

2011 Arizona Pavements Materials Conference

Accelerated Bridge Construction

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Former “State Bridge Engineer”

California Department of Transportation



Presentation Outline

- Accelerated Bridge Construction – Basic Need**
- Emergency Response – ABC Projects/2009 Scan**
- Projects Planned for ABC**
- ABC Connections – 2012 Scan**
- Recent Developments and Coordination efforts related to ABC (AASHTO & FHWA)**
- Q&A**

Why ABC ???



ABC Related “Domestic Scans”

- **2009 Scan – Accelerated Construction Practices**
 - **Brief Description of “Domestic Scan”**

- **Proposed 2012 Scan – Performance of ABC Connections**
 - **Discuss later.....**

US Domestic Scan Program “NCHRP 20-68A”

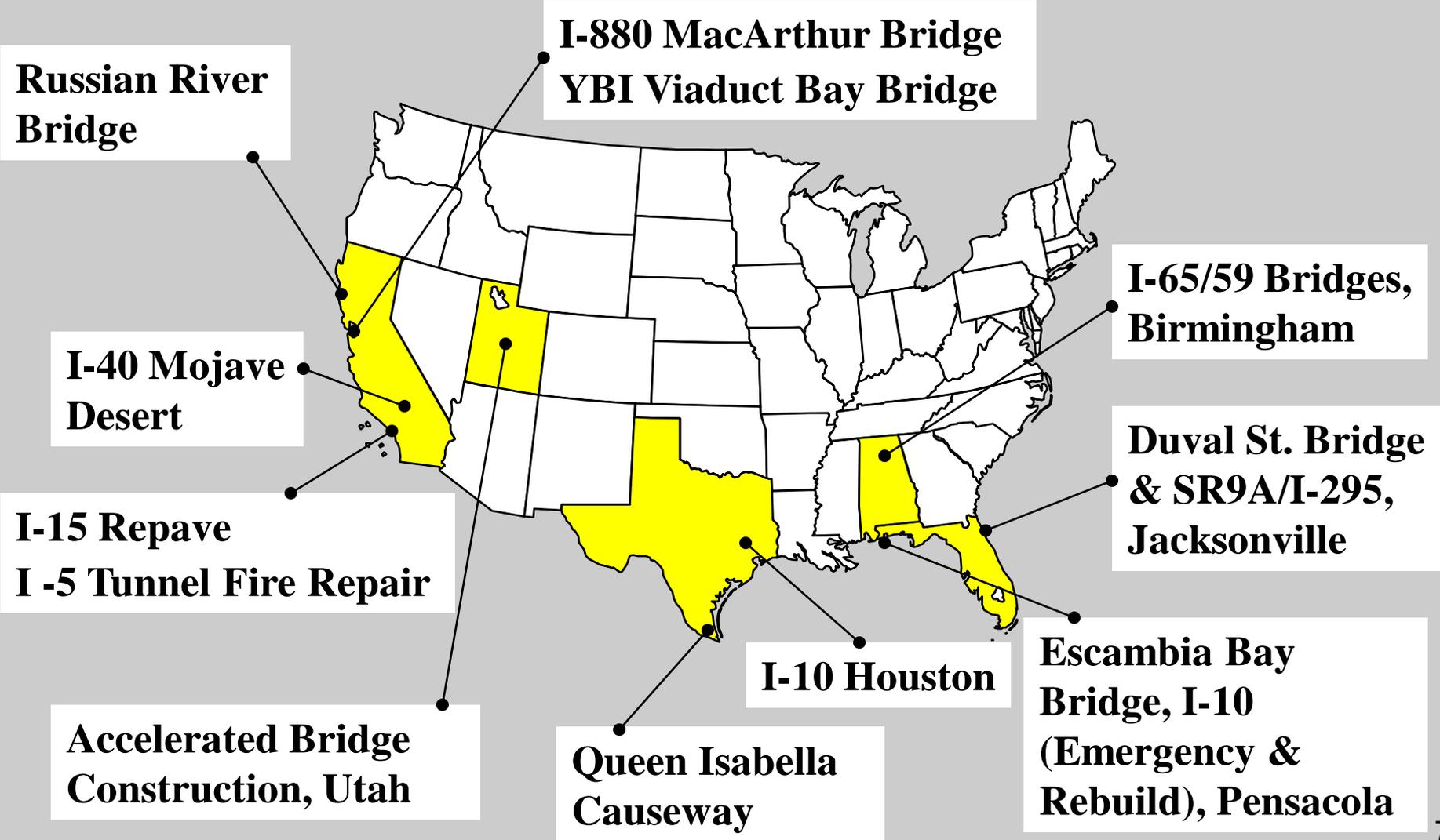
- Program requested by AASHTO, with funding provided by State DOT’s and managed through NCHRP
- Scan topics are solicited every year for funding
- NCHRP Project panel meets once a year to select proposed scan topics for funding
- AASHTO and FHWA identify team & SME members
- Planning meeting held – determine AQ’s & Locations to visit
- Conduct the scan – one to two weeks is typical
- Products – Final Report w/Implementation Plan

