Workshop Objective & ABC Technologies Review

Mary Lou Ralls Newman, P.E.
Director of Technology Transfer, ABC-UTC
Principal, Ralls Newman, LLC

Contractor/Owner Collaboration on ABC Programs Workshop
September 30, 2021

Workshop Objective

- To understand the reasons and purpose surrounding the paradigm shift in State decision making for implementing accelerated bridge construction as common practice in bridge project delivery
- To assist contractors and suppliers in partnering in this effort
- To focus on explaining the need for ABC and developing a path forward to support contractor buy-in
- To provide a forum for contractors and owners to talk about how to better design, specify, build, and pay for ABC projects

ABC Technologies Review

- **ABC Definition:** Accelerated Bridge Construction (ABC) is bridge construction that uses innovative planning, design, materials, and construction methods in a safe and cost-effective manner to reduce the onsite construction time that occurs when building new bridges or replacing and rehabilitating existing bridges. [*AASHTO LRFD Guide Specifications for ABC, 1st Ed, 2018*; https://www.fhwa.dot.gov/bridge/abc/; https://abc-utc.fiu.edu/resources/project-research-databases/project-database-keywords/]
- **ABC does not include** spread prestressed concrete or steel girder bridges with cast-in-place concrete decks; ABC must save a construction process, e.g., placing formwork for deck
- **ABC does include** adjacent beams, e.g., adjacent box beams

Categories of ABC

- **Project Planning**: Decision-making tools, site procurement techniques, project delivery methods, and contracting methods can accelerate overall project time and decrease mobility impact time
- **Geotechnical Solutions**: Foundation and wall systems and rapid embankments can accelerate site preparation and foundation construction
- **Structural Solutions:** Prefabricated bridge elements and systems and construction equipment and methods can reduce the time that traffic is impacted by construction

Project Planning

Decision-Making Tools

- FHWA Process [FHWA Decision-Making Framework] [*Final Report*]
- State Process
- TPF-5(221) [AHP Decision-Making Tool]; [*Final Report*]; [*Public Roads*, November/December 2011]
- Benefit/Cost Method
- Other Decision-Making Tool

Site Procurement

- Programmatic Agreement
- Right-of-Way Acquisition
- Relocation Incentive
- Flexibility in Utilities
- Early Environmental Clearance & Permitting
- Electronic Shop Drawing Submittal & Approval Process
- Fabrication Drawings Prior to Bid
- Material Procurement Prior to Contract Award
- Other Site Procurement

Project Delivery

- Design-Bid-Build
- Design-Build
- In-House Force
- CM/GC [Construction Manager / General Contractor]
- Public-Private Partnership [P3]
- Emergency Contract
- Alternative Technical Concept
- Alternative Ton (Foundation)
- Other Project Delivery

Ref.: https://abc-utc.fiu.edu/resources/project-research-databases/project-database-keywords/

Project Planning, cont'd., 2

Contracting

- A+B Bidding
- A+B+C Bidding
- Full Lane Closure
- Warranty
- Lane Rental
- Incentive / Disincentive Clause
- No Excuse Bonus
- Lump Sum Bonus
- Contractor Option
- Contractor Revision
- Value Engineering
- VE with Partnering
- Formalized Partnering
- Best Value Award
- Performance Contracting
- Accelerated Bid Process
- Other Contracting

ABC can be used with a variety of different contracting methods. There is a large benefit to involving the contractor early in the design process.

Additional Details on Project Planning in general at https://www.fhwa.dot.gov/bridge/abc/fast.cfm

Ref.: https://abc-utc.fiu.edu/resources/project-research-databases/project-database-keywords/

Geotechnical Solutions

Foundations and Walls

- Continuous Flight Auger Pile
- Micropile
- High-Capacity Pile
- GRS IBS [Geosynthetic Reinforced Soil Integrated Bridge System]
- CIP Substructure Under Traffic
- Reused Substructure/Foundation Unit
- Pre-Grouted Void
- Other Foundation/Wall

Rapid Embankment

- EPS Geofoam {Expanded Polystyrene Geofoam}
- Self-Compacting Backfill
- Intelligent Compaction
- Fully-Contained Flooded Backfill
- Embankment Surcharge
- Lightweight Fill
- Other Rapid Embankment

Foundation work can be done before superstructure replacement. Foundations can also possibly be repaired/retrofitted and reused.

Ref.: https://abc-utc.fiu.edu/resources/project-research-databases/project-database-keywords/

Structural Solutions – Prefab. Elements

Prefabricated Bridge Elements (PBE) are a category of Prefabricated Bridge Elements and Systems (PBES) which comprise a single structural component of a bridge:

- **Deck elements** (e.g., full-depth precast deck panels, partial depth precast deck panels)
- **Deck beam elements** (e.g., adjacent deck bulb T beams, adjacent slab beams, modular decked beams)
- **Full-width beam elements** (e.g., truss or arch span without deck, precast segmental)
- **Pier elements** (e.g., precast concrete or steel cap and columns, precast pile cap)
- **Abutment and wall elements** (e.g., precast abutment cap, precast wingwall)
- **Buried bridge elements** (e.g., buried precast box, buried metal arch)

FDPC Deck Panels

TH 53 Bridge over Paleface River (Minnesota 2012)

Adjacent Deck Bulb T

O'Malley Road Bridge (Alaska 2006)

Precast Pile Cap

I-10 Bridge over Escambia Bay (FL 2007)

Precast Abutment Cap

Montour Run Bridge No.6 (PA 2012)

All photos from ABC Project Database (https://abc-utc.fiu.edu/resources/project-research-databases/)

Structural Solutions – Prefab. Elements, cont'd., 2

- Various prefabricated deck and deck beam elements

Partial-Depth Precast Panel
I-5 / South 38th Street Bridge

Adjacent Slab Beams
North Kahana Stream Bridge

Deck Elements	• Full-Depth Precast Deck Panel w/PT • Full-Depth Precast Deck Panel w/o PT • Partial-Depth Precast Deck Panel • FRP Deck Panel {fiber-reinforced polymer deck panel} • Steel Grid (open) Deck • Steel Grid (concrete filled) Deck	• Aluminum Deck • Exodermic Deck • Orthotropic Deck • UHPC Waffle Deck • Other Deck Element
Deck Beam Elements	• Adjacent Deck Bulb T Beam • Adjacent T Beam • Adjacent Inverted T Beam • Adjacent Box Beam • Adjacent Slab Beam • Adjacent Slab Beam w/Backwall • MDcBc {Modular concrete-Decked concrete Beam}	• MDcBs {Modular concrete-Decked steel Beam} • MDcBh {Modular concrete-Decked hybrid Beam} • MDhBs {Modular hybrid-Decked steel Beam} • PT Concrete Through-Girder • Other Deck Beam Element

FDPC Deck Panel
I-84 Bridge F-114

Adjacent T Beams
South Punaluu Stream Bridge

Ref.: https://abc-utc.fiu.edu/resources/project-research-databases/project-database-keywords/
All photos from ABC Project Database (https://abc-utc.fiu.edu/resources/project-research-databases/)

Structural Solutions – Prefab. Elements, cont'd, 3

Most Common Deck Element → Full-Depth Precast Deck Panels

Urban Example: **24th Street Bridge over I-29/I-80**
(Council Bluffs, Iowa)

Ref.: ABC Project Database (https://abc-utc.fiu.edu/resources/project-research-databases/)

Structural Solutions – Prefab. Elements, cont'd., 4

Most Common Deck Element → Full-Depth Precast Deck Panels

Rural Example: **I-70 Bridge over Eagle Canyon (Eastbound)**
(southern Utah)

Ref.: ABC Project Database (https://abc-utc.fiu.edu/resources/project-research-databases/)

Structural Solutions – Prefab. Elements, cont'd., 5

- Various prefabricated full-width beam and pier elements

Truss Span w/o Deck
Church Street

Precast Pile Cap
UPRR Bridge 126.31

Full-Width Beam Elements	• Truss Span w/o Deck • Arch Span w/o Deck • Precast Segmental • Steel Segmental • Other Full-Width Beam Element	
Pier Elements	• Precast Pile Cap • Precast Cap Shell • Precast Cap & Column(s) • Precast Column Cap (Precast Bent Cap; Precast Crossbeam) • Precast Column(s) • Precast Footing Shell	• Precast Footing(s) • Precast Caisson Cap • Steel Pile Cap • Steel Column Cap • Steel Column(s) • Steel Cap & Column(s) • Other Pier Element

Precast Segmental
Linn Cove Viaduct

Precast Cap Shell
Willis Avenue Bridge over Harlem River

Ref.: https://abc-utc.fiu.edu/resources/project-research-databases/project-database-keywords/
All photos from ABC Project Database (https://abc-utc.fiu.edu/resources/project-research-databases/)

Structural Solutions – Prefab. Elements, cont'd., 6

- Various prefabricated abutment and wall elements

Precast Abutment Cap w/Backwall
Craig Creek Bridge

GRS Abutment
Bowman Road

Abutment and Wall Elements		
	• Precast Abutment Cap • Precast Backwall • Precast Abutment Cap w/Backwall • Precast Abutment Stem • Precast Wingwall • Precast Cheek Wall • Precast Abutment Footing • Steel Sheet Piling • Precast Sheet Piling • Precast Lagging Panel	• Precast Full-Height Wall Panel • Precast Retaining Wall • MSE Wall {mechanically-stabilized earth wall} • Modular Block Wall • GRS Abutment {geosynthetic reinforced soil abutment} • Proprietary Wall • Other Abutment Element

Precast Abutment Cap
Route 202 Bridge over Passaic River

Precast Wingwall
US 6 Bridge over Keg Creek

Ref.: https://abc-utc.fiu.edu/resources/project-research-databases/project-database-keywords/
All photos from ABC Project Database (https://abc-utc.fiu.edu/resources/project-research-databases/)

Structural Solutions – Prefab. Elements, cont'd., 7

- Various prefabricated buried bridge elements

Buried Bridge Elements	
	• Buried Precast Arch • Buried Metal Arch • Buried Precast 3-Sided • Buried Metal 3-Sided • Buried Precast Box • Buried Metal Box

Buried Precast 3-Sided
CTH B Bridge over Parsons Creek

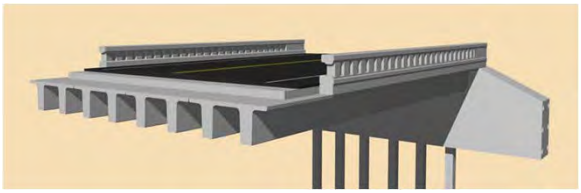
Ref.: https://abc-utc.fiu.edu/resources/project-research-databases/project-database-keywords/
All photos from ABC Project Database (https://abc-utc.fiu.edu/resources/project-research-databases/)

Structural Solutions – Prefab. Elements, cont'd., 8

Element of Most Interest Nationwide → Modular Decked Beam

Concrete Beam Example: **2011 Chester VT 103 Bridge 8**
(Chester, Vermont)

MDcBc (Modular concrete-Decked concrete Beam)



Ref.: ABC Project Database (https://abc-utc.fiu.edu/resources/project-research-databases/)

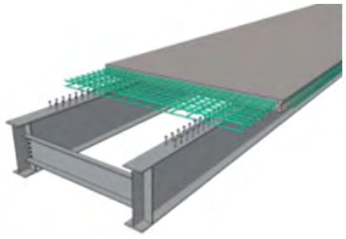
https://www.pci.org/PCINE/Technical_Resources/Bridge_Resources/Northeast_Extreme_Tee_NEXT_Beam/PCINE/Technical_Resources/Bridge_Resources/NEXT_Beam.aspx?hkey=5dc58288-9dab-4f7d-b23c-55bea7ae9d17

Structural Solutions – Prefab. Elements, cont'd., 9

Element of Most Interest Nationwide → Modular Decked Beam

Steel Beam Example: **2011 Salem St Bridge EB (93FAST14)**
(Medford, Massachusetts)

MDcBs (Modular concrete-Decked steel Beam)



Ref.: 2014 In-Depth Web Training, "MassDOT's 93FAST14 Project," https://abc-utc.fiu.edu/mc-events/massdots-93fast14-project/?mc_id=190

Ref.: ABC Project Database (https://abc-utc.fiu.edu/resources/project-research-databases/)

Structural Solutions – Misc. Elements

- Prefabricated miscellaneous elements either eliminate various activities that are associated with conventional bridge construction or complement the use of PBES

Misc. Structural Elements	• Precast Approach Slab • Precast Curb • Prefabricated Railing • Precast Diaphragm • Steel Diaphragm	• LWC Beam (lightweight concrete beam) • LWC Deck (lightweight concrete deck) • LWC Substructure (lightweight concrete substructure) • Other Miscellaneous Element
Closure Joints / Connections	• CIP Reinforced Closure Joint (cast-in-place reinforced concrete closure joint) • High-Strength CIP Reinforced Closure Joint • HESt-LSh Concrete Joint (high-early-strength low-shrinkage concrete joint) • UHPC Closure Joint (ultra-high performance concrete closure joint) • Epoxy Joint • Grouted Key Closure Joint	• Grouted Blockout w/ Shear Connector • Grouted Duct Connection • Pocket Connection • Socket Connection • Link Slab • Match Cast Closure Joint • Bars in Splice Coupler • PT Ducts/Bonded • PT Ducts/Un-bonded • Other Closure Joint/Connection

Ref.: https://abc-utc.fiu.edu/resources/project-research-databases/project-database-keywords/

Structural Solutions – Misc. Elements, cont'd., 2

- Prefabricated miscellaneous elements either eliminate various activities that are associated with conventional bridge construction or complement the use of PBES

Overlays	• Standard Concrete Overlay • High-Density Concrete Overlay • HPC Overlay (high-performance concrete overlay) • UHPC Overlay (ultra-high performance concrete overlay) • Asphalt Overlay w/Membrane • Asphalt Overlay w/o Membrane	• Latex-Modified Overlay • Micro-Silica Concrete Overlay • Polymer Concrete Overlay • Rapid Set Overlay • Thin-Bonded Epoxy Overlay • Asphalt Chip Seal w/o Membrane • Other Overlay

Ref.: https://abc-utc.fiu.edu/resources/project-research-databases/project-database-keywords/

Structural Solutions – Prefabricated Systems

Prefabricated Bridge Systems (PBS) are a category of PBES that consists of:

- **Superstructure Systems**
- **Superstructure/Substructure Systems** (without foundations)
- **Total Bridge Systems** (on shallow foundations)

- Rolled, launched, slid, lifted, or otherwise transported into place as a unit
- Procured such that traffic operations can resume immediately or very soon after placement

Elk Creek Crossing 3 (2008, OR)

Coleman Bridge (1996, VA)

Graves Ave. over I-4 (2006, FL)

4500 South Bridge (2007, UT)

Structural Solutions – Prefab. Systems, cont'd., 2

- Prefabricated **superstructure systems** include both the deck and primary supporting members integrated such that mobility disruptions occur only as a result of the system being placed; these systems can be rolled, launched, slid, lifted, or otherwise transported into place as a unit onto existing or new abutments and/or piers

FDcBc
Graves Ave. over I-4

Steel Orthotropic Box Girder Span
Maritime Off-Ramp

Superstructure Systems		
	• FDcBc (Full-Width concrete-Decked concrete Beam Unit) • FDcBs (Full-Width concrete-Decked steel Beam Unit) • Through-Girder Span w/Deck • Truss Span w/Deck • Arch Span w/Deck	• Steel Orthotropic Box Girder Span • Prestressed Multi-Cell Box Girder Span • Metal Panel Deck Span • RDcBc (Reused concrete-Decked concrete Beam span) • RDcBs (Reused concrete-Decked steel Beam span) • Other Superstructure System

FDcBs
Elk Creek Crossing 3

Truss Span w/Deck
Willis Ave. over Harlem River

Ref.: https://abc-utc.fiu.edu/resources/project-research-databases/project-database-keywords/
All photos from ABC Project Database (https://abc-utc.fiu.edu/resources/project-research-databases/)

Structural Solutions – Prefab. Systems, cont'd., 3

- Examples of prefabricated **superstructure/substructure systems** are rigid frames that include either the interior piers or the abutments, or buried bridge systems, without foundations, and rolled, launched, slid, lifted, or otherwise transported into place as a unit onto existing or new foundations
- Prefabricated **total bridge systems** include the entire superstructure and substructure (both abutments and piers) on shallow foundations, made integral with the superstructure, built off-line and rolled, launched, slid, lifted, or otherwise transported into place as a unit on the existing alignment such that traffic operations can resume after placement

Emerging Technologies

Super/Substructure Systems	• Super/Substructure System w/o Foundations • Buried Bridge System w/o Foundations
Total Bridge Systems	• Total Bridge System

Super/Substructure System w/o Foundations
Highway 401 Cornwall Centre Road Overpass, Ont.
(Ref.: ABC-UTC April 2016 Monthly Webinar, https://abc-utc.fiu.edu/mc-events/ontarios-rapid-installation-of-concrete-rigid-frame-bridges/?mc_id=146)

Ref.: https://abc-utc.fiu.edu/resources/project-research-databases/project-database-keywords/

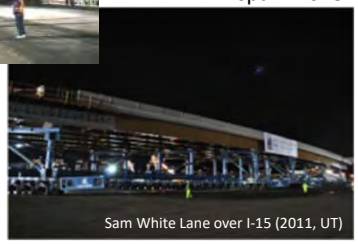
Structural Solutions – Prefab. Systems, cont'd., 4

Systems of Most Interest Nationwide:

Superstructure move using self-propelled modular transporters

e.g., concrete beams; single-span move

e.g., steel beams; 2-span move



Superstructure lateral slide using hydraulic jacks or winches

e.g., concrete beams; 5-span slide

e.g., steel beams; 3-span slide

Structural Solutions – Constr. Equip./Methods

- PBES can require special construction equipment to place heavier elements and systems

SPMT (Self-Propelled Modular Transporter)	Lateral Slide (aka, Slide-In Bridge Construction)
• SPMT(s) • SPMT with Gantry System • SPMT on Barge • Other SPMT Combination	• Lateral Slide w/pad • Lateral Slide w/roller

Ref.: https://abc-utc.fiu.edu/resources/project-research-databases/project-database-keywords/

Structural Solutions – Constr. Equip./Methods, cont'd., 2

- PBES can require special construction equipment to place heavier elements and full systems

Longitudinal Launch	Other Equipment
• Longitudinal Launch w/pad • Longitudinal Launch w/roller	• High-Capacity Crane(s) • High-Capacity Crane on Barge • Strand Jack • Towed Modular Transporter • Float In • Gantry System • Multi-Axle Flatbed Trailer

Ref.: https://abc-utc.fiu.edu/resources/project-research-databases/project-database-keywords/

For more information on ABC technologies:

Accelerated Bridge Construction University Transportation Center (ABC-UTC)

https://abc-utc.fiu.edu

Implementing Accelerated Bridge Construction -
A Rural State's perspective

VERMONT
AGENCY OF TRANSPORTATION

Accelerated Bridge Program
VTRANS

Kristin Higgins, P.E.
Vermont AOT
Structures Program Manager
Vermont State Bridge Engineer

Presentation Outline:

