



Every Day Counts – Market Ready Options



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**



EDC2

Shortening Project Delivery

Reducing Construction Time

Safety

Environment

Mobility

Innovative Contracting

- Programmatic Agreements II
- Locally Administered Federal-Aid Projects
- Three-Dimensional Modeling
- Intelligent Compaction
- Accelerated Bridge Construction
 - Slide-In Bridge Construction
 - Geosynthetic Reinforced Soil-Integrated Bridge Systems
 - Prefabricated Bridge Elements and Systems (PBES)
- Design Build
- Construction Manager/General Contractor
- Alternative Technical Concepts
- High Friction Surfaces
- Intersection and Interchange Geometrics
- Geospatial Data Collaboration
- Implementing Quality Environmental Documentation
- SHRP 2 National Traffic Incident Management Responder Training



EDC 3

Shortening Project Delivery

Reducing Construction Time

Safety

Environment

Mobility

Innovative Contracting

- 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)



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



*Penetrations Eliminate
CIP Structures*

■ Costs Due to Delays

- Reduce Construction Time
- Reduce Delays in Construction Zone

■ Costs Due to Accidents



*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

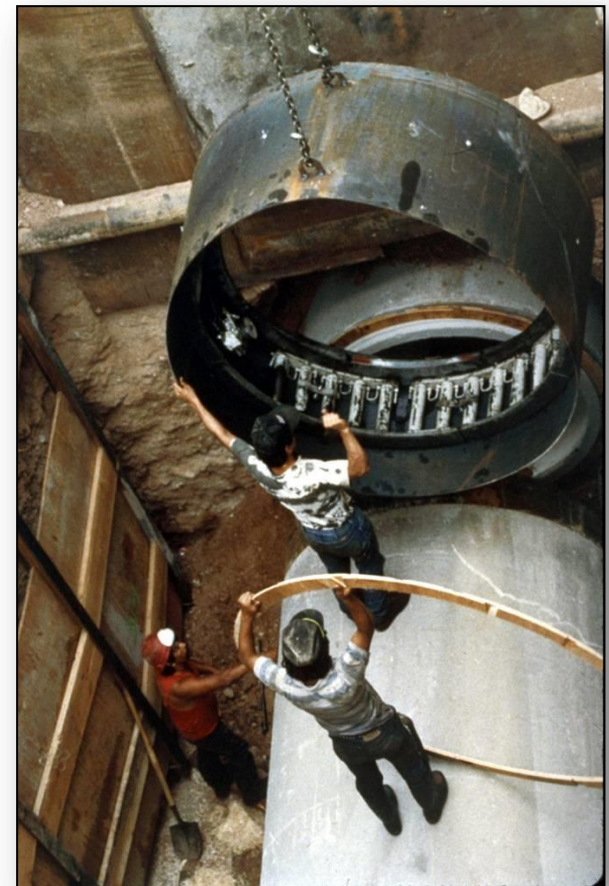


Precast Concrete Beam
(Remove from Critical Path)



Minimize Impact to Roadway Alignment

- **Reduced MOT**
 - Minimize Amount of Displacement
 - Increased Safety
- **Temporary Alignment**
- **Trenchless Installation**





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



Caps on Land/not over water

Quad 12'x10' RCB - Oxford, AL



Minimize Environmental Impact

- **Permitting**
 - Reduced Impact on Waterways
- **ROW Take**
 - Reduced Construction Limits
- **Reduced Utility Relocation**
 - Possibly Eliminated



Precast Box Culvert Protects Native Trout Stream Corridor H, US Route 48 Grant County, West Virginia



Box culvert pieces transported over 150 miles from producer plant



Cranes set box pieces



Backfill applied in lifts and compacted



Culvert alignment

267 precast boxes over 1,500 feet
Size: 10 ft x 10 ft (inside) 13 ft x 13 ft (outside)
Some buried under 300 feet of fill



Bottom built into the culverts to create a natural area for water to pool for the trout.



Backfill applied in lifts and compacted



Precast allowed assembly and curvature to maintain existing flow channel.



US Route 48 over box culvert assembly 300 ft. below.



