

# 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**

# ABC

- 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



# DELIVERING BRIDGES SOONER

## I-580 Connector Span Replace



Figure 2: View of damage from above

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

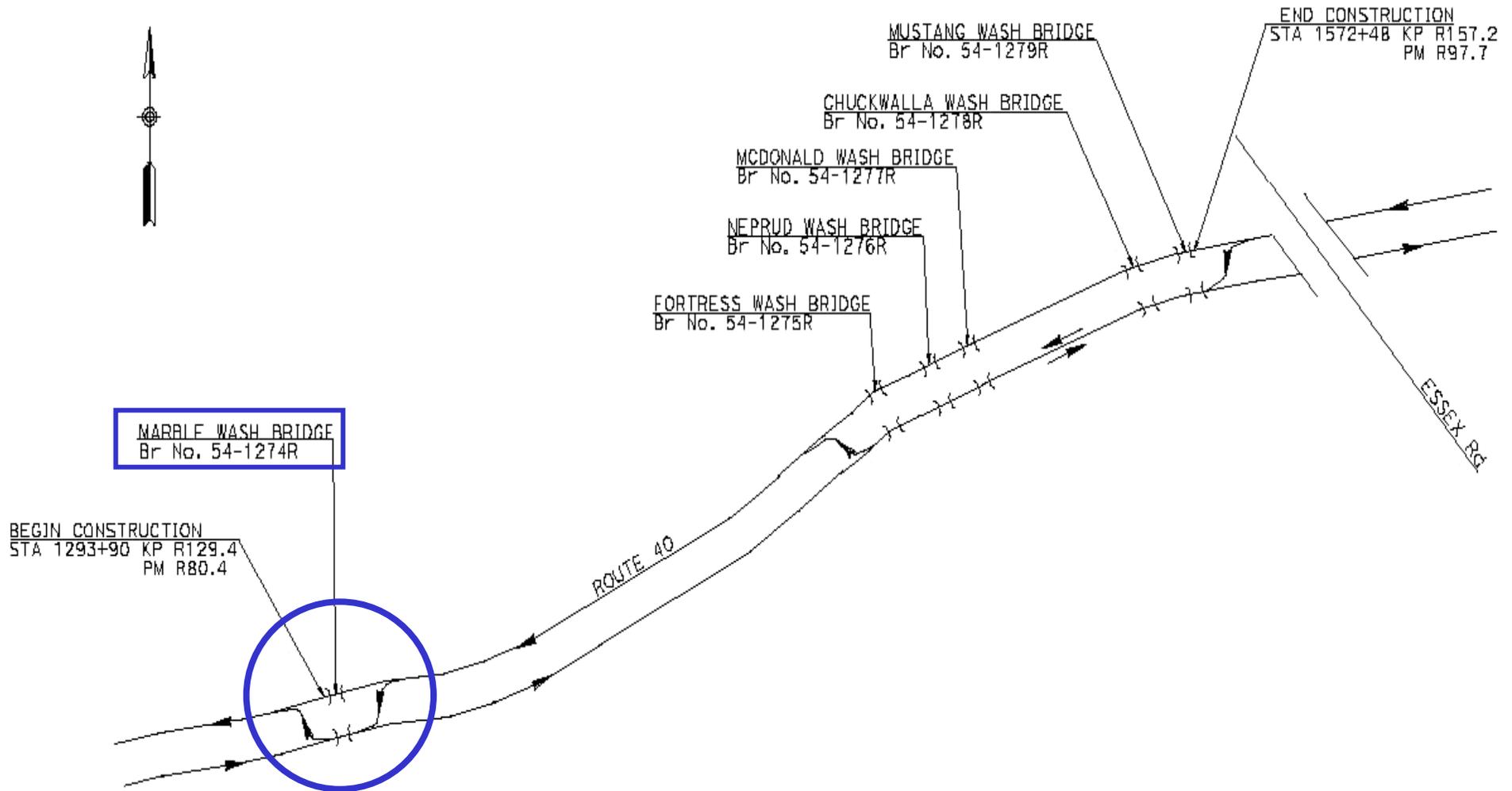
Construction & Demolition  
labor Day Weekend - 2007