Vermont's experience with ABC prior to program implementation

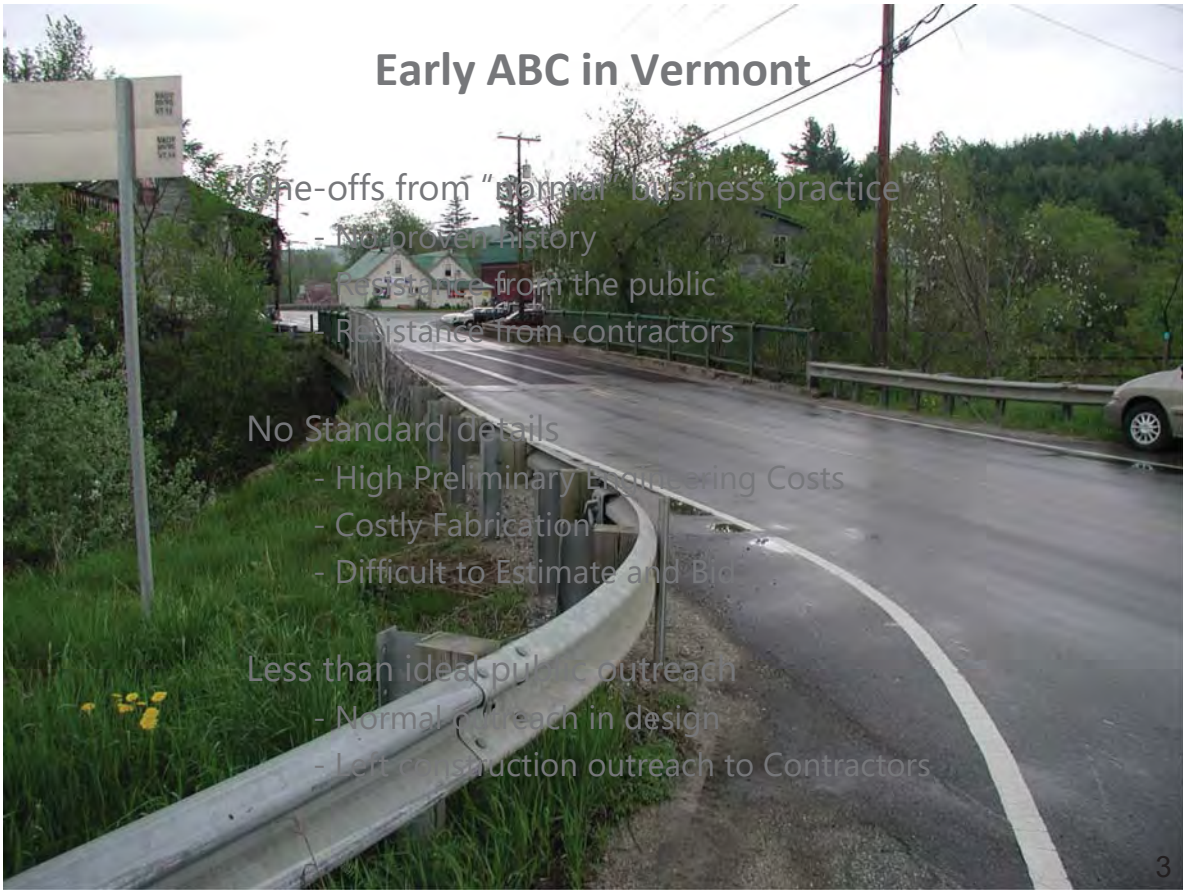
- Early ABC projects
- Project costs
- Lessons learned

Creating the Accelerated Bridge Program – What it means

Setting up ABC projects for success

- Road Closures
- Standard Details
- Listening to our contractors
- Contract Language

Questions



Early ABC in Vermont

One-offs from "normal" business practice
- No proven history
- Resistance from the public
- Resistance from contractors

No Standard details
- High Preliminary Engineering Costs
- Costly Fabrication
- Difficult to Estimate and Bid

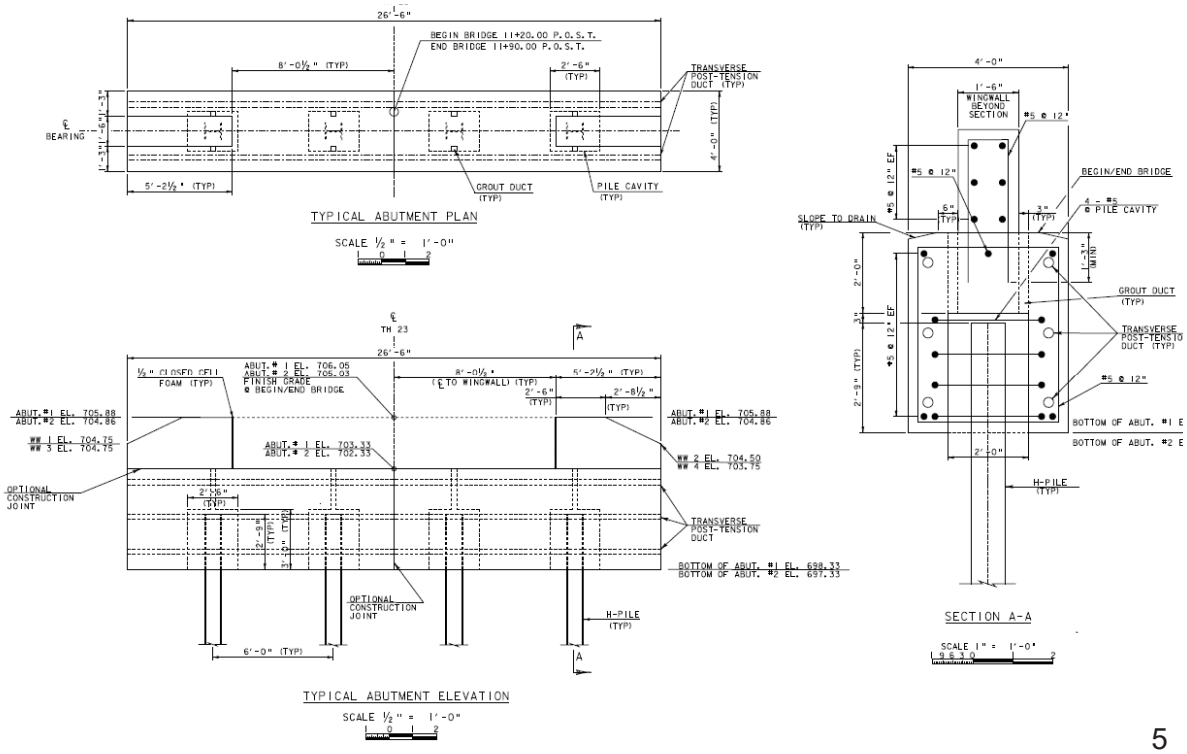
Less than ideal public outreach
- Normal outreach in design
- Left construction outreach to Contractors

Braintree – Gravel Road

1st ABC Project – Full Replacement

Construction Year: 2010
67' Prestressed Concrete Box Beams
Precast Pile Caps and Wingwalls
20-day bridge closure planned
Low ADT

Braintree as Designed – Everything Precast



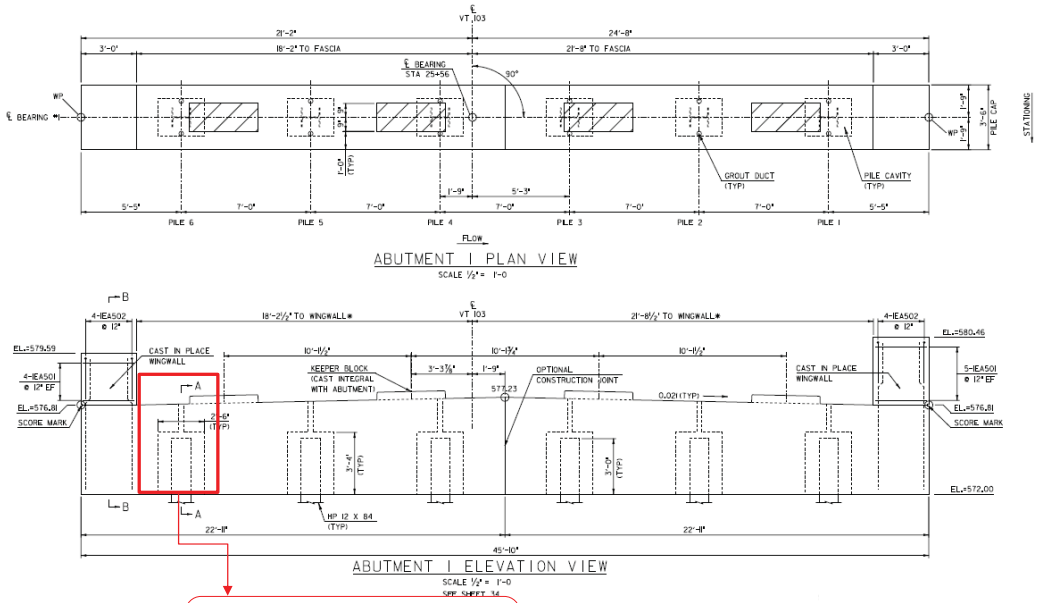
Braintree as Constructed – Cast in Place Abutments

Chester – VT Rte. 103

2nd ABC Project – Full Replacement

- Construction Year: 2011
- 60' NEXT Beam
- Precast Abutments
- 28 Day Closure with Incentive/Disincentive
- **Contractor responsible for outreach during construction**

Chester Precast Abutment



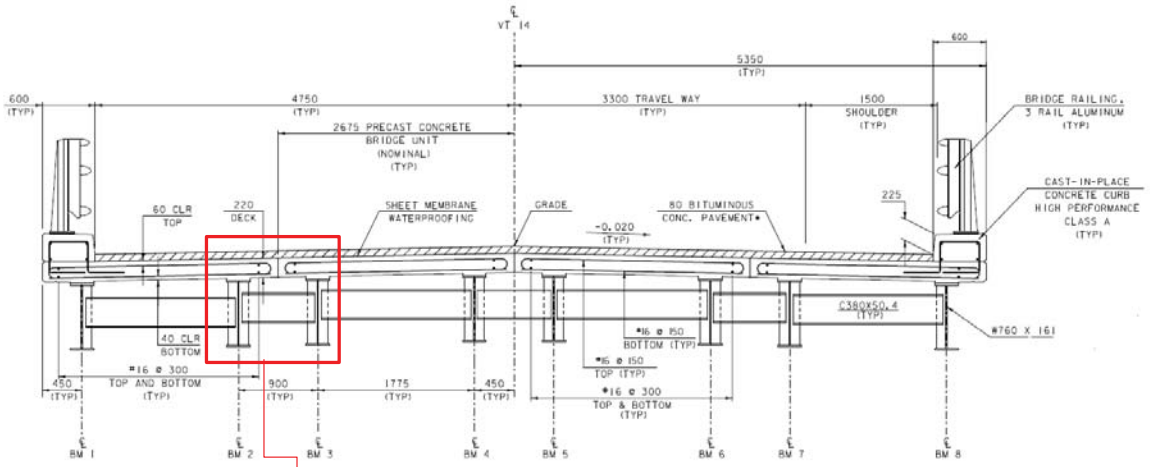
Square formed cavity
Narrow Grout Pocket

East Montpelier – VT Rte. 14

3rd ABC Project – Full Replacement

- Construction Year: 2011
- 64′ precast composite concrete deck on steel beams
- Cast in Place abutments on bedrock
- 90 Day Closure with Incentive/Disincentive
- Night work not allowed

East Montpelier – Precast steel Bridge Units (PBU's)



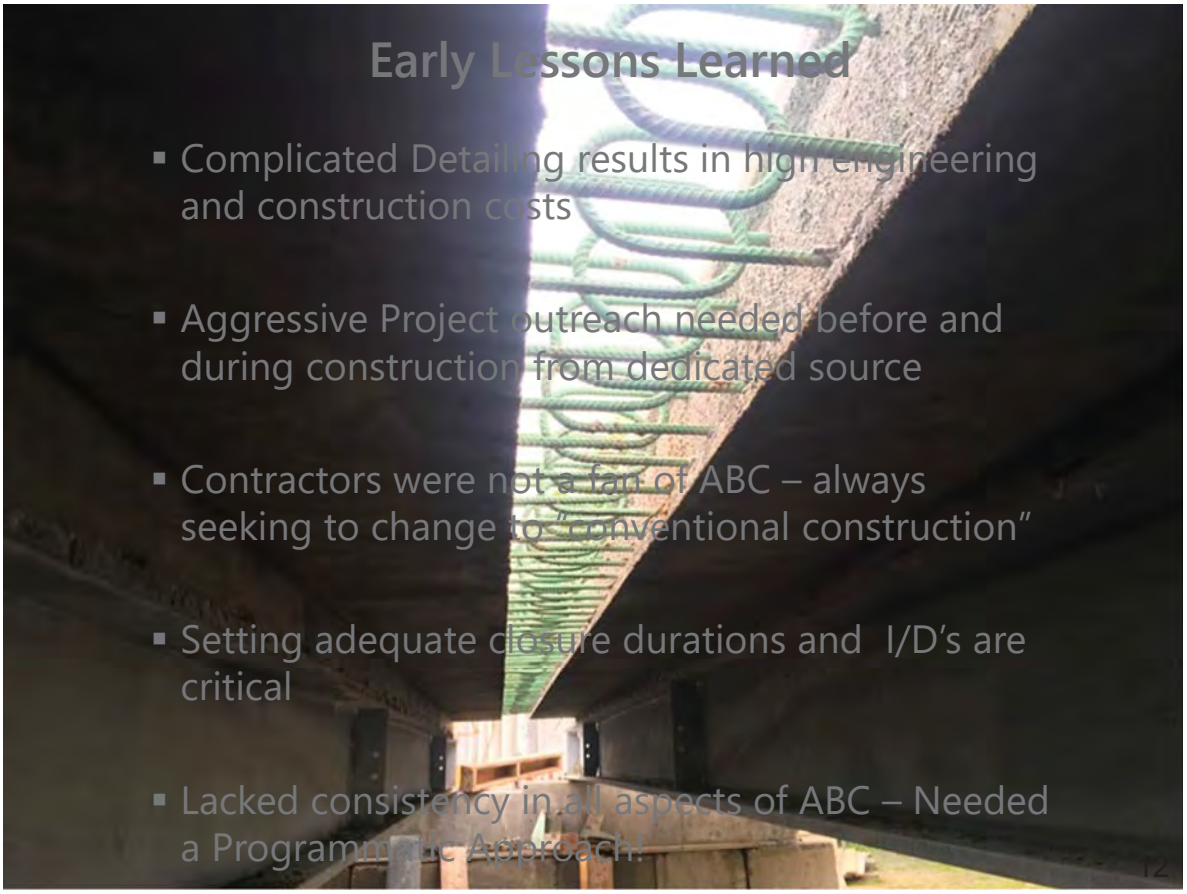
Diaphragms for continuity

3-0" spacing – Narrow for diaphragm placement

Early ABC Project Cost

- Braintree
  - Construction Cost: $302,790
  - Preliminary Engineering Cost: $82,510 (27%)
  - Construction Engineering Cost: $49,250 (16%)
- Chester
  - Construction Cost: $942,493
  - Preliminary Engineering Cost: $374,830 (40%)
  - Construction Engineering Cost: $127,160 (13%)
- East Montpelier
  - Construction Cost: $1,250,700
  - Preliminary Engineering Cost: $314,460 (25%)
  - Construction Engineering Cost: $167,650 (13%)

High Preliminary Engineering Costs



Early Lessons Learned

- Complicated Detailing results in high engineering and construction costs
- Aggressive Project outreach needed before and during construction from dedicated source
- Contractors were not a fan of ABC – always seeking to change to "conventional construction"
- Setting adequate closure durations and I/D's are critical
- Lacked consistency in all aspects of ABC – Needed a Programmatic Approach!

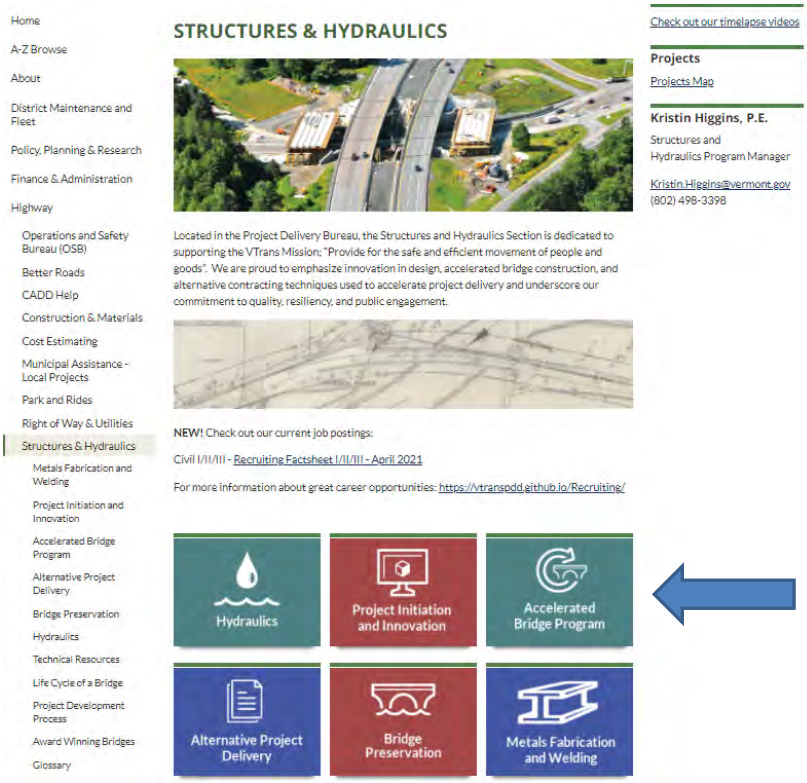
Setting the Stage for the Vermont's Accelerated Bridge Program

- Aging bridge population
- Dozens of Legacy projects
- We had done a couple already
- Massachusetts was a leader in ABC and was eager to assist
- Tropical Storm Irene (August 2011)

Accelerated Bridge Program Implementation

- Structures Section Reorganization in 2012
  - Accelerated Bridge Program (ABP) with dedicated leadership and staff was created
  - Project Initiation and Innovation Team with dedicated leadership and staff was created to scope project. ABC is always first option

Dedicated Accelerated Bridge Program Website



Accelerated Bridge Program - Brand

Banner

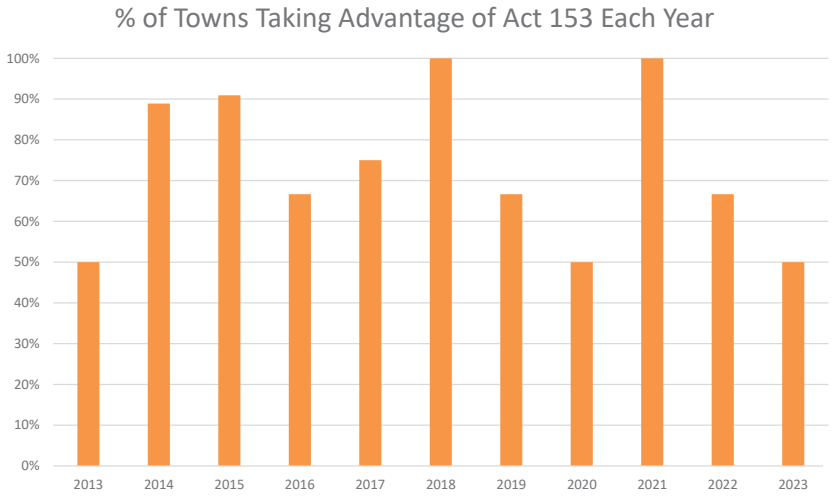
Shirts

Stickers

Act 153 – Town Highway Bridge Projects

2012: Legislation is passed to Promote ABC

- 50% Reduction in local share if the Town closes the bridge during construction
  - 5% local share for Bridge Replacement
  - 2.5% local share for Bridge Rehabilitation



