

Concrete Pipe News

Spring 2017

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American
Concrete Pipe
Association

Concrete Pipe News is an interactive communications channel of the American Concrete Pipe Association that is published quarterly and archived at concretepipe.org. Readers include engineers, specifiers, contractors, suppliers, government officials, and members of the American Concrete Pipe Association.

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Russell Tripp, P.E., President
American Concrete Pipe Association

Russell Tripp, P.E., President American Concrete Pipe Association

The American Concrete Pipe Association (ACPA) announced March 3 that Russell Tripp, P.E., would succeed Matt Childs, P.E. as President, effective April 1. Tripp served as the ACPA's Georgia, California, and Florida engineer, working with local concrete pipe producer members to strengthen their state associations, since 2010.

"Russell has invested a lot of time and energy working with ACPA staff colleagues, member volunteers, and industry leaders through his responsibilities in Florida, CA, GA and many parts of the U.S. and Canada through ASTM, AREMA, ACPA Committee Week, AASHTO Meetings, Annual Meetings, and Pipe School, all the while supporting ACPA's PAC to make positive improvements for our membership and industry," said Matt Childs.

Tripp's vision is an ACPA that is relevant, visible and known to agencies, engineers, contractors, legislators, members, associates, partners, and competitors. He believes in a strategy for retention and development of member volunteers, future volunteers, and staff for the long-term success of the ACPA. He wants to strengthen ACPA's relationship with Concrete Industry Management (CIM) through an outreach program to students seeking a career in the concrete pipe industry.

Tripp is looking forward to working with members and staff to implement the 2017 ACPA Strategic Plan.

A Clemson University alumnus, Tripp earned his Bachelor of Science degree in Civil Engineering in 1982. He spent the first 21 years of his professional career working in the natural gas industry. He then served three years in the PVC sheet pile industry and four years in the plastic drainage industry before joining the ACPA.

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Have something to say to Russell Tripp about this editorial? The blog is published under Latest News at concretepipe.org. Get involved and leave a comment.

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On the Cover:

An aging three-sided cast-in-place (7-foot x 7-foot) box culvert replaced with (12-foot x 6-foot) precast concrete box culvert to expedite replacement.

Autogenous healing is observed in the failing culvert as a white precipitate.

Only concrete has autogenous healing for sealing cracks and maintaining the structural integrity of the concrete

American Concrete Pipe Association

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2017 ACPA Project Achievement Award

Aging MDOT Cast-in-Place Culvert Replaced with Precast

Bill Washabaugh, Northern Concrete Pipe, Inc.

Will Thompson, P.E., Lansing Transportation Service Center Manager Michigan Department of Transportation



There is one clear choice of product for resilient culvert replacement and that is precast concrete.

An aging three-sided cast-in-place (7-foot x 7-foot) box culvert constructed in 1946 under M-43, west of Grand Ledge, MI was compromised by degradational scour, which undermined its foundation and footings. M-43 is a critical roadway owned by the Michigan Department of Transportation (MDOT) that links industry, commerce, agriculture, and residents. The failing structure was identified through MDOT's ongoing condition surveys of existing culverts and bridges. MDOT closed the road and specified a 12-foot x 6-foot precast concrete box culvert to expedite the replacement of the failing structure.

Although it was clear that the 70-year culvert structure was failing, the concrete in the top slab bridged the waterway averting a potentially catastrophic and life threatening failure. The aging culvert could still withstand the live loads, as well as accommodate forces of

nature, thereby demonstrating the value of life cycle cost analysis performed by the former Michigan State Highway Department.

Upon close inspection, the 70-year culvert exemplified the effect of autogenous healing on concrete structures. Autogenous healing is a natural process of crack repair that occurs in concrete when moisture is present along with the deposition of calcium carbonate from the cementitious materials. It is observed as a white precipitate. Of all the available culvert material options, only concrete has this unique natural process for sealing cracks throughout the service life of structures while maintaining structural integrity.

