Caltrans Accelerated Bridge Construction Pilot Project Program

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Mission: Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability
WHY?

• Implement research results into design and construction applications for precast element connections. Specifically column to cap and cap to girder.
• Evaluation of current practice
• Test feasibility of new methods
• Standardize designs, specifications, construction
• Constructability - Vetting construction challenges
• Validating costs and benefits
• Lessons learned
• Reduce risk of implementation
• Educate industry

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Benefits of ABC

• **ABC Reduces**
  – Traffic Impacts
  – Onsite Construction Time
  – Weather Related Time Delays

• **ABC Improves**
  – Work Zone Safety for Traveling Public and Contractor Personnel
  – Total Project Delivery Time
  – Site Constructability
  – Material Quality and Product Durability

• **ABC can minimize**
  – Environmental Impacts
  – Utility Relocations and Right-of-Way Take
  – Impacts to Existing Roadway Alignment
ABC PBES in California
Categories of Application

- Emergency Projects
- Site Condition Constraints
- Programmed Projects
Paramount Blvd OC
Emergency Replacement

- 2 Span Replacement Structure
- PC/PS Bulb T Girders
- Steel Deck Forms
- A+B Contract
- Incentive/Disincentive

Contractor onsite March 2, 2012
Open to traffic May 21, 2012
San Mateo-Hayward Bridge Widening Project

Site Condition Constraints
San Mateo-Hayward Bridge Widening Project
San Mateo-Hayward Bridge Widening Project

CALTRANS ACCELERATED BRIDGE CONSTRUCTION
I-40 Mustang Wash Bridge Programmed Project

Use of Single Span Precast Bulb T Girders and Precast Abutments Expedited the Bridge Construction
Craig Creek Bridge Programmed Project
Bridge Design in California

- Seismic often controls

- Structures are tied together robustly with an emphasis on limiting the number of joints and directing plastic hinging in predefined locations

- PBES implementation in California **focuses on connections**
Iowa State University
PC I Girder to Inverted T Cap Connection
University of Nevada, Reno

- Energy dissipation and reduced seismic damage of segmental columns.

- Seismic connection detailing of a precast pier system.

- Emulative performance of connections between precast columns and footings and cap beams.

- Static and dynamic performance of standard couplers
Girder to Bent Cap Connection
Girder to Bent Cap Connection

Inverted Tee Bent Cap
Criteria for the ABC seismic connection pilot projects

- Span Length: Consider roughly 140 feet as a comfortable maximum.
- Number of Spans: 2 to 3.
- Span Configuration: Equal or nearly equal span lengths if two span. End spans of 75% length of the center span if three spans (maximum bridge length of 350 feet).
- Girder Type: Precast concrete.
- Bent Configuration: Prefer multi-column bent configuration
- Skew: Prefer skew under 20 degrees but larger skews can be considered.
- Access: Prefer location on or near a major route for PC element delivery
- Project Type: New or replacement structure only (not a widening)
- Deck configuration/Alignment: Minimal horizontal curvature. Prefer uniform deck width.
- Seismic: Prefer site that does not have liquefaction of ground improvement issues
- Column: Prefer maximum length of 50 feet.
Column to Footing Connection

- *PC Column with partially debonded bars plunged into High Strength Grout Filled Voids*
PC Girder Continuity through Bent Caps

Strand Tails Lapped and Tied into place
ABC Isolated
Ordinary Standard Bridge
Proposed Typical ABC Assembly

PC Bent Cap

PC Column Shell

Type II Cased Shaft
Proposed Typical ABC Assembly

PC Cap with Temporary voids

PC Shell in Type II Shaft
Proposed Typical ABC Assembly

PC Bent Cap;
Approx. 50% lighter
than non-voided cap

PC/RC Shell in Type II
Shaft – filled at site
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Questions?

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