# Concrete Pipe News


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**On the Cover:** Concrete pipe used on widening and reconstruction of SR 92 in Utah.
Photo credit: Mel Mackay, Geneva Pipe



# Editorial

## Concrete Pipe Producers without Borders...

**Mark Omelaniec, Chairman**
American Concrete Pipe Association

**Matt Childs, P.E., President**
American Concrete Pipe Association

Markets are increasingly influenced by new products and materials originating anywhere on the planet. When thermo-plastic[1] and corrugated metal[2] pipe with variances in chemistry and structural characteristics enter the market, they require standards[3] for early adoption by public sector clients. Once standards are in place, then products and materials can be specified[4] or sole-sourced, according to rules, regulations, and legislation for purchasing goods and services.

Our industry has seen this process used for introducing unplasticized polyvinyl chloride (PVC) pipe[5], HDPE[6], and fiber reinforced concrete (FRC) conduit[7]. PVC and HDPE drainage products quickly entered the market from Europe, while FRC (originating in Australia) found market penetration far more challenging.

There was a time when concrete pipe[8] markets were supplied by locally manufactured products with locally processed natural resources. Nowadays, flexible pipe[9] products and resins that may not be produced locally can enter a geographic market area under NAFTA and other international trade agreements between states and provinces. Products and materials developed in Europe and Australia have found their way into the U.S. before being introduced to smaller markets in Canada and Mexico. Mexican concrete pipe producers compete with US-based HDPE pipe manufactures who have built plants near, and in Mexican cities for supplying local markets, while shipping north to distributors in the USA.

Competition for market share begins long before an alternative product enters local markets. States and provinces are not immune from product development that is taking place half a world away. Concrete pipe producers and associations need to be vigilant about standards being developed for products and materials before they show up in a local market with a standard from another country, and a new standard pending for the American market. ACPA[10] is acutely aware of the need for vigilance and works with its colleagues in Canada, Mexico and other countries to monitor the development of new drainage products. When agencies like ASTM[11] and AASHTO[12] work on draft standards with industry, ACPA, its producers, and allied state and provincial associations partner to comment and contribute research and studies. We are in a global economy where political boundaries have all but vaporized when it comes to markets. It is the responsibility of the North American concrete pipe industry to ally with global partners to ensure that new products and materials are safe for public consumption, and if deemed to be, have standards that are fair and equitable when being specified for applications best suited for them.

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Doors and vents at access points and end caps.

# Bridging The Technology Gap

## Escape Exits Constructed With Reinforced Concrete Pipes

*By L. Steve Hiner*
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Recent mining disasters in the USA were heartbreaking reminders of the dangers of mining, and the significance of on-the-job safety. Modern technology has improved workplace safety, and innovations have saved lives and prevented injuries. Now, after its use as sewers for the past 150 years, reinforced concrete pipe[1] has another industrial application. It can be used for escape exits[2], or conduits. The concrete pipe escapeways[3] are simple and easy to replicate, with precast products available from local suppliers.

In 2006, the ACPA shared information with members about concrete pipe being used as escape tunnels in Australia[4]. The tunnels were used at a coal mine in Hunter Valley, New South Wales. Coal is removed from a 25-meter high stockpile from below via reclaim valves at the center of the pile, then transported by conveyor belt. Safety regulations require dual egress for the reclaim equipment operators.

A concrete pipe producer designed a custom 2550mm diameter (>Class 6) pipe for a load of 28 meters of fill, using much of the on-site backfill material. The concrete pipe was used to construct a separate escape tunnel running from the reclaim valves to the side of the stockpile, 100 meters in the opposite direction of the conveyor tunnel.

In late 2007, the U.S. Department of Labor's Mine Safety and Health Administration[5] (MSHA) debuted "The Great Escape" rescue system[6]. In a press release, MSHA said that the system provides miners a constant and uncontaminated supply of breathable air, along with a rapid, safe means of escape through an isolated, structurally protected escape path. The system could safely protect communications and tracking systems from fire and explosive forces.