Emergency Acceleration

Acceleration is often in response to an accident or unexpected event. Projects accelerated under emergency situations have very compressed schedules yet they still have to be delivered following **sound design, construction, and management processes.**

This is the challenge!

Projects Visited



Construction Incentive- ABC



Gasoline tanker fire resulted in the collapse of two spans on the I-580 connector in Oakland CA. (April 29, 2007 3:52 AM)



Completed May 24, 2007

I-580 Reconstruction – May 24, 2007



I-40 Marble Wash Bridge (Replace)



Precast Abutment & Girder Placement

I-5 Truck Route UC- Repair



Big rigs crash in Los Angeles County - Photo 1 of 7

HIDE CAPTIONS 

Trucks burn early Saturday, October 13, at a tunnel on Interstate 5 in north Los Angeles County, California, after more than a dozen big rigs crashed the night before. AP Photo

I-5 Truck Route Repair



Accelerated Bridge Construction

“Plan Ahead”

Utah Rating Procedure

Utah Department of Transportation 4501 South 2700 West Salt Lake City, UT 84114		Project: Hypothetical Bridge Project
		By: MPC Checked: BLB
		Date: 8/30/2010 8/30/2010
		Sheet No. 1 of 3

ABC Rating Procedure **June 2010**

Enter values for each aspect of the project. Attach applicable supporting data.

Average Daily Traffic	<input type="text" value="5"/>	0 No traffic impacts 1 Less than 5000 2 5000 to 10000 3 10000 to 15000 4 15000 to 20000 5 More than 20000
Delay/Detour Time	<input type="text" value="2"/>	0 No delays 1 Less than 5 minutes 2 5-10 minutes 3 10-15 minutes 4 15-20 minutes 5 More than 20 minutes
Bridge Classification	<input type="text" value="1"/>	1 Normal Bridge 3 Essential Bridge 5 Critical Bridge
User Costs	<input type="text" value="4"/>	0 No user costs 1 Less than \$10,000 2 \$10,000 to \$50,000 3 \$50,000 to \$75,000 4 \$75,000 to \$100,000 5 More than \$100,000
Economy of Scale (total number of spans)	<input type="text" value="2"/>	0 1 span 1 2 to 3 spans 2 4 to 5 spans 3 More than 5 spans
Use of Typical Details	<input type="text" value="1"/>	1 Complex geometry or unfavorable site conditions 3 Some complexity, but favorable site conditions 5 Simple geometry and favorable site conditions
Safety	<input type="text" value="5"/>	1 Short duration impact with simple MOT scheme 2 Short duration impact with multiple traffic shifts 3 Normal duration impact with multiple traffic shifts 4 Extended duration impact with multiple traffic shifts 5 Extended duration impact with complex MOT scheme
Railroad Impacts	<input type="text" value="0"/>	0 No railroad or minor railroad spur 3 One mainline railroad track 5 Multiple mainline railroad tracks