# ABC

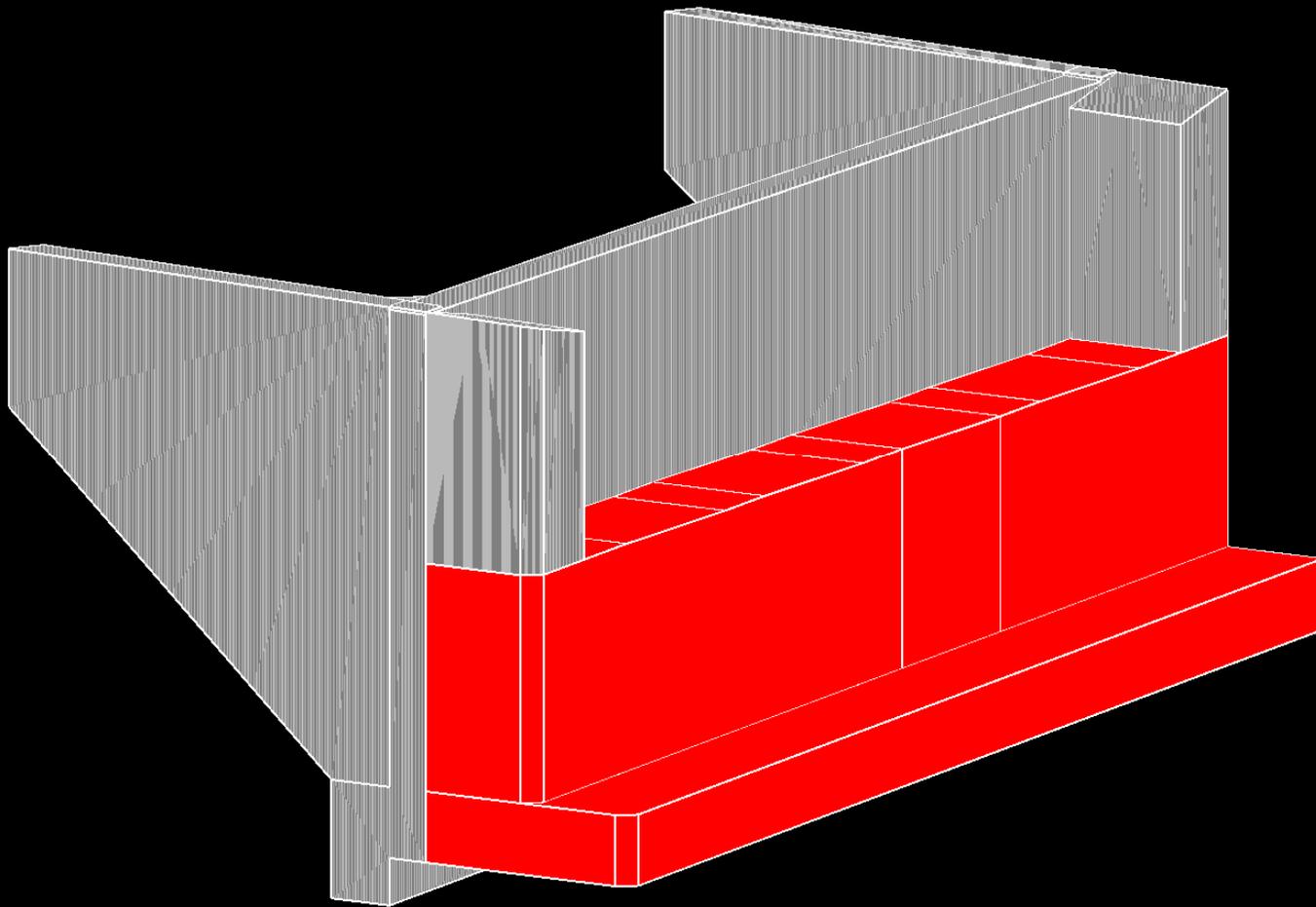
- I-40 BRIDGE REPLACEMENTS



# WB Replacement Traffic Plan



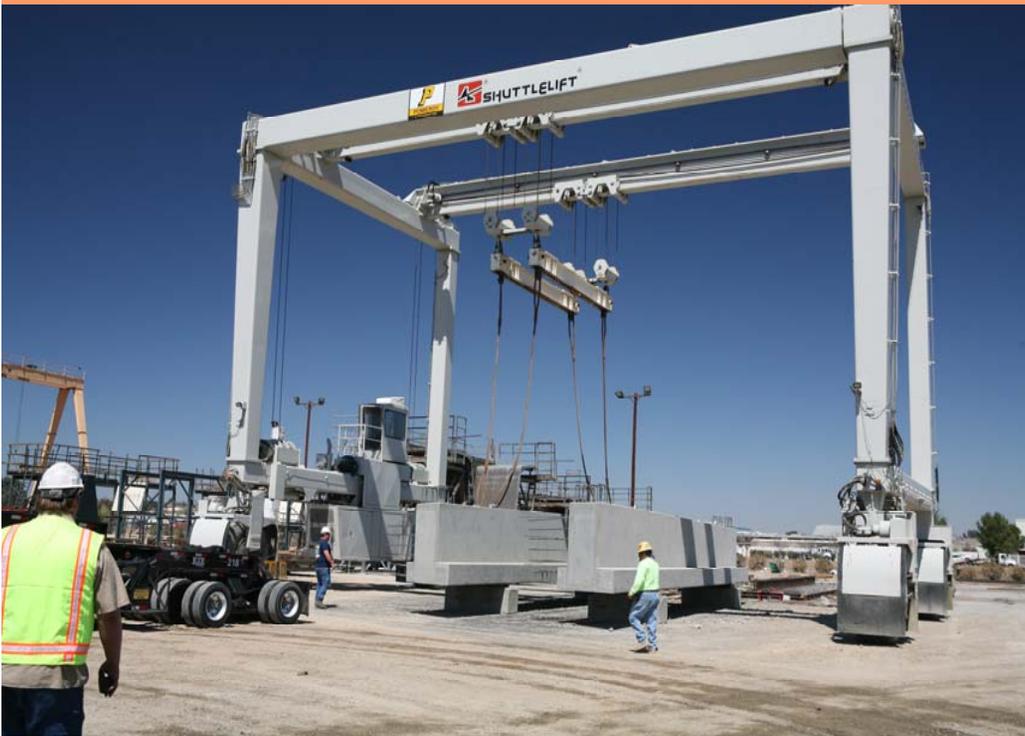
# Precast Abutment Specifications



<b>LENGTH</b>	<b>15.283 m</b> <b>(50.14 ft)</b>
<b>WIDTH</b>	<b>1.990 m</b> <b>(6.53 ft)</b>
<b>HEIGHT</b>	<b>1.800 m</b> <b>(5.91 ft)</b>
<b>WEIGHT</b>	<b>82 tons</b> <b>(140 tons)</b>

