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On the Cover: INFRASET, is one of many South African concrete pipe producers supplying products to the Gauteng Freeway Improvement Project in preparation for the 2010 FIFA World Cup.

Editorial

Durability of the Concrete Pipe Industry

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

The durability and performance[1] of concrete pipe is well documented from 1842, the year that marks the oldest recorded concrete pipe sanitary sewer in the United States. By the end of the 19th Century, pipe producers were ready to organize to participate with governments in creating practical standards and specifications that would help them compete with clay and steel pipe for market share. When the Interstate Cement Tile Manufacturers Association was created in 1907, the industry emerged into a new era on the back of standards and specifications driven by the research and development[2] of the day.

Like in the past, the ACPA adjusted its resources and focus to gain in strength and purpose following the recessions of the early 1980s and '90s. In the '80s, PVC and HDPE conduits flooded into a market where buyers were willing to trade proven performance for alternatives boasting cheaper capital cost. ACPA invested in sound research and development and introduced new bedding standards[3] that provided an alternative to cheap capital costs of flexible pipe through installation savings. The '90s recession unleashed creativity and innovation and producers were able to offer designers and specifiers software[4] to design long lasting pipelines and culverts. The application of concrete pipe for sewers and culverts became easy with reduced risk[5] for owners and designers.

Throughout the 2000s, ACPA's producers embarked on an intensive program of research, development and studies[6] to reinforce performance knowledge of concrete boxes and pipe, while demonstrating the weaknesses of standards and specifications that treat flexible and rigid[7] pipe as similar products. ACPA's producers funded research on shear design of boxes, crack classification, fatigue, bedding thickness, testing procedures, corrosion, bedding and fill heights, standard installations, economic costs of culvert failures, durability, and schools that investigated condition surveys of HDPE installations. Work is well underway to educate[8] specifiers, designers, regulators, contractors and legislators about the performance of rigid and flexible pipe, and precast concrete boxes.

The global recession and shift to green products, standards, specifications and best practices[9,10,11,12] has opened the marketplace to new alternative products. Again, as in the past, ACPA's producers are employing new technology, engaging in research and development, and developing better standards and specifications to build market share with new applications of a proven product. The concrete pipe industry is as durable as the products it produces, and like concrete, the industry gets stronger with age.

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Bridging The Technology Gap

Managing Fire and Water in a Changing Climate and Shifting Weather Patterns

By ACPA Staff
972-506-7216

Rising temperatures and shifting rainfall patterns that accompany climate change make some areas of the U.S. more susceptible to disasters, heightening an awareness of the impact of wildfires and flooding on buried infrastructure. The 25,000-acre brushfire of April 2009 that burned the entire Town of Stoneburg[1] demonstrates that greater thought must go into the specifications for drains and culverts in areas susceptible to wildfire. A section of FM (Farm-to-Market) Road 1806 collapsed when three high density polyethylene (HDPE) pipe culverts used for drainage and support for the road ignited and melted leaving a crater. HDPE is often substituted for conventional concrete culverts[2] in roadway construction. Using combustible materials in high fire-risk areas or in evacuation routes for natural disasters could prove harmful to the health and safety of the public.

In May 2009, approximately 100 vehicles were stranded at River Grove Park in Kingwood[3] Texas after the park's only access road collapsed forming a sinkhole measuring 21 by 24 feet on the surface and approximately eight feet deep. The corroded four-barrel 60-inch diameter corrugated metal culvert was quickly replaced by a four –cell precast concrete box culvert with standard sections that measured 8 feet x 6 feet.

In September 2009, Gwinnett County[4] Georgia DOT closed a portion of Liddell Road after a motor vehicle fell into a sinkhole. The failed 48-inch diameter corrugated metal pipe culvert was replaced with a 72-inch diameter reinforced concrete pipe culvert designed to last 100 years.

These three cases of culvert failure are classic examples of a systemic problem facing public works professionals throughout the United States. FHWA rules[5] that trickle down, and fiscal restraint make it difficult for local officials to specify the products and materials they know should be applied to certain public works.

In regions susceptible to massive flooding and wildfires, the application of concrete pipe[6] and boxes for culverts and associated storm sewers makes sense because concrete culverts don't burn[7], they resist buoyancy[9], have installation savings, are strong and durable, can be used for stormwater retention[9], and producers are nearby to supply products in a hurry.