Utah Decision Flowchart

Utah Department of Transportation
4501 South 2700 West
Salt Lake City, UT 84114

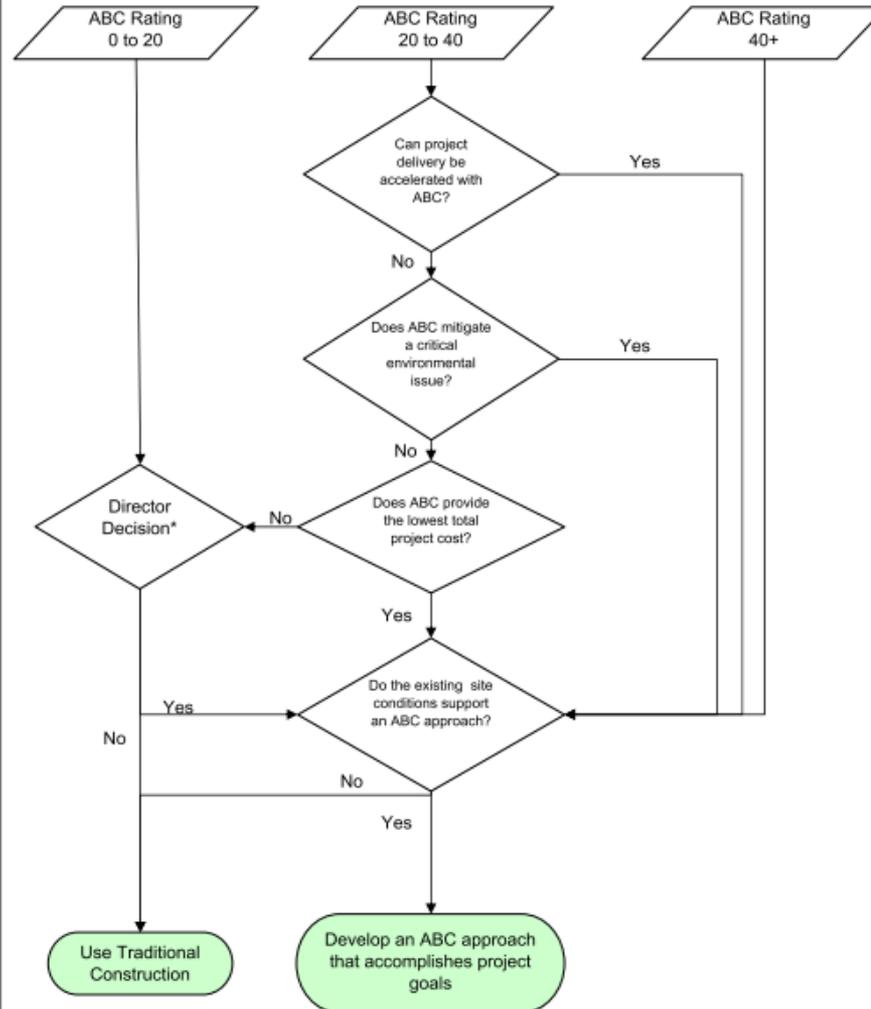


Project: Hypothetical Bridge Project	
By: MPC	Checked: BLB
Date: 8/30/2010	8/30/2010
Sheet No. 3	of 3

ABC Decision Flowchart

June 2010

* Region Director or Project Development Director to evaluate possible indirect benefits



California 2007 - ABC (SFOBB)



California 2007 - ABC (SFOBB)



California 2007 – ABC (SFOBB)





Utah 2007 – ABC with SPMT's



Oregon 2008 – ABC floating Bridge





Current Developments

“Accelerated Bridge Construction”

- **ABC Domestic Scan – Connections**
- **Prefabricated Bridge Elements and Systems (PBES)**
- **FHWA/AASHTO/FIU coordination**

ABC Related “Domestic Scans”

- 2009 Scan – Accelerated Construction Practices (Overview)
 - Domestic Scan overview

- **Upcoming 2012 Domestic Scan – Performance of ABC Connections**

Upcoming Domestic Scan 11-02

“Best Practices Regarding Performance of ABC Connections in Bridges Subjected To Multi-Hazard and Extreme Events”

