Every Day Counts (EDC) is a state-based model to identify and rapidly deploy proven, but underutilized innovations to shorten the project delivery process, enhance roadway safety, reduce congestion and improve environmental sustainability.
Every Day Counts 1

- Design-build
- Construction Manager/General Contractor
- Planning and Environmental Linkages
- Legal Sufficiency Enhancements
- Expanding Programmatic Agreements
- In Lieu Fees and Mitigation Banking
- Clarifying the Scope of Preliminary Design
- Flexibilities in Right of Way
- Flexibilities in Utilities
- Enhanced Technical Assistance on EIS
- Safety Edge
- Warm Mix Asphalt
- Adaptive Single Control
- Prefabricated Bridge Elements and Systems
- Geosynthetic Reinforced Soil Integrated Bridge

Shortening Project Delivery

Accelerate the Deployment of Technology and Innovation
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EDC 3

- 3D Engineered Models: Schedule, Cost and Post-Construction
- Data-Driven Safety Analysis
- e-Construction
- Geosynthetic Reinforced Soil-Integrated Bridge System (GRS-IBS)
- Improving Collaboration and Quality Environmental Documentation (eNEPA and IQED)
- Improving DOT and Railroad Coordination (SHRP2 R16)
- Locally Administered Federal-Aid Projects: Stakeholder Partnering
- Regional Models of Cooperation
- Road Diets (Roadway Reconfiguration)
- Smarter Work Zones
- Ultra-High Performance Concrete Connections for Prefabricated Bridge Elements (UHPC)

Innovative Contracting
EDC 4

Shortening Project Delivery

Reducing Construction Time

Safety

Environment

Mobility

Innovative Contracting

- Automated Traffic Signal Performance Measures (ATSPMs)
- Collaborative Hydraulics: Advancing to the Next Generation of Engineering (CHANGE)
- Community Connections
- Data-Driven Safety Analysis (DDSA)
- e-Construction and Partnering: A Vision for the Future
- Integrating NEPA and Permitting
- Pavement Preservation (When, Where, and How)
- Road Weather Management – Weather Savvy Roads
- Safe Transportation for Every Pedestrian (STEP)
- Ultra-High Performance Concrete Connections for PBES
- Using Data to Improve Traffic Incident Management
Accelerated Precast Construction (APC)

The use of innovative scheduling, delivery, design, manufacturing and construction methods to reduce onsite construction time and costs, while improving safety and reducing road user impacts.
Focus of Accelerated Precast Construction

Replacing/Repairing Aging State, City and County Short Span Bridges and Culverts across our Nation’s Waterways

“Every Day Counts is not about inventing the next big thing. It’s about taking effective, proven and market-ready technologies and getting them into widespread use.” (FHWA)
Accelerated Precast Construction

Fundamentals Attributes

Reduce
Reduce Road User Impacts
Reduce Costs
Reduce Construction Time
Reduce Weather Related Time Delays

Improve
Improve Durability/Quality
Improve Work Zone Safety

Minimize
Minimize Environmental Impact
Minimize Impact to Existing Roadway Alignment
Reduce Road User Impacts/Traffic Impacts

- Minimizes Traffic Delays
  - Reduce Construction Equipment Distraction

- Minimizes Community Disruption
  - Reduced Detours, Closures
  - Reduced Narrow Lanes

- Shorten Project Duration

Bridge Replacement - Missouri

Bridge Widening - Arkansas
Reduce Costs to Society

- **Actual Costs**
  - Reduce Costs through Repetitive use
  - Shift from Dangerous to Safe Area

- **Costs Due to Delays**
  - Reduce Construction Time
  - Reduce Delays in Construction Zone

- **Costs Due to Accidents**

  **Penetrations Eliminate CIP Structures**

  **I-20 Bridge Replacement – GDOT Quad 12’x10’ Bridge Replacement**
Reduce Onsite Construction Time

- Cast in Place vs Precast
- Critical Path
  - Simultaneous Construction
- Safety (Value of Statistical Life)
  - Worker Safety
  - Motorists Safety

Multi-Barrel 8’x3’ RCB
Reduces onsite time

Precast Concrete Beam
(Remove from Critical Path)
Reduce Weather-Related Time Delays

- **Wet/Cold Weather Delay**
  - Manufacture in Controlled Environment

- **Predictable Schedule**
  - Simultaneous Actions
**Improve Quality**

- **Prefab. In Controlled Environment**
  - Temp, Humidity, Rain & Wind
- **Increased Quality Control**
  - Inspect Prior to Installation
- **Crew Tenure**
  - Quality/Durability/Consistency
Minimize Impact to Roadway Alignment