The prototype demonstration system consisted of reinforced concrete pipe (RCP) measuring approximately 42 inches in diameter, accessible at various points along the pipe. Doors and vents are installed in the unit's access points and end caps. Actual escape system installations may be able to use smaller diameter pipe and may be installed between a mine's working sections and an escape shaft or, depending on the mine layout, run completely to the surface. The standard 42-inch diameter RCP with a 4-inch wall was supplied by Rinker Materials Concrete Pipe Division CEMEX[7] from its facility outside of Pittsburgh. The prototype was designed with pipe that could withstand a 50-ton collapse or methane explosion. The escape-way can be made watertight, if flooding were a concern.

There are likely many more industries that could make good use of locally produced reinforced concrete pipe to enhance safety programs. Concrete pipe producers[8] are the people who are best informed about the performance of concrete pipe, and have a long history of working with clients to provide innovative applications with their products.

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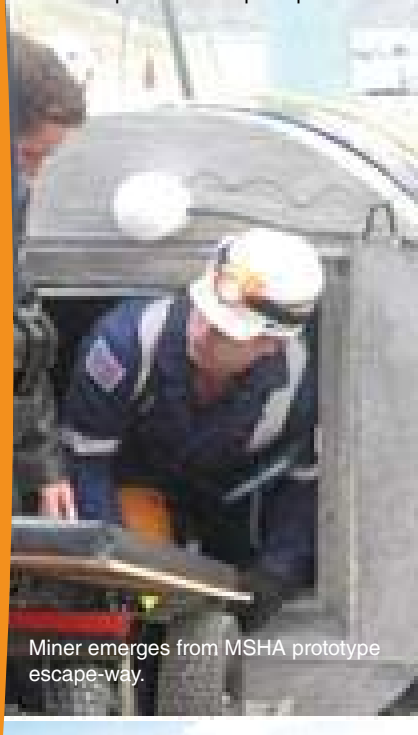

Miner emerges from MSHA prototype escape-way.

Installation of the mine tunnel in New South Wales, Australia.
www.concpipe.asn.au

Photos: Mel Mackay, Geneva Pipe

Nearly 12 miles of concrete pipe used.

Concrete pipe meets UDOT test requirements after installation.

In-line concrete tees save money and provide convenient access locations.

## 2010 Project Achievement Award Winner

### New Technology, Innovation and Cost Effectiveness Recognized on UDOT SR 92 Project

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SR 92 is the main east-west corridor for the rapidly growing communities of Alpine, Highland, Cedar Hills and north eastern Lehi. Thousands of vehicles travel this east/west corridor which links to I-15, allowing for quick commutes to Salt Lake City or Provo. A 5.5-mile portion of the roadway is being reconstructed and widened in 2010 from Interstate 15 (I-15) to S.R. 74 (Alpine Highway) as an expressway to improve mobility. The design-build project includes commuter lanes to provide direct access to I-15 without signalized intersections. An expanded trail system is also included in the project. The ACPA's Project Achievement Award was presented to the Utah Department of Transportation[1] based on new technology, innovation and cost effectiveness.

New Technology

Approximately 300 feet of 72-inch Class 5 reinforced concrete pipeline[2] was pipe-jacked[3] under I-15. The pipe was wet cast[4] with self consolidated concrete[5] (SCC) for improved outer smoothness. The pipe units were produced with steel end rings to control vertical and horizontal alignment. The finished grade of the jacked pipe was constructed to within 0.02 inches of the design grade demonstrating that concrete pipe can be jacked without an exterior casing.

Innovation

The designer and contractor chose to use in-line concrete tees[6] instead of manholes and cleanouts, in many circumstances. These underground junctions for 66-inch and 72-inch diameter pipe were produced by Geneva Pipe[7] to save money, and provide convenient access locations for future maintenance.