# ABC

- CHALLENGES
  - PRECAST ABUTMENTS



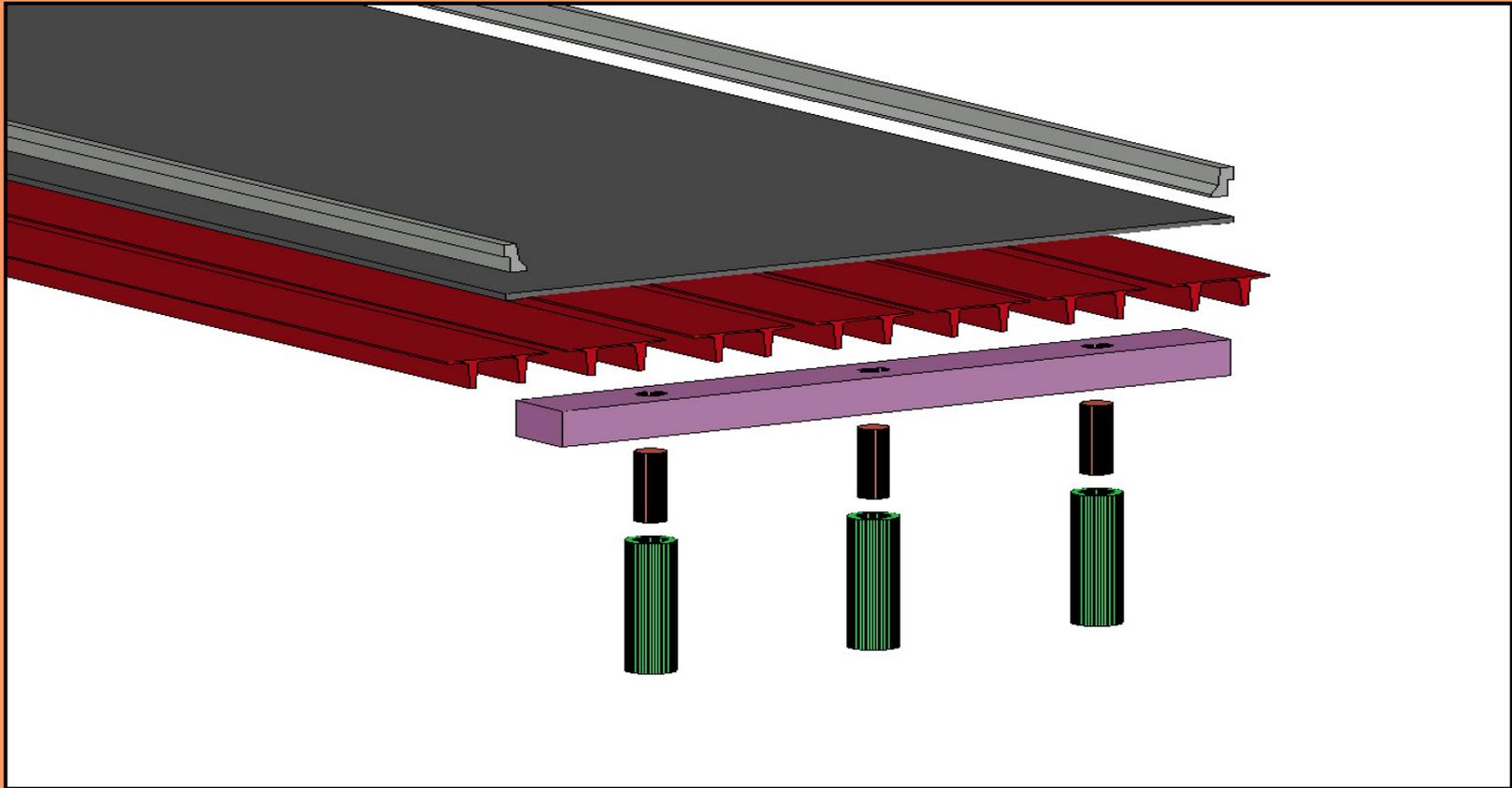


**MARBLE WASH BRIDGE OPENED TO THE  
PUBLIC ONLY 28 DAYS AFTER DEMOLITION**

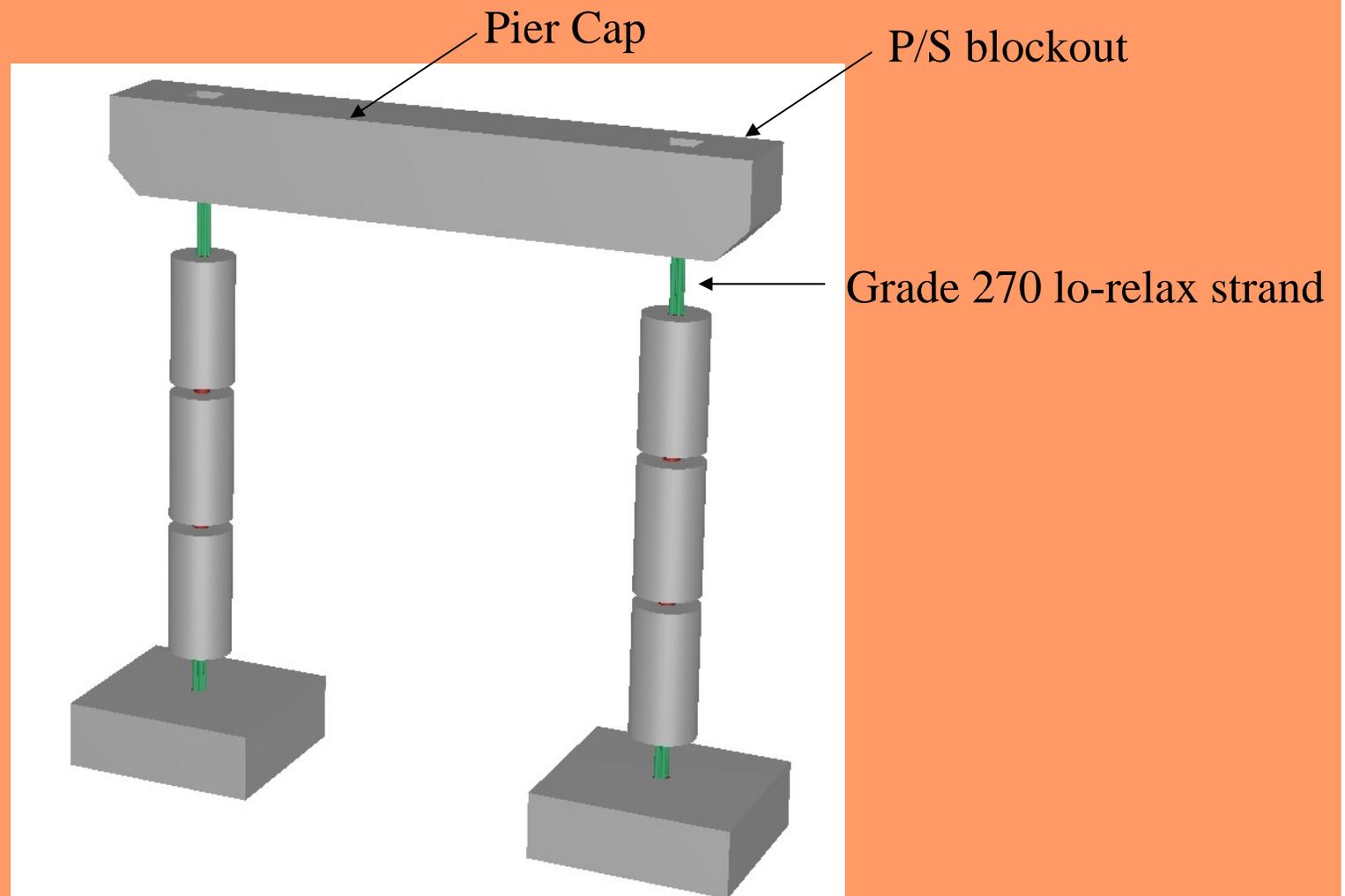
# ABC

- 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



- **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

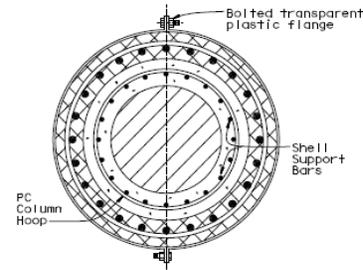
## Proposed Prefab Column-to-Footing Component

**NOTES:**

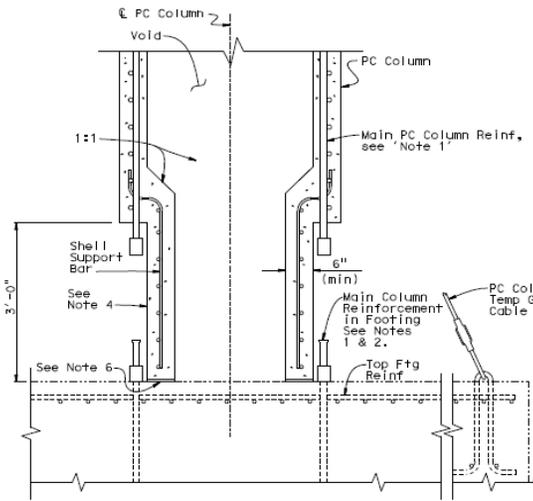
1. Match mark Main PC Column Reinf and Main Column Reinforcement in footing.
  2. Template required for placement of Main Column Reinforcement in footing.
  3. Field fabricate Column Reinf Links as required. Test Protocol:
- | Test Order | Link Type   | Purpose             |
|------------|-------------|---------------------|
| 1          | A 706 Steel | Standard Production |
| 2          | NITI SMA    | Future Use          |
4. Roughen surface to 1/4" amplitude during casting.
  5. All hoops are "Ultimate" butt splice continuous.
  6. Plumb and support PC Column and provide grout seal.