After closing the road, MDOT's University Region engineering team, led by Will Thompson, P.E., Lansing TSC's

Quick Notes

Who	Michigan Department of Transportation (MDOT) Northern Concrete Pipe, Inc.
What	Replacement of an aging three-sided cast-in-place box culvert constructed in 1946 under M-43, west of Grand Ledge, MI.
Why	The failing structure was identified through MDOT's ongoing condition surveys of existing culverts and bridges.
When	2016
Where	West of Grand Ledge, MI
How	Specification of a 12-foot x 6-foot precast concrete box culvert to expedite the replacement of the failing structure within 13 working days.

Manager, coordinated re-routing of traffic. Coreen Strzalke, P.E. organized various MDOT, County Road, and County Drain personnel, and John Perry, Engineer for the Eaton County Drain Commission favored the precast concrete replacement option, noting; "We have one clear choice for culvert materials, and that is concrete". Three culverts were directly impacted by the upsizing of the Oneida Road crossing, but only two would be addressed by MDOT during the M-43 emergency replacement. The Eaton County Drain Commission handled the third culvert.

The design team of Northern Concrete Pipe presented a precast design that would enable MDOT to solicit emergency bids from local, prequalified contractors. Shortly thereafter, Northern submitted the required loading calculations, and required steel end area for department review for both the box sections, and the precast headwalls and wingwalls. Will Thompson, P.E. noted, "I cannot tell you how thankful I am for your help on this emergency repair." Adding, "Without your help we would not be close to sending out a bid document so we can get this work rolling".

MDOT quickly overcame several potential delays to initiating the project including financing; tendering the project at a time when they were already struggling to meet construction deadlines on other MDOT contracts; recent heavy rains that affected minimizing the road closure period; the approaching Labor Day holiday; and the fact that precast box sections needed for the project were not a stocked product.

Davis Construction, of Lansing, MI, was awarded the contract for this fast-tracked culvert replacement. Northern Concrete Pipe, Inc initiated a production schedule that would produce three wet cast box sections per day until completion. All precast sections for

the 96-foot crossing were completed before the demolition of the failing culvert and beginning of the sub-base work. The duration of the culvert replacement, from the day the failure was identified to the day the last box section for the first crossing was set, was only 13 working days. Completion of the second culvert was accomplished within 28 days of the discovery.

Expedited design and review of the proposed culvert replacement, along with Northern Concrete's allocation of multiple forms contributed significantly to shortening the construction schedule from bid date to installation. The shortened schedule reduced inconveniences to nearby residents, especially inconveniences from detoured traffic and noise.

MDOT continues to seek a long-term funding mechanism to address replacement of culverts and bridges that are functioning well beyond their design life. MDOT department heads are looking for new ways to accommodate emergency repair funding that is essential to the management of Michigan's aging infrastructure.

Bill Washabaugh; wew@ncp-inc.com

Photos: Therese Kline, P.E., of MDOT



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Precast concrete culvert sections produced and installed within 13 working days.

CONCRETE PIPE NEWS Spring 2017

Reconstruction of Storm Outfalls Included in Post-Hurricane Sandy Resiliency Project

Nick Domenico, Oldcastle Precast

In the wake of Hurricane Sandy, the Christie Administration, in partnership with the U.S. Army Corps of Engineers, awarded a contract of approximately \$90 million to Manson Construction Company of Seattle, WA to reconstruct beaches, storm water outfalls and implement modifications to existing groins in the area of Loch Arbour and Deal in Monmouth County, NJ. The contract was part of the Administration's post-Sandy storm resiliency effort and part of the Sandy Hook to Barnegat Inlet Beach Erosion Control Project. Included in the contract was the modification of six storm water outfalls.

Agate Construction of Oceanview, NJ was subcontracted for about \$33 million to install extensions to the stormwater outfalls. Oldcastle Precast was contracted to supply 584 feet of 58-inch x 91-inch HE 3 (elliptical) reinforced concrete pipe (RCP); 592 feet of 63 x 98-inch HE3 RCP; and 1,528 feet of 96-inch diameter O-ring gasketed RCP. Outfall 19 was designed to accommodate the 63-inch x 98-inch HE3 RCP. Outfall 34 was designed for the 58-inch x 91-inch HE3, and outfall 36 was designed for the 96-inch diameter RCP.

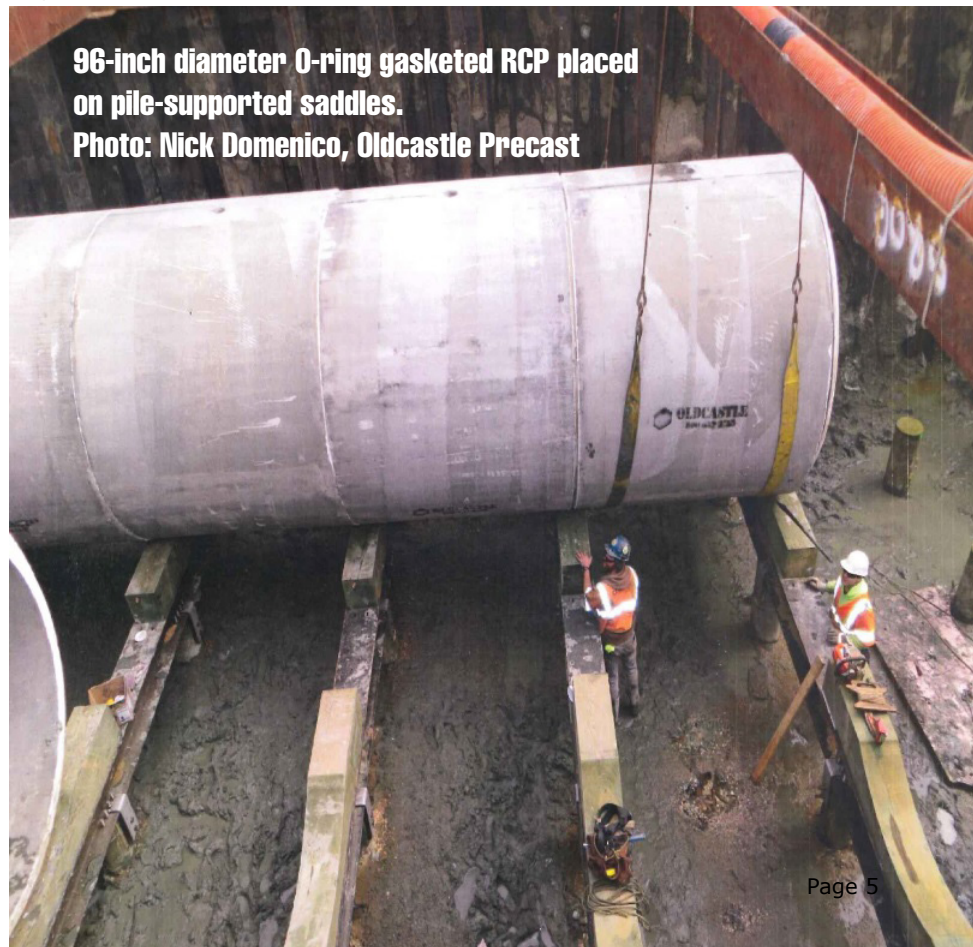
Several pipe units were produced as special length or skewed end pieces, so that the joints would lay precisely upon a saddle-supporting system connected to piles driven to a depth of 40 feet. The saddle-supporting system was installed prior to the pipe installation. Because of the marine environment, the RCP was produced with a special mix and reinforced with galvanized reinforcing wire to resist corrosion. Challenges that had to be addressed in the design of the outfalls were marine weather conditions; high waves and wind affecting the installation of the piles; and management of the work zone characterized by high and low tide which demanded constant maintenance of the coffer dams and dewatering activity; and, precise placement of the concrete pipe and special/custom pieces of the outfall pipeline

system. Straps and pipe joints had to be centered over the centerline of the pile caps. Outfalls 19, 34 and 36 supplied by Oldcastle were under construction simultaneously.

The overall project that included pumping sand on 1.6 miles of beach in Elberon and Deal, modification to six existing stormwater outfalls and modification of two existing groins that extend from the beach into the ocean are part of the Christie Administration's plan to increase the resiliency of its coastal communities to major storms.