Road Closures in a Rural State

- Mitigate Isolation
  - Mutual emergency response aid from neighboring towns
  - Staged emergency services (EMT or Firetruck staged for response)
- Reduced response time – Emergency Services
  - Difficult to navigate and can derail a project
- Ideal mitigation - Identify unofficial bypass
  - Narrow and mountainous gravel Road
  - Neighborhoods
- Compensate for "damages" caused by increased traffic on local road network
- Establish realistic durations with I/D's clearly defined

Incentive Disincentive Calculations

Project Information

- AADT
- % Trucks
- Through Route Distance
- Detour Route Distance

Monetary Value of Travel time

- Median Household income
- Average Vehicle occupancy

Vehicle & Work zone Operating Costs

Discount Factor Approach

- Adjusted for Aggressiveness of closure period
- ½ of total incentive for meeting date
- ½ of total incentive used as hourly rate for early completion

Vermont Project Incentives

▪ Georgia Vermont – High ADT (Short Detour)	$103,000.00
▪ Moretown Vermont – Medium ADT (Long Detour)	$110,000.00
▪ Mt. Holly Vermont – Low ADT Moderate Detour	$47,040.00
▪ Plymouth Vermont – Low ADT Moderate Detour	$47,040.00
▪ Poultney Vermont – Low ADT (Short Detour)	$36,940.00
▪ Woodstock Vermont – Medium ADT (Aggressive Closure)	$66,000.00

Grants Available to Towns

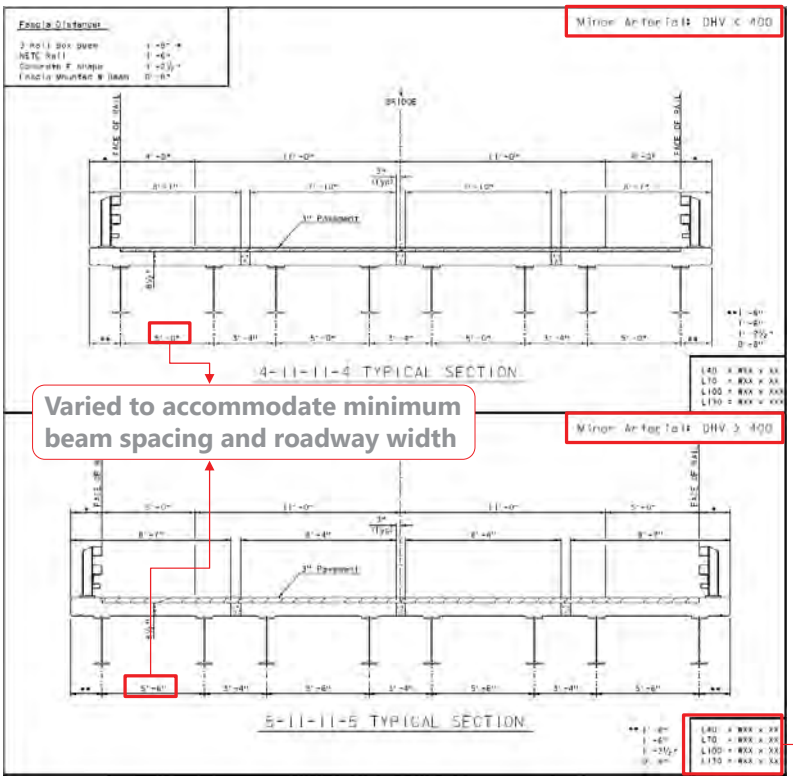
Local Bypass Mitigation Grants

- Grants provided by the state to compensate towns for impacts to local roads due to increased traffic resulting from a state highway road closure
- The compensation amount is calculated based closure duration, traffic volumes, road classification and the bypass length and is intended to assist with:
  - Providing police presence to deter speeding
  - Providing enforcement to enforce local road weight limits
  - Dust control
  - Roadway maintenance (grading/addition of gravel/general maintenance)

Signed Regional Detour Route on State-Owned Roads: 47.6 Miles end-to-end

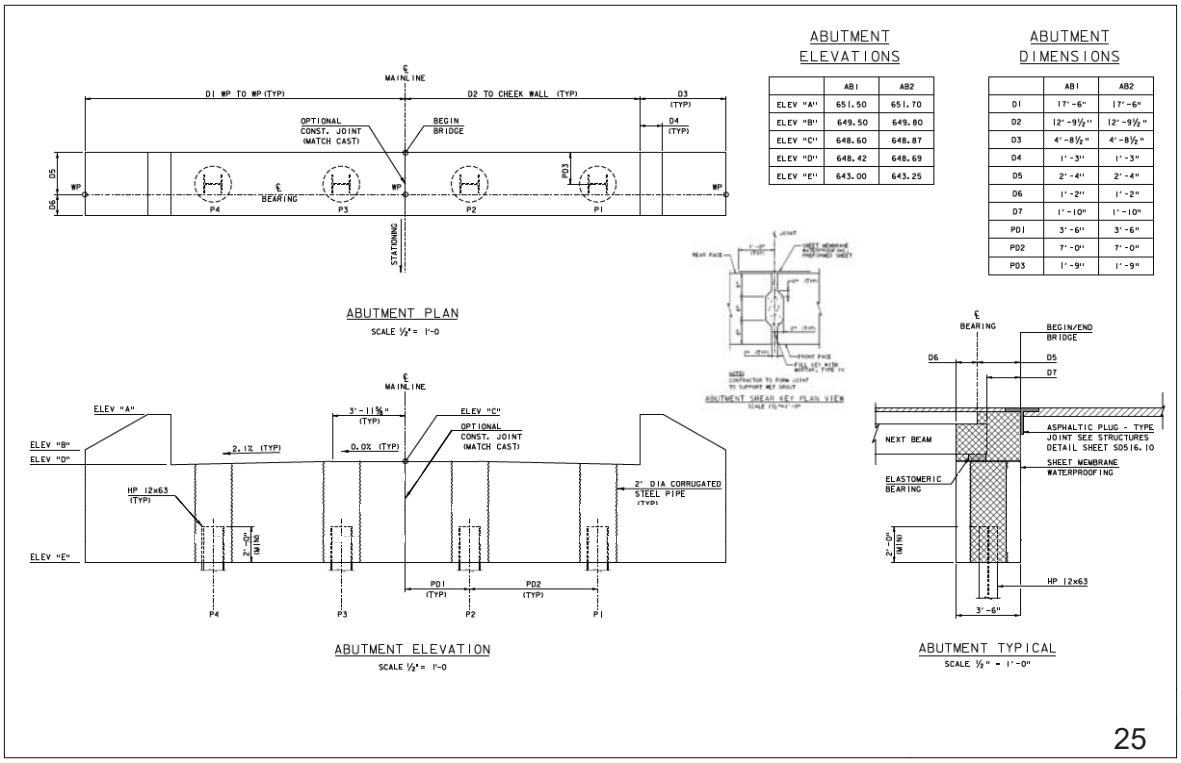
Local Bypass Route on Municipally-Owned Roads: 1.0 Mile end-to-end

Precast Superstructure - Typical Section



- Standardizing
  - Width based on AADT
  - 3'-4" Minimum spacing between units
  - Varying Overhang to accommodate bridge rail

Precast Integral Abutment



	AB1	AB2
ELEV "A"	651.50	651.70
ELEV "B"	649.50	649.80
ELEV "C"	648.60	648.87
ELEV "D"	648.42	648.69
ELEV "E"	643.00	643.25

	AB1	AB2
D1	17'-6"	17'-6"
D2	12'-9½"	12'-9½"
D3	4'-8½"	4'-8½"
D4	1'-3"	1'-3"
D5	2'-4"	2'-4"
D6	1'-2"	1'-2"
D7	1'-10"	1'-10"
PD1	3'-6"	3'-6"
PD2	7'-0"	7'-0"
PD3	1'-9"	1'-9"

25

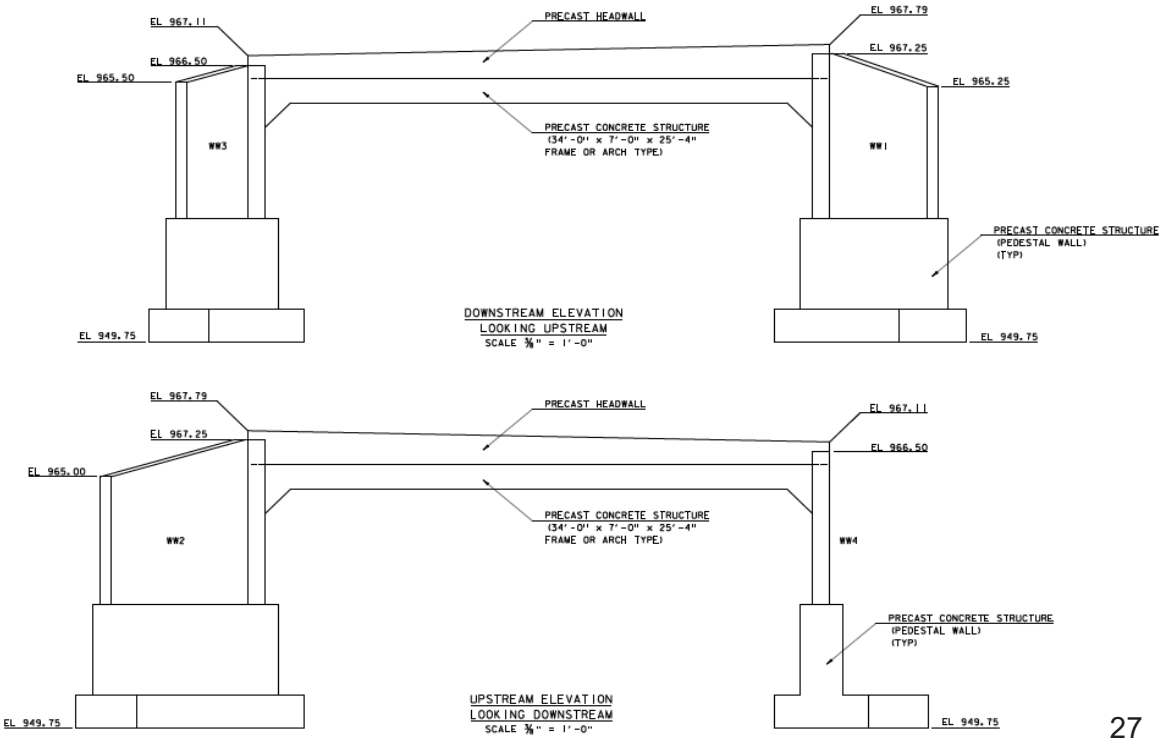
Short Span Structure (less than 50')

Bridges < 50'

- No SHRP2 solution for structures under 50'
- VTrans uses an at grade rigid frame
- Used joint details similar to NEXT Beam

26

Short Span Structure (less than 50')



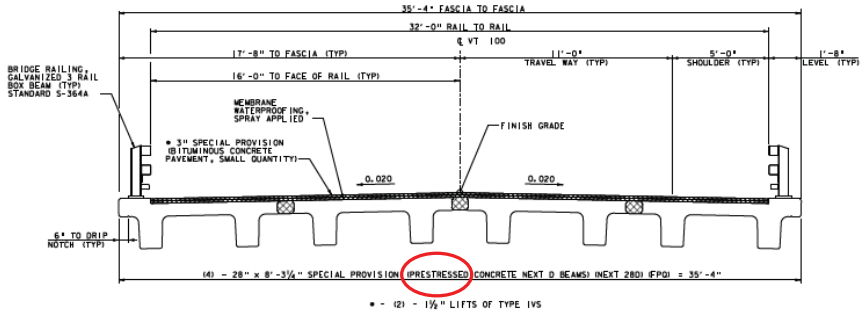
Precast Frame spans < 50'

Contractor Fabricated Elements

Contractor Fabrication

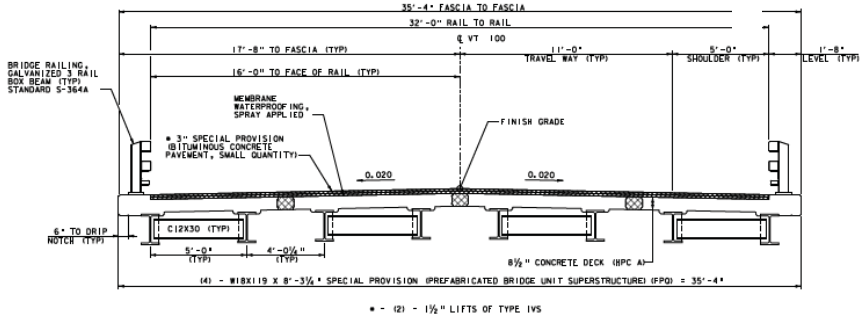
- Reduces dependency on subcontractors
- Maintain their workforce
- Greater availability to prefabricate/reduced costs
- Keeps heavy loads off state highways, no permits
- Required a new Specification

Superstructure - Alternates



TYPICAL NEXT BEAM BRIDGE SECTION ALTERNATE

SCALE ½" = 1'-0"



TYPICAL PBU BRIDGE SECTION ALTERNATE

SCALE ½" = 1'-0"

Contractor Fabricated Elements - Superstructure


LORAIN

Optioning for Means and Methods

	BEGIN OPTION AA	
LS	PRECAST CONCRETE STRUCTURE (ABUTMENT #1)	540.10
LS	SPECIAL PROVISION (CONTRACTOR-FABRICATED PRECAST CONCRETE STRUCTURES)(ABUTMENT #1)	900.645
	END OPTION AA	
	BEGIN OPTION BB	
LS	PRECAST CONCRETE STRUCTURE (ABUTMENT #2)	540.10
LS	SPECIAL PROVISION (CONTRACTOR-FABRICATED PRECAST CONCRETE STRUCTURES)(ABUTMENT #2)	900.645
	END OPTION BB	

Contractor Fabricated Elements- Abutments

Contractor Fabricated Elements- Wingwalls

Contractor Fabricated Elements – Approach Slabs

Contract Language – Incentive/Disincentive

2. NOTICE TO BIDDERS – INCENTIVE/DISINCENTIVE (I/D). The Agency's intent is to complete the Identified Work as rapidly as possible. To encourage the Contractor to complete the Identified Work within the period defined below, the Agency is willing to pay an incentive.

   (a) Dates. The allowable I/D work period shall start at 7:00 a.m. and end 35 consecutive Calendar Days later by 6:59 a.m. This 35 consecutive Calendar Day work period is herein defined as the I/D Period. The Begin Construction Date for the I/D work period shall be determined by the Contractor. However, in no case shall the I/D work period begin before 7:00 a.m. on June 22, 2020, and it shall end no later than 6:59 a.m. on August 21, 2020.

   The Contractor shall submit to the VTrans Construction Section for review and approval a certified letter specifying the Begin Construction Date for the I/D work. This letter shall be received by the Construction Section a minimum of 14 Calendar Days prior to the Begin Construction Date specified in the letter.

   During the I/D Period, the Contractor will be allowed to work on the Project for 24 hours per day, 7 days per week, including holiday periods. Night work will be allowed during the I/D Period. See Special Provision No. 3 and No. 4 for additional information and requirements regarding night work.

   The I/D Period as established above for this Contract is a fixed date and will not be changed for any reason whatsoever unless done so by the Secretary, and then only under extreme conditions as determined by, and at the sole discretion of, the Secretary.

Contract Language – Identified Work within I/D Period

(c) Identified Work. All work identified below shall be completed before the end of the I/D Period:

(1) Wearing course of pavement placed on approaches;

(2) Centerline of the approaches marked with line striping targets;

(3) Permanent bridge rail and approach guardrail; and

(4) Temporary pavement taper placed at bridge ends; and

(5) Transition barrier concrete achieves 85% design strength

(6) Detour signs removed or covered up.

All prefabricated concrete elements required to complete the Identified Work shall be authorized for shipment prior to the start of the I/D Period.

Contract Language – Pay Schedule for I/D Period

(d) Pay Schedule. The Contractor will receive a lump sum compensation of $59,800.00 for completing the Identified Work before the end of the I/D Period.

In addition to the lump sum payment, the Contractor will also be compensated at a rate of $300.00 per hour for each hour that the Identified Work is completed prior to the end of the I/D Period, up to a maximum total payment of $103,000.00 (including the lump sum payment). Only full hours where the new bridge is opened by 6:59 a.m. will count toward this extra incentive payment.

For each hour after the end of the I/D Period that the Identified Work remains uncompleted, the Contractor will be assessed a disincentive at a rate of $300.00 per hour. The full hourly disincentive amount will be assessed for each hour during which the Identified Work is not completed for any portion of the hour. There shall be no maximum on the disincentive amount.

This assessed disincentive is separate from, and will be imposed in addition to, liquidated damages which may be imposed for failure to complete the Contract on time.

Contract Language – Pre-I/D period meeting

(b) Meetings. There shall be a pre-I/D period meeting held on site with the Contractor's Superintendent, Contractor's Project Manager, the Engineer, the Project Manager, the Town of Georgia, Town of Georgia Fire Department, Georgia First Response, Vermont State Police, and the Northwest Regional Planning Commission (NRPC) to discuss durations of work, types of night work, work sequencing, etc. The Contractor shall be responsible for setting this meeting up and making appropriate contacts. This meeting shall be held a minimum of 14 Calendar Days prior to the start of the I/D Period.

For this Project, there shall also be a public information meeting prior to the start of the I/D Period. The Contractor's Superintendent and Contractor's Project Manager shall be available to attend. The Contractor shall be prepared to discuss the construction schedule with the public. The Public Outreach Coordinator shall be responsible for setting this meeting up and making appropriate contacts. This meeting shall be held a minimum of 21 Calendar Days prior to the start of the I/D Period.

Weekly meetings between the Contractor, Engineer, and other pertinent parties as determined by the Engineer shall be held during the I/D Period to discuss the Project progress and future construction activities, and current CPM progress schedules and narratives.

Contract Language – Traffic Control - Closure

Traffic Control

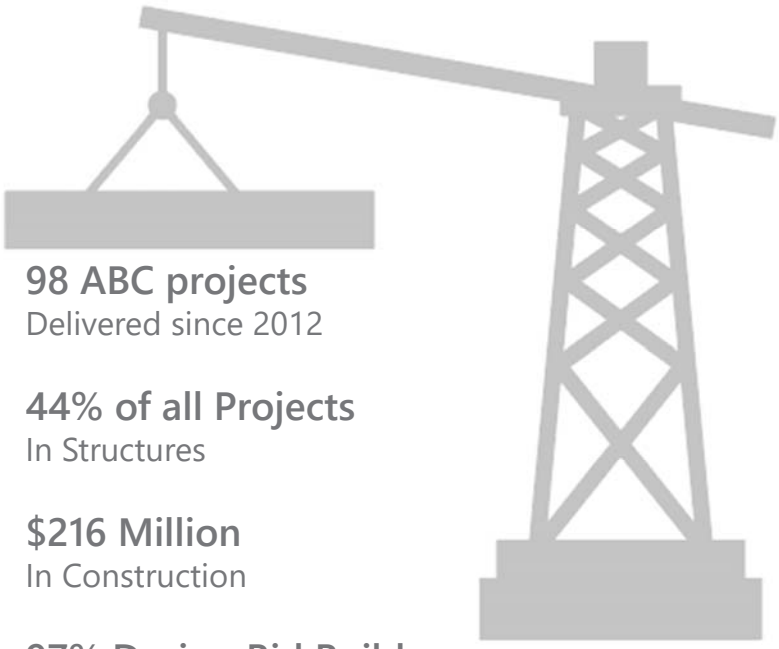
The contractor shall be responsible for the design and implementation of a specific traffic control plan for all stages of construction. The plan shall clearly detail how traffic will be maintained for each phase of construction. The plan shall clearly specify all construction activities for each phase and show appropriate temporary traffic control. All costs will be included in the item 641.11, Traffic Control, All inclusive".

