A Brief History of Time
Accelerated Bridge Construction Projects

- Finding that ABC Project
- McCormick Taylor’s ABC Projects
- Future of ABC

Presented by:
Thomas Porter, PE
Finding that ABC Project
Finding that ABC Project

**ABC Benefits:**

- Reduced Onsite Construction Time
- Reduced Traffic/Stakeholders Impact
- Improves Work-Zone Safety
- Improves Quality & Durability of Structure
- Reduced Cost to Society

**ABC Selection Criteria:**

- Traffic Volumes
- Detour Length
- Importance of Roadway
- Stakeholder Consideration
- Cost of Constructions (Tolls, Railroad Fees, etc.)
- Schedule Constraints (Navigational, Utilities, Environmental, etc.)
Finding that ABC Project

ABC AHP Decision Making Software
(developed by Oregon State University)

FHWA
(ABC Manual & Website)
McCormick Taylor’s ABC Projects

NJDOT – Rt 46 over Overpeck Creek (2004)

- One of NJDOT’s 1st ever Hyperbuild Project
- Bergen County, NJ (just outside of New York City)
- Over 40,000 vehicles/day
- Existing 6-Span Bascule Bridge
  - No longer moved
  - Very deep girders
McCormick Taylor’s ABC Projects

NJDOT – Rt 46 over Overpeck Creek (2004)

- Construction time reduced from 30 months to 7 months
- $3 million in cost savings
McCormick Taylor’s ABC Projects

PennDOT – Dillerville Road over Amtrak Railroad (2006)

- Heavy Traffic Volumes
- Congested Detour
- Limited Railroad Clearance
- Overhead Utilities
- Major Stakeholders

Proposed Typical Section
McCormick Taylor’s ABC Projects

PennDOT – Dillerville Road over Amtrak Railroad (2006)

- 20,000 ADT on Structure
- 20,000 ADT on Manheim
- 30,000 ADT on Harrisburg
McCormick Taylor’s ABC Projects

PennDOT – Dillerville Road over Amtrak Railroad (2006)

Substructure Design:

- CIP Footings
- Amtrak Requirements
- Limited number of heavy pieces
  - Column 27’ x 3’, 40 Ton
  - Cap 46’x3.5’x5’, 50Ton
  - Abutment stem in two pieces
- Match Casting
- Grouted Voids
- Epoxy-coated Post-tensioned bars w/ oversized ducts
McCormick Taylor’s ABC Projects
PennDOT – Dillerville Road over Amtrak Railroad (2006)

Hydraulic Gantry Crane Concept:

- Setup w/ small cranes & equipment
- Ease working around overhead utilities
- Eliminates need for temporary shielding
- Enables removal of entire spans & lifting precast pieces
- Higher initial cost offset by reduced duration of railroad protection services
McCormick Taylor’s ABC Projects

PennDOT – Dillerville Road over Amtrak Railroad (2006)

- Construction time reduced from 18 months to 6 months (100 day road closure)
- Lessons Learned – Better advertising for “New” Construction
  - Expected bid: $5 million
  - Original bid for Summer 2006: $7 million
  - Rebid Fall 2006 w/ 120 day closure & CIP alternate: $7 million
  - Final bridge was constructed as CIP with conventional cranes w/ multiple crews
McCormick Taylor’s ABC Projects

PennDOT – PA 581 over 10th Street (2015)

Project Information:
- Congested, Urban Corridor
- 86,200 ADT
- ~ 25 mile detour
- MT responsible for:
  - preliminary PS&E for Design/ Build included in overall project
  - reviewing final plans and calculations prepared by Traffic Planning & Design, Inc.