The restoration and repair work is funded 100 percent through the Army Corps' Flood Control and Coastal Emergencies program. Construction is funded entirely by the federal government through the 2013 Disaster Relief Appropriations Act (PL113-2), commonly known as the Hurricane Sandy Relief Bill. Following the completion of initial construction, the project is eligible for continued periodic nourishment.

(http://www.nj.gov/dep/newsrel/2015/15_0006.htm)



96-inch diameter O-ring gasketed RCP placed on pile-supported saddles.
Photo: Nick Domenico, Oldcastle Precast

Quick Notes

Who	Christie Administration, in partnership with the U.S. Army Corps of Engineers Manson Construction Company of Seattle, WA Agate Construction of Oceanview, NJ Oldcastle Precast
What	584 feet of 58-inch x 91-inch HE 3 (elliptical) reinforced concrete pipe (RCP); 592 feet of 63 x 98-inch HE3 RCP; and 1,528 feet of 96-inch diameter O-ring gasketed RCP.
Why	To increase the resiliency of New Jersey coastal communities to major storms.
When	2015-2016
Where	1.6 miles of beach in Elberon and Deal, in Monmouth County, NJ
How	Simultaneous construction of three outfalls using elliptical HE3 and O-ring gasketed RCP placed on pile-supported saddles.



Reconstruction of beaches, storm water outfalls and modifications to groins.

Nick Domenico; nick.domenico@oldcastle.com

Photos: Tomas Vaitkevicius, Agate Construction



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Several work zone challenges were overcome to install the 96-inch diameter RCP twin storm water outfall.



Barefoot Box Culvert™ Accommodates Groundwater Upwelling While Maintaining Thermal Conditions for Fish Habitat

By Christopher Pfohl, C.E.T., EP, Can-CISEC, Sr. Aquatic Group Team Lead

RJ Burnside and Associates Limited



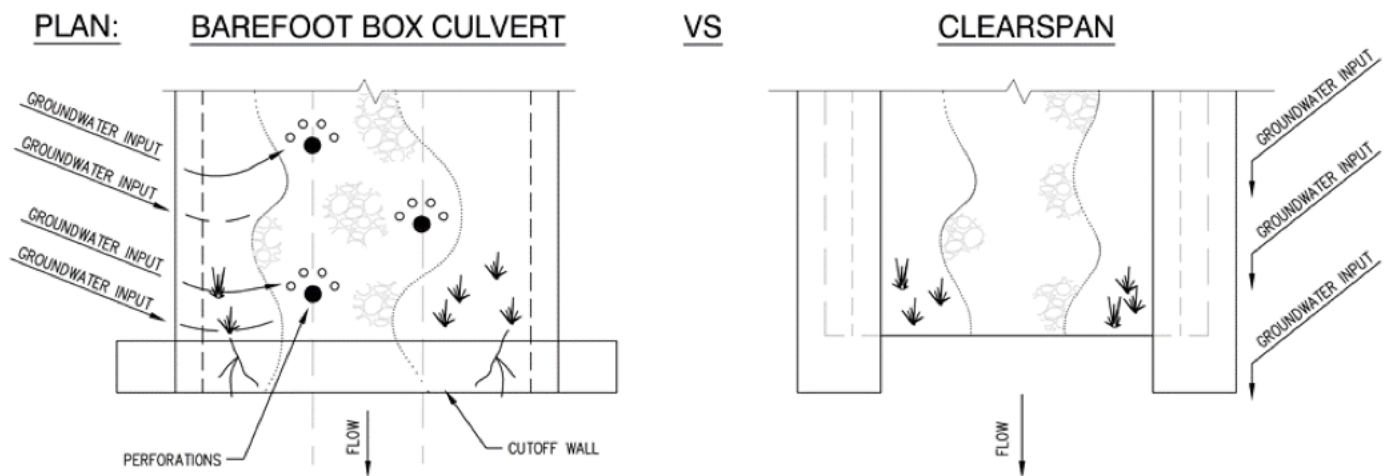
Replacement of degraded cast-in-place culverts may be costly with significant ecological considerations. The Barefoot Box Culvert designed by R.J. Burnside & Associates Limited accommodates groundwater upwelling, while maintaining thermal conditions vital to Brook Trout. Replacement of a 3-meter cast-in-place open bottom culvert located on Sideroad 15, north of Shelburne Ontario on the headwaters of the Pine River in Melancthon Township, may be the first of its kind in Ontario, approved by the Nottawasaga Valley Conservation Authority and Department of Fisheries and Oceans.