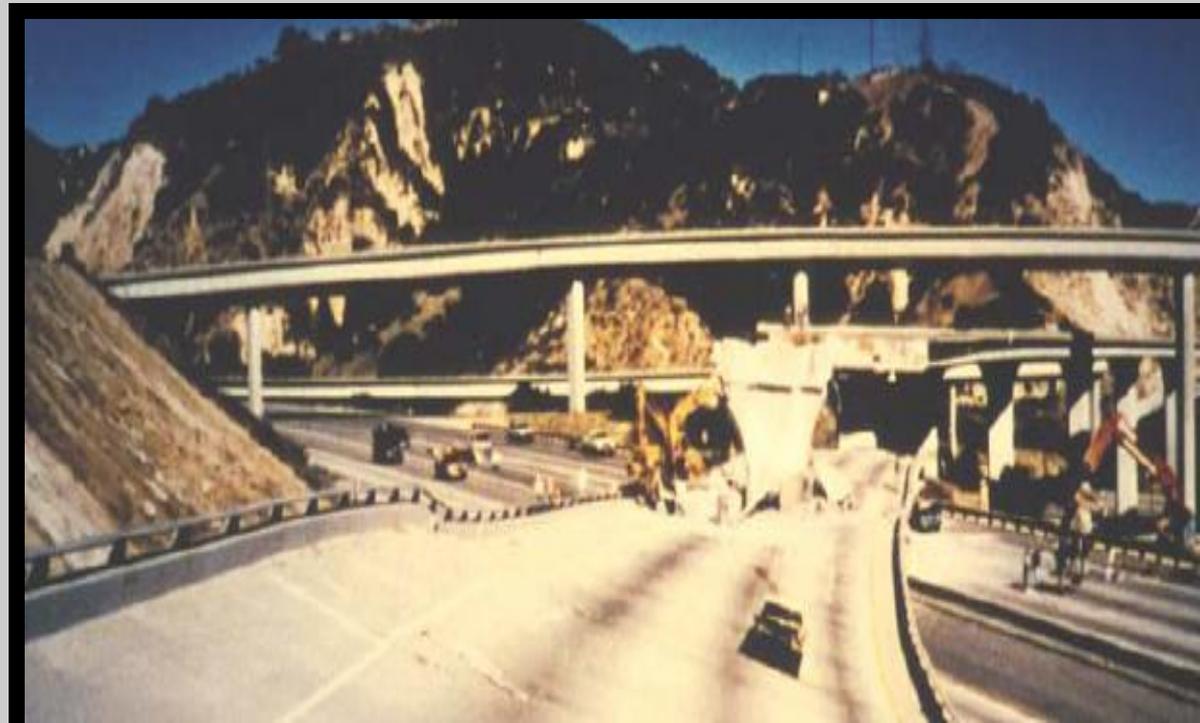
The purpose of this scan is to:

Identify domestically used ABC connection details that perform well under extreme event loading