- **Reduced MOT**
  - Minimize Amount of Displacement
  - Increased Safety

- **Temporary Alignment**

- **Trenchless Installation**

---

[Image of construction site with large pipes and workers.]
Improve Work Zone Safety

- **Motorist Safety**
  - Minimize Amount of Labor at Site
  - Reduced Construction Presence

- **Construction Worker Safety**
  - Reduced Time on Job Site
  - Construction w/out Traffic

*Quad 12’x10’ RCB - Oxford, AL*

*Caps on Land/not over water*
Minimize Environmental Impact

- **Permitting**
  - Reduced Impact on Waterways

- **ROW Take**
  - Reduced Construction Limits

- **Reduced Utility Relocation**
  - Possibly Eliminated
Empower DOT/Public Works/Contractors

Stretch Budget Dollars
Provide Cost Saving Options
Increased Number of Projects
Innovative/Competitive Options
Provide Practical Options
Value Engineering
Empower DOT - Curved Alignment

Logan Canyon Irrigation - Utah
Following a curved alignment with Beveled Box Culvert

Installation average of 18 pieces per day

4,296 feet of 6’ x 5’ Box Culvert

Special equipment allows bevels from 1/2” to 8”

Watertight Joints - Mastic plus interior joint sealant

20 curves with radii as low as 65 feet

Oldcastle Precast, Inc.
Empower DOT
Curved Alignment

Single 6’ x 5’ Curved Alignment
Empower DOT

Curved Alignment

Single 6’ x 5’ (4,296’)
Curved Alignment
Project Overview

Structure:
- Single precast box culvert with wall luminaires for interior lighting.
- Box measures 14.75' H x 17.0' W with 12.0' max. interior clearance.
- Architectural treatment used which consists of tinted stone pattern.
- Precast arch and columns used to enhance entrances appearance.

Proposed Construction:
- Utilized phased construction which consisted of 6 total phases.
- Proposed precast set without closing US 13 and impacting traffic.
- Two weekend road closures needed to remove the existing bridges.
- Removal of the existing bridges required majority of the project time.
- Construction went smoothly with no major problems encountered.
- Final project cost was $2,867,908.

ABC Techniques:
1. Liquidated Damages assessed to the contractor if road closure went beyond the weekend closures (Road User Costs).
2. Precast concrete culvert utilized as opposed to a cast-in-place culvert.
   a. Product can be ordered in advance.
   b. Construction is simplified.
3. Phasing of Construction and use of temporary roadways allowing for minimum roadway closures and maintaining the traffic flow throughout construction.
5. Use of public workshops and public outreach for comments and to raise the public’s awareness.
Empower Transportation Innovations

JACKING—Trenchless Installation

**APPLICATIONS**
- Culverts
- Drainage
- Gas mains
- Water mains
- Subways
- Transmission ductwork

**BENEFITS**
- Reduce construction time
- Reduce weather-related time delays
- Reduce impact on road users
- Reduce environmental impact
- Reduce impact in roadway alignment
- Can be utilized in most soil types

**LIMITATIONS**
- Good coordination
- Direction change in shafts
- Friction from pipe and liners

**Factors Affecting Lubrication**
- Soil Type
- Lubricant Loss to Soil
- Mechanical Means—Overbore

**Cushioning Material**
- Plywood/Particle Board
  - 5/8 in. to 3/4 in. (1/2 in. min)

**Decision Makers**
- Contractor
  - Jacking pit design
  - Selects excavation method/equipment
  - Selects jacking equipment
  - Schedules operations

- Owner/Engineer
  - Intended use of pipeline
  - Pipe inside diameter
  - Pipeline plan and profile

- Producer
  - Manufacturing design data
  - Manufactures pipe

**Key Steps**
- Soil investigation
- Shield/tunneling machine
- Working shaft design
- Drive lengths/jacking/friction loads/1JS
- Lubrication/surface establishments
- Jacking pipe
- Ground movement

**Jacking Methods**
- Equip leading edge with a cutter or shoe to protect the pipe
- Coating with lubricant to decrease the frictional resistance

**Loading Conditions**
- Axial due to jacking pressure applied during installation
- Earth and live load applied from the ground level
- Cohesive forces developed at the interface of the soil and the pipe

*References:
  1. Concrete Design Manual, American Concrete Pipe Association, Irving, TX
  2. Concrete Flow Technology Handbook, American Concrete Pipe Association, Irving, TX
  3. ASCE 27-00, Standard Practice for Design of Prestressed Concrete Pipe for Jacking in Trenchless Installations, Reston, VA
54 inch Reinforced Concrete Pipe

First use of tunneling method with RCP jacking pipe in DelDOT’s history.