American Concrete Pipe Association

concretepipe.org



Empower DOT/Public Works/Contractors

Stretch Budget Dollars
Provide Cost Saving Options
Increased Number of Projects
Innovative/Competitive Options
Provide Practical Options
Value Engineering



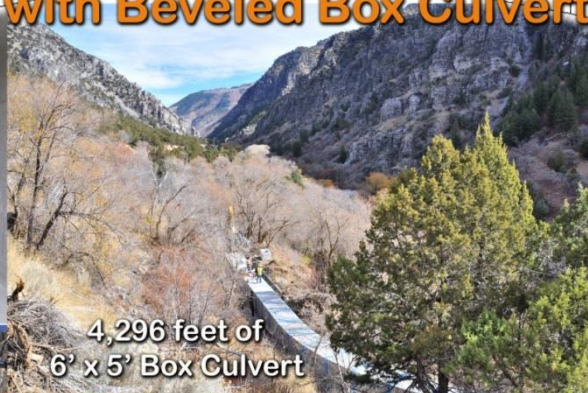


Empower DOT - Curved Alignment

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



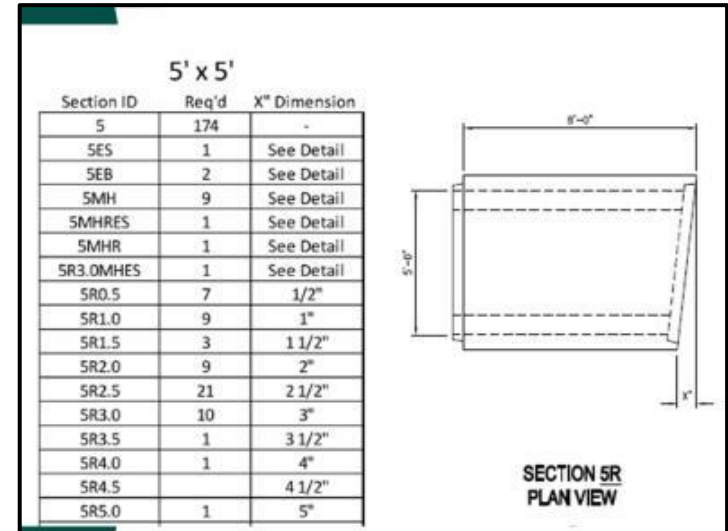
20 curves with radii
as low as 65 feet



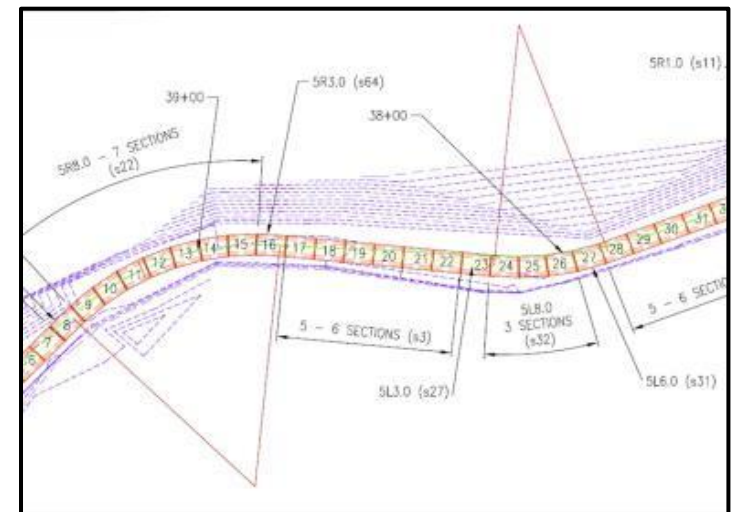
Empower DOT *Curved Alignment*



Single 6' x 5'
Curved Alignment



Shop Drawing/Plan View





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.

Bridge 1665 Replacement
Single 17' x 14.75'
6 Phases
Ordered in Advance
Construction Simplified



PRECAST CONCRETE TO THE RESCUE!!!

DeLDOT's Rails to Trails Solution

Bridge 1-665 Location History

The existing bridge was a single-span concrete bridge which was approximately 175 feet in length and was located south of Wilmington, DE and the I-205 interchange. They were built in the 1950s to carry US 13, which runs from the Delaware / New Castle Rail Line. The rail line was subsequently purchased by the Delaware Department of Transportation for the construction of Taylor Boulevard, which runs east-west to the northeast, both the rail line and Taylor Blvd. have since been taken out of service.