Allowable work outside of closure

No daily lane closures will be allowed before 14 days prior to the BCP to progress work items outside EPSC and Traffic Control.

In the 14 days prior to the BCP the contractor will be allowed to maintain a minimum of one-lane (10 feet wide) alternating traffic for Pre-Excavation of Integral Abutment Piles, and pile driving operations during daytime hours. No night work will be allowed during this 14-day window and two-lane, two-way traffic must be maintained on the existing alignment during nighttime hours.

Accelerated Bridge Program



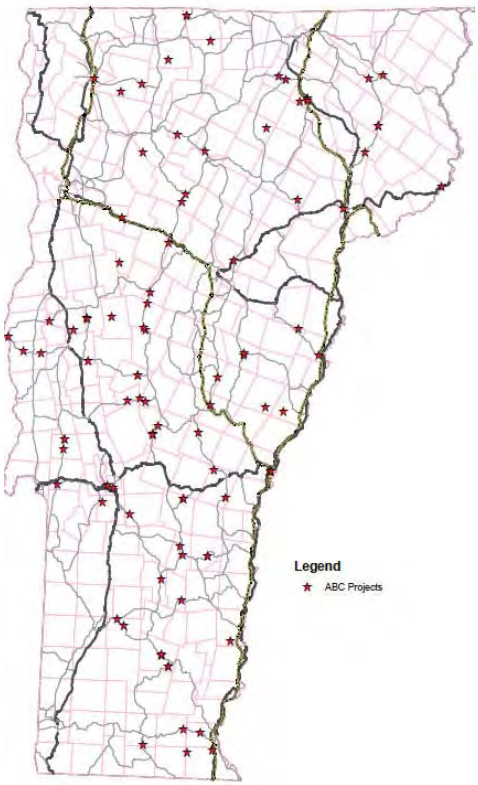
98 ABC projects
Delivered since 2012

44% of all Projects
In Structures

$216 Million
In Construction

97% Design Bid Build
3% Alternative Contracting

ABC Projects in Vermont



Questions?

VERMONT
AGENCY OF TRANSPORTATION

Accelerated Bridge Program

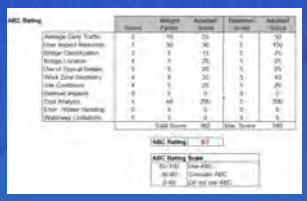
Vermont Contacts:
Kristin Higgins Kristin.higgins@vermont.gov
Rob Young Rob.young@vermont.gov

A State DOT's ABC Decision-Making Process

Presenter

Timothy D. Fields, P.E.

Transportation Principal Engineer
Division of Bridges - Major Structures
Connecticut Department of Transportation



1

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Connecticut DOT's ABC Decision Process

- ABC Decision Matrix developed as a collaborative process with major assistance From Mike Culmo, P.E. with CHA Consulting, Inc.
- Development occurred over 3 year period
- Used on pilot basis during refinement prior to official release
- ABC Decision Matrix officially released November 2017 with mandate for use in CTDOT bridge design projects
- Now used in preliminary design of all bridge projects involving replacement of bridge deck, superstructure, and entire bridge

2

Connecticut Department of Transportation

Benefits of ABC

From FHWA ABC Website

- ABC can improve:
  - Site Constructability
  - Total project delivery time
  - Work-zone safety for the traveling public
- ABC can reduce:
  - Traffic Impacts
  - Onsite construction time
  - Weather-related time delays

Any decision to use ABC should be based on these benefits

Implementation of ABC at CTDOT

- CTDOT understood the benefits of ABC
- But needed a decision process to use ABC wisely
  - Early ABC projects were successful, but expensive
  - Needed method to evaluate comparative costs and benefits of ABC for good project decision making

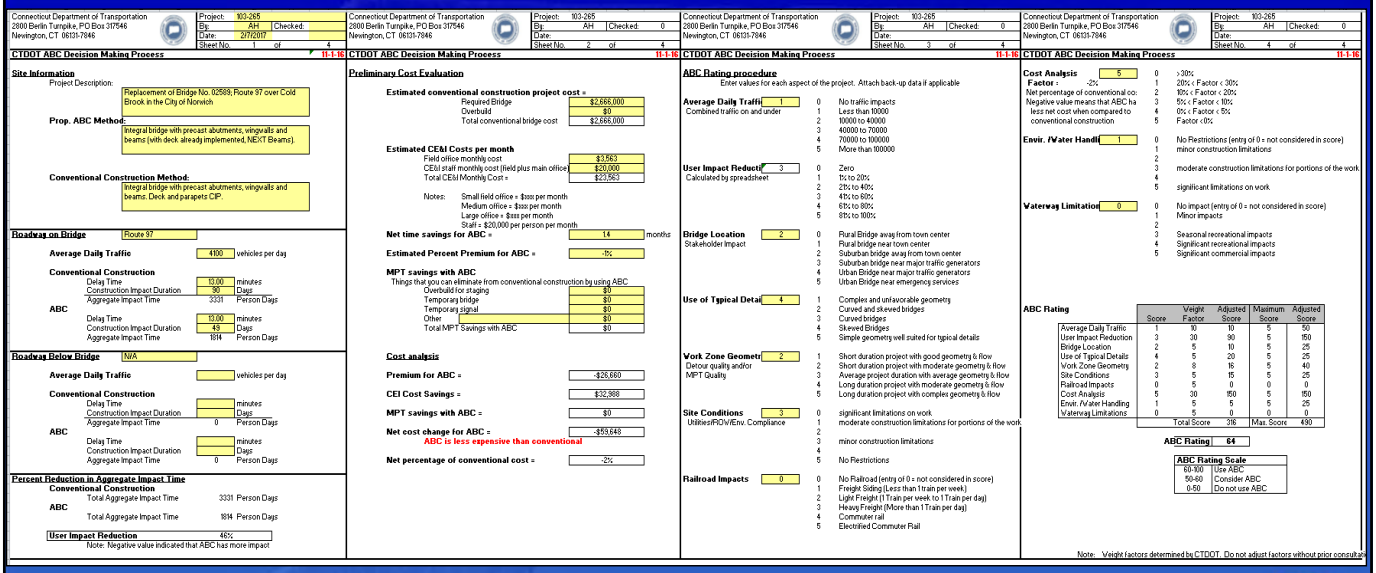
Building on work by others

- There were several ABC decision processes in use across the United States
  - Some simple (FHWA, Utah DOT)
  - Others more complex (Oregon: Analytical Hierarchy Process)
- Simple process
  - Easy to use
  - May not factor in all the desired aspects of the decision process (i.e. Cost)
- Complex Process
  - Provides a more detailed justification
  - Not justified at the decision process milestone (not all information is determined yet)
  - Too onerous

CTDOT Approach

- Middle ground approach
  - Keep it relatively simple:
    - Use aspects of the UTAH ABC decision matrix
    - Weighted scoring algorithm
  - Develop a simplified road user impact process
  - Account for total project costs
  - Offset ABC costs with costs that can be reduced or eliminated with ABC

ABC Decision Matrix



- Matrix calculates weighted ABC rating scores for all input variables.
- Output macro then provides the user with an ABC rating score.
- (Spreadsheet input in ***yellow*** boxes; Spreadsheet output in ***white*** boxes)

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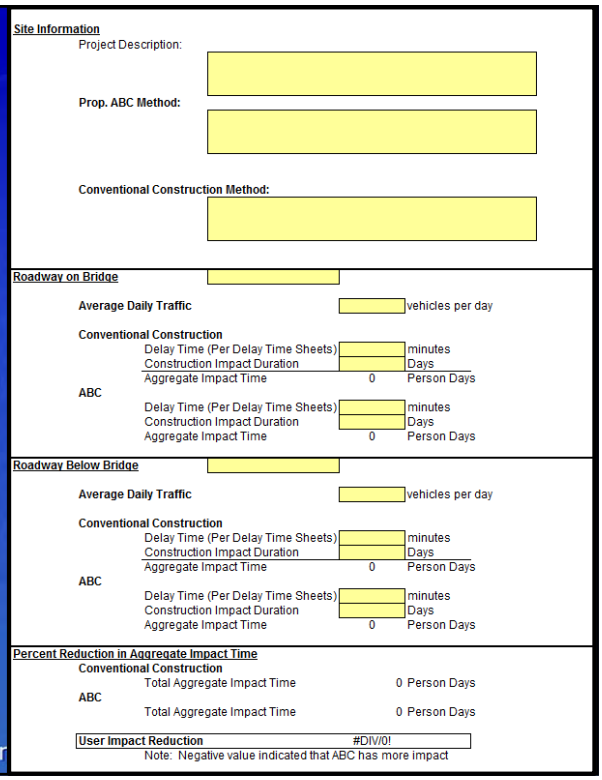
Connecticut Department of Transportation

ABC Decision Matrix Sheet 1

CTDOT ABC Matrix Screen Shot

Enter Site Information data
- Project description
- ABC construction method
- Conventional Construction method

Enter following traffic inputs for *Roadway on Bridge* and *Roadway Below Bridge* (if applicable) for both *Conventional* and *ABC* alternatives for determination of user impact reduction:
  - ADT
  - Delay Time (entered from supplementary traffic delay time spreadsheets)
  - Construction Impact duration
- Spreadsheet calculates *User Impact Reduction* value for ABC compared to Conventional Construction



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CTDOT Approach to User Impacts

- User costs
  - Some states calculate user costs
  - Good tool for political justification of ABC
  - Problem:
    - You cannot spend user costs (not a real cost to the DOT)
    - Approach to calculating user costs vary widely
  - What is important?
    - Impact of ABC on road users, environment, etc.
    - The ratio of impacts is more important than the $$

CTDOT Approach to User Impacts

- User cost impact ratio approach
  - Compare aggregate road user impacts for ABC versus conventional construction
    - Calculated in person days
    - Add up impacts to travelers on the bridge and below the bridge
    - Calculate a percent increase or reduction
  - Key factors needed
    - ADT for all roadways
    - Delay time for all roadways

Weighted Factors

User Impact Reduction

- This value is a percent reduction of the time it takes for ABC construction compared to conventional construction.
- The spreadsheet calculates the appropriate value based on the input.
- Weight Factor: 30/108 (one of the highest weight factors)

Roadway on Bridge			
Average Daily Traffic		vehicles per day	
Conventional Construction			
Delay Time (Per Delay Time Sheets)		minutes	
Construction Impact Duration		Days	
Aggregate Impact Time	0	Person Days	
ABC			
Delay Time (Per Delay Time Sheets)		minutes	
Construction Impact Duration		Days	
Aggregate Impact Time	0	Person Days	
Roadway Below Bridge			
Average Daily Traffic		vehicles per day	
Conventional Construction			
Delay Time (Per Delay Time Sheets)		minutes	
Construction Impact Duration		Days	
Aggregate Impact Time	0	Person Days	
ABC			
Delay Time (Per Delay Time Sheets)		minutes	
Construction Impact Duration		Days	
Aggregate Impact Time	0	Person Days	
Percent Reduction in Aggregate Impact Time			
Conventional Construction			
Total Aggregate Impact Time	0	Person Days	
ABC			
Total Aggregate Impact Time	0	Person Days	
User Impact Reduction	#DIV/0!		
Note: Negative value indicated that ABC has more impact			

User Impact Reduction	5	0	Zero
Calculated by spreadsheet		1	1% to 20%
		2	21% to 40%
		3	41% to 60%
		4	61% to 80%
		5	81% to 100%

CTDOT ABC Matrix Screen Shots

Connecticut Department of Transportation

User Impact Example

Site Information			
Project Description:	Short span bridge replacement Bridge over a waterway		
Prop. ABC Method:	Precast Integral Substructure Modular Deck Beams Detour traffic		
Conventional Construction Method:	Staged construction One lane alternating traffic		

Roadway on Bridge	Route 99		
Average Daily Traffic	7000	vehicles per day	
Conventional Construction			
Delay Time (Per Delay Time Sheets)	3.00	minutes	
Construction Impact Duration	300	Days	
Aggregate Impact Time	4375	Person Days	
ABC			
Delay Time (Per Delay Time Sheets)	8.00	minutes	
Construction Impact Duration	30	Days	
Aggregate Impact Time	1167	Person Days	

Percent Reduction in Aggregate Impact Time		
Conventional Construction		
Total Aggregate Impact Time	4375	Person Days
ABC		
Total Aggregate Impact Time	1167	Person Days
User Impact Reduction	73%	
Note: Negative value indicated that ABC has more impact		

CTDOT ABC Matrix Screen Shots

Connecticut Department of Transportation

CTDOT Approach to cost analysis

Ways to save $$ with ABC

- Reduced Construction Management Costs
  - Field Inspectors: Less time on the job
  - Backoffice staff: Reduced number of invoices and reports
  - Field office and equipment rental: Reduced number of months
- Reduced Traffic Management Costs
  - Temporary signals
  - Flagging and police
  - Multiple stages of construction
  - Elimination of Temporary Bridges
  - Elimination of overbuilds to accommodate construction stages

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Connecticut Department of Transportation

ABC Decision Matrix Sheet 2

Entire following project inputs:

- Conventional Project Cost
  - Overbuild
  - Req'd base bridge costs
- CE&I Monthly costs
  - Field office
  - CE&I staff
- ABC Net time savings
- ABC estimated add'l cost premium
- MPT (Maintenance & Protection of Traffic) cost savings with ABC
  - Overbuild not needed
  - Temporary bridge not needed
  - Temporary signal not needed
  - Other

Spreadsheet calculates the ABC premium as a "Net Percentage of conventional cost"

CTDOT ABC Matrix Screen Shot

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Estimated conventional construction project cost =

Required Bridge	
Overbuild	$0
Total conventional bridge cost	$0

Estimated CE&I Costs per month

Field office monthly cost	
CE&I staff monthly cost (field plus main office)	
Total CE&I Monthly Cost =	$0

Notes: Small field office = $xxx per month
Medium office = $xxx per month
Large office = $xxx per month
Staff = $20,000 per person per month

Net time savings for ABC = months

Estimated Percent Premium for ABC =

MPT savings with ABC

Things that you can eliminate from conventional construction by using ABC

Overbuild for staging	$0
Temporary bridge	$0
Temporary signal	$0
Other	$0
Total MPT Savings with ABC	$0

Cost analysis

Premium for ABC =	$0
CEI Cost Savings =	$0
MPT savings with ABC =	$0
Net cost change for ABC =	$0
ABC is less expensive than conventional	
Net percentage of conventional cost =	#DIV/0!

Cost Analysis Example

Preliminary Cost Evaluation

Estimated conventional construction project cost =

Required Bridge	$2,000,000
Overbuild	
Total conventional bridge cost	$2,000,000

Estimated CE&I Costs per month

Field office monthly cost	$2,000
CE&I staff monthly cost (field plus main office)	$40,000
Total CE&I Monthly Cost =	$42,000

Net time savings for ABC =	12.0	months
Estimated Percent Premium for ABC =	20%	

MPT savings with ABC

Things that you can eliminate from conventional construction by using ABC

Overbuild for staging	
Temporary bridge	$0
Temporary signal	$40,000
Other	$0
Total MPT Savings with ABC	$40,000

Cost analysis

Premium for ABC =	$400,000
CEI Cost Savings =	$504,000
MPT savings with ABC =	$40,000
Net cost change for ABC =	-$144,000
ABC is less expensive than conventional	
Net percentage of conventional cost =	-7%

CTDOT ABC Matrix Screen Shots

ABC Decision Matrix Sheet 3

CTDOT ABC Matrix Screen Shot

Enter project rating values:

- Average Daily Traffic
- Bridge Location
- Use of Typical Details
- Work Zone Geometry
- Site Conditions
- Railroad Impacts

User Impact Reduction is internally computed from data input on Sheet 1

ABC Rating procedure

Enter values for each aspect of the project. Attach back-up data if applicable

Average Daily Traffic Combined traffic on and under		0	No traffic impacts
		1	Less than 10000
		2	10000 to 40000
		3	40000 to 70000
		4	70000 to 100000
		5	More than 100000
User Impact Reduction Calculated by spreadsheet	#DIV/0!	0	Zero
		1	1% to 20%
		2	21% to 40%
		3	41% to 60%
		4	61% to 80%
		5	81% to 100%
Bridge Location Stakeholder Impact		0	Rural Bridge away from town center
		1	Rural bridge near town center
		2	Suburban bridge away from town center
		3	Suburban bridge near major traffic generators
		4	Urban Bridge near major traffic generators
		5	Urban Bridge near emergency services
Use of Typical Details		1	Complex and unfavorable geometry
		2	Curved and skewed bridges
		3	Curved bridges
		4	Skewed Bridges
		5	Simple geometry well suited for typical details
Work Zone Geometry Detour quality and/or MPT Quality		1	Short duration project with good geometry & flow
		2	Short duration project with moderate geometry & flow
		3	Average project duration with average geometry & flow
		4	Long duration project with moderate geometry & flow
		5	Long duration project with complex geometry & flow
Site Conditions Utilities/ROW/Env. Compliance		0	significant limitations on work
		1	moderate construction limitations for portions of the work
		2	
		3	minor construction limitations
		4	
		5	No Restrictions
Railroad Impacts		0	No Railroad (entry of 0 = not considered in score)
		1	Freight Siding (Less than 1 train per week)
		2	Light Freight (1 Train per week to 1 Train per day)
		3	Heavy Freight (More than 1 Train per day)
		4	Commuter rail
		5	Electrified Commuter Rail

Weighted Factors

Average Daily Traffic

- The goal of this measure is to account for the number of vehicles that are traversing the construction site. The value used should account for vehicles on the bridge and vehicles under the bridge (overpass structures).
- Weight Factor: 10/108

CTDOT Traffic Count Website

Average Daily Traffic		
Combined traffic on and under	0	No traffic impacts
	1	Less than 10000
	2	10000 to 40000
	3	40000 to 70000
	4	70000 to 100000
	5	More than 100000

CTDOT ABC Matrix Screen Shot

Weighted Factors

Bridge Location

- This is a measure of the location relative to the surrounding community and the impact on the economy when there is construction work on the bridge. A location that is vital to a connection to other transit would rate high in use of ABC. A location nearby a hospital would equally rate high.
- Weight Factor: 5/108

Bridge Location		
Stakeholder Impact	0	Rural Bridge away from town center
	1	Rural bridge near town center
	2	Suburban bridge away from town center
	3	Suburban bridge near major traffic generators
	4	Urban Bridge near major traffic generators
	5	Urban Bridge near emergency services

CTDOT ABC Matrix Screen Shot

Weighted Factors

Use of Typical Details

- The complexity of design is a factor we use to calculate the ability to utilize ABC. A site with simple geometry rates high while a site with complex geometry rates low.
- Weight Factor: 5/108

Use of Typical Details	1	Complex and unfavorable geometry
	2	Curved and skewed bridges
	3	Curved bridges
	4	Skewed Bridges
	5	Simple geometry well suited for typical details