Rinker Material Concrete Pipe with steel bands and grouting ports to withstand the anticipated 400,000 lb. jacking load.
Empower DOT/Contractors

Trenchless Installation

- Minimize Impact to Drivers
- Increase Safety of Contractors
- Reduce Construction Time
Value Engineering Proposal

Submitted by Contractor

Jack & Tunnel Proposed In Lieu of Open Cut

Advantages

Cost Savings - $126,330
Reduced M.O.T. and No Lane Shifts
Increased Work Zone Safety
No Supporting of Existing Utilities Required
Empower DOT

Pipe Jacking

Reduce
Reduce Road User Impacts
Reduce Costs
Reduce Construction Time
Reduce Weather Related Time Delays

Improve
Improve Durability/Quality
Improve Work Zone Safety

Minimize
Minimize Environmental Impact
Minimize Impact to Existing Roadway Alignment
Empower DOT/Contractor

Kansas Department of Transportation

KDOT I-70 jacked Reinforced Concrete Pipe

Problem: Not enough waterway opening at higher flows due to the restriction caused by installing the liner on existing arch bridge causing a raise in the backwater within the supplemental class.

Deer Creek Culvert
- 144-inch dia. RCPs required on each side of the lined-arch.
- Boring and jacking RCPs the viable method, due to high cost and settlement of open-trench installation.
- ABC—No disruption of traffic during construction, least cost compared to the other options.
- Forterra supplied the RCP and Jacking RCP; EJM was the RCP Installing Sub-Contractor (Boring & Jacking).
- Likely the largest bored and jacked pipes for a KDOT highway.
Factors

1. Nature of soil, water table & effects of dewatering
2. Jacking/Receiving Pit
3. Length, alignment and outside dimension of pipeline
4. Jacking Forces
5. Pipe Joints
6. Loads on shield and pipe
7. Size of overbore
8. Lubrication
9. Grouting
10. Spoils Removal

Empower DOT/Contractor
Empower DOT/Contractor

3 Sided Rigid Frame
1. Per AASHTO LRFD
2. Spans of 14-50 feet
3. Per ASTM C-1504
4. Rises to 12 Feet
5. Skews to 45 degrees
Empower Public Works Department

PC PULASKI COUNTY

Precast Empowers Pulaski County Public Works

**Precast Box Culvert**
- Empowers pipe crew
- Increases number of projects
- Improves durability and quality of infrastructure

**Precast Modular Bridges**
- Reduces road user impacts
- Reduces costs
- Reduces construction time

**Mission Statement:**
To improve and maintain the safety, mobility and quality of life of the citizens of Pulaski County by providing services which include: planning and development management; road, bridge and drainage maintenance, emergency planning and coordinating response to emergency situation, county wide communications, planning and maintenance of radio and electronic equipment, timely maintenance of vehicle and equipment fleet, and solid waste management.

Precast Concrete Products lie at the heart of Accelerated Precast Construction. The Pulaski County Public Works Department in Central Arkansas uses precast to replace bridges economically and quickly.
Innovative

Mercer County
Low Flow Culvert
Corbels for Approach Slab
Empower Public Works Department

**Multi-Cell**
- Reduces Installation Time
- Requires Greater Lift Capability
- Precast Headwall Attached
Empower Public Works Dept.

**Large Box Culverts**
- Allowed per Special Design
- Up to 24’ Span (Wet Cast)
- Requires Greater Lift Capability

23’ x 8’ Reducer
Empower Contractors/Owners

**Features**
Seven Barrel RCB Low Water Crossing
Replaced Triple Barrel CMP
Concrete Driving Surface with Curb
Rock Face Aesthetic Look
Empower Contractors (6x5/8x5/75’ fill)

Deep Bury of Box Structures Along Major Canadian Highway

The Crownsnest Highway (Highway 3) in British Columbia Canada is an east-west highway that connects southern regions in British Columbia and Alberta. The Ministry of Transportation and Infrastructure is completing an improvement project on the highway near Princeton, B.C.

The project involves re-alignment of the highway to remove a dangerous downhill S-curve to improve safety.

Precast box structures and headwalls were specified in the design process to maintain the flow of existing creeks at locations where significant fill is required to cross a ravine.