Cost Effectiveness

Nearly 8 miles of 18-inch to 36-inch diameter non reinforced concrete pipe[8] (NRCP) are being used on the project. UDOT specifications typically call for smooth line pipe in smaller diameters which allows contractors to select from different alternative materials[9]. NRCP was chosen for its cost, which was lower than the alternative materials. Since post installation testing must be considered when evaluating overall cost effectiveness, the ability for concrete pipe to meet UDOT test requirements was a major consideration in choosing concrete pipe.

The SR-92 Highway Drainage project[10] is a complex design-build undertaking that requires coordination between the designer, contractor and pipe producer. The close proximity of the Geneva Pipe facility to the project facilitates production and delivery of the various pipe sizes in accordance with the contractor's installation schedule. The total cost of the project is $148 million with completion expected in the fall, 2011.

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  (Jacking, non reinforced, tees, reinforced concrete pipe, manual, cost)
  www.concrete-pipe.org

# Extreme Moves with Reinforced Concrete Pipe

*By Rex A. Busa*
*Oldcastle Precast, Inc.*
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*Mazhar A. Malik*
*Pennsylvania Department of Transportation*
*Engineering District 8-0 and Engineering District 6-0*
*Harrisburg PA*

Self Propelled Modular Transport (SPMT) vehicles were used to move two new steam generators to Exelon Nuclear's Three Mile Island Unit I, nuclear power plant in Middletown, Pa. When loaded with a generator, the SPMT vehicles were 825 tons. Because of the weight and length of the loaded vehicles, several bypasses of bridges were required. The project team used reinforced concrete pipe (RCP)[1] for some of the by-pass designs from Oldcastle's Croydon facility[2], because of its engineered strength and availability. Construction of the bypasses began in July 2009, shortly before the steam generators arrived from the AREVA[3] facility in Chalon, France.

The generators were first delivered into the port in Claymont, Delaware and moved by barge to the Tomes Marina in Port Deposit, Maryland. This is where the 75-mile over-land trip began. Challenges along the route included narrow roadways, 90-degree turns, 51 stream crossings as well as hundreds of culverts, storm drains and overhead utility lines. The journey took 18 days at a top speed 3 m.p.h. The longest distance moved in any one day was 9.8 miles and the shortest 0.5 mile.

Oldcastle Precast supplied approximately 1,700 feet of 48-inch diameter Class 4 RCP. The pipe was used on the bridge bypasses to allow water to continue to flow through the temporary roads constructed to carry the generators. The pipe was removed and reused on the next crossing requiring RCP. There were 16 sites along the route that required the RCP bypasses. Two sites required the use of over 1,700 feet of RCP to complete the crossings.

Mazhar A. Malik, PennDOT's[4] Highway Occupancy Permit Manager and his team were responsible for issuing permits, and highway, bridge and temporary structures inspection within its District, including the inspection of the temporary stream bypasses, constructed by Kinsley Construction, Inc.[5]

Backfill material consisted of R-4 Rip Rap, AASHTO[6] No. 1 and No. 57 stone placed over and around the pipe. This composite of materials made for an extremely strong structure, but at the same time was porous to allow the passage of water through the structure. The RCP was designed for a D-Load[7] of 64,000 lbs. Testing demonstrated failure or ultimate at over 96,000 lbs. under "Three Edge Bearing[8]" conditions, which represent the worst case scenario. These sites, and the pipe in particular, were inspected before, during, and after passage with absolutely no signs of stress or failure. An excavator would crawl across the previously placed pipe sections to complete the bypass construction. Once the initial structure was completed, 18 inches of 2A coarse aggregate was placed as a cap and driving surface for the bypasses.