CTDOT ABC Matrix Screen Shot

Weighted Factors

Work Zone Geometry

- This measure pertains to safety both for workers and motorists.
- For example: With alternating one-way traffic the potential for an accident is greater than if a project is constructed with a detour.
- Weight Factor: 8/108

Work Zone Geometry Detour quality and/or MPT Quality	1	Short duration project with good geometry & flow
	2	Short duration project with moderate geometry & flow
	3	Average project duration with average geometry & flow
	4	Long duration project with moderate geometry & flow
	5	Long duration project with complex geometry & flow

CTDOT ABC Matrix Screen Shot

Weighted Factors

Site Conditions

- This is a measure of site restrictions and how limited ROW or significant utilities impacts construction of the project.
- Numerous utilities could severely influence the ability to use ABC construction.
- Restrictive ROW (e.g. building that cannot be acquired) prohibits the use of certain types of ABC construction like lateral slides, potentially SPMT moves or crane placement for prefabricated bridge units.
- Weight Factor: 5/108

Site Conditions	0	significant limitations on work
Utilities/ROW/Env. Compliance	1	moderate construction limitations for portions of the work
	2	
	3	minor construction limitations
	4	
	5	No Restrictions

CTDOT ABC Matrix Screen Shot

Weighted Factors

Railroad Impacts

- This is a measure of the importance of maintaining rail traffic.
- A high volume of rail traffic or important rail lines benefit highly from ABC construction techniques.
- An important rail line is defined as one that has significant influence on commuters or the economic vitality of the region it serves.
- Weight Factor: 5/108

Railroad Impacts	0	No Railroad (entry of 0 = not considered in score)
	1	Freight Siding (Less than 1 train per week)
	2	Light Freight (1 Train per week to 1 Train per day)
	3	Heavy Freight (More than 1 Train per day)
	4	Commuter rail
	5	Electrified Commuter Rail

CTDOT ABC Matrix Screen Shot

ABC Decision Matrix Sheet 4

Enter Project rating values:

- Cost Analysis Factor
- Environmental Water Handling
- Waterway Limitations

(ABC Rating Table - discuss next slide)

CTDOT ABC Matrix Screen Shot

Cost Analysis Factor = #DIV/0!		
Net percentage of conventional cost	0	>30%
Negative value means that ABC has	1	20% < Factor < 30%
less net cost when compared to	2	10% < Factor < 20%
conventional construction	3	5% < Factor < 10%
	4	0% < Factor < 5%
	5	Factor <0%
Envir. /Water Handling	0	No Restrictions (entry of 0 = not considered in score)
	1	minor construction limitations
	2	
	3	moderate construction limitations for portions of the work
	4	
	5	significant limitations on work
Waterway Limitations	0	No impact (entry of 0 = not considered in score)
	1	Minor impacts
	2	
	3	Seasonal recreational impacts
	4	Significant recreational impacts
	5	Significant commercial impacts

ABC Rating

	Score	Weight Factor	Adjusted Score	Maximum Score	Adjusted Score
Average Daily Traffic	0	10	0	5	50
User Impact Reduction	#DIV/0!	30	#DIV/0!	5	150
Bridge Location	0	5	0	5	25
Use of Typical Details	0	5	0	5	25
Work Zone Geometry	0	8	0	5	40
Site Conditions	0	5	0	5	25
Railroad Impacts	0	5	0	0	0
Cost Analysis	0	30	0	5	150
Envir. /Water Handling	0	5	0	0	0
Waterway Limitations	0	5	0	0	0
		Total Score	#DIV/0!	Max. Score	465

ABC Rating	#DIV/0!

ABC Rating Scale	
60-100	Use ABC
50-60	Consider ABC
0-50	Do not use ABC

Note: Weight factors determined by CTDOT. Do not adjust factors without prior consultation.

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Con

Weighted Factors

Cost Analysis

- This is comparative measure between the additional costs associated with ABC methodology related to the additional cost of conventional construction.
- The cost factor is generated from Sheet 2 and shown to the left of the input box.
- CTDOT is willing to spend a measured premium if other factors are high
- Weight Factor: 30/108 (one of the highest weight factors)

Cost Analysis Factor = -8%		
Net percentage of conventional cost	0	>30%
Negative value means that ABC has	1	20% < Factor < 30%
less net cost when compared to	2	10% < Factor < 20%
conventional construction	3	5% < Factor < 10%
	4	0% < Factor < 5%
	5	Factor <0%

CTDOT ABC Matrix Screen Shot

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Connecticut Department of Transportation

Weighted Factors

Environmental/Water Handling Impacts

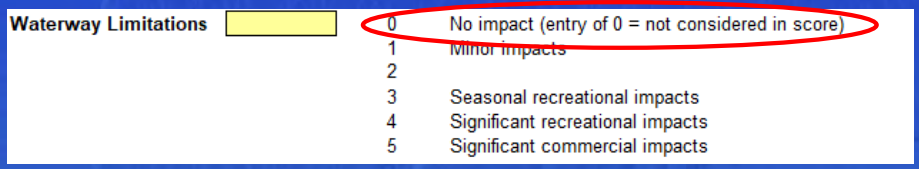
- This is a measure of the impact on time-of-year limitations for in-water work in watercourses.
- Typically, in-water work is required for installation and removal of cofferdams, and diversion pipes and other water handling measures.
- Water handling measures may be less costly on a project where shorter water diversion duration is possible and where a lower design storm frequency may be used.
- Weight Factor: 5/108

CTDOT ABC Matrix Screen Shot

Weighted Factors

Waterway Limitations

- This is a measure of the functional significance of a waterway beneath a structure and the degree to which restrictions are imposed on the waterway use by recreational and commercial users. .
- Weight Factor: 5/108



CTDOT ABC Matrix Screen Shot

ABC Decision Matrix Rating Table

- ABC Rating table computes comparative rating for ABC project methodology under consideration
- Rating Table
  - Compiles all selected or computed rating measures
  - Multiples rating measures by weighting factors
  - Divides sum of weighted measure by theoretical maximum to produce ABC rating score
- Rating Scores
  - 60-100 - Use ABC
  - 50-60 - Consider ABC
  - 0-50 - ABC not favorable

ABC Rating

	Score	Weight Factor	Adjusted Score	Maximum Score	Adjusted Score
Average Daily Traffic	0	10	0	5	50
User Impact Reduction	#DIV/0!	30	#DIV/0!	5	150
Bridge Location	0	5	0	5	25
Use of Typical Details	0	5	0	5	25
Work Zone Geometry	0	8	0	5	40
Site Conditions	0	5	0	5	25
Railroad Impacts	0	5	0	0	0
Cost Analysis	0	30	0	5	150
Envir. /Water Handling	0	5	0	0	0
Waterway Limitations	0	5	0	0	0
		Total Score	#DIV/0!	Max. Score	465

ABC Rating	#DIV/0!

ABC Rating Scale	
60-100	Use ABC
50-60	Consider ABC
0-50	Do not use ABC

CTDOT ABC Matrix Screen Shot

Weighted Scoring Algorithm

- Score each measure on a scale of 1-5
- Weight factor provided for each measure considered
- Multiply score by weight factor
- Normalize the total to a scale of 1:100
- Why weight factors?
  - Some measures in the decision process are more important than others to the Department
  - Other agencies may vary weight factors depending on ABC goals and priorities

ABC Rating

	Score	Weight Factor	Adjusted Score	Maximum Score	Adjusted Score
Average Daily Traffic	3	10	30	5	50
User Impact Reduction	4	30	120	5	150
Bridge Location	4	5	20	5	25
Use of Typical Details	4	5	20	5	25
Work Zone Geometry	3	8	24	5	40
Site Conditions	3	5	15	5	25
Railroad Impacts	0	5	0	0	0
Cost Analysis	4	30	120	5	150
Envir. /Water Handling	0	5	0	0	0
Waterway Limitations	0	5	0	0	0
		Total Score	349	Max. Score	465

ABC Rating	75

ABC Rating Scale	
60-100	Use ABC
50-60	Consider ABC
0-50	Do not use ABC

CTDOT ABC Matrix Screen Shot

ABC Decision Matrix Deployment

- Issued to all designers (in-house and consultants) on November 8, 2017
- Used in preliminary engineering phase for:
  - Deck replacement project
  - Superstructure replacement projects
  - Entire bridge replacement projects
- Not absolute
  - It is an assessment tool, not a mandate
  - Other factors can be considered (both positive and negative)
- ABC Decision Matrix - Performance Good
  - A reasonable & reliable assessment tool

Connecticut DOT Number: EB-2017-6

Office of Engineering Date: November 8, 2017

ENGINEERING BULLETIN

Division Chief, Bridges

Accelerated Bridge Construction Decision Matrix

The Accelerated Bridge Construction (ABC) Decision Matrix is issued as a new Bridge Design Standard Practice. It shall be used to assess the viability of accelerated bridge construction methodology during the preliminary design phase of all projects involving bridge deck replacement, superstructure replacement or entire bridge replacement. The companion Guide explains the use of the worksheet and definitions of the input variables obtained from project preliminary design development. The results of the accelerated bridge construction assessment for any project should not be considered to be absolute as other factors not included in the decision matrix may be significant. However, accelerated bridge construction design methodology should be very strongly considered where the results of the worksheet analysis are favorable for accelerated bridge construction. It is anticipated that the Accelerated Bridge Construction Matrix will be updated from time to time as the Department's experience grows in this relatively new construction methodology.

The Accelerated Bridge Construction Decision Matrix and Guide are available via the Bridge Standard Practices link on the Division of Bridges web page.

CTDOT Engineering Bulletin

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Connecticut Department of Transportation

Questions?

Thank You

Web address to CTDOT ABC Decision Matrix
https://portal.ct.gov/DOT/Bridges/Bridge-Standard-Practices

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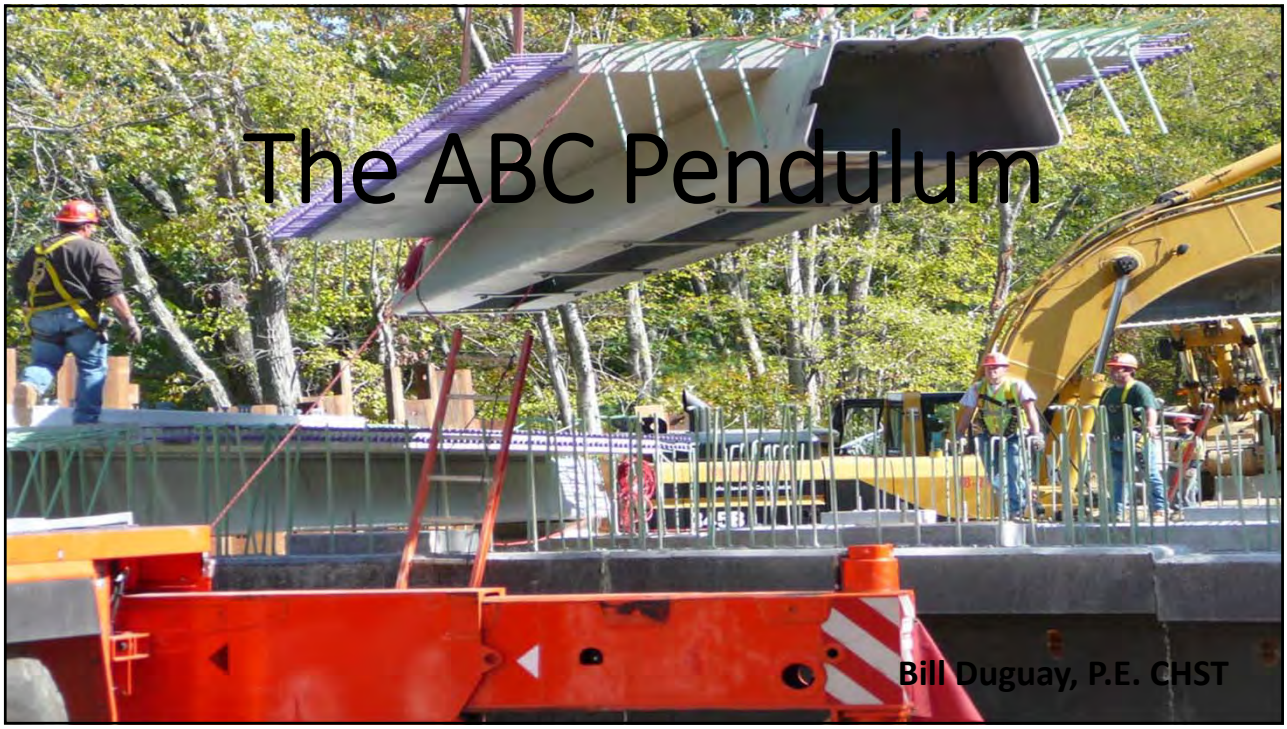
Connecticut Department of Transportation



The ABC Pendulum

Bill Duguay, P.E. CHST

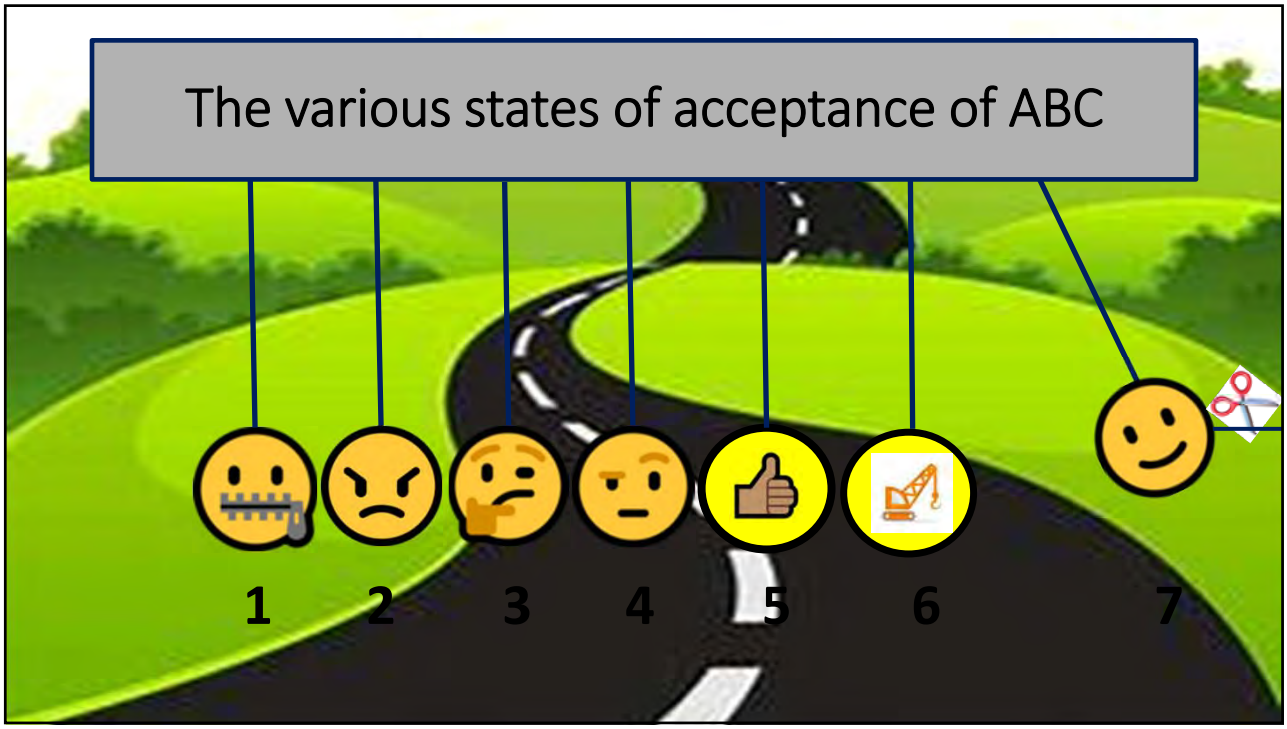
What is the issue or concern?

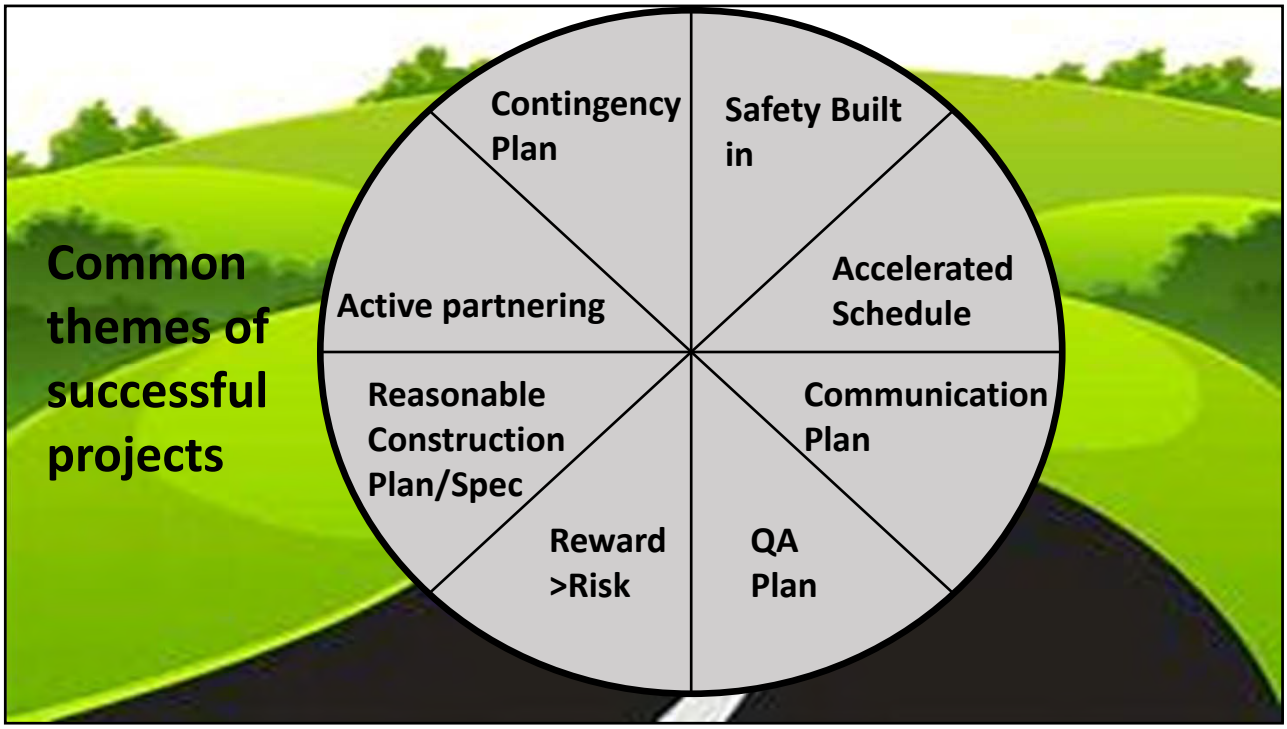
- A recent national poll of bridge owners discovered one common concern:
  - **Negative feedback** of ABC from the contracting community is holding back acceptance and wider implementation of ABC
  - The concerns being raised **aren't technical** in nature
- $1.2B version of our next highway funding bill potentially gets voted on today
  - ABC should expect increased demand as the bill passes
  - This increased demand is better met with collaborative approaches to ABC

US17, Neuse River, New Bern, NC

SH66 Rockwall, Texas

Border Express Highway, El Paso, Texas




Common themes of successful projects
Contingency Plan
Safety Built in
Active partnering
Accelerated Schedule
Reasonable Construction Plan/Spec
Communication Plan
Reward >Risk
QA Plan


How do we keep the conversation going?