**Project Highlights:**
- Creek Crossing One - 330 feet of 6-foot x 5-foot box structures.
- Creek Crossing Two - 310 feet of 8-foot x 5-foot box structures.
- Creek Crossing Three - 250 feet of 8-foot x 5-foot box structures.

Maximum earth cover applied to the structures is 72 feet.

Gasketed joints were factory installed for a soil and water tight joint to 13psi of water pressure.

The Langley Concrete Group acted as the Engineer of Record for the structures providing installation inspection and certification for the structures.

All pre-cast products were produced in a Q-Cast Certified Plant.
Empower Contractors

Innovations
Precast Fitting Saves Money + Time Versus Cast in Place
Partnering

Staunton District
Partners with Contractor
Bridge Crews Install
Partnering

Highway 20 Partnering Benefited Everyone
IDOT Chief Engineer determined that precast box culverts would provide an acceptable risk for an accelerated construction schedule. Ames Construction, Hancock and IDOT worked to shape a sound construction strategy.

Hancock
Precast Innovations Accelerate Highway 20 Construction

$0.10/gallon Fuel Tax
Governor Branstad signing Proclamation declaring Concrete Pipe Week in Iowa. In 2015 Gov. Branstad signed the fuel tax generating $203 Million/year

Largest Contract on 40-Mile Stretch Awarded
Ames Construction of Minnesota won with a bid of $62 Million; Their preference toward precast was key in winning the project.

Precast Strategy Addresses Record Rainfall
Ames Construction offered an extensive value engineering proposal to turn cast-in-place to precast whenever possible. The precast strategy reduced the impact of record rainfall in 2016. Precast kept Ames on schedule.

Mitered Cambered Sections
Joints designed to close when box settles.

Precast Barrel Accelerates construction despite cast-in-place
Precast barrel installed in 2 days, which allowed grading to continue during the additional two months it took to complete cast-in-place ends.
Why Accelerated Precast Construction?

The traveling public deserves it.
FHWA is promoting accelerated construction.
MISSION

The Local Technical Assistance Program (LTAP) is sponsored by the Federal Highway Administration, the Virginia Department of Transportation, and the University of Virginia to foster a safe, efficient, and environmentally sound transportation system by improving the skills and knowledge of local transportation providers through training, technical assistance, and technology transfer.

Transportation Training Academy
University of Virginia
Department of Civil and Environmental Engineering
Phone: 434-982-2897
Fax: 434-982-2856
Training

VDOT - Lynchburg District
Installation Seminar (19 March 2015)

ACPA brings training your way this year. We have put together an agenda to both challenge and inform you. Plan on participating in practical exercises, group discussions and a little competition. We hope you can join us for this training. Lunch and refreshments provided.

9:30 - 11:00 "PROPER BOX CULVERT INSTALLATION" - Wally Cufflett, P.E. (ACPA)
Prepare your staff with a product that creates opportunity and resources in creativity. The learning highlights the proper techniques to be installing your product correctly while teaching your resources and information. 

11:00 - 12:00 "BOTTOM-LESS CULVERT INSTALLATION" - Ed Page, P.E. (CPA)
From the top of the pipe and up the opening, they are constructed by the local site, the installation is critical for the success of the structure. They are available in a range of 15 through 12, with sizes up to 15.

12:00 - 1:00 "LUNCH AND JEOPARDY" - Mini Coles (PermitPix)
ACPA challenges your ability to retain training. The testing game not only tests your knowledge about Concrete Products but it offers a little clue about local regulations and best practices in the field. The idea is to keep the learning and the mind alert at the same time.

1:00 - 2:15 "PRECAST DRAINAGE STRUCTURE INSTALLATION" - Hank Gottschalk (CPA)
Precast concrete structures are a valuable addition to the market. This hands-on training provides detailed, practical information on installing precast concrete structures to ensure greater savings for the city, county and state.

2:15 - 3:00 "JACKING CONCRETE PIPE" - Alain Cox Connection (Rocker Materials)
A great example of the potential in both applications. They are designed to fit many conditions, whether it is a city, county or industrial site. The idea is to keep the competitive pipe as an alternative to traditional options for the city, county and state.
Plant Tours

- CP&P
  - Chesapeake, VA
  - Ashland, VA
  - Jessup, MD
  - Harrisonburg, VA
  - Manassas, VA
  - Salem, VA
- Permatile
  - Bristol, VA
- Oldcastle
  - Fredericksburg, VA
- Rinker Materials
  - Frederick, MD