**LEGEND:**

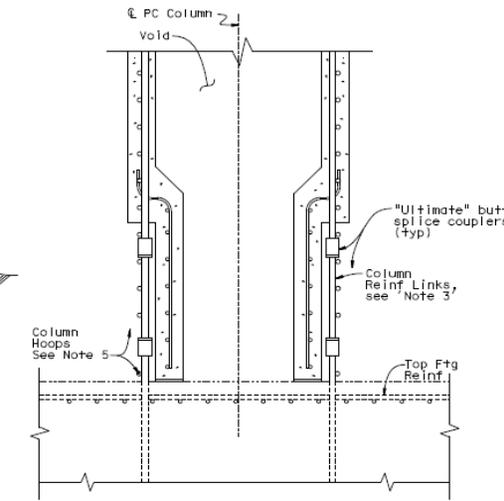
-  Denotes infill with SCC in column void.
-  Denotes grout injection.



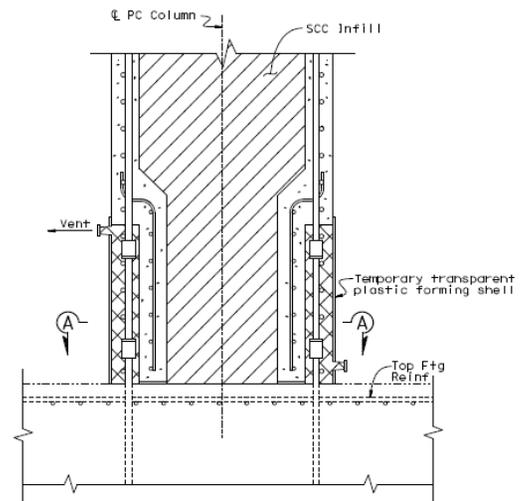
**SECTION A-A**  
1" = 1'-0"



**STAGE 1**  
**ELEVATION - PRECAST COLUMN PLACEMENT**  
1" = 1'-0"



**STAGE 2**  
**ELEVATION - COLUMN BASE CONNECTION**  
1" = 1'-0"



**STAGE 3**  
**ELEVATION - COLUMN BASE POUR**  
1" = 1'-0"

NOTE:  
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

**STANDARD DRAWING**

FILE NO. <b>X6 PG1</b>	DESIGN BY ALBROWNSCHENKEL	CHECKED XXXXXXXX	APPROVAL RECOMMENDED BY
DESIGN DATE <b>10/08</b>	DETAILS BY ALBROWNSCHENKEL	DESIGNED XXXXXXXX	DESIGN SUPERVISOR
	SUBMITTED BY XXXXXXXXXXXX		