**Concrete Viaduct Collapse
during the 1989 Loma
Prieta Earthquake**

**14-5 Interchange 1994
Northridge Earthquake
in Southern California**



1971 San Fernando 1994 Northridge

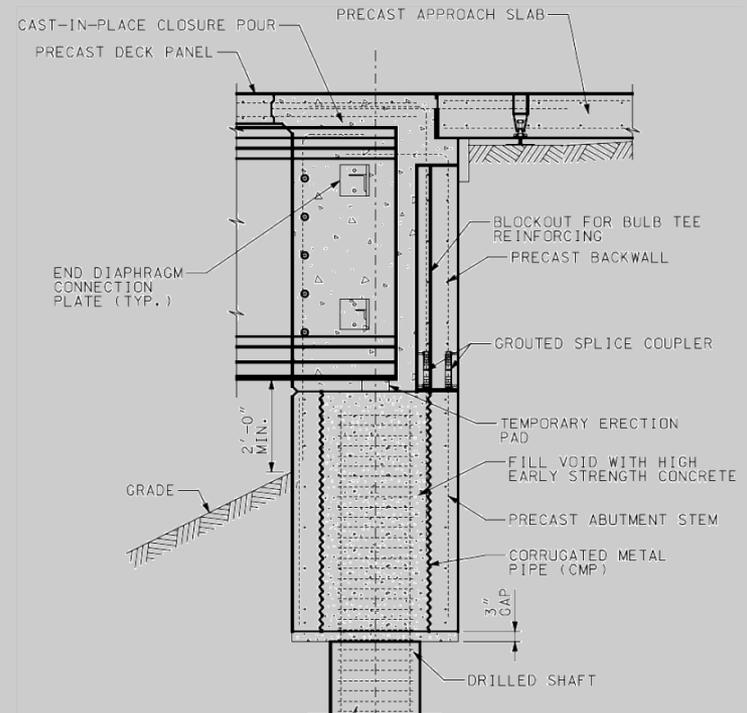
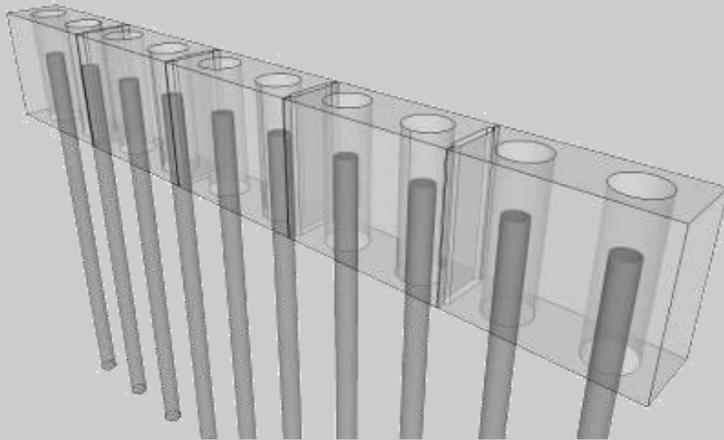


**Key
“Connection”
Details**

UTAH

Design - *Implement Standardization*

ABC Manual and Standard Drawings



ABUTMENT SECTION

A
IA-1

NOTE: ALL ABUTMENT REINFORCEMENT NOT SHOWN FOR CLARITY

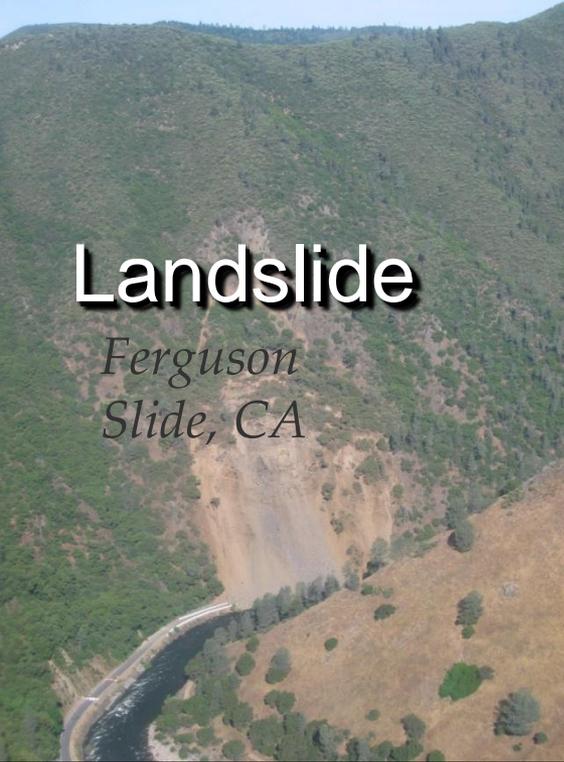
Prefabricated Bent Cap



Other Extreme Events

Landslide

*Ferguson
Slide, CA*



*Sherman
Island, CA*



Scour / Flooding

*Irene
New York*



*Hurricane
Katrina*



Wind / Hurricane

Blast





*Center for Accelerated Bridge
Construction
(ABC) Center at
Florida International University*

Website: abc.fiu.edu

Accelerated Bridge Construction



Project Planning



Foundations and Wall Elements



Rapid Embankment Construction



Prefabricated Elements & Systems



Structural Placement Methods

Email Notification

Enter your E-mail

Submit

Events

SHRP2 Iowa Demonstration Project Showcase
October 6, 2011 (tentative)

[View Event Calendar](#)

ABC Technical Contacts

Decision Making Framework
Benjamin Beerman
(404) 562-3930
benjamin.beerman@dot.gov

Innovative Contracting
Gerald Yakowenko
(202) 366-1562

What is ABC?