RJ Burnside and Associates Limited worked with Con Cast Pipe to ensure that the precast concrete culvert replacement design integrated the required specifications relating to structural integrity of the box units and cut-off walls. Each box unit was 2.0 meters long, designed according to OPSS 1821 and CSA S6 (CHBDC). The five pieces of 3658mm x 1829mm box units and two precast concrete cut-off walls were manufactured to CSA A23.4. Drexler

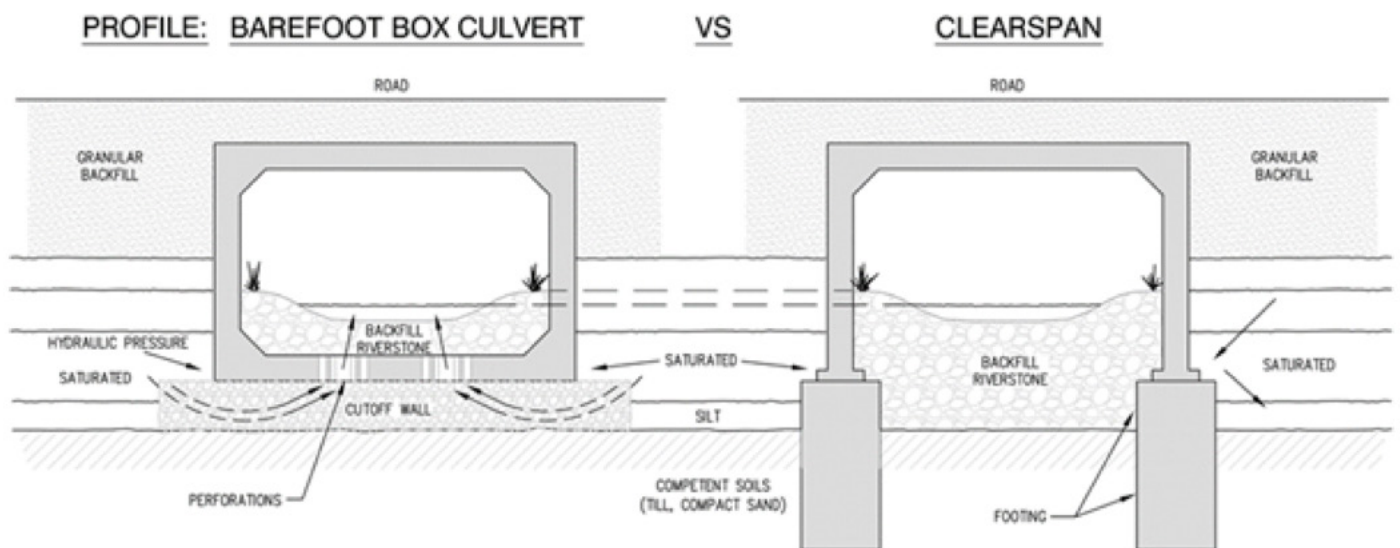
Construction Limited, the installation contractor, was responsible for removal of the existing structure, installation of the new culvert, and construction of a cast-in-place distribution slab that was required due the very low cover over the culvert.

Based on the ecological sensitivity of the site, it was important to replicate the form and function of the watercourse, as well as the existing conditions. Burnside designed the pre-cast concrete culvert to promote groundwater upwelling and discharge through strategically placed perforations in the bottom slab of the boxes. In addition, the design incorporated strategically placed river stone simulating natural substrate, and accommodating a meandering low flow channel within the structure.