Full Story: http://www.concrete-pipe.org/CP/ExtremeMovesWithReinforcedConcretePipe.pdf

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  www.concrete-pipe.org
- **Concrete Pipe Design Manual**
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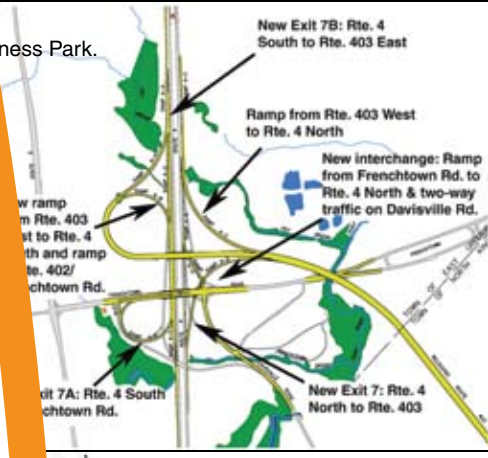
Photos: Ed Pentecost, Oldcastle Precast


Fagioli, Inc. of Houston, Texas and Areva NP Inc. Lynchburg Va. move two 510 ton steam generators to Exelon's TMI-Unit I Nuclear Power facility in Middletown PA.

PA. State Rt. 272, Pequea Creek, Lancaster County PA, bridge bypass utilizing Oldcastle's 48-inch diameter Class 4 RCP and the Kinsley's composite stone construction.


825 ton transport vehicles (26 axles and 208 wheels) and some the 100+ people that it took to make sure the move went off without a hitch.




## RCP Reduces Impact of New Expressway on Wildlife

*By Richard Williams*
*Hanson Pipe & Precast*
*401-782-2600*

Relocation of Route 403[1] in Rhode Island was needed to alleviate heavy traffic conditions of Davisville/Devils Foot Road, and to handle the projected traffic associated with anticipated increased employment at the Quonset Point Business Park. The relocated Route 403 is more than 4.5 miles of four lane freeway on an alignment mostly located on undisturbed land.

The Environmental Impact Statement determined that the project could have impacts on the wildlife associated with loss of habitat, fragmentation of home range units, disruption of breeding territories, isolation of breeding populations, increased mortality from road kill and possible species-specific behavioral alteration resulting in lowered local population levels. Increased road kill of small mammals was determined to be a significant concern during the public coordination program. To minimize this potential, the Rhode Island Department of Transportation (RIDOT)[2] considered the implementation of design features that could facilitate small mammal passage. Two possible design alternatives included occasional openings in the median barrier, and installing concrete culverts to allow safe passage. RIDOT decided that concrete culverts[3] were the best solution.

Two locations for the wildlife crossings were based on close proximity to existing environmental features and wildlife habitat. One culvert was located adjacent to and above the existing Pine River crossing where wetlands had been divided by rail tracks, and further fragmented by the wider and busier Route 403 alignment with its concrete median barrier. The Pine River flow was maintained using a new 36-inch diameter reinforced concrete pipe (RCP)[4], while the wildlife crossing culvert constructed with 42-inch diameter RCP with invert set above the anticipated 100-year storm elevation of the Pine River. The pipe was obtained from Hanson Pipe & Precast[5] The other location was where an elevated embankment of the Route 403 alignment traversed a heavily forested area. The location of the culvert was several hundred feet from where Route 403 and Route 402 (Frenchtown Road) crossed the Hunt River.

In each location, large diameter pipe was used to accommodate the size of larger mammals, and to provide sufficient light at the far end of the tunnel to encourage mammals to use the culvert. Fencing was positioned to help direct the animals toward the controlled passages. The use of concrete pipe to preserve wildlife migration was found to be cost-effective and unobtrusive.

Wildlife crossing near Hunt River on north side of Route 403 alignment.

Wildlife crossing culvert constructed with 42-inch diameter RCP with invert set above the anticipated 100-year storm of Pine River.

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  www.concrete-pipe.org

Photos: John Simpson, Sherman-Dixie

20-foot x 8-foot concrete box sections lowered into position.

Precast concrete box sections joined with butyl mastic to reduce exfiltration and infiltration.

Installed precast concrete box rainwater storage structure ready for backfill with native soil.