The existing bridge was in generally poor condition with major deficiencies in the deck, side bents, and approach, with the steel beams and abutments being in fair condition. Since both the rail line and Taylor Blvd. were eliminated, the existing bridge could not be used to complete a current multi-use trail project. The Delaware Department of Transportation (DelDOT) was looking for a solution to replace the bridge and well as create a new trail. A position of the proposed trail running from New Castle to US 13 is already complete.

Several options were studied including either rehabilitation or replacement of the existing structure. Many factors had to be considered such as the best long-term value as well as a preferred shorter time to construct and the need to provide the public with a safe and a pleasant structure when the trail is built. The final decision was to build a new precast concrete bridge.

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.
4. Partial closure of US 13 during consecutive weekends for paving.
5. Use of public workshops and public outreach for comments and to raise the public's awareness.

DeLDOT
DEPARTMENT OF TRANSPORTATION



Empower Transportation Innovations

JACKING—Trenchless Installation



APPLICATIONS

Culverts
Drainage
Gas mains
Water mains
Subways
Transmission ductwork
Sewer replacement and new

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

Trenchless Installation exhibits many Accelerated Precast Construction attributes. It empowers DOTs and Public Works Agencies with the ability to replace failing culverts and bridges in an innovative and efficient manner.

Concrete pipelines were first jacked in 1896. Reinforced concrete pipes of 18 to 132 inches diameter can be installed by jacking. Microtunneling machines for smaller diameters; Tunnel boring machines for larger diameter pipe.



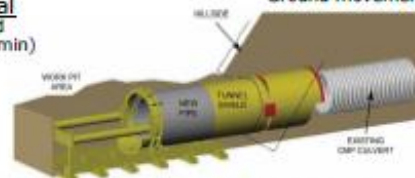
Factors Affecting Lubrication

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)



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

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

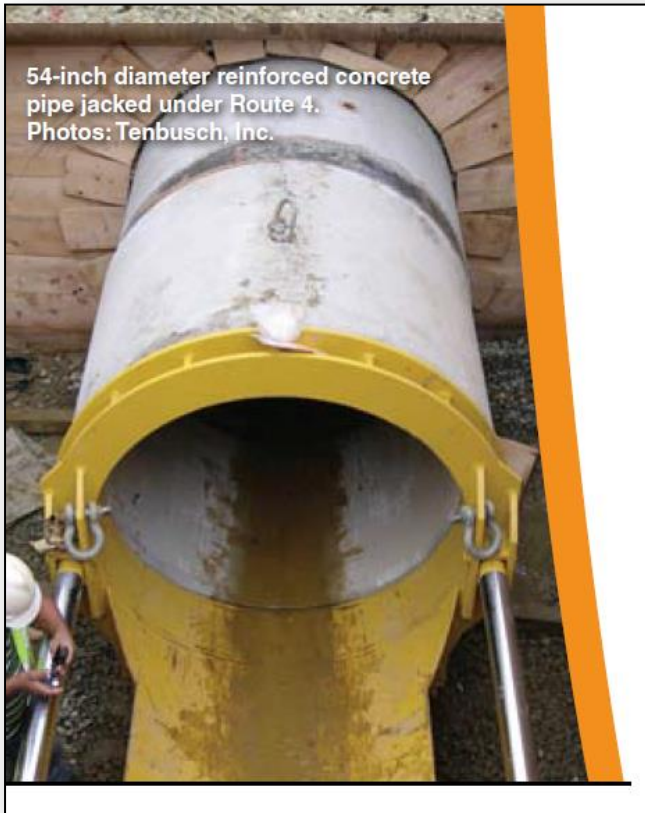
Key Steps

- Soil investigation
- Shield/tunneling machine
- Working shaft design
- Drive lengths/jacking/friction loads/IS
- Lubrication/surface establishments
- Jacking pipe
- Ground movement

1. Concrete Design Manual, American Concrete Pipe Association, Irving, TX
2. Concrete Pipe Technology Handbook, American Concrete Pipe Association, Irving, TX
3. ASCE 27-05 - Standard Practice for Design of Precast Concrete Pipe for Jacking in Trenchless Installations, Reston, VA
4. Trenchless Construction Methods and Soil Competibility Manual, The National Utility Contractors Association, Arlington, VA



Empower DOT/Contractors



54-inch diameter reinforced concrete
pipe jacked under Route 4.
Photos: Tenbusch, Inc.