Contractor/Owner Collaboration on ABC Programs Workshop: Iowa's Perspectives

September 30, 2021

Ahmad Abu-Hawash, Iowa DOT

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Agenda

- Background: Strategy, Policy Development, & Program
- Why is ABC important for Iowa
  - Benefits, Concerns, and Challenges
- What are the driving factors for ABC decisions?
  - Approach, Policy, and Framework
- What are the goals of Iowa's ABC program?
- What types of ABC projects are planned?

3

Background: Deployment Strategy

- Develop skills and design details through demonstration projects (IBRD, HfL, SHRP2, ..)
- Invest in research and include laboratory and field testing to confirm constructability and performance.
- Participate in national pooled fund studies
- Involve local construction industry and hold ABC workshops.
- Develop policies for ABC

4

Background: Policy Development

- Assembled a team of engineers from all disciplines, FHWA, and AGC.
- Goal is to create a statewide policy to determine when ABC should be used.
- Incorporated decision-making tools such as: ABC Rating Score, Flow Chart, and AHP.
- Evaluated the impact on bridge replacement program
- Presented to Leadership for approval

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Background: Policy Development

- Conducted a survey of State DOTs
- Collected and reviewed all available policies
- Discussed the development of the policy with other states, FHWA staff, and national experts at various conferences and workshops
- Collaborated with neighboring states and hosted a policy forum
- Visited a State DOT with established experience in ABC

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Background: Iowa's ABC Program

- Prefabricated Bridge Elements and Systems (PBES) – 22 projects
  - Various precast components
  - Full-depth deck panels
  - UHPC connections
- Lateral Bridge Slide – 5 projects
  - Integral abutments
  - Semi Integral abutments
  - UHPC connections

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Background: Iowa's ABC Program

ABC Components	703 O'Brien	106 Boone (Mackey Bridge)	106 Madison	305 Marion	508 Pottawattamie (CB 24th)	208 Bremer	109 Buena Vista	210 Washington	111 Pottawattamie (Keg Creek)	L-#39--73-90Wapello (Waffle Deck)	113 Cass (Massena)
Approach pavement	X					X		X	X		
Abutment wings							X		X		X
Integral abutments		X	X				X				
Semi-integral abutments									X		X
Drilled shafts									X		
Pile bents		X									
Frame piers									X		
T-piers											
Box beams			X				X				
PPCB + diaphragms		X								X	X
RSB + diaphragms											
Full depth precast deck		X			X					X	
Rails											
RSB + deck + rail									X		
Paving notch repair				X							
A + B contracting					X						
Staged construction					X						
I/D contracting							X		X		X
Slide-in bridge constr.											X
UHPC									X	X	
Post-Tensioning		X			X						
Grouted splice coupler									X		

Last updated 2014

Background: Iowa's ABC Program

Lateral Slide Projects

2013: Massena, 120'x44' PPCB
Cass County, IA 92 over Small Stream

2019: Old Woman's Creek, 135'x44' PPCB
Johnson County IA 1 over Old Woman's Creek

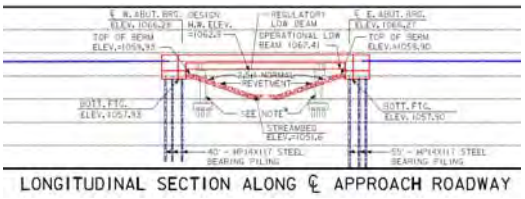
2018: Camp Creek, 120'x44' PPCB
Washington County, IA 1 over Camp Creek

2019: Old Man's Creek, 300'x44' RSB
Johnson County, IA 1 over Old Man's Creek

Background: Iowa's ABC Program

Lateral Slide Projects

2020: Muchakinock Creek, 230'x44' CWPG
Mahaska County, IA 92 over Muchakinock Creek



2022: Woodbine, 72.5'x44' PPCB (30 deg skew)
Harrison County, US 30 over Stream

There are a couple of additional ABC lateral slide projects under consideration.

ABC Traditional Construction?
5 weeks?

2024: Prairie Creek, 100'x44' PPCB
Benton County IA 150 over Prairie Creek

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Background: Iowa's ABC Program

Other Key Projects

- **2006**: Mackey Bridge: Boone County, Precast substructure and full depth precast deck panels.
- **2006**: Madison County Bridge, Precast abutment footings and precast box beams.
- **2008**: 24th Street Bridge over I-80 in Council Bluffs, Precast Deck Panels, P/T, and grout pockets.
- **2011**: US 6 over Keg Creek (Modular), PBES, UHPC, on-site prefabrication, I/D contracting, & drilled shafts.
- **2015**: IA 92 over Little Silver Creek Bridge (Keg Creek 2.0), Improvements: S.S. deck rebar, smaller UHPC joints, & CIP alternatives.
- **2019-2021**: Statewide County Bundling Project, 8 bridges, Precast Concrete Box, Precast Abutments, UHPC Joints.

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Why ABC in Iowa?

- To deal with schedule constraints
  - Limited time-window due to special events
  - Emergency replacement due to natural disasters, accidents, or intentional acts
- To minimize impact on local traffic
  - Access to business
  - Essential services
- To deal with the unavailability of suitable detour

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Why ABC in Iowa?

- Reduce public inconvenience
- Improve public perception
- Improve road users and workers safety
- Reduce negative economic impact on communities
- Perhaps improve the durability of the structure

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ABC in Iowa: Concerns/Challenges

- **Perceived** substantial increase in construction cost: fewer bridge replacements
- Staged construction or onsite detour is seen as an equivalent
- Requires the development of new design standards and specifications: higher design cost
- Contractors are generally uncomfortable with ABC: higher risk, worker's fatigue, coordination…

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ABC in Iowa: Concerns/Challenges

- Accuracy of estimating cost for new ABC concepts.
- Unknown long-term performance of bridges constructed with ABC.
- Need for higher level of construction inspection.

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Implementation Challenges

- Funding to offset ABC construction cost – need to identify new revenues or alternative funding
- Resistance from some local contractors to ABC – working with industry to change the climate
- Limited contracting methods – since Design Build (DB) is not allowed in Iowa we are looking at the partial DB option
- Design aids – we are working on ABC design policies, specifications and standard details.
- Limited experience in ABC design – several ABC projects have been identified to attain experience for our engineers.

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Driving Factors For ABC Decisions Iowa' ABC Policy

- Iowa DOT Bridge Design Manual – Chapter 8 ABC
https://iowadot.gov/bridge/policy/08-00-00AbcLRFD.pdf

- Every bridge project is evaluated for ABC

- Evaluation utilizes common decision-making tools :
  - ABC Rating Score & Flow Chart as a first level filter
  - AHP Decision Making Tool as a second level confirmation and further evaluation of alternatives.

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Driving Factors For ABC Decisions
IOWA DOT ABC Decision Making Framework

- Part 1 – ABC Rating Score (0 to 100)
  - Average Annual Daily Traffic (AADT)
  - Out of distance travel
  - Daily road user costs
  - Economy of scale
- Score >50 then further ABC consideration is warranted.
- <50 not considered a good candidate for ABC.

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Driving Factors For ABC Decisions
IOWA DOT ABC Decision Making Framework

- Part 2 – Analytical Hierarchy Process (AHP) - optional
  - Direct Costs
  - Indirect Costs
  - Schedule Constraints
  - Site Constraints
  - Customer Service

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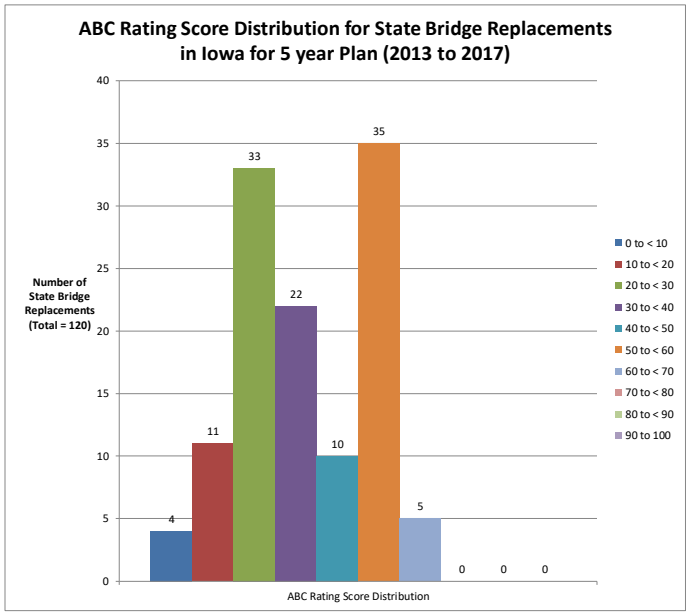
Driving Factors For ABC Decisions



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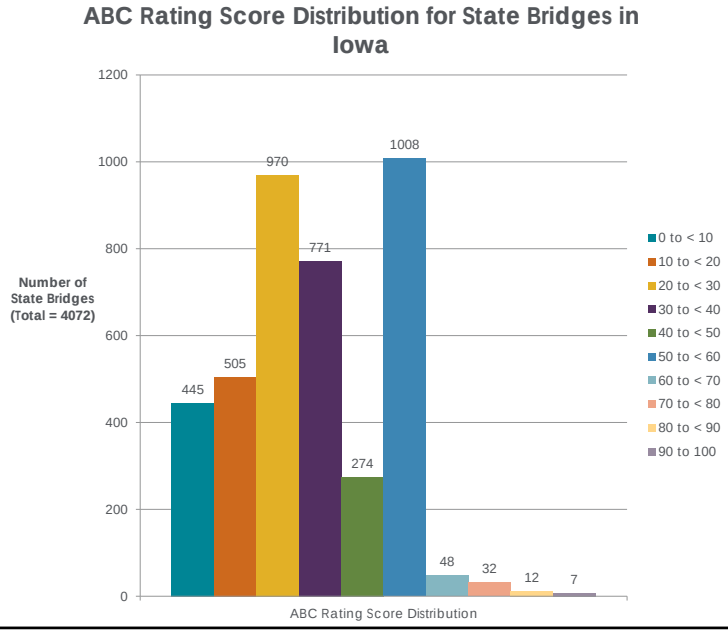
Driving Factors For ABC Decisions



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Driving Factors For ABC Decisions
Summary

- Disruption to the public and businesses
  - Availability of suitable detour route
  - Impact on local businesses
  - Out of distance travel
  - ADT & ADTT
- Cost
- District input
- Schedule

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What are the goals of Iowa's ABC Program?

- Improve safety
- Minimize disruption
- Community well being
- Customer satisfaction
- Contractor's buy-in

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What types of ABC projects are planned?

- Several lateral slide projects
- PBES or Lateral Slide project: Dubuque case study

THANK YOU FOR YOUR TIME AND ATTENTION

CONTACT INFORMATION
Ahmad Abu-Hawash
Chief Structural Engineer
Iowa DOT
ahmad.abu-hawash@iowadot.us

https://iowadot.gov/bridge/Research-and-Investigations/Accelerated-Bridge-Construction

Accelerated Bridge Construction in Nebraska

NEBRASKA
Good Life. Great Journey.
DEPARTMENT OF TRANSPORTATION

Mark Traynowicz
NDOT

Dale Burkhead
Simon Contractors

Contractor/Owner
Collaboration Workshop

September 30, 2021

Today's presentation

- Brief History of Accelerated Bridge Construction in Nebraska
- Nebraska's all Precast Bridge

History of ABC in Nebraska – How did we get here?

- Precast Concrete Deck Panels
- Steel Tubs
- Precast Elements
- Precast Approach Slabs

- Work closely with University of Nebraska
- Durable before Fast

Skyline Drive (Precast Concrete Deck Panels)

- Built in 2002
- Post-tensioning in Open Troughs
- Finished with Concrete Overlay

Phillips Interchange over I-80 (Steel Tubs)

- Built in 2003
- Simple to erect
- HPSW-100ksi
  - First in USA

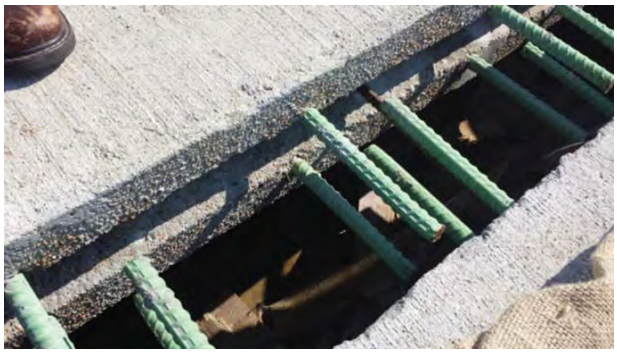
262nd Street over I-80 (Steel Tubs)

- Built in 2008
- Headed Rebar
- Overnight Interstate Closure
- HPSW-70ksi

Primrose East (Folded Plate)

- Built in 2014
- Folded Plate Girders
- GRS Abutments
- Precast Elements

Primrose East (Folded Plate)



UHPC Connections

Kearney East Bypass (Precast Concrete Deck Panels)

- Built in 2016
- Full Width
- Tangent Roadway
- Post Tensioning under Precast Panels
- No Overlay

Belden to Laurel All Precast Bridge

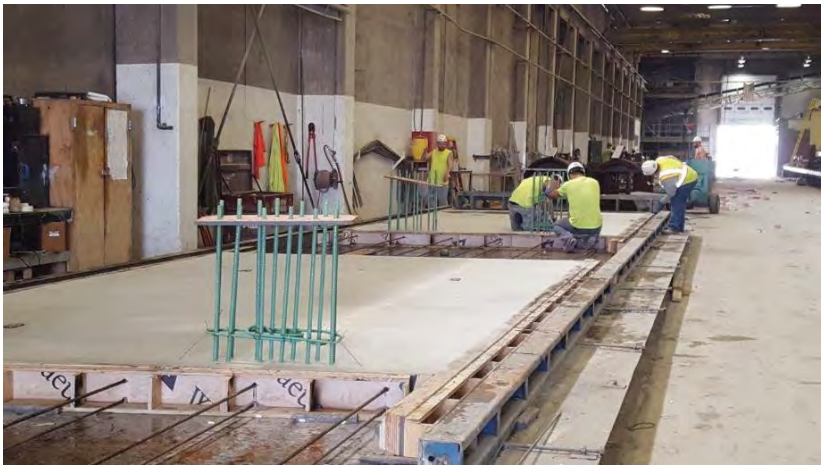
ABC Precast Elements Bridge

- Single span 130’
- 43’ wide
- 10 skew
- Construction in 2018
- Designed by NDOT Staff
- Design-Bid-Build
- 13 mile detour
- 45 Calendar days of road closure per contract
- $3,750 Incentive/Disincentive per day
- Incentive capped at ten days

55 Precast Elements

- 7 NU 1100 Prestressed Girders (131 feet long)
- 22 Full-depth Deck Panels with Bridge Rail
- 2 Abutment Caps
- 2 Abutment Backwalls
- 4 Abutment Wingwalls
- 2 Grade Beam Caps
- 8 Approach Section Panels
- 8 Paving Section Panels

- Fabricated in Lincoln, NE
- 140 miles from project site



Field Cast Concrete for Connecting Precast Elements

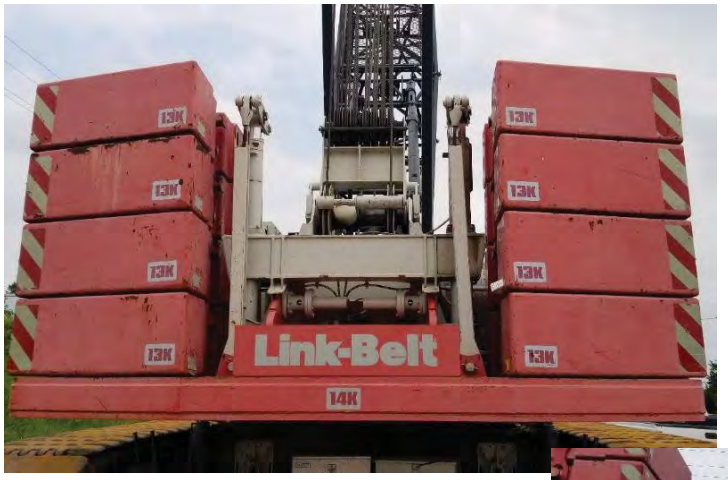
- High Early Strength Concrete
  - 3,500 psi in 48 hours
- Self-Consolidating Concrete
  - 5,000 psi
- Ultra High-Performance Concrete
  - 12,000 psi in 4 days
  - 21,000 psi in 28 days

US-20 Closed May 29, 2018

Remove Existing Bridge, Drive Pipe Piles

High Water 4 times during Construction

200 Ton Crane to lift and Set Heavy Substructure



NU-1100 Girder Weight = 47.4 Ton per girder

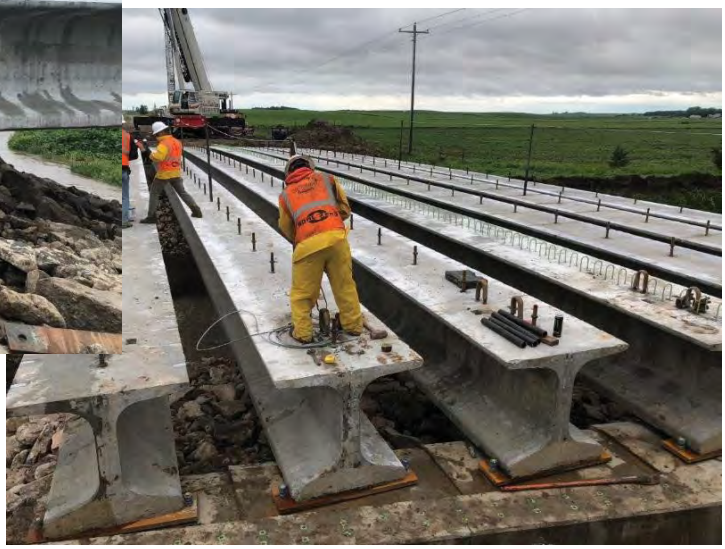
* WEIGHTS FOR ACCELERATED BRIDGE SEGMENTS	
Abutment Cap	58.5 Tons Each
Wings	29.0 Tons Each
Grade Beam	31.5 Tons Each
Approach Sections w/ Rails	22.7 Tons Each
Approach Sections w/o Rails	18.0 Tons Each
Paving Sections w/ Rail	25.4 Tons (Min.); 29.9 Tons (Max.)
Paving Sections w/o Rails	23.9 Tons (Min.); 27.0 Tons (Max.)
Interior Deck Panels	11.1 Tons Each
Exterior Deck Panels	11.8 Ton Each