Full Story: http://www.concrete-pipe.org/news/ManagingFire&WaterinaChangingClimate&ShiftingWeatherPatterns.pdf

Collapsed access road in River Grove Park, Kingwood. Photo: Hanson Pipe & Precast

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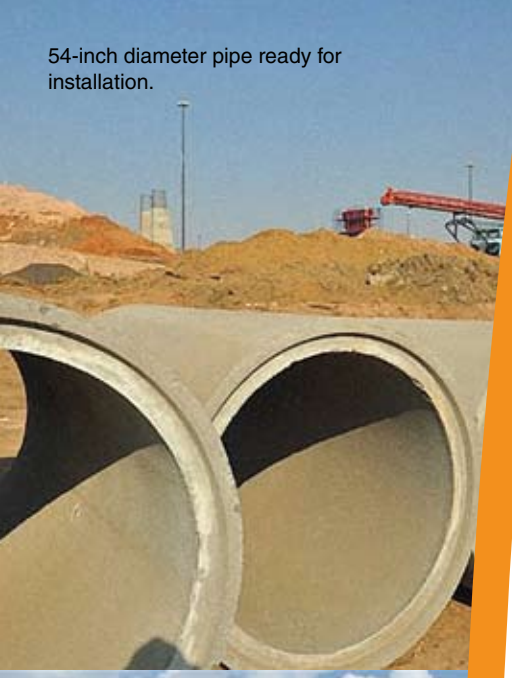
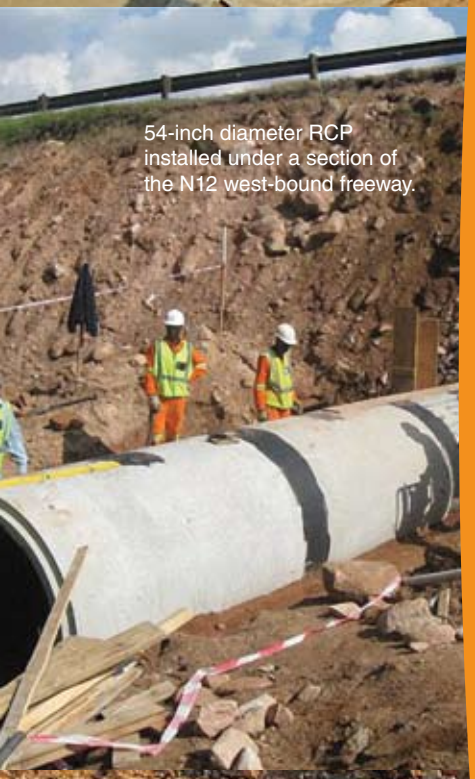


54-inch diameter pipe ready for installation.



54-inch diameter RCP installed under a section of the N12 west-bound freeway.

60-inch diameter manhole near switch ramp on N3.

RCP and RCB En Route to 2010 FIFA World Cup

By Francois Myburgh, General Manager
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Producer members of the Concrete Manufacturers Association (CMA)[1] are making a substantial contribution to the Gauteng Freeway Improvement Project (GFIP)[2] in South Africa. As of September 2009, CMA producer members of the CMA's PIPES (Pipes, Infrastructural Products and Engineering Services) Division[3], had supplied over 20,000 tons of precast concrete infrastructure and construction products. Included in the list of products are sanitary sewer pipe (150 tons), stormwater pipe (6,000 tons), precast boxes for culverts (250 tons), facade panels (900 tons), barriers (13,000 tons), manholes, and other precast products.

Existing storm water pipes and box culverts had to be extended under the freeways. Where new interchanges were built, culvert and storm water systems had to be installed. Given that the space for staging and formwork support is often extremely limited, the use of precast concrete elements such as beams on bridges, along with concrete pipe[4] and boxes was indispensable to the upgrading.

The R11,9-billion ($1.7 billion) freeway improvement project comprises 12 work sections or work packages over 180 kilometers (112 miles). The massive project is needed for the 2010 19th FIFA World Cup[5], the premier international football (soccer) tournament. It is scheduled to take place between 11 June and 11 July 2010. This will be the first time that the tournament has been hosted by an African nation.

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Photo credit: INFRASET

New Age Drainage Solves Oldtown Problem

By Jeff Bradley, P.E., L.S., Vice President
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The City of Wichita has rebuilt most of the old brick streets, and replaced water lines, sewer lines and utilities to serve the Oldtown District[1]. A 100 year-old-plus brick arch weaved through the district and drained the entire area. Given the poor condition of the brick arch conduit, anything other than a light rain would quickly flood the streets. A new major drainage outlet was needed to alleviate the flooding. Wildcat Construction of Wichita was awarded the Phase 1 contract and W.B. Carter Construction of Wichita was awarded Phase 2.

Baughman Company[2] and Wichita Department of Public Works[3] worked closely with McPherson Concrete Products / Wichita Concrete Pipe[4] to supply approximately 5,300 feet of 8-foot x 4-foot, 8-foot x 3-foot and 4-foot x 4-foot reinforced concrete boxes and 4,700 feet of reinforced concrete pipe ranging in size from 15 to 48 inches in diameter. The project included over 110 inlets, manholes and transition structures. Because of the speed of installation, this project was designed as pre-cast[5] from the beginning. To achieve the necessary depth, the project needed to cross below several large diameter interceptor sewer lines, including three 36-inch diameter lines and a 27-inch diameter line. Considering these crossings, the reinforced concrete box[6,7,8] floor and top slab thicknesses were critical factors, so that the clearance, no matter how slight, was achievable.