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



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

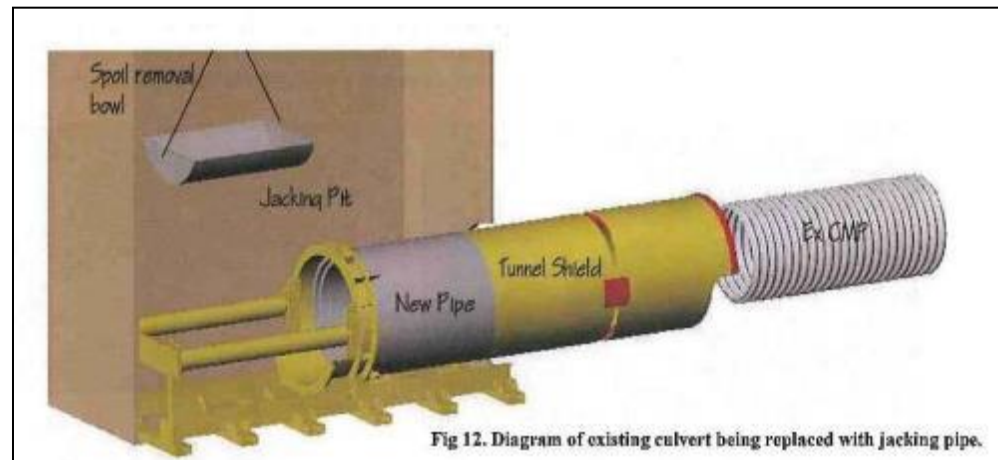
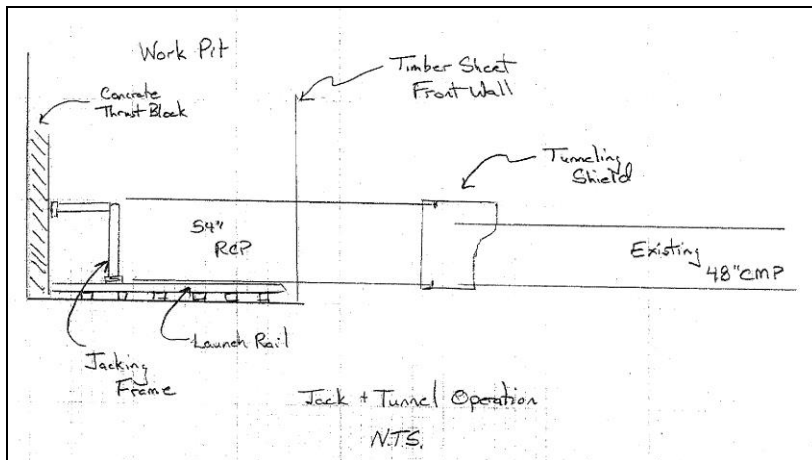
Advantages

- 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

METAL PIPES

...what were we thinking?!

DelDOT's failing CMP solutions...

Delaware's Corrugated Metal Pipes

Facts by the numbers :

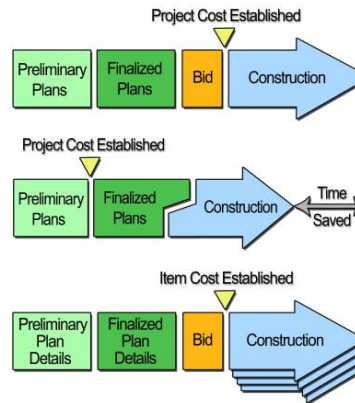
- There are approximately 1600 bridges in DelDOT's inventory, 14% are CMP's.
- Any structure with an opening of 20 SF or more is considered a bridge in Delaware.
- 57 CMP's were found that meet the 20 SF opening requirements in the last 2 years,
- 160 CMP's were re-inventoried between 2007 - 2010.
- Starting in 2009, an average of 20 - 25 CMP's have been replaced each year.
- 238 CMP's still remain in DelDOT's bridge inventory that need to be replaced.
- CMP's account for approximately 72% of all structurally deficient bridges in our inventory.



