Statewide Teamwork

Missouri’s Safe & Sound Project

Ken Warbritton, MoDOT
Overview

- Brief History
- Team Organization and Communications
- Results
- Public Acceptance
- Lessons Learned
Contract Models

- Design-Build-Finance-Maintain (DBFM)
- Design-Build
- Modified Design-Bid-Build
Project Timeline

- **Oct. 2006**: Project announced as DBFM
- **Sep. 2008**: DBFM model viable, but unaffordable ... Credit Crisis split procurement into DB (554) and MDBB (248)
- **Apr. 2009**: First Bridge Complete (MDBB)
- **May 2009**: KTU Constructors selected as Design-Builder
- **Dec. 2009**: First 4 DB Bridges Complete
- **May 2010**: DB Design Complete
- **Nov. 2012**: Final Bridge Completed
10,249 bridges on MoDOT system at start of program.

1,093 were Condition 3 (serious) or Condition 4 (poor)

Why Do a State-wide Bridge Project?
Project Goals

1. Deliver good bridges at a great value.
2. Minimize public inconvenience through increased construction speed & flexible schedule.
Safe & Sound Partners

MoDOT

ROW
Utilities
Environmental Inspection
Public Outreach
Motor Carrier

Kiewit

Traylor Brothers, Inc.

United Contractors
A United Infrastructure Group Company

Design Team
LPA HNTB
Regional Offices

NW Region
2011 Office: St. Joseph
KTU Reg. Sup.
Dave Lehr
MoDOT Reg. Field Eng.
Troy Slagle

KC Region
2011 Office: Lee’s Summit
KTU Reg. Sup.
Cory Gapstur
MoDOT Reg. Field Eng.
Mary Miller

SW Region
2011 Office: Bolivar
KTU Reg. Sup.
Keith Hoff
MoDOT Reg. Field Eng.
Jim Conley

NE Region
2011 Office: Columbia & Kirksville
KTU Reg. Sup.
Steve Kullman
MoDOT Reg. Field Eng.
Preston Kramer

SE Region
2011 Office: Benton
KTU Reg. Sup.
Brian Cruickshank
MoDOT Reg. Field Eng.
Andy Meyer
Team Organization/Communications

- Executive: Met 3-4 times/year
- Central: Daily Calls/Weekly Meetings
- Regional: Daily Calls/Weekly Meetings
- Bridge: Daily On-Site Coordination
- Specialist: Variable – Based on Need
## Risk Assignment

<table>
<thead>
<tr>
<th>MoDOT</th>
<th>KTU</th>
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<tbody>
<tr>
<td>• ROW</td>
<td>• Design</td>
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<tr>
<td>• Environmental</td>
<td>• Suppliers</td>
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<tr>
<td>• Community Relations</td>
<td>• Subcontractors</td>
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<tr>
<td>• Inspection</td>
<td>• Schedule</td>
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<td>• Utilities</td>
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KTU’s Design Goals

- Practical Design
- Rapid, Repetitive Construction
- Durability
- Minimize Site Impacts
- Efficient Usage of Labor and Materials
- Maximum Usage of Precast Concrete Units
Structural Approach

Additional Applicable Standards
(Cored Slabs and Box Beams)

- FHWA Approved
- Allows for Rapid, Repetitive Construction
- Proven Durability in North Carolina, South Carolina, and other states
- A Practical Design for the program’s ADT requirements
<table>
<thead>
<tr>
<th>Structure Types</th>
<th>Count</th>
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<tr>
<td>Adjacent Core Slab</td>
<td>196</td>
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<tr>
<td>Adjacent Box Beam</td>
<td>116</td>
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<tr>
<td>Adjacent CS/BB</td>
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<td>Spread CS/BB</td>
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<th>Structure Types</th>
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<tr>
<td>Flat Slab</td>
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<tr>
<td>Box Culvert</td>
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<td>Pipe Culvert</td>
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<td>Super-cor</td>
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<tr>
<td>Prestressed Slab</td>
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<tr>
<td>Hybrid Composite</td>
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</table>

**TOTAL** 554
Pre-Fabricated Materials

- CFM – Contractor-Furnished Materials
- Fabrication off Critical Path
- Pricing/Escalation
Pre-Construction: Site Plan Review

Site Plan

Wetlands

Utilities

Access

Temp Easement
Execution

• Planning Challenges
  • Just-in-time design is typical.
  • Accelerated pace (10+ bridges/week)
  • Average 20+ bridges/month

• Logistical Challenges
  • 554 bridges in 111 different counties
  • Average distance between bridges – 11 miles
  • Avg. construction schedule: 45 calendar days/bridge
Construction Sequence

Demolition of Existing Bridge
Construction Sequence

Pile Foundations Used at Most Sites
Construction Sequence

End Bent Construction (beams “stacked and stored” on site)
Construction Sequence

Erecting Pre-cast Beams
Construction Sequence

When All the Dust Settles, Missouri Has A New Bridge
Completion Speed

• Average time to complete 42 Days/Bridge

• Completion by Bridge Type:
  - Box 27 Hours of Traffic Impact
  - Single Span 8 Days
  - Double Span 31 Days
  - Triple Span 28 Days
  - Four Span 33 Days

156 Bridges Complete in 2010
281 Bridges Completed in 2011
117 Bridges Completed in 2012
1. GOAL: Deliver good bridges at a great value.
   • RESULT: **UNDER BUDGET**

2. GOAL: Minimize public inconvenience through increased construction speed & flexible schedule.
   • RESULT: **AVG. CLOSURE – 42 DAYS**

   • RESULT: **2 years ahead of MoDOT requirement.**
   • RESULT: **14 months ahead of KTU commitment (12/31/13).**
Election Day
School Year
Local Festivals
Vacation Destinations
Lessons Learned - Procurement

- Confidential Meetings
- Additional Applicable Standards
- Design Exceptions
- Innovation and Thorough Vetting of Issues
- Scoring Spread
Lessons Learned - Design

• Standardization
• Prefabricated Elements/Interchangeable Parts
• Constructability Reviews
• Speed/Volume
• Coordinated with Subcontracting
• Work Together from the Start
Lessons Learned - Construction

- Learn from Early Bridges
- Best Practices Manual – Always Get Better
- Contractor Furnished Materials
- Repetition – Builds Speed and Quality
- Pre-Fabrication - Consistency and Interchangeable Parts
- Flexible Scheduling
Lessons Learned
Best Practices
Big Picture - Lessons Learned

• Build a Team to Build a Project
• Safety and Quality Process and Culture
• Communications, Internal and External
• Issues = Opportunities
• 360 Degree Reviews/Surveys
Design-Build Contract Model

- Procurement Process Flexibility
- Execution Flexibility
- Adaptable To Changes and Innovations
- Manage Risk (Assign or Limit)
Safe & Sound
800 Better Bridges by 2012