



ICCX ICCX Middle East 2018 - Meet the industry players in Sharjah **NEWS** HawkeyePedershaab announces formation of Afinitas parent company **CONCRETE TECHNOLOGY** Two-prong approach to protect concrete in harshest environments **CONCRETE PRODUCTS** New production line for concrete paving stones at Sunroad in South Korea **CONCRETE PIPES AND MANHOLES** Modular and fully automated production process for free-form concrete moulds

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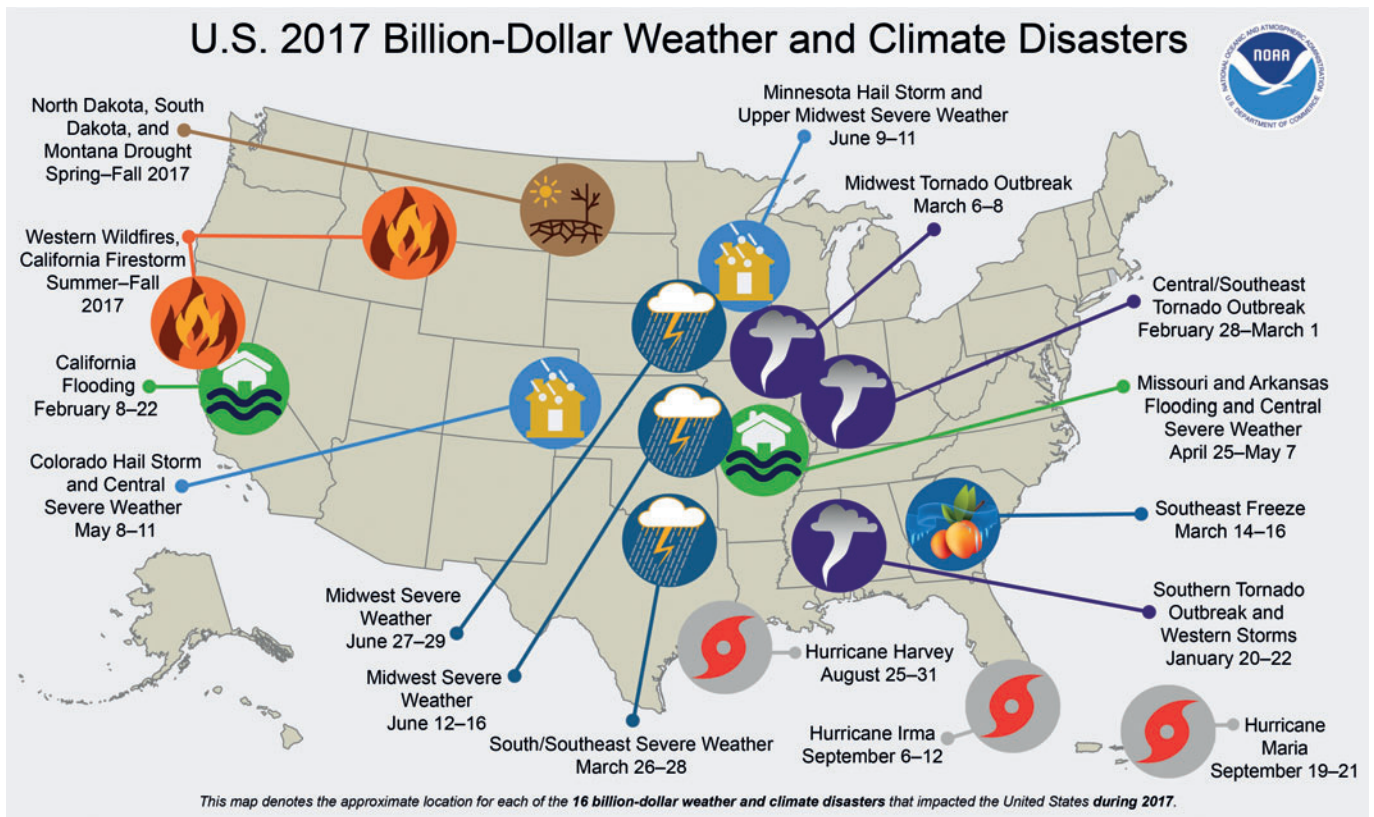


Concrete Pipe – Health and Safety in Severe Weather Conditions

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

After more than 175 years, concrete pipe continues to be a product of choice for specifiers, contractors, and design engineers. Throughout its 111-year history, the American Concrete Pipe Association and its members have met the demands of infrastructure owners while improving the quality and performance of concrete drainage and collection systems through advancements in product design, plant production, and concrete mixes. Contemporary designs of production plants in automated and robotic facilities ensure quality of products, health and safety, especially built to overcome severe weather conditions.