Extensive
Section Loss



Bottom
Heaving



Methods of Project Contracting

Traditional Design, Bid, Build :

- Design and plan set creation takes time and coordination for each bridge.
- Environmental coordination and permitting requires the same amount of time as complex bridges.
- Utility, right of way, and real estate acquisition require additional time for review and coordination.
- Project advertising, bidding, and awarding takes time.

Design-Build :

- 35 pipe replacement locations are chosen and prioritized.
- Only need to advertise and bid once for a Design-Build Contract.
- Design-Build Team tasked with utility, right of way and real estate process which saves time.
- Design and construction process is streamlined since contractor and designer work together on design.
- Department is still tasked with environmental process and real estate acquisition.

Open End :

- Can consist of up to 25 pipe replacement locations.
- Only advertise and bid once for an Open End Contract and each pipe location becomes a work order.
- Design, environmental, utility and right of way coordination still takes time.
- Essentially "fast-tracks" the design process but puts pressure on the support sections.

Methods of Construction

Traditional :

- Excavate, remove existing pipe and place new pipe.
- Pro: New pipe, typical method and proven results.
- Con: Utilize lane closures or close road, utility relocation and traffic / pedestrian control.
- Currently the preferred method of construction.

Pipe Lining :

- Spray high strength concrete inside existing pipe.
- Pro: Little to no impact to traffic or utilities and no excavation.
- Con: Smaller hydraulic opening, limited applications and a temporary fix.
- Design consideration must be given for bends, obstructions or debris in the pipe, construction feasibility and inspecting the quality of the final lining.

Pipe Jacking :

- Using new pipe to push existing old pipe.
- Pro: Little to no impact to traffic or utilities, no excavation and it's a new pipe.
- Con: Limited applications and currently not a typical replacement method.
- Design consideration must be given to ensure pipe has adequate strength for jacking forces, any bends in the pipe, construction feasibility as well as contractor's capabilities.





Empower DOT/Contractor



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 without the supplemental pipes



Deer Creek Culvert

- 144-inch dia. RCPs required on each 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 Jacklin the RCP Installing Sub-Contractor (Boring & Jacking)
- Likely the largest bored and jacked pipes for a KDOT highway

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



Empower DOT/Contractor



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 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.



23' x 8' Reducer

Large Box Culverts

Allowed per Special Design
Up to 24' Span (Wet Cast)
Requires Greater Lift Capability





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 Crowsnest 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



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 \$200 Million/year



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.

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.



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 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.



Mitered Cambered Sections

Joints designed to close when box settles.





Accelerated Precast Construction

Box Culverts





Accelerated Precast Construction

Box Culverts





Why Accelerated Precast Construction?

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





UVA Transportation Training Academy

VA LTAP

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

2017 ENGINEER'S COLLOQUIUM
Hanson
Dallas, Texas
Hanson Engineers Colloquium
September 17 & 18, 2017
Agenda

Wednesday, September 17	
0800 - 0830	Welcome and introduction
0830 - 1100	Steel pipe plant overview and tour
1100 - 1200	Jack pipe overview
1200 - 1300	Lunch
1300 - 1530	Design of single-offset-joints and gaskets
1530 - 1545	Break
1545 - 1700	Chostak Bridge

Thursday, September 18	
0830 - 0930	DASH
0930 - 0945	Break
0945 - 1045	Technical marketing alternatives
1045 - 1100	Break
1100 - 1200	LRFD and other design standards issues
1200 - 1300	Lunch / Industry overview
1300 - 1400	Cracking in small bore pipe
1400 - 1415	Break
1415 - 1515	Tools sharing
1515 - 1530	Break
1530 - 1700	Competitive overview and wrap-up



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.

8:30 - 11:00 "PROPER BOX CULVERT INSTALLATION" - Walt Cates, P.E. (ACPA)

Empower your staff with a practical tool versus opportunity and enhance credibility. This training highlights the proper technique for installing precast box culverts, while increasing your awareness of business opportunities. Provide your staff with a valuable skill while saving your community money. Provide your engineer staff with competitive options for design and value engineering.

11:00 - 12:00 "BOTTOM-LESS CULVERT INSTALLATION" - Ed Page, P.E. (CPMP)

Precast Bottom-less Culverts reduce cost impact costs. They are recommended for installations where precast box culverts cannot carry the required flow capacity, undersized opening space is necessary, natural stream bottoms are desired and installation time is important. They are available in spans of 10' through 40', with diam up to 12'.

12:00 - 1:00 "LUNCH AND JEOPARDY" - Mini Coles (Pernette)


ACPA challenges your ability to retain training. This exciting game not only tests your knowledge about Concrete Products but a little bit about local highways as well as local history and transportation knowledge. This block of training provides an alternative learning approach to traditional practices. It reinforces the learning and is a lot of fun at the same time.

1:00 - 2:15 "PRECAST DRAINAGE STRUCTURE INSTALLATION" - Hank Gottschalk (CPMP)

Precast drainage structures enhance construction, therefore reducing costs. This block of training utilizes pictures, videos and practical exercises to increase your awareness of precast drainage structure installations. Take a walk with us through the precast process from design to installation. Consider precast structures for more greater savings for your city, county or state.

2:15 - 3:30 "JACKING CONCRETE PIPE" - Alnee Conneron (Rinker Materials)

A growing segment of pipe installation includes trenchless applications. They are less disruptive to traffic, communities, utilities and businesses. Trenchless installation is environmentally friendly and results in more economical pipe designs. It is important to know the competitive options. As our industry evolves, trenchless applications will become another option.

CAPCA  **Annual Ellicott City, MD (2017)**

CAPCA 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.

8:00 "REGISTRATION" - Marie Derry (Esaroc)

Help yourself, you. A precast box culvert provides the base for creating. Learn the proper techniques for installing precast box culverts, while increasing your awareness of business opportunities. Provide your engineer staff with competitive options for design and value engineering.

9:00 "PROPER BOX CULVERT INSTALLATION" - Jim Talbot (Gillespie Precast)

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10:00 "PROPER STRUCTURE INSTALLATION" - Walt Cates, P.E. (ACPA)

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11:00 "ACCELERATED PRECAST CONSTRUCTION BENEFITS" - Paul Sherman (Joldoc)

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Plant Tours

■ CP&P

- Chesapeake, VA
- Ashland, VA
- Jessup, MD
- Harrisonburg, VA
- Manassas, VA
- Salem, VA

■ Permatile

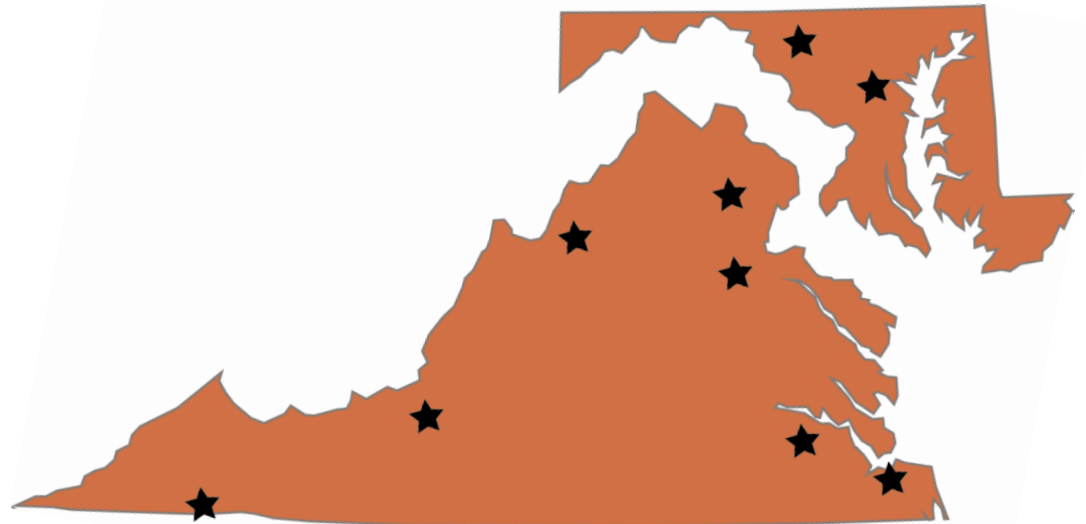
- Bristol, VA

■ Oldcastle

- Fredericksburg, VA

■ Rinker Materials

- Frederick, MD





CONCRETE PIPE WEEK

AUGUST 20-26, 2017



American Concrete Pipe Association