ABC is a paradigm shift in the project planning and procurement approach where the need to minimize mobility impacts which occur due to onsite construction activities are elevated to a higher priority.

Intrinsic benefits of the ABC approach include improvements in:

- Safety
- Quality
- Sustainability

FHWA ABC Website

<http://www.fhwa.dot.gov/bridge/abc>



INGENUITY IMAGINATION

INVENTION INNOVATION

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[FHWA](#) > [Every Day Counts](#) > [Accelerating Technology](#) > [Prefabricated Bridge Elements and Systems](#) > [Description](#)

Prefabricated Bridge Elements and Systems

What is PBES?

PBES are structural components of a bridge that are built offsite, or near-site of a bridge and include features that reduce the onsite construction time and the mobility impact time that occurs when building new bridges or rehabilitating or replacing existing bridges relative to conventional construction methods.

- [PBES Definitions](#)

> How Does It Work?

> How Does PBES Impact ABC?

> Webinars

- [Session 1](#)
- [Session 2](#)
- [Session 3](#)
- [Session 4](#)

PREFABRICATED BRIDGE ELEMENTS AND SYSTEMS

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[Connection Details for PBES](#)

[Manual on Use of Self-Propelled Modular Transporters to Remove and Replace Bridges](#)



EMAIL NOTIFICATION

T-4 Construction

Subcommittee on Bridges and Structures

2011 SCOBS Annual Meeting



Shoukry Elnahal, P.E.

Deputy Chief Engineer for Bridges and Tunnels

MassDOT Highway Division

The focus of this year's T-4 meeting was on Accelerated Bridge Construction (ABC).