ABC Concept:
- Sawcut & Remove 2-beam sections
- Modify bearings
- Place new 3-Span, 2-beam sections w/ longitudinal closure pours
- Open to traffic after 1 weekend
  - Scarify deck and place latex concrete overlay during roadway paving
McCormick Taylor’s ABC Projects

**PennDOT – PA 581 over 10\textsuperscript{th} Street (2015)**

Typical Section

**Closure Pour Detail**
(Class AAA – Accelerated)

**Bearing Retrofit**
McCormick Taylor’s ABC Projects

*PennDOT – PA 581 over 10th Street (2015)*
McCormick Taylor’s ABC Projects

*PennDOT – PA 581 over 10th Street (2015)*
McCormick Taylor’s ABC Projects

PennDOT – PA 581 over 10th Street (2015)
McCormick Taylor’s ABC Projects

PennDOT – PA 581 over 10th Street (2015)

Time-lapse video on Youtube @
https://youtu.be/olzaI2ajZ3A
McCormick Taylor’s ABC Projects

_PennDOT – SR 219 over Elk Creek (2015)_

**Old Bridge:**
- Ribbed Rigid RC Arch
- Pigeon Hole Barrier
- Built 1912
- Span 70 feet backwall-to-backwall

**New Bridge:**
- Modular Adjacent Box Beam (ABC)
- Context Sensitive Barrier (TXDOT)
- Composite Deck
- Span 68 feet C-C BRG
McCormick Taylor’s ABC Projects

PennDOT – SR 219 over Elk Creek (2015)

ABC Factors:

- Detour Reduces Business District Traffic
- Detour Affects School Bus Routes
- Detour Affect EMS Response Time
- Community pressure to reduce detour time
- SR219 is an important corridor for Northwest PA.
PennDOT – SR 219 over Elk Creek (2015)

ABC Concept:
- Modular Adjacent Box Beams
- 2-3 Beam Units
- Precast Beams, Deck, Sidewalk
- Long. Deck Closure Pours
- 6- Units Required
- Approx. 150 ton Max Weight
- Non-contact lap splices
- Accelerated AAAP Concrete for Closure Pour
Modular Unit Erection:

- Each unit was erected in approx. 30 minutes
- Formwork for closure pours completed that afternoon
- Closure pours completed next day
McCormick Taylor’s ABC Projects

PennDOT – SR 219 over Elk Creek (2015)

Time Saved:

- Precast Deck and Sidewalk
- Form Deck
- Place Rebar
- Pour Deck
- Cure Deck
- Form Sidewalk
- Place Rebar
- Pour Sidewalk
- Cure Sidewalk
- Conservative Estimate 3 weeks per stage = 6 weeks total
- Fit into Summer School Break
McCormick Taylor’s ABC Projects

PennDOT – SR 22 over I-83 (In-Construction)
McCormick Taylor’s ABC Projects

*PennDOT – SR 22 over I-83 (In-Construction)*

**Project Information:**
- Congested, Urban Corridor
- 30,300 ADT on SR 22
- 83,560 ADT on I-83
- Early Action Contract to replace bridges
- High Volume Detour Routes
- Fiber-Optic & Other Utilities on Bridge
- Low Vertical Clearance
- 2-Span Bridge, 113’-5” wide

**ABC Concept:**
- PA Bulb Tees w/ Precast Deck
- Steel Diaphragms
- UHPC Closure Pours
  - Transverse Jts
  - Longitudinal Jts
  - Non-contact rebar splices
  - Water-tight specification
- Scarify & Overlay Wearing Surface
McCormick Taylor’s ABC Projects

PennDOT – SR 22 over I-83 (In-Construction)
McCormick Taylor’s ABC Projects

PennDOT – SR 22 over I-83 (In-Construction)
Continuous for live load
Future of ABC

- Material Science
  - Ultra High Performance Concrete
  - Main load carrying members
- Economy of Scale
  - Currently UHPC ~ $5,000/ cy
  - Cost of steel fibers reduced w/ multiple manufacturers
- Comfort w/ ABC
  - Ongoing Research
  - Best practice details
  - FHWA Documentation
  - Design Provisions (Oversized P/S Strands)
- Technology???
“And that’s all I have to say about that”

Questions?