**STATE OF CALIFORNIA**  
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES  
STRUCTURE DESIGN

**NOB SEISMIC RESEARCH DETAIL**

**TEST STRUCTURE**

**PRECAST COLUMN CONNECTION DETAIL NO. 1**

OS OSD DATA (CAD) 7/97

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS

CJ 59-83  
EA 930343/mfscjlexeron

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION NO.	DATE	DESCRIPTION
1	10/08	ISSUE FOR CONSTRUCTION

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

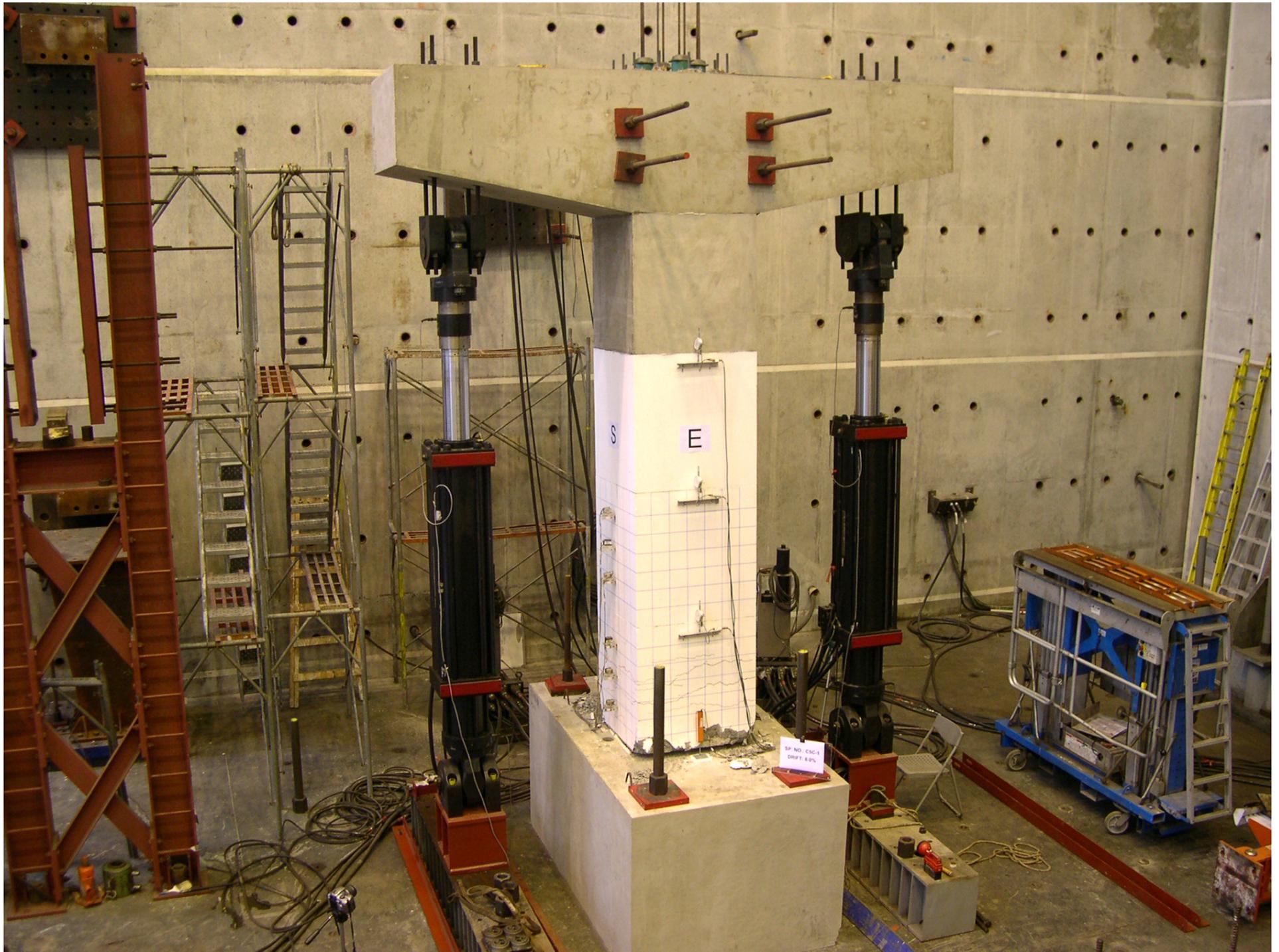
REGISTERED ENGINEER - CIVIL

PLANS APPROVAL DATE



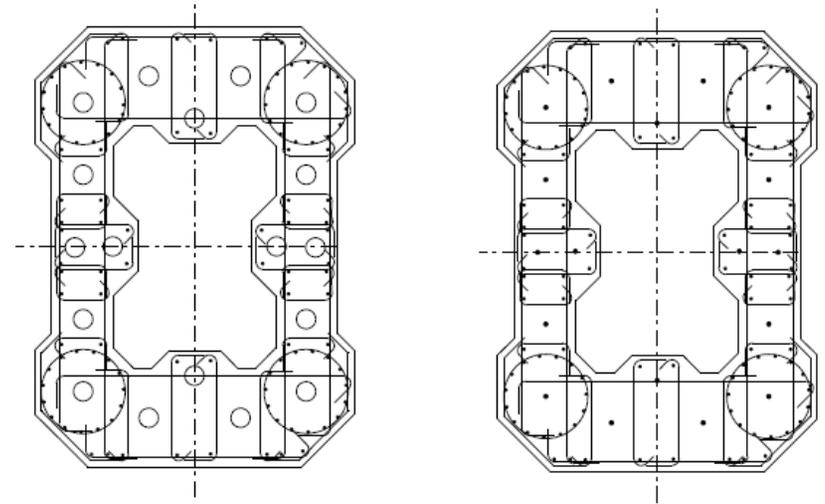
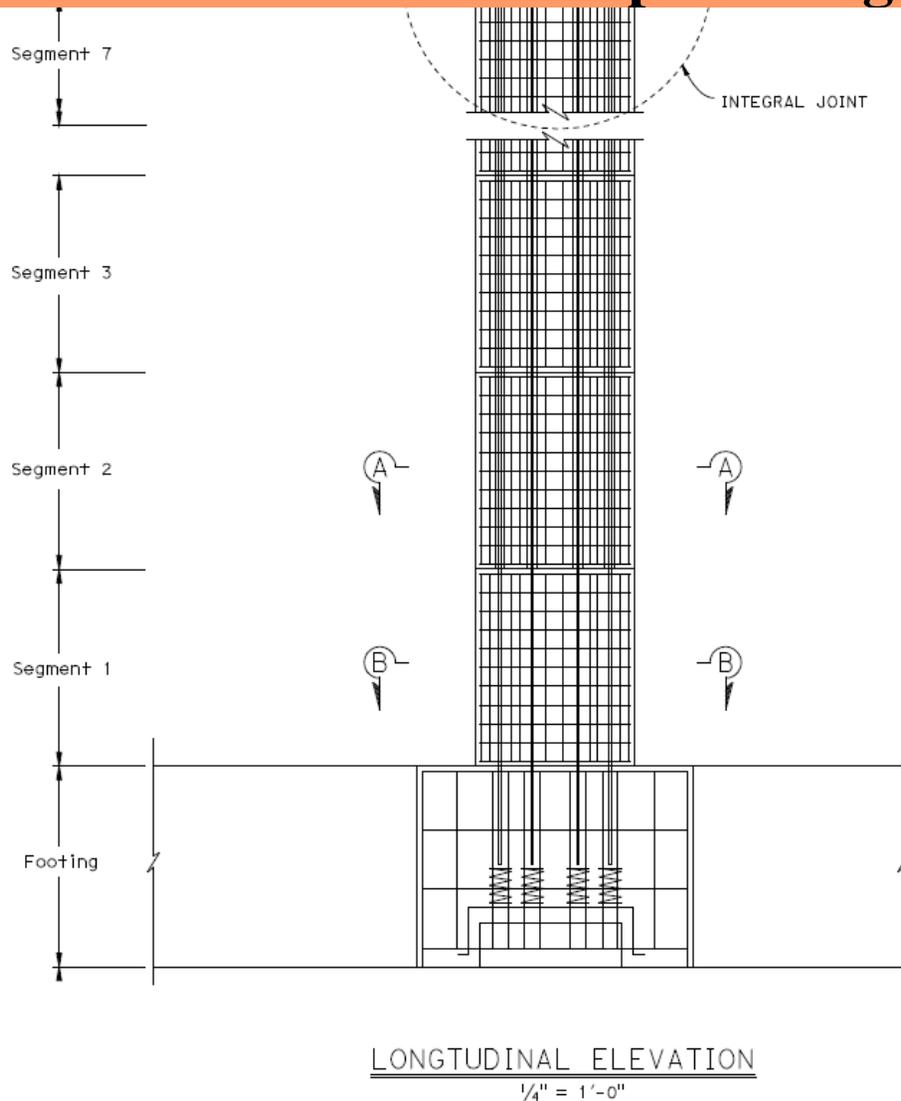
The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