FHWA Update – Claude Napier EDC Initiative

ABC Connection Details Manual – Mike Culmo

ABC/PBES Research Update – Mary Lou Ralls

FIU ABC Center Update – Kevin Thompson

**We can Build
Faster!**



Q & A Discussion

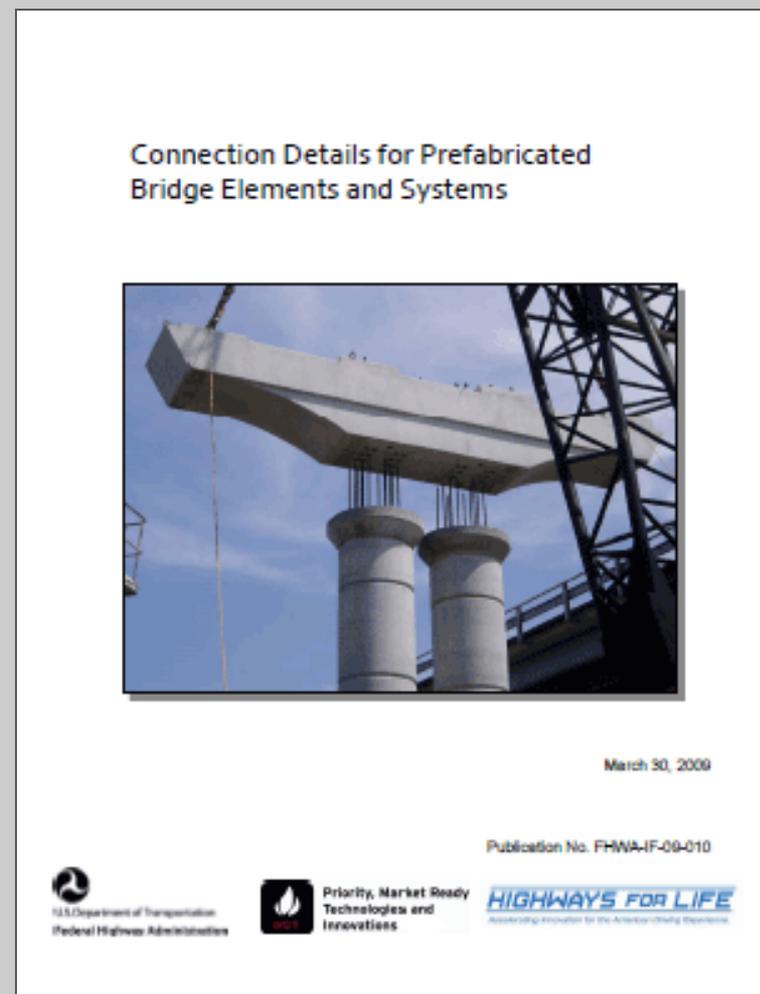
Thank you

Topics to be considered by the scan include:

- **Construction details for durable PBES and other ABC connections that have a history of good performance**
- **Seismic and other testing (blast) of ABC connection details**
- **Specialized technology and standards used in monitoring, inspecting, and repair of ABC connection details**
- **Relative costs for design, construction, maintenance, and inspection of ABC connection details**

Connections Details for PBES

- **General Topics**
- **Superstructure Connections**
- **Substructure Connections**
- **Foundation Connections**
- **Connection Design Examples**
- **Proprietary Products**
- **Sample Construction Specs**
- **Case Studies**



March 11, 2011 Webinar

Gregory G. Nadeau
FHWA
Deputy Administrator



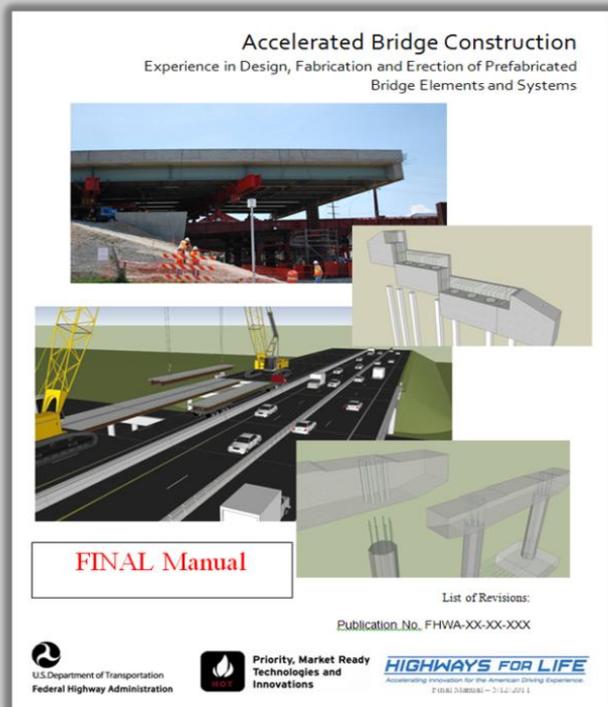
**Inaugural Webinar on the National Center for
Accelerated Bridge Construction**

March 11, 2011

FHWA ABC Manual Webinar

Thursday, June 2, 2011

Accelerated Bridge Construction Experience in Design, Fabrication and Erection of Prefabricated Bridge Elements and Systems



Michael P. Culmo, P.E.

Vice President of Transportation and Structures

CME Associates, Inc., East Hartford, CT

2011 3-month Series on Full-Depth Precast Bridge Decks

- Sept. 29** **State-of-the-Art Full-Depth Precast
Concrete Bridge Decks**
by Sameh Badie representing PCI
& Ben Graybeal, FHWA
- Oct. 11** **Field-Cast UHPC Connections in
Full-Depth Precast Bridge Decks**
by Ben Graybeal, FHWA
- Nov. 17** **Full-Depth Prefabricated Bridge Deck
Options for Durability and Cost**
by Bruce Johnson, Oregon DOT