK-UP DEVICES
Seismic - KY Lake

Solutions

- Modular Exp. Joints
  - 18” Long. Movement
  - 9” Lat. Movement
Construction Letting

- Initial Letting - November 2012
  - 1 Bid
  - Above Engineer’s Estimate
  - Pile Load Testing Concerns
- 2\textsuperscript{nd} Letting - February 22, 2013
  - 2 Bids
  - Jim Smith Contracting Co. LLC
  - $24,212,491.14
  - 420 Calendar Days Total
  - Below Engineer’s Estimate
- Award Date - March 01, 2013
- Notice to Proceed - April 18, 2013
Activities

• Causeway Fill
• Construct Lagoon Bridge
• Pile Load Testing
Causeway Section

Max Flood, El. 375
El. 363
Summer Pool, El. 359
Winter Pool, El. 354
Stone Rip Rap
Granular Embankment
3:1 Slopes

September 10, 2013
### QUANTITIES

<table>
<thead>
<tr>
<th>Granular Embankment</th>
<th>Embankment in Place</th>
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</thead>
<tbody>
<tr>
<td>165,400 CY</td>
<td>172,500 CY</td>
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</tbody>
</table>

September 10, 2013
ADD Plan/Elevation
TYPICAL SECTION
(Looking East)
The Lagoon

Lagoon
Purpose

- Confirm Geot. Parameter
- Test Drivability
- Refine Ground Response
- Test Pile Capacity
Test Requirements

- Vert. & Lateral
- Dynamic Pile Load
- Statnamic Load
- Static Load
- Fully Instrumented Piles
  - Soil Resistance
  - Depth Response
Test Piles

- 48” Piles
- 72” Piles

- 1.5” Wall
- 2” Wall

- Near Causeway
- Deep Water

- Open End
- Constrictor Plate
Early Results

- Easy to Drive
- Constrictor Plate Appears Effective
- Tip Resistance May be Achieved at Higher Elev.
- Thinner Walls May be Usable
KY Lake Multi-Use Path

Parking

Lagoon Bridge

Path Onto Bridge

Path Along Water’s Edge

US68/KY80

WEST APPROACH

Kenlake SRP
KY Lake Multi-Use Path

Path Onto Bridge
US68/KY80
Path Along Water’s Edge
Path Into LBL
EAST APPROACH
Lake Barkley Multi-Use Path

WEST APPROACH

US68/KY80

Path Along Water’s Edge Under Bridge

Path Onto Bridge

Path Into LBL

Parking

Lake Barkley
Lake Barkley Multi-Use Path

Lake Barkley

Path Under Bridge

Path To Water Access

Path Onto Bridge

Parking

US68/KY80

EAST APPROACH
KY Lake Arch
Welcome to the Lake Bridges project website. This site provides information about the project and allows you to share your concerns and ask questions. KYTC is committed and will continue to keep the community well-informed as the project moves forward. We hope you will visit this site often for the latest information on the Lake Bridges Project.

Proposed Basket-Handle Tied Arch Bridge

Design continues on both the Kentucky Lake and Lake Barkley crossings. An advance construction contract was let and awarded in early 2013. The Kentucky Lake contract is for construction of a bridge over an existing legon located on the west side of the lake and for placing fill material for both causeways.