INCOMPLETE PLAN FOR DESIGN STUDY PRINTED  
DATE: 03-13-09  
Office of Structure Design  
STATE OF CALIFORNIA



# Accelerated Bridge Construction

## Proposed Segmental Column



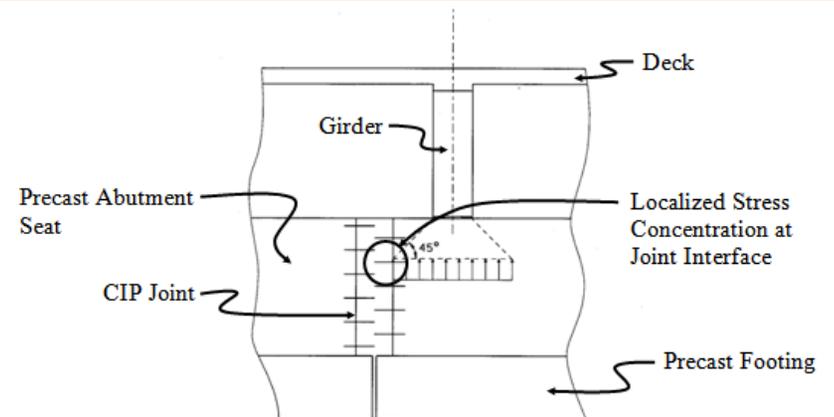
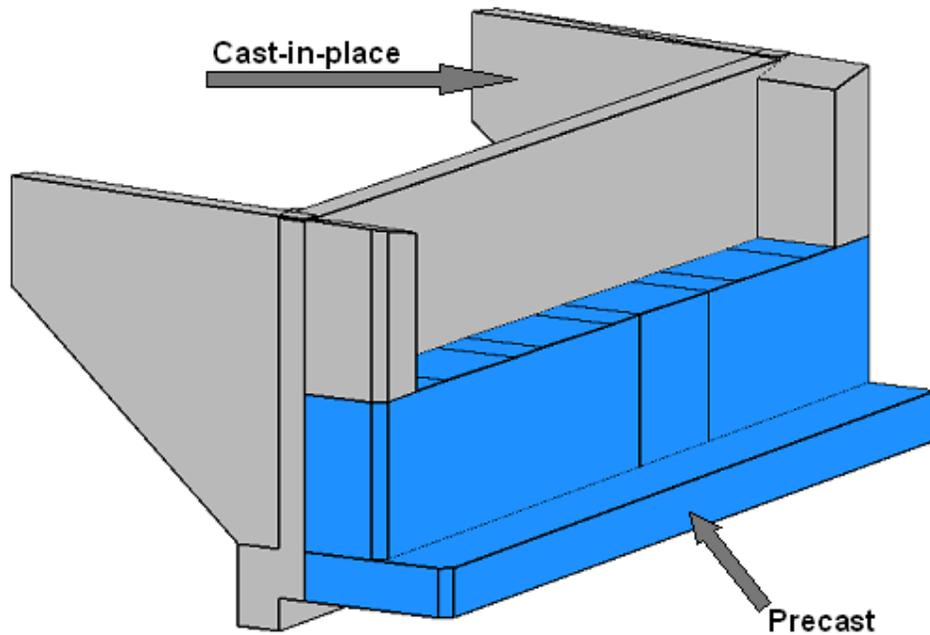
Pier Sections 5' to 8' lengths

- Long. Mild Rebars
  - ✓ Grouted
- Post-tensioned tendons
  - ✓ Bonded or Unbonded