The U.S. has sustained 230 weather and climate disasters since 1980 where overall damages/costs reached or exceeded \$1 billion (including Consumer Price Index adjustment to 2018). The total cost of these 230 events exceeded \$1.5 trillion (www.ncdc.noaa.gov/billions). As of April 6, 2018, there have been 3 weather and climate disaster events with losses exceeding \$1 billion each across the United States. [1] The California wildfires, which burned more than 9.8 million acres in 2017, destroyed over 15,000 homes and businesses, caused 44 deaths, and racked up a cost of \$18 billion. [2]



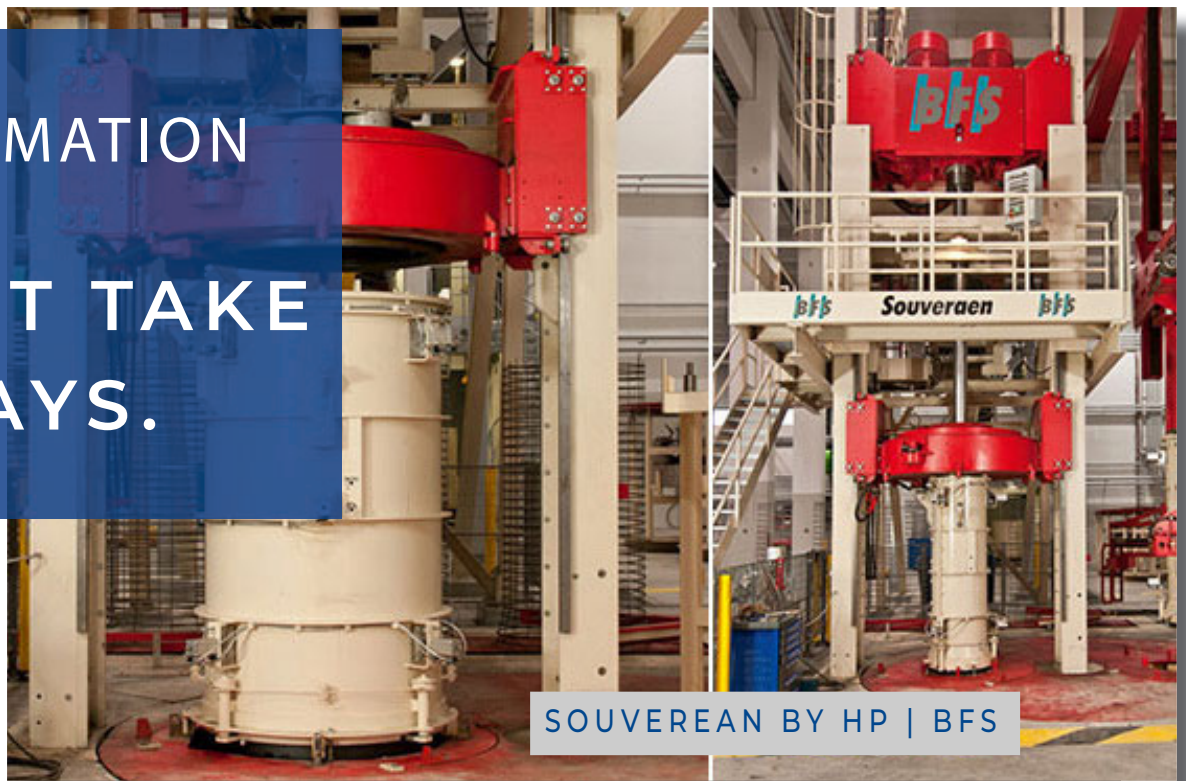
2017 Billion dollar weather and climate disaster

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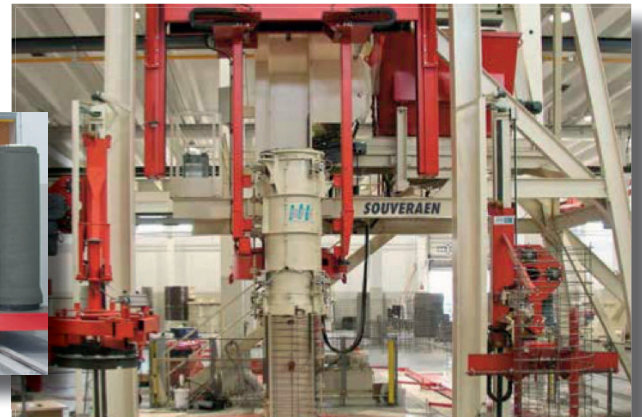
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■ Russell Tripp, P.E., Clemson University alumnus, earned his Bachelor of Science degree in Civil Engineering in 1982. He spent the first 21 years of his professional career working in the natural gas industry. He then served three years in the PVC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

Following disaster events, news reports documented pipeline systems and culverts that were irreparably damaged. Failed thermoplastic or corrugated metal drainage systems, from the wild fires in California to the hurricane damage in Texas and Florida, were identified as the primary cause of many road failures.