* For Information Only; All Weights are Appoximate

Set Abutment Caps

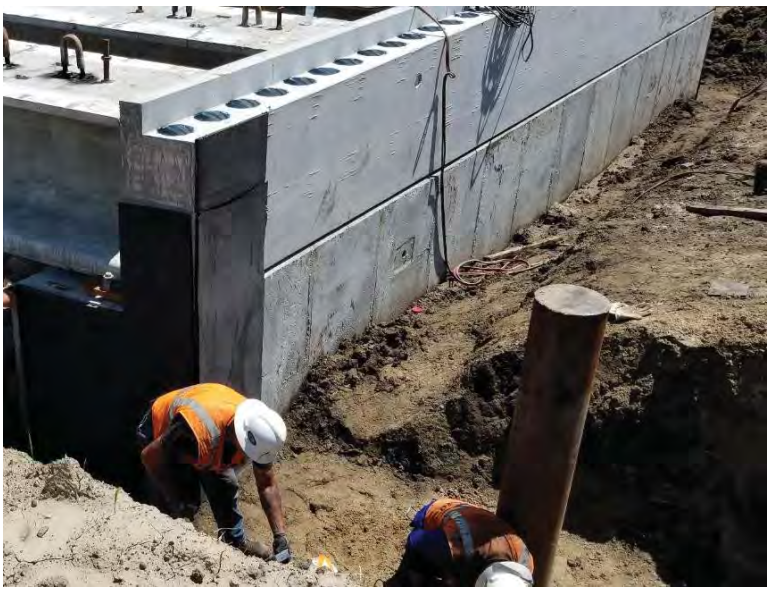
Place rebar and fill pockets with High Early-Strength Concrete

Girder Erection



Girder Camber 11” (anticipated 8.5”)

Set Abutment Backwalls



Prepare and Set Wings and Grade Beam

Drive Sheet Piles

Set Deck Panels

Styrofoam for SCC Side forms

Shim Packs to set Elevations

Setting Deck Panels

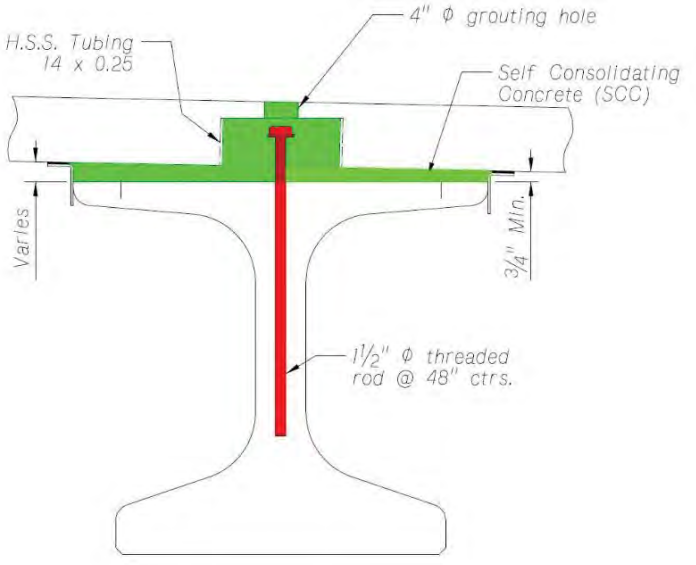
Shear Connector Pockets with Vent Holes for SCC

Setting Deck Panels

Last Panel Set July 13 – Four Days to set Panels

Placing Self-Consolidating Concrete

Belden - Laurel



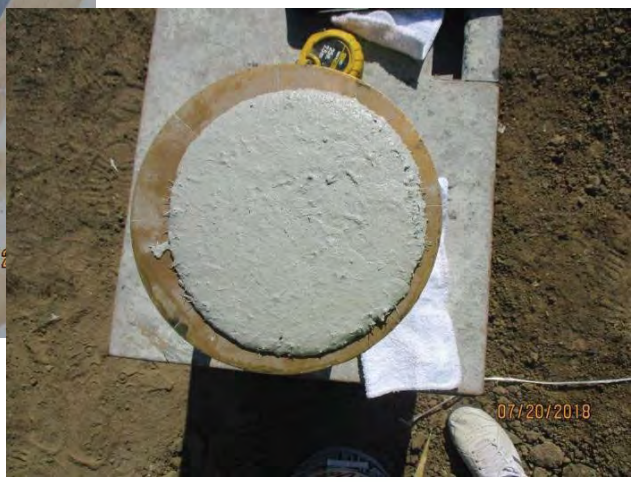
TYPICAL GIRDER SECTION
Girders A, B, C, E, F, & G

Placing Ultra High-Performance Concrete

Preparing Prior to Pour

Bridge Rail Connections - UHPC

Placing Ultra High-Performance Concrete



Precast Approach Panels

Special Thanks to NDOT District 3 Construction Personnel

Last Precast Approach Panel set on July 24

Flowable Fill Under Panels

High Early Strength Concrete in Joints

Open to Traffic July 26, 2018

Observations & Lessons Learned

- Block outs for piles were hard to line up with the driven piling
  - Suggest bigger block outs
- Difficulty keeping workers that will put in the long hours for this ABC project
- The contractor's work area (ROW) sometimes was not large enough for the equipment and prefabricated pieces
- The communication on this project was key and went very well
  - Between contractor, bridge design, fabrication plant, and district
- NDOT's good relationship with the AGC, Nebraska Chapter

Observations & Lessons Learned

- Support from DOT Administration is Important
- Input and Communication between Contractor and DOT – Before, During, and After Construction
- Durable Joints are Imperative for a long-lasting bridge
- Gain Knowledge from Research – University of Nebraska
- Market Success to the Public

ABC Next Steps - UHPC Decked NU Prestressed Girders

Questions?

MoDOT and ABC

- Why is ABC important for MoDOT?
  - It allows us to build structures faster with less inconvenience for the travelling public
- What are the driving factors for ABC decisions?
  - We typically provide an incentive/disincentive to the contractor and let them innovate to earn the maximum incentive

MoDOT and ABC

- What are the goals of MoDOT's ABC program?
  - MoDOT wants durable bridges that are built quickly
- What types of ABC projects are planned?
  - MoDOT uses many elements of ABC on a regular basis

Emery Sapp & Sons and ABC

- What are the goals when evaluating ABC opportunities?
  - What is the benefit to both ESS and the Owner
  - Will consideration of an ABC technique help us win the job
  - Will ABC increase our profit margin
  - Will ABC decrease risk
  - Will the ABC technique be a valuable tool in the future

ESS & ABC

- Typical project needs of ABC
  - High traffic areas
  - Long detour routes
  - Major industrial or business districts adversely effected
  - Immediate need for a new bridge (Emergency)
  - Reduce the risk of injury to the traveling public or the construction employees

ESS & ABC

- I-44 Project Bridge Rebuild in Southwest Missouri
  - High Traffic
  - Long Detour
  - Major Truck Route
  - Increased Safety
  - No Head to Head Traffic
  - Design Build Project – Points for limited closure days

EMERY SAPP & SONS

MoDOT

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MoDOT


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MoDOT


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MoDOT

ESS & ABC

- I-44 Laclede County – Bridge Deck Replacement
  - High Traffic
  - Long Detour
  - Major Truck Route
  - Increased Safety
  - Minimal Head to Head Traffic
  - Liquidated Damages / Incentive for Head to Head Days

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MoDOT

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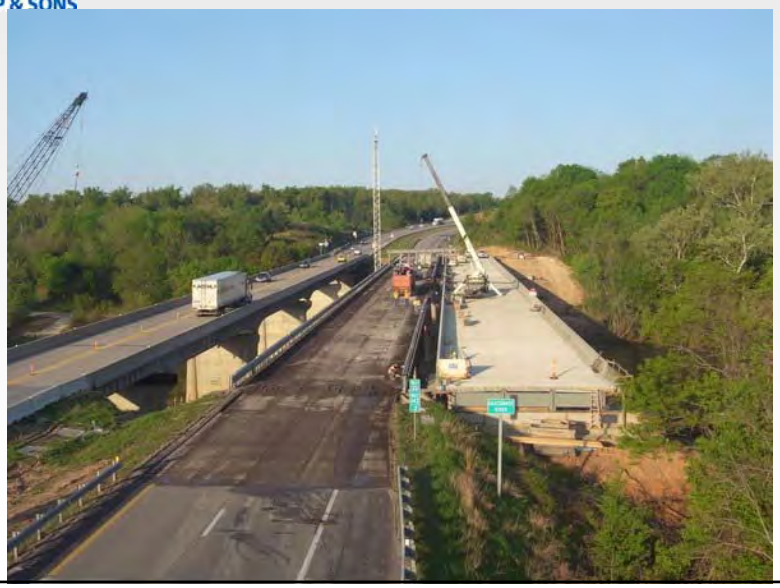
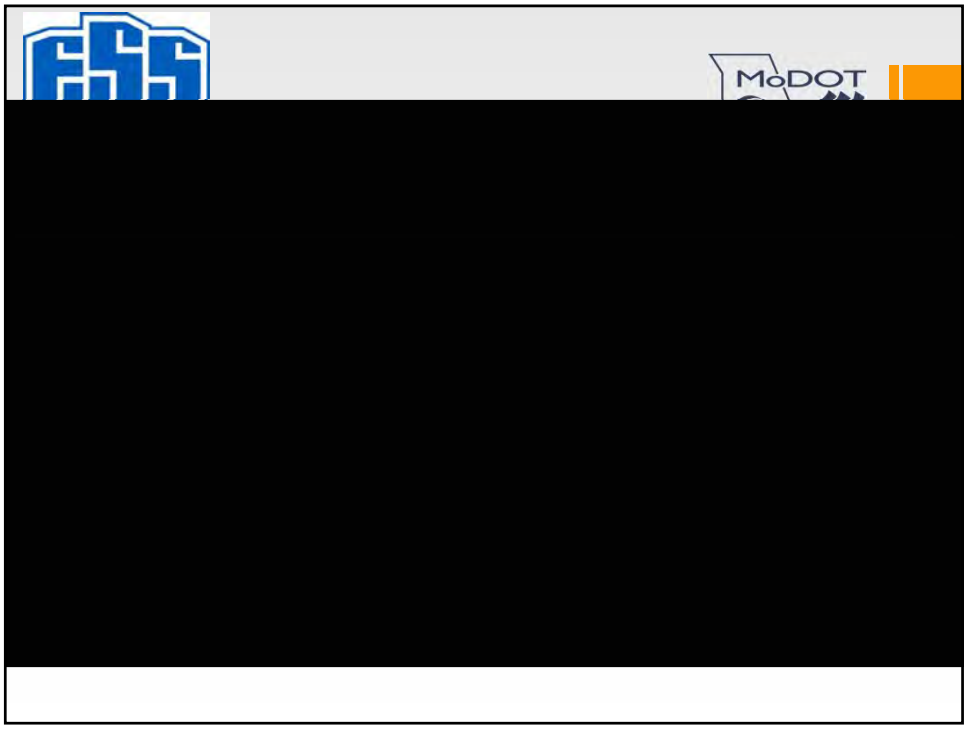
MoDOT





EMERY SAPP & SONS

ESS & ABC

- I-70 Columbia Bridges - Boone County
  - High Traffic
  - No good by-pass of traffic around Columbia
  - Increased Safety
  - Design Build awarded points for minimum number of lane closure days
  - Won the job by ½ point – ABC difference

EMERY SAPP & SONS

MoDOT

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MoDOT

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MoDOT

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MoDOT

Contractor/Owner Collaboration on ABC Programs Workshop

Recommended Approach to Contractor Collaboration for ABC at the Program Level and the Project Level

Michael Culmo, PE
Chief Bridge Engineer
CHA Consulting, Inc.

September 30, 2021

CHA

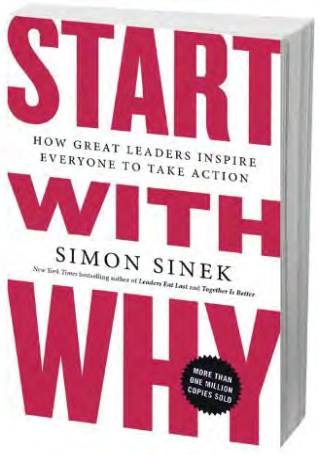
Instituting an ABC Program

- This is not an engineering problem
- This is an organizational management problem
- In order to have a successful implementation of an ABC program we need to:
  - Use a business management approach

CHA

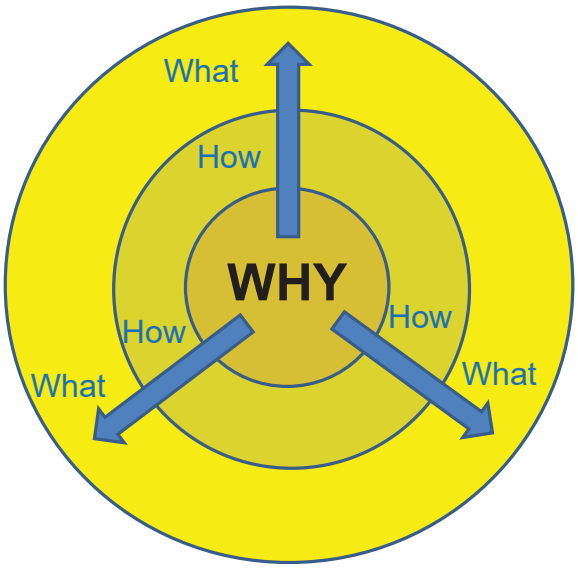
How to create a successful program

- Start with "WHY"
  - Best selling book by Sinek
  - Ted Talk Series (check it out on youtube)
  - Harley Davidson example
  - Apple example
  - https://www.youtube.com/watch?v=VtvjbmoDx-I
- We need to clearly define "WHY" we are using ABC and write it down
- Guiding Principle Statement
  - A simple short statement is preferred
- Everything that we do in an ABC program needs to be based on the "WHY"



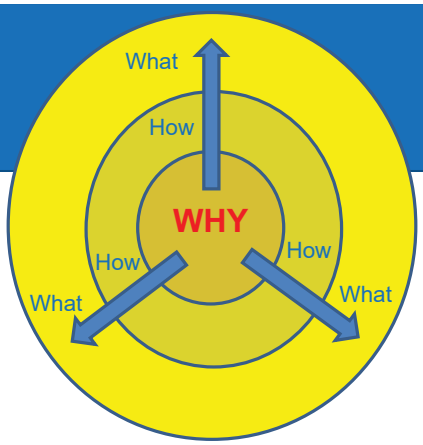
Best Selling Book
"Start with Why"

How to create a successful program



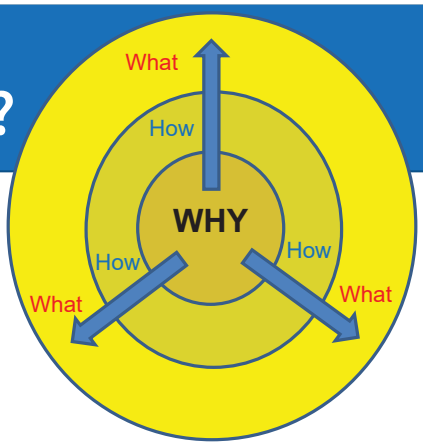
- The concept of the "Golden Circle"
  - Every process needs to be based on the "WHY"
  - The "WHATS" are the desired outcomes
  - The "HOWS" are the processes to achieve the "WHATS"

Start with "WHY"



- WHY do we use ABC?
  - Fortunately, we have this stated this already
  - FHWA ABC Website (and virtually every ABC publications)
    - Improved safety for travelers and workers
    - Improved quality and durability
    - Reduced User Impacts (Time = $$)
    - Reduced environmental impacts
    - Reduced construction management costs
  - Guiding Principle Statement: My idea
    - Changing construction to better serve society
    - You can develop your own

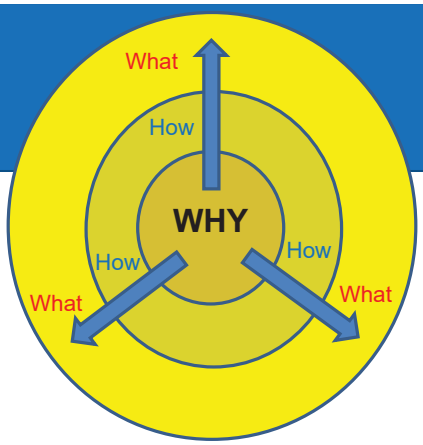
"WHAT" do we want to accomplish with an ABC Program?



We need to get buy-in from all levels of the organization and our industry partners

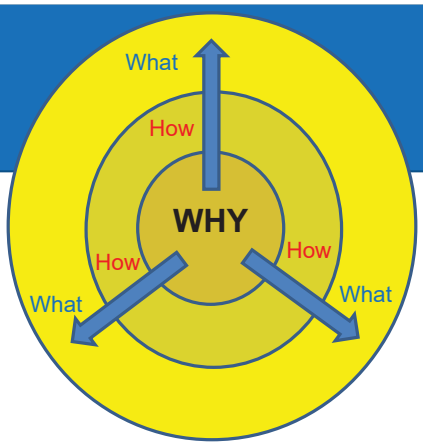
- Internal (DOT)
  - Management
  - Design staff (including consultants)
  - Construction staff
- External
  - Political
  - Public involvement
  - Contractor buy-in

Why is "buy-in" important?



- If contractors push back…
  - They won't call the design office
  - They will call
    - DOT Construction office
    - DOT management
    - Political leaders
  - If everyone is not on board with the "WHY", the program can fall apart

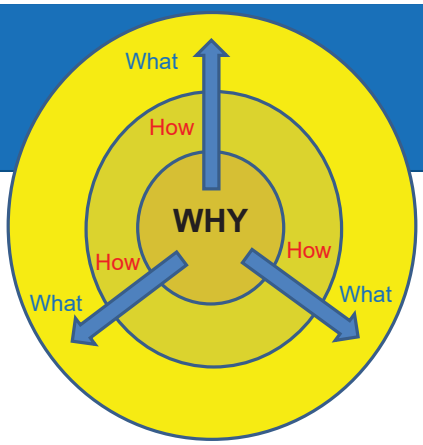
"HOW" do we get there?



We know the "WHY" and the "WHAT", what about the "HOW"?

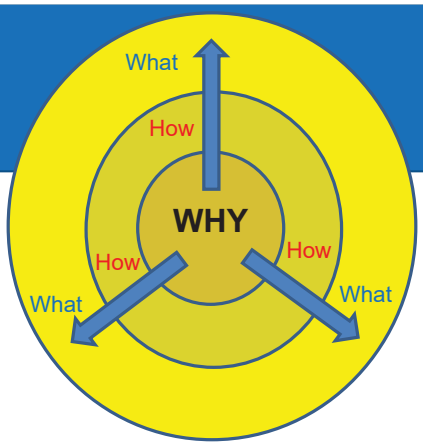
- How do we obtain contractor buy-in?

Step 1: Internal DOT Buy-in



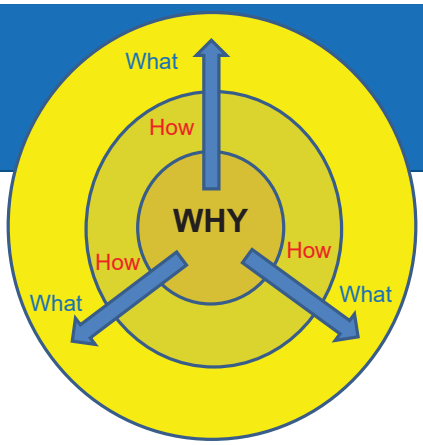
- Upper management
  - They need to be educated as to the benefits of ABC
  - This can be done with facilitated workshops/meetings
    - Open discussion about the aspirations of the program
    - Understanding of the benefits
    - Learning and understanding the meaning of the Guiding Principle Statement
  - Why is this important?
    - They need to be the flag bearers for external communications

Step 1: Internal DOT Buy-in



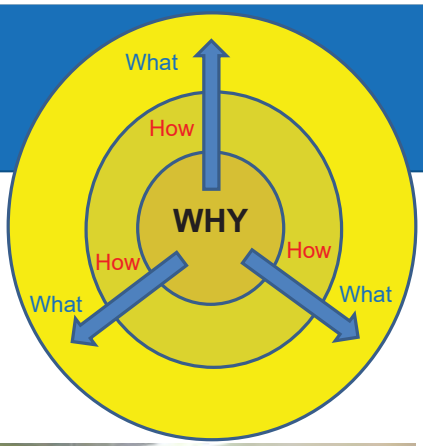
- Design Staff
  - They need to be educated as to the benefits of ABC
  - This can be done with facilitated workshops/meetings
    - Open discussion about the aspirations of the program
    - Understanding of the benefits
    - Learning and understanding the meaning of the Guiding Principle Statement
  - Training: How to design with ABC
  - Why is this important?
    - We need to develop buildable and efficient designs

Step 1: Internal DOT Buy-in



- Construction Staff
  - They need to be educated as to the benefits of ABC
  - This can be done with facilitated workshops/meetings
    - Open discussion about the aspirations of the program
    - Understanding of the benefits
    - Learning and understanding the meaning of the Guiding Principle Statement
  - Construction Benefits
    - Safety, lower CEI costs, etc.
  - Why is this important?
    - They are at the front line with the contractors

Step 2: External Buy-in

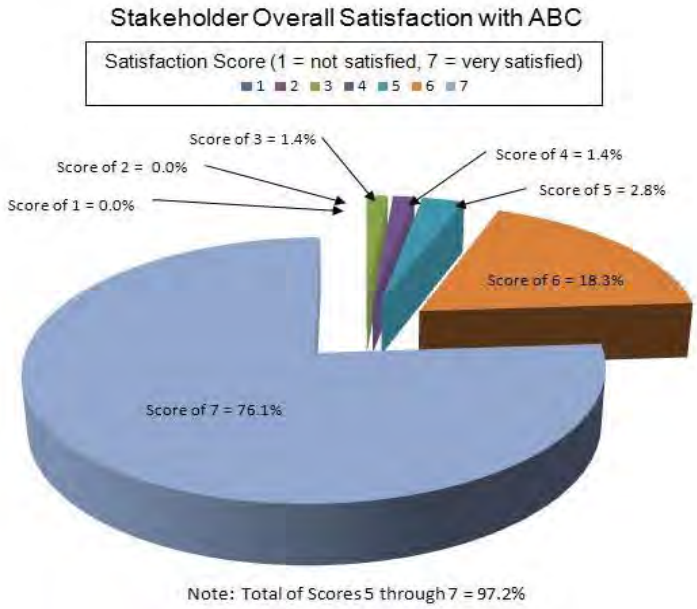


- Political
  - Politicians need to be educated as to the benefits of ABC
  - Why is this important?
    - The public will contact them, and they listen
    - Happy travelers are happy voters
    - Politicians secure funding for projects

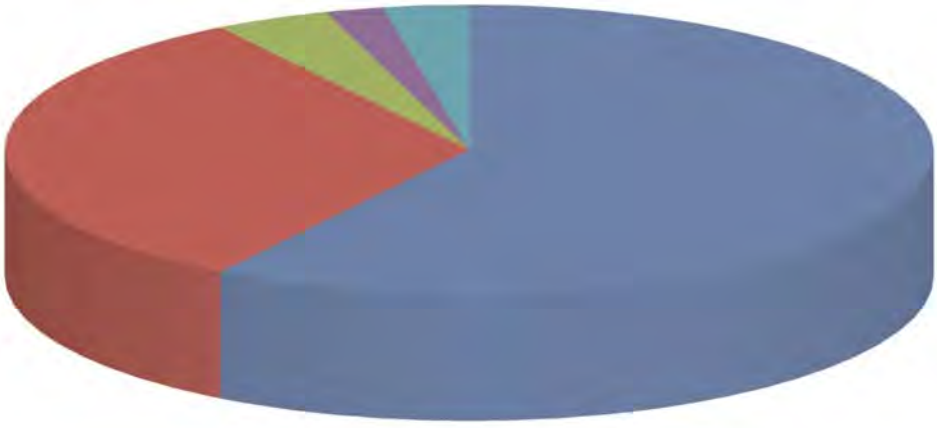
Step 2: External Buy-in

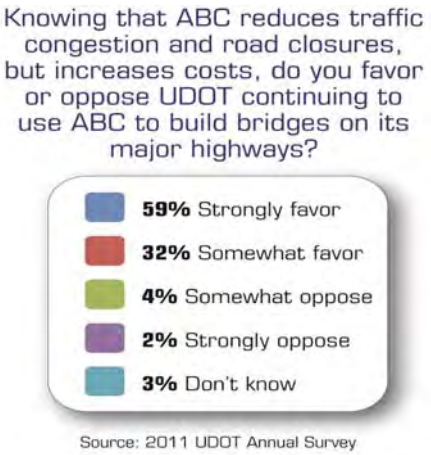
Use information from successful programs

- 2009 Utah DOT Survey



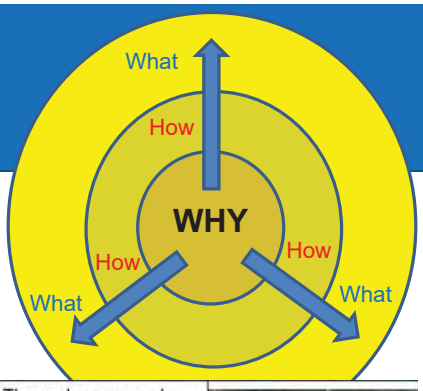
Step 2: External Buy-in





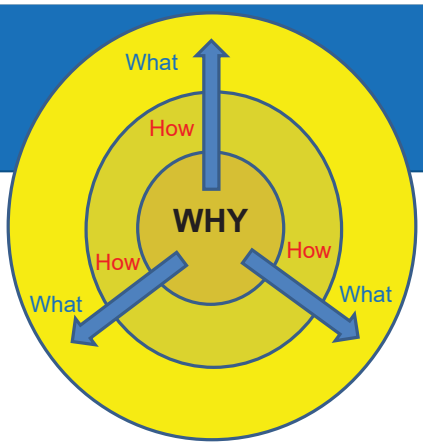
2011 Utah DOT Survey

Step 2: External Buy-in



- Public Involvement
  - We need to educate the public about what we are doing and WHY we are doing it.
  - Why is this important?
    - We often plan short-term increases in impacts for long-term reduction in impacts.
    - The public needs to know the big picture and why
    - Initially there will be a trust issue
    - They have driven for years through work zones
    - We are the butt of their jokes
    - A few successful ABC projects can turn that around fast

Step 2: External Buy-in



- Contractors
  - We need to educate contractors about what we are doing and WHY we are doing it.
  - Why is this important?
    - Given a chance, contractors will switch out precast concrete to CIP concrete

Why do Contractor's dislike ABC?

- They like to pour concrete
  - They are staffed and equipped for CIP concrete work
  - Precasting takes work away from their staff
- Potential loss of control over project production and schedule
- Risk:
  - Working with new technologies
  - Risk = $$ = loss of bid advantages

How to engage the Contracting Community

- Programmatic
  - An agency can hold regular meetings with the contractor's associations
  - Educate them about the "WHY" = Guiding Principle
  - Benefits of ABC
    - Less overhead: Do more with less staff
    - Safer work environment:
      - Shorter duration work zones
      - Building off site
    - Benefits to the traveling public
      - Reduced user costs due to delays
      - Happy motorists = Happy voters = better political support for more highway construction

What can we do about this?

- Start with “practice projects”
  - Get everyone on the same page
  - Bid a few projects with more relaxed schedules
    - Make it clear the switching to CIP will not be allowed even if there is time
      - Build contractor familiarity with ABC without so much risk
      - At some time in the future, there will be projects with much tighter schedules where ABC will be necessary
      - Goal: Reduce risk on future projects through practice
    - This should be clearly communicated with….
      - DOT management at all levels
      - Politicians
      - The contracting community

What can we do about this?

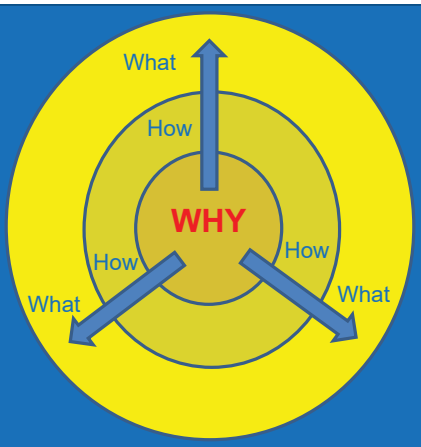
- Project Level
  - Pre-bid conferences
    - Explain why ABC is being used
      - Both programmatic and project level
    - Go through the proposed details
    - Invite comments:
      - Live
      - Post conference
    - Make it clear that switching to CIP will not be allowed

How can we make ABC more palatable to contractors?

- Relax schedules on early projects
  - But not too much
  - Reduces risk = lower bids
- Limit value of disincentives
  - Reduces risk = lower bids
- Consider allowing self-performance of precasting
  - Require development of QA/QC processes
    - Expected quality should be the same as a precast plant
    - Utah DOT has contractors obtain PCI “Precast” certification
  - Allows the contractor to keep work in-house
  - This has worked well in Utah

Conclusions

- Instituting an ABC program requires an organizational management approach
  - WHY ⟶ WHAT ⟶ HOW
  - WHY is the most important aspect
  - Everything we do should be based on the WHY
- Need to engage multiple players
  - All levels of DOT
  - Politicians
  - Contractors
  - Public
- Contractor engagement is important
  - Program level
  - Project Level



Questions?

Contractor/Owner Collaboration on ABC Programs Workshop: Case Study

September 30, 2021

Ahmad Abu-Hawash, Iowa DOT

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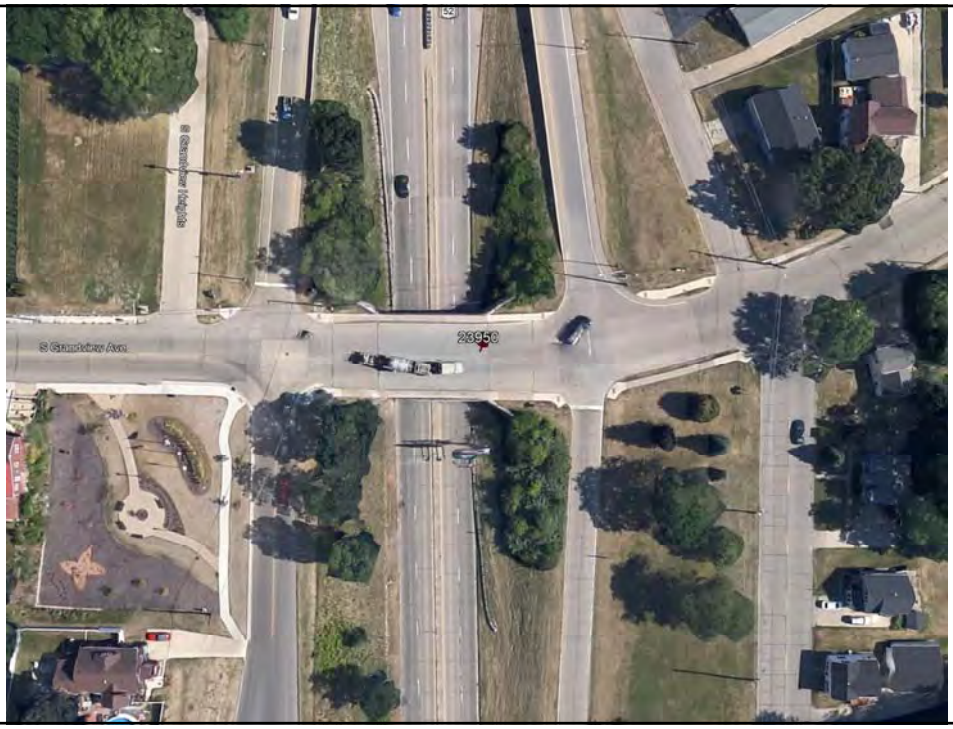
Iowa's ABC Case Study

Grand Avenue over U.S. 61 in Dubuque

3



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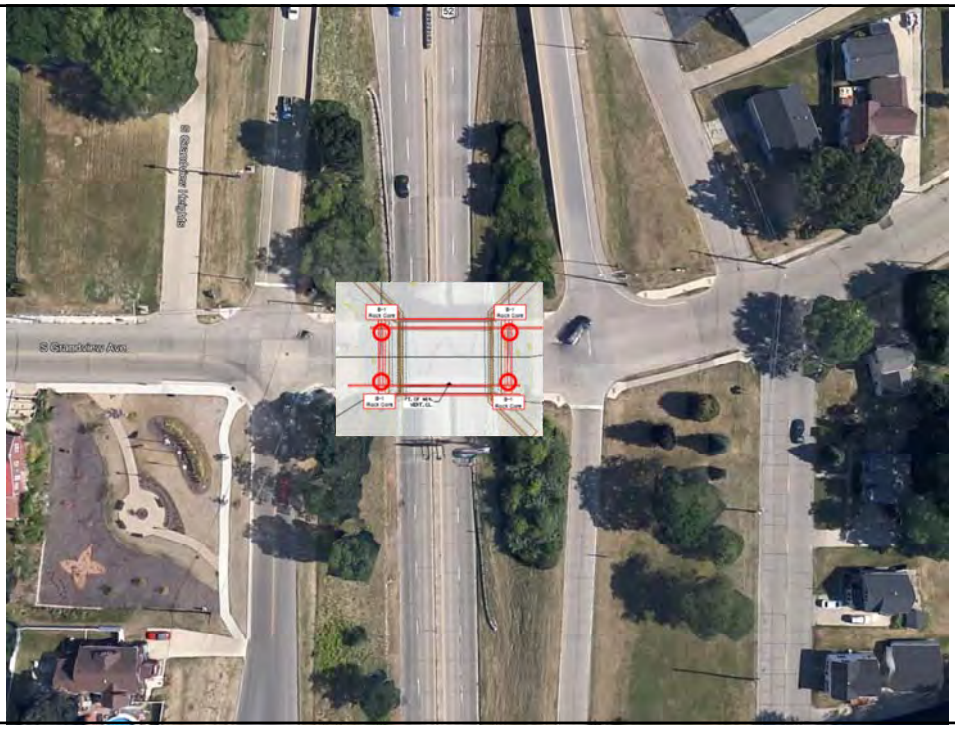

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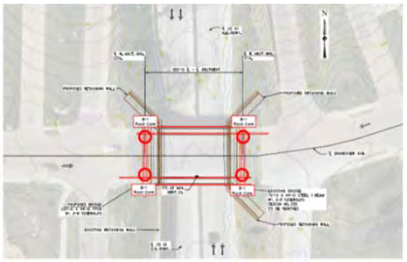
Iowa's ABC Case Study

- Grand Ave over U.S. 61 in Dubuque
- Existing bridge: 70' x 44 Steel I-Beam
- Replacement bridge: 100' x 44' PPCB
- ADT/Truck %: US 61/52 16200/18%,
  South Grandview Ave 6000/0%
- Letting: December 20, 2022
- Project delivery: Design-Bid-Build



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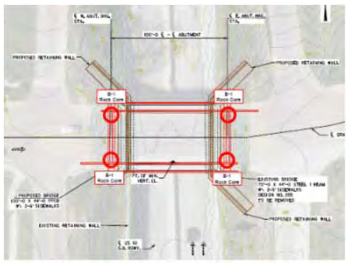
Iowa's ABC Case Study

- 100' single span to minimize the impacts on the adjacent ramps
- Only 4'- 5' between existing high abutment footing and the new abutment
- Semi-integral with a separate secant wall or a high abutment without a separate wall
- Competent rock approximately 30 feet below the grade of Grandview Avenue and 10 feet below U.S. 61
- Use ABC methods for 8-week closure or reduce the working days as the ABC method



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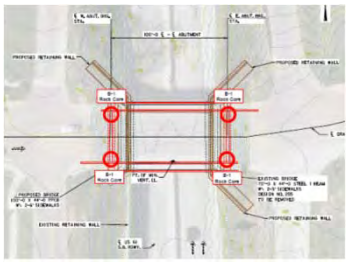
Iowa's ABC Case Study

- Superstructure options:
  - Lateral slide or SPMT methods:
    - Staging area nearby?
    - Construction over live traffic?
  - Modular superstructure :
    - Weight concerns?
    - Change to rolled steel I-beam
  - Full depth deck panels



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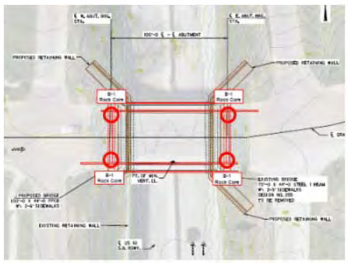
Iowa's ABC Case Study

- Substructure options:
  - Semi-integral on drilled shafts
    - Duration?
  - Secant/tangent wall
    - Duration?
  - Limited room between existing high abutment, new secant wall, and new abutments



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Iowa's ABC Case Study

- Potential sequence:
  - Close Grand Ave
  - Partially construct new abutments
  - Partially construct secant/tangent walls
  - Remove existing superstructure (night closures)
  - Close US 61
  - Remove existing abutments
  - Complete abutments and walls
  - Erect superstructure prefabricated units
  - Open US 61
  - Complete remaining activities
  - Open Grand Ave

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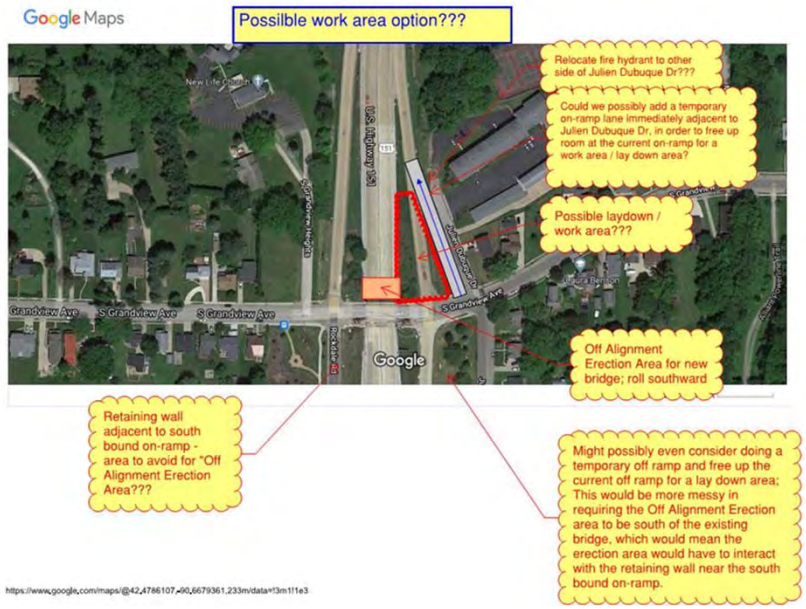
Iowa's ABC Case Study



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Iowa's ABC Case Study

- Questions/Concerns/Feedback:
  - Schedule
  - Feasibility
  - Sequence
  - Other options
  - Contract period
  - Incentives/disincentives

THANK YOU FOR YOUR TIME AND ATTENTION

CONTACT INFORMATION
Ahmad Abu-Hawash
Chief Structural Engineer
Iowa DOT
ahmad.abu-hawash@iowadot.us

https://iowadot.gov/bridge/Research-and-Investigations/Accelerated-Bridge-Construction