Plan showing placement of preformed holes to promote groundwater upwelling



Comparison between the Barefoot box culvert and an open bottom culvert with footings



Design features:

- No footing forming a barrier that blocks lateral ground water
- Cut-off wall promotes ground water upwelling into perforations
- Cut-off wall creates the required hydro-static pressure to promote groundwater upwelling
- Speed of construction, substantial cost savings, and ease of construction

A budget estimate of \$300,000 plus taxes was allocated to complete the engineering and construction of the new structure. The box units were cast in advance of the project installation date, and delivered in a “just-in-time” construction method to eliminate wait-time and expedite the installation of the precast boxes. The openings cast in to the bottom slab were placed according to details provided by Burnside.

Design Metrics

To determine if the base slab perforations, cut-off walls, and bedding would function as designed, Burnside installed shallow stream bed piezometers at various depths to determine groundwater upwelling and hydraulic gradient. Each piezometer was outfitted with an automatic water level recorder to determine levels within the piezometer compared to the natural stream conditions. Following construction, all piezometers showed increased water levels that promote groundwater discharge and upwelling within the culvert. Piezometers revealed a 2-4cm increase in groundwater level above the existing base flow, which could significantly increase groundwater contribution.

Additional monitoring of groundwater levels and temperature continues. Brook trout use and underwater footage of spawning activity <5m downstream has been captured using under water cameras. As-built conditions have been reviewed by DFO and the conservation authority to ensure all mitigation measures and approved detailed design was completed.

The new structure upgraded the culvert to current standards considering safety, geometry, road grades, and load capacity. Collaboration between Burnside’s aquatic ecologists, hydrogeologists, structural engineers, and Con Cast Pipe’s precision manufacturing has taken precast innovation to a new level in watercourse crossing design.



Post construction Barefoot Box Culvert over Pine River.



Click to leave a comment!

Christopher Pfohl; chris.pfohl@rjburnside.com

Quick Notes

Who	Township of Melancthon Nottawasaga Valley Conservation Authority Department of Fisheries and Oceans RJ Burnside and Associates Limited Drexler Construction Limited Con Cast Pipe
What	Replacement of degraded cast-in-place culvert with Barefoot Box Culvert™ design.
Why	Cast-in-place concrete culvert over Pine River in Melancthon Township had degraded and needed to be replaced.
When	2016
Where	Sideroad 15, north of Shelburne Ontario on the headwaters of the Pine River in Melancthon Township.
How	Open cut and just-in-time delivery of standard precast concrete box units with bottom slab special design.

Photos: Christopher Pfohl, RJ Burnside and Associates Limited

Precast Concrete Arch System Replaces Inefficient CMP Culvert

Darren Schmidt, Technical Resource Engineer, Forterra



Precast footings for arch sections and wingwalls.

Threatened litigation over a twin 36-inch diameter corrugated metal pipe (CMP) culvert on Kentucky Highway 2009, south of Hyden, KY in Leslie County resulted in the specification of a precast concrete structure to replace the undersized culvert. The twin culvert would become clogged with debris from upstream properties and flood adjacent properties and portions of the highway. Avoidance of legal action against the Kentucky Transportation Cabinet (KYTC) District required remediation of the flooding by the end of 2016.



Completed precast concrete arch culvert to accommodate design hydraulics and passage of debris from upstream properties.

Quick Notes

Who	Kentucky Transportation Cabinet District 11 Local landowners Forterra
What	Replacement of an inefficient twin CMP culvert with a precast concrete arch culvert.
Why	Flooding of adjacent properties and Highway 2009, and possible litigation.
When	2015-2016
Where	Highway 2009 south of Hyden, KY in Leslie County
How	Open cut precast installation with diversion lane.



The existing and anticipated hydraulics of the catchment area of the culvert determined that the span of the structure would be greater than that of a traditional precast concrete box culvert. A three-sided arch culvert with a 16-foot span and 5.5-foot rise was specified to replace the CMP culvert. The precast concrete system produced by Forterra in its Louisville facility would include precast footings, headwalls, and wing walls.

The advantages of the precast arch culvert were the hydraulic capacity capable of accommodating existing and planned flows, and those projected in extreme storm events. In addition, the system has a large clear opening for the passage of debris from woodlots and farmland. A Kentucky Transportation Cabinet District 11 Maintenance Crew could install the arch sections, thereby eliminating additional costs associated with a contractor hired to assemble the system. The option of installing the sections with a maintenance crew offset the shortage of funds in the budget for the culvert replacement.

Landowners near the area prone to flooding, and commuters who used the 8-mile road were happy to see the installation of the arch culvert. Bids were advertised in August and soon thereafter Forterra was awarded the material bid. The precast concrete arch culvert system was produced and delivered to the site in late November. The KYTC Maintenance Crew built a diversion lane to temporarily reroute traffic during construction. The project was completed in December to meet the 2016 deadline and avoid the lawsuit.

Darren Schmidt; darren.schmidt@forterrabp.com

Photos: : Darren Schmidt, Forterra



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Concrete Pipe and Precast Rejects and Seconds Repurposed for Artificial Reef

By Bruce W. Spatz, P.E., Northeast Region Manager, Rinker Materials

With the renewal of the Maryland Artificial Reef Initiative (MARI) 10-year permit from the U.S. Army Corps of Engineers in 2016, planning commenced immediately for the first placement of precast concrete pipe and other precast products on MARI's Tangier Sound reef. Marine contractor Smith Brothers, Inc. (Galesville, MD) was awarded the contract for construction of the new reef. The concrete will duplicate naturally occurring habitat by providing hard substrate. Rinker Materials supplied 400 tons of precast concrete pipe, manholes and other precast rejects and seconds during the reef construction in February 2017. Rinker donated the logistics to deliver over 20 truck loads of precast.

To restore marine habitat while improving fishing opportunities for recreational anglers in the Chesapeake Bay, Building Conservation Trust's Coastal Conservation Association (CCA) national habitat program, partnered with CCA Maryland, the Maryland Artificial Reef Initiative, Rinker Materials, Forterra, and Engel Coolers to add several hundred tons of concrete structure to the Tangier Sound reef site. The project is the result of partners coming together for marine habitat conservation! (video of the deployment and installation of the repurposed precast concrete <https://www.youtube.com/watch?v=DXZ6xty95fw>). The new underwater habitat, promises to be a boon for recreational anglers and commercial charter captains who depend economically on fishing structure and live bottoms.

The Maryland Artificial Reef Initiative includes over 60 private, state, and federal partners, and acts as a funding mechanism using private and corporate donations for reef development. It is a volunteer organization dedicated to preserving, restoring and creating fish habitat in tidewater Maryland. Funding for the MARI comes from the Coastal Conservation Association, Maryland Department of Natural Resources and the coalition of donors and partners.





400 tons of precast concrete pipe, manholes and other precast rejects and seconds supplied by Rinker Materials.

Quick Notes

Who	Maryland Artificial Reef Initiative U.S. Army Corps of Engineers Chesapeake Bay, Building Conservation Trust Coastal Conservation Association Smith Brothers, Inc. Rinker Materials Forterra Engel Coolers
What	Construction of Tangier Sound Reef.
Why	To preserve, restore, and create marine habitat in tidewater Maryland.
When	February 2017
Where	Chesapeake Bay
How	Delivery of precast concrete products by truck and barge to reef site and installation by Smith Brothers, Inc

Bruce W. Spatz, PE; brucew.spatz@rinkerpipe.com

Photos: Courtesy of WEBBER/SMITH Group®



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Barge with repurposed concrete pipe and precast products arrives at Tangier Sound Reef for unloading.

Video Features

Concrete Pipe and Precast Rejects and seconds Reproposed for Artificial Reef

Rinker Materials of supplied 400 tons of precast concrete pipe, manholes and other precast rejects and seconds during the reef construction in February 2017. Read more on page 12.

WATCH VIDEO

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MAP-21

A special interest group from Washington DC is trying to convince state legislatures that pipe material choices should be mandated by state law rather than determined by professional engineers. Don't let them tell you how to make procurement decisions.

WATCH VIDEO

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Project Achievement Award 2017 Nominee

Hancock Concrete Products, LLC - Precast concrete products accelerate Highway 20 construction in Iowa (See Concrete Pipe News, Page 7, Winter, 2017)

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