# Rainwater Harvested for LEEDing Power Generator Using Precast Boxes

*By John Simpson, P.E.*
*Sherman-Dixie*
*JSimpson@shermandixie.com*

In December 2007, Alstom Power Systems[1] began work to extend its facility in Chattanooga, Tennessee, where it will manufacture gas and steam turbines for the U.S. market. The new 350,000 square-foot facility is designed to support the U.S. nuclear renaissance by producing the world's largest steam turbine, ARABELLE™.

The facility is being constructed as a zero-emissions factory, and Alstom is applying for Leadership in Energy and Environmental Design (LEED)[2] certification. Half of all demolition debris will be re-used; buildings and roofs are highly insulated; process heat will be recovered for heating; and rainwater will be harvested and reused for on-site irrigation.

Barge, Waggoner, Sumner and Cannon, Inc.[3] (Chattanooga), the professional services company retained to design the rainwater harvesting system, first specified flexible products[4], but the estimated complete installed price was considered to be excessive. The company then specified a four sided box system and a three-sided box bridge system for storage. The contractor, Stein Construction Company of Chattanooga contracted with Sherman-Dixie to supply 186 feet of four-sided 20-foot x 8-foot precast concrete boxes[5].

The system is off-line from the storm drainage infrastructure of the site. During rainfall, water fills the system via a diversion structure. After the box system fills with water, the balance of the stormwater flows over a weir in a diversion structure, then into a local storm drainage system.

Construction of the box conduit and storage facility was close to the Tennessee River, where the water table was high. The contractor had to dewater the construction site before installing the boxes to a depth of approximately 22 feet, using a Type 4 Standard Installation[6] that allows for the use of native material for backfill. This was a major advantage for reducing the installed cost and keeping the precast concrete box option competitive with a flexible system. A flexible system would likely have required the import of select bedding and backfill material and greater energy and time to install the system. The contractor sealed the joints of the box conduit and storage system with butyl mastic and wrapped the joints with a geosynthetic cloth to form joints[7] that minimized exfiltration and infiltration. The boxes were set in place in two construction days. Over two additional days the system was backfilled and completed.

The precast concrete box system, produced with primarily local materials from a local facility, and backfilled with excavated material, provided advantages for the owner to help achieve credits for LEED certification. In addition, specification of precast concrete boxes saved the project time and money, through a shortened installation period, and use of native soils for backfill. The LEED-designed project[8] will cost $280 million and create 350 jobs.

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# Join us at ACPA's 2011 Pipe School!

This year's Pipe School will be held on January 26 - 29 in Charlotte, North Carolina. Don't miss the opportunity to learn from the most experienced and knowledgeable instructors in areas of production, quality, engineering, sales and marketing.

The highlight of this year's school will be a half-day dedicated to a Post Installation Demonstration using CCTV inspection equipment on pre-cracked RCP. The pipe laid above ground allows inspectors and engineers to compare cracks in person with the video images captured by the inspection equipment, without the need to crawl through installed pipelines. The above-ground demonstration allows a better understanding and interpretation of the inspection data.

Engineers and Production Personnel alike will enjoy the Rinker plant tour to see how this facility makes concrete pipe. For those interested in the production side of the business, a Tent City will be set up for both QCast demonstrations and Clinics. QCast tents will include such things as proper Three-Edge-Bearing, hydrostatic testing, go-no-go measurements, aggregate moisture testing and more. And the Clinic tents will include representatives from Machine manufacturers, gasket suppliers, wire rolling, mixers, and more.

The Pipe School will also offer the opportunity for personnel to become QCast accredited by attending the Quality School and passing the exam at the end of the course.

## Be sure to make a Pit Stop in Charlotte!

*Save this link www.concrete-pipe.org/cpnews.htm to your favorites list to increase your knowledge about drainage applications and innovative ways to use precast reinforced concrete pipe and boxes to build structures that will last.*