**Elevation**

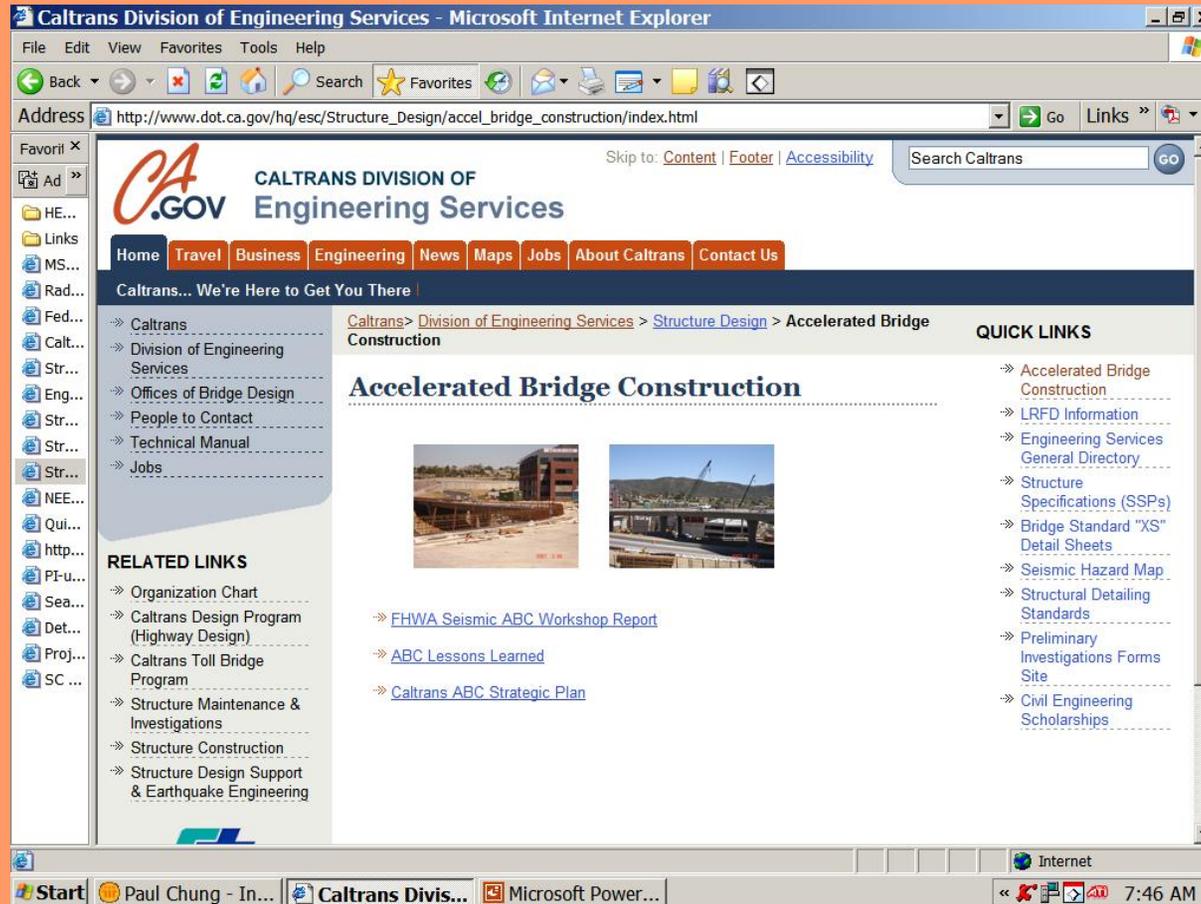
# Accelerated Bridge Construction

## Prefab Segmental Abutment (I)





# ABC On-Line



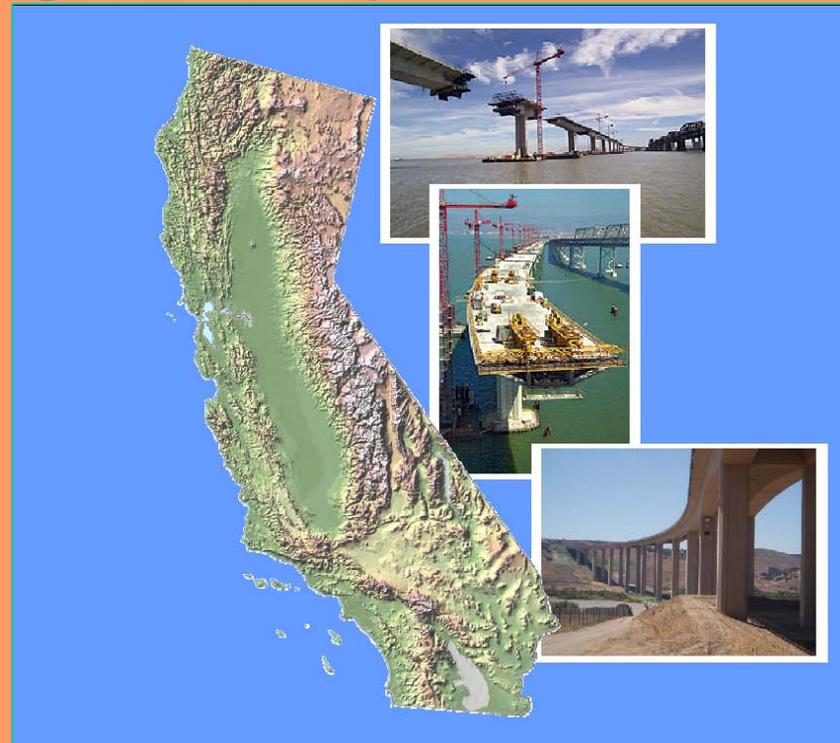
[http://www.dot.ca.gov/hq/esc/Structure\\_Design/accel\\_bridge\\_construction/](http://www.dot.ca.gov/hq/esc/Structure_Design/accel_bridge_construction/)

# ABC On-Line



## Accelerated Bridge Construction Applications in California *A Lessons Learned Report*

August 2008  
Version 1.1



Caltrans ABC Strategic Plan  
*Development of practice and policy for  
Future bridge projects*

*ABC- Advisory Council*

August 2008  
Version 1.1

August 2008

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