Unlike concrete, thermoplastic pipes will melt and burn. Based on recent fires in California, damage to a thermoplastic drainage system has extended far beyond the damaged pipe itself to include sidewalks, roadway, gas/oil pipelines, drinking water systems and nearby structures. Thermoplastic pipe materials installed close to the surface or where there is an exposed pipeline inlet or outlet run the risk of being damaged or destroyed by fire regardless of the use of special end treatments. Fires in concrete pipeline systems generally don't affect structural strength or flow capacity; the two fundamental requirements of a gravity pipeline drainage or collection system. The repair or replacement of infrastructure is incredibly expensive, and the community impacts include the interruption of service, localized flooding and damaged roadways that severely disrupt traffic based on damaged thermoplastic or metal pipelines found in, or adjacent to road rights of way. Thermoplastic pipe culvert failures have been documented recently where access by emergency service vehicles were blocked resulting in loss of property and more threats to health and safety.

During the 2017 Santa Rosa, California fires, underground thermoplastic drainage pipes in the North Bay fires melted and burned. Utility owners and municipalities in the areas affected by the fire inspected culverts and water pipelines. Culverts were replaced and drinking water tested. In the winter of 2018, water in the neighborhood near Fountaingrove Parkway remained undrinkable because the tests found benzene, a chemical that can cause cancer.[3] "Since Jan. 24, when the city last released detailed test results, the city has found 58 additional instances of benzene in the drinking water in Fountaingrove. The vast majority were found within the boundaries of a 184-acre advisory zone where the city first discovered el-

evated levels of benzene, a chemical commonly found in plastics and gasoline that can cause cancer." [4] The use of HDPE and polypropylene (PP) pipe in storm-drain systems increased over the past thirty years because the purchase price was often perceived as lower than reinforced concrete pipe and corrugated metal pipe. Perhaps problems resulting from fire, deflection, joint failure, and flotation weren't fully understood. In many jurisdictions, codes stipulate that the last few feet of a thermoplastic culvert be constructed of corrugated metal to lower the risk of structural damage in the case of fire. Such codes however have overlooked the risk of fire damage to pipeline sections beyond the metal inlet or outfall. Subsequently, storm drains under pavement installed as cross drains made of HDPE and PP conduits continue to be specified and installed in fire hazard zones. Such cross drains have been shown to act as paths to direct flames under roads to ignite brush and residences, thereby increasing the threat to health and safety.

The U.S. National Fire Protection Association recognizes the potential danger of thermoplastic culverts to public health and safety. In Section A.5.2.10 of the 2017 edition of Standard for Fire Protection Infrastructure for Land Development in Wildland, Rural, and Suburban Areas, it states: "Driveway entrances constructed of multiple surfaces of dirt, concrete, and asphalt are usually a single vehicle width and cross the culvert leading into the actual driveway. The culverts often have either a metal or plastic pipe laid into them and the driveway is built over the pipe. During the response effort of the Black Forest Fire in Colorado in 2013, at least three incidents were cited where the integrity of the plastic pipe had been compromised by the fire and resulted in fire apparatus getting stuck in the culvert area. This situation can compromise egress of the occupants as well as the safety of responding fire crews. Fire apparatus access roads should be designed and maintained to support the imposed load of a fire apparatus and withstand the impacts of (or from) fire [5]."

Damage to America's transportation infrastructure by fire does not stop with the melting and ignition of culverts and pipeline systems; larger structures can be damaged as well. The March 2017 collapse of a section of the I-85 Bridge in Atlanta, Georgia due to fire, resulted in a new Georgia Department of Transportation policy that states, "only non-combustible materials may be stored under bridges." In addition, the policy includes minimum requirements for storing construction materials like high density plastic conduit that fueled the blaze [6].

The American Concrete Pipe Association published a demonstration at a concrete pipe plant showing a time lapse video of a low temperature ignition of high density polyethylene and polypropylene drainage pipe. The material used to ignite the equally-sized segments of thermoplastic pipe was dried grass. The same amount of grass was placed inside a section

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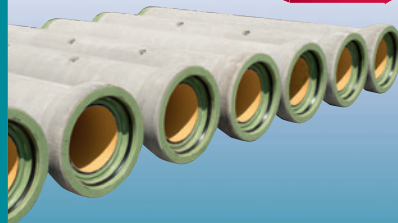
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Before and after burn. Using the QR-Code you can see the ACPA Comparative Flammability Demonstration October 21, 2015 on www.youtube.com/watch?v=FoXuyWnaJm4

of concrete pipe located between the two pieces of thermoplastic pipe. As soon as the grass was ignited, the time it took for the thermoplastic samples to melt, catch fire, and be reduced to a barely recognizable mass was recorded. The thermoplastic pipe ignited by grass took about 20 minutes to be consumed, at times emitting a black sooty smoke.[7]

Concrete pipe production facilities produce one of the world's most enduring products for storm drainage and sewage collection systems. The long-lasting performance of precast concrete pipe and box drainage systems is well documented in severe weather conditions. Compared to thermoplastic drainage systems, concrete pipe has always been and will continue to be rigid, rugged, and resilient. ■

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FURTHER INFORMATION



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