Caltrans Accelerated Bridge Construction

Caltrans / PCMAC Workshop
November 17, 2011

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Division of Engineering Services
Caltrans - Accelerated Bridge Construction (ABC)

Overview

- Why ABC?
- ABC Applications
- Research
- Planning Phase Decision Making Tool - Overview
- Action Plan - What’s Next For Caltrans and ABC?
- ABC On-Line
Why are we interested in ABC?

FHWA has been actively promoting Prefabricated Bridge Elements and Systems (PBES) and the advantages of Accelerated Bridge Construction (ABC) as part of the “Every Day Counts” Innovation Initiative.

Proven PBES/ABC benefits include:

- Reduced disruption to the public
- Improved work zone safety
- Reduced on site environmental impacts
- Expedited capital improvements
- Stimulate & improve the State’s economy
I-580 Connector Span Replace

Use of Precast Concrete Bentcap and Steel Girders
Construction Complete in 20 Days
I-5 Truck Route UC- Repair (Precast Girders)

15 Precast Girders Erected, Steel Deck Forms and Cast-In-Place Deck all Completed in 3 Days!
I-40 Mustang Wash Bridges

Use of Single Span Precast Bulb T Girders and Precast Abutments Expedited the Bridge Construction
District 2 – Craig Creek Bridge, Route 99
(Precast Abutments and Box Beams)

Con-Fab California Corporation

DAILY QUALITY CONTROL REPORT
#4

JOB NAME: Craig Creek Bridge
CALTRANS NUMBER: 02-2C1104
CONTRACT BID ITEM NUMBER: 56
CONTRACT BID ITEM CODE: Blaisdell Construction
CONTRACTOR: Precast Wingwall
PRODUCT: PreCast Wingwall

Prepared By: Danny Cabias
Sent: February 9, 2011
SFOBB Yerba Buena Island Viaduct
(Superstructure Roll-In)

Demolition of Existing Bridge Superstructure and Roll-In New Superstructure
Completed and Open to Traffic in 4 Days
District 1 - Hardscrabble Creek Bridge, Route 199
On-Going ABC Research

- Seismic Performance of Precast Column to Foundation Connections for Accelerated Bridge Construction
- Rapid Construction of Bridge Piers with Concrete Filled Tubes
- Seismic Performance of an I-Girder to Inverted-Tee Bent Cap Connection
- Girder-to-Cap Connection Details
- Decision Making and Economic Modeling Tool "Just Completed !!!"

Inverted Tee Bent Cap
Planning Phase Decision-Making Tool

- Joint Venture - Pool Funded Study by FHWA, and numerous State DOT's
- Tool available in October

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<tr>
<th>State</th>
<th>Members and Titles</th>
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<tbody>
<tr>
<td>Oregon</td>
<td>Benjamin Tang, P.E., Br Preservation Manager</td>
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<td></td>
<td>Steve Soltesz, Research Coordinator</td>
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<td></td>
<td>Dawn Mach, Bridge Fin. Analyst</td>
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<td>Holly Winston, Sr. Local Bridge Standards Engineer</td>
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<td>FHWA</td>
<td>Mary F. Huie, Highways for LIFE, Program Coordinator</td>
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<td>Tim Rogers, P.E., Division Bridge Engineer</td>
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<td>Nat Coley, Asset Manager</td>
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<td>California</td>
<td>Paul Chung, Sr. Bridge Engineer</td>
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<td>Iowa</td>
<td>Ahmad Abu-Hawash, Chief Structural Engineer</td>
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<td>Minnesota</td>
<td>Kevin Western, Bridge Design Engineer</td>
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<td>Montana</td>
<td>David Johnson, Bridge design Engineer</td>
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<td>Texas</td>
<td>Courtney Holle, Transportation Engineer</td>
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<td>Utah</td>
<td>Daniel Hsiao, P.E., S.E., Sr. Project Manager</td>
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<tr>
<td>Washington</td>
<td>Bijan Khaleghi, Design Engineer</td>
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<td>DeWayne Wilson, Bridge Management Engineer</td>
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Planning Phase Decision-Making Tool

- Determines which construction approach (ABC vs. conventional construction) is appropriate for a specific bridge site.

- Provides a tool to help analyze different bridge alternatives and multi-criteria simultaneously using a Analytical Hierarchy Process (AHP) and pair-wise decisions.

- AHP analysis allows decision makers to insert or eliminate levels and elements as necessary to sharpen the focus on one or more parts of the analysis. Less important criteria and sub-criteria can be dropped from further consideration (see next slide).
The hierarchy organizes the decision-making process.

A decision maker can insert or eliminate levels and elements as necessary to sharpen the focus.
AHP Analysis Details

- Comparisons between criteria and between sub-criteria.
ABC Versus Conventional Output

[Diagram showing comparisons between Conventional and ABC methods in terms of Direct Costs, Indirect Costs, Site Constraints, Customer Service, and Schedule Constraints. The ABC method appears to have higher utility across different metrics.]
**Action Plan**

**What is Next for Caltrans and ABC?**

- ABC Presentation to DES Structure Policy Board.
- ABC Presentation to Chief Engineer and Project Delivery Division Chiefs.
- ABC Presentation to the DMB, PMB and CMB.
- ABC Presentation to PDAC.
- Establish ABC Team
  - Sponsors: Division Chiefs of DES, PM, Const & Design
  - Team Members: DES, PM, Const, Design, Planning, Maintenance
- ABC Team responsible for:
  - Develop Department’s ABC policy
  - Implementation Plan
  - Oversight of key ABC research projects to validate seismic performance
  - Development of ABC technical standards and guidance
  - ABC Training and education for the Project Development Team
ABC On-Line

- 2007 FHWA Seismic ABC Workshop Report
- Caltrans ABC Strategic Plan
- ABC Lessons Learned Report - CA Applications
QUESTIONS?