At the confluence of Project 1 and Project 2, the 6-foot x 4-foot box ended allowing a 4-foot x 4-foot box to extend westward, while a 48-inch reinforced concrete pipe extended to the north. By pre-casting this structure, the roadway was not closed for any significant time, which greatly expedited traffic control. Special inlet structures were also designed and built as pre-cast units to accommodate the brick alley section pavements. Laterals were extended into the worst flooding areas, and these special structures installed and connected to existing pavement laterals. The Phase 1 contract was awarded in October 2007 and completed in July 2009. The Phase 2 work began in April 2008 and finished in June 2009. Phase 1 cost $5,300,000 and Phase 2 cost $2,000,000.

Full Story: http://www.concrete-pipe.org/news/NewAgeDrainageSolvesOldtownProblem.pdf

Photo credit: Baughman Company


Completed 8-foot x 4-foot outfall structure at the Wichita Canal.


Flooded street before improvements.


Flooded street after improvements - Special alley inlet structure.

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RCP Used on Hartford's First Major ARRA-Funded Project

By Kevin Brown
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Reinforced concrete pipe[1] is being used on the first major project in Hartford[2], Connecticut to proceed with funding from the American Recovery and Reinvestment Act[3]. The Homestead Avenue Interceptor (HAI) Extension project is part of the Metropolitan District's Clean Water Project[4] to reduce combined sewer overflow[5] (CSO) to the Connecticut River. The state received $48.5 million in federal stimulus funds to help dozens of municipalities repair and update aging water and sewer infrastructure with "shovel-ready" projects that create immediate jobs for construction workers, designers and engineers.

Work includes the installation of 3,700 feet of 72-inch diameter PVC-lined reinforced concrete pipe (RCP) using microtunneling[6] technology through varved clays up to 45 feet deep and the installation of 450 feet of 72-inch diameter RCP using open cut methods through congested city streets. Varved clay is clay with visible annual layers, formed by seasonal differences in erosion and organic content. This type of deposit is common in former glacial lakes.

The longest single microtunnel drive was 1,200 feet. The work includes microtunneling beneath I-84 as well as beneath active Amtrak railroad tracks. All excavated material is stockpiled and characterized prior to disposal.

The project extends the Homestead Avenue Interceptor to the Park River Interceptor. The HAI discharges combined sewage to the Gully Brook Conduit (GBC), which is primarily a storm water pipe, on Walnut Street north of I-84. This extension will reduce combined sewer flows to the Gully Brook Conduit from the HAI for flows up to the 1-year design storm. Along its route the new pipe will take combined sewer flows from the Chestnut Street Sewer, which is also connected to the GBC. As a result, the new pipe will reduce combined sewage flows at two primary CSO outfalls.

Tunnelling the entire HAI through a wet varved clay, with groundwater 7 to 10 feet below the surface, was selected to avoid the utilities, roads and rail tracks along the alignment. The $22.9 million project, which is sometimes up to 40 feet deep under parts of Hartford, is expected to be completed in the spring of 2011. The contractor was Northeast Remsco Construction, Inc. of Farmingdale, NJ[7].

72-inch diameter RCP prepared for installation.

Installation of 3,700 feet of 72-inch diameter RCP using microtunneling[6] technology.

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Photo credit: Northeast Remsco Construction, Inc.

Concrete pipe specified for storm and sanitary sewers.

30 year-old tear-shaped RCP.

Eleven of the excavated RCP units reused for storm water diversion structure.

This Is Sustainable Development

Fish Creek Deep Utilities Relocation, Calgary

By Robert Powers, C.E.T.
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Fish Creek Park is a provincial park located in the southern part of Calgary Alberta[1], Canada. At 5.2 sq. miles, it is over three times the size of Vancouver's Stanley Park. The City has developed a stormwater management strategy[2] which seeks to maintain the current level of sediment deposits into the Bow and Elbow Rivers over the next ten years. This strategy includes constructing stormwater quality retrofit facilities.

A line of 60-inch diameter reinforced concrete pipe[3] was excavated in mid 2009, during the retrofit of the storm water outfall line. The quality of the 30-year-old pipe and gaskets was so high that the decision was taken by the consulting engineer, MPE Engineering Ltd.[4] and the City to reuse eleven of the excavated units for a storm water diversion structure. Reinforced concrete pipe was also specified and used for the new 42-inch diameter sanitary sewer under approximately 5 metres of fill through the park. The pipe required no special design considerations, and 3,477 feet were supplied by Inland Pipe of Calgary[5]. Acceptable use of the pipe was confirmed by a corrosion[6,7] review and report by the Canadian Concrete Pipe Association, Alberta Chapter.

Hydropipe, the predecessor of Inland Pipe, was the company that supplied the old Class II pipe that had been designed according to the ASTM C76[8]. All pipelines in Calgary are specified with gasketed joints[9], so the old pipe was refitted with new gaskets before being reinstalled. The concrete pipe used for the new storm and sanitary sewers was designed[10] with a service life[11] that matches or exceeds the design life[12] of the project. The reused pipe is expected to last as long as the new sewers.

The Fish Creek deep utilities relocation project is an example of sustainability[12] according to all excepted norms of sustainable development[13]. Because of its long life, concrete pipe is an economical and cost effective drainage product that consumes minimal materials and energy with reduced maintenance and rehabilitation requirements.

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Photo credit: MPE Engineering Limited.

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