ACCELERATED BRIDGE CONSTRUCTION

BRIDGE CONSTRUCTION FORUM

JUNE 3, 2009
OVERVIEW

• ACCELERATED BRIDGE CONSTRUCTION (ABC)
• PAST/PRESENT ACCOMPLISHMENTS
• FUTURE FOCUS AREAS
  – CONTRACTOR FEEDBACK
ABC

• WHAT IS ACCELERATED BRIDGE CONSTRUCTION?
  – ABC IS COMPONENT OF APD
    • DELIVERING TRANSPORTATION PROJECTS SOONER
  – ABC MEANS
    • DELIVERING BRIDGES SOONER
    • REDUCING THE IMPACTS FROM CONSTRUCTION OF BRIDGES
      – TRAVELING PUBLIC
      – ENVIRONMENT
      – LOCAL BUSINESSES
      – OTHER
• DELIVERING BRIDGES SOONER
  – REDUCING BRIDGE CONSTRUCTION TIME
  • EMERGENCY/URGENT TYPE BRIDGE PROJECTS
    – INCENTIVE/DISINCENTIVE PROVISIONS, PREFABRICATED BRIDGE ELEMENTS, HIGH EARLY STRENGTH CONCRETE MIXES, ELECTRONIC SHOP DRAWING SUBMITTALS, STAY-IN-PLACE DECK FORMS, ETC
Gasoline tanker overturned on I-880 in Oakland, California - April 29, 2007 at 3:52 AM

- Fire and extreme heat from the tanker fire
- Extreme heat caused the collapse of 2-spans on I-580

Upper Connector: steel girders and steel bent cap
I-580 Connector Span Replace

Construction contract awarded on May 7
Completed May 24, 2007, less than 20 days
DELIVERING BRIDGES SOONER

• CHALLENGES
  – PRECAST GIRDERS (“I” VS “BULB TEE”)
DELIVERING BRIDGES SOONER

• CHALLENGES
  – STAY-IN-PLACE METAL DECK FORMS
DELIVERING BRIDGES SOONER

• CHALLENGES
  – ELECTRONIC SHOP DRAWING SUBMITTALS
ABC

• REDUCING IMPACTS FROM BRIDGE CONSTRUCTION
  – LAUNCH/ROLL-IN METHODS
  – PRECAST ABUTMENTS/GIRDERS
    • SPLICED GIRDERS
  – STEEL GIRDERS
  – SEGMENTAL CONSTRUCTION
Hardscrabble Creek Bridge (Replace)
District 1- North Region
SFOBB Yerba Buena Island Viaduct
Superstructure Roll-In Move- Total 2.5 days

San Francisco - Oakland Bay Bridge

South-South Detour Project
West Tie-In
Phase 1

Construction & Demolition
labor Day Weekend - 2007
ABC

• I-40 BRIDGE REPLACEMENTS
Precast Abutment Specifications

LENGTH 15.283 m (50.14 ft)
WIDTH 1.990 m (6.53 ft)
HEIGHT 1.800 m (5.91 ft)
WEIGHT 82 tons (140 tons)
ABC

- CHALLENGES

  - PRECAST ABUTMENTS
MARBLE WASH BRIDGE OPENED TO THE PUBLIC ONLY 28 DAYS AFTER DEMOLITION
ABC

• FUTURE FOCUS AREA – PREFabricated Bridge Elements
• CAST-IN-PLACE CONSTRUCTION PREFERRED ALTERNATIVE
  – BETTER PERFORMANCE
  – USUALLY COSTS LESS THAN ABC
  – ABC METHODS UTILIZED WHEN SITE CONDITIONS JUSTIFY USE
ABC Concept Developments-
Segmental Elements
ABC-
Segmental Bent Construction

Pier Cap

P/S blockout

Grade 270 lo-relax strand
• Precast Bent Cap connection tests - NCHRP 12-74:
• UCSD/ Sac State
• Precast Bent Cap connection tests- NCHRP 12-74
• UCSD/ Sac State
Accelerated Bridge Construction

Proposed Prefab Column-to-Footing Component

NOTES:
1. Mark both main PC Column Reinforcement and main Column Reinforcement in footing.
2. Template required for placement of main Column Reinforcement in footing.
3. Field fabricate Column Reinforcement as required.
4. Test Protocol

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<thead>
<tr>
<th>Test Order</th>
<th>Link Type</th>
<th>Purpose</th>
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<tbody>
<tr>
<td>1</td>
<td>A 706 Steel</td>
<td>Standard Production</td>
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<tr>
<td>2</td>
<td>HiIli</td>
<td>Future Use</td>
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SECTION A-A

STAGE 1
ELEVATION - PRECAST COLUMN PLACEMENT

STAGE 2
ELEVATION - COLUMN BASE CONNECTION

STAGE 3
ELEVATION - COLUMN BASE POUR

NOTE:
The Contractor shall verify all controlling field dimensions before installing or fabricating any material.
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Proposed Segmental Column

Pier Sections 5’ to 8’ lengths

- Long. Mild Rebars
  - Grouted
- Post-tensioned tendons
  - Bonded or Unbonded
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Prefab Segmental Abutment (I)
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Precast Segmental Abutment (II)
ABC On-Line

Accelerated Bridge Construction
Applications in California
A Lessons Learned Report

August 2008
Version 1.1

http://www.dot.ca.gov/hq/esc/Structure_Design/accel_bridge_construction/