



## Fire-Resilient Infrastructure Depends on Concrete Pipe

Fire poses one of the costliest and most dangerous of all disasters affecting every region of the United States. Engineers must carefully plan fire-resilient infrastructure for the safety and future survival of their communities, in the same way they do for above ground structures and dwellings. Unlike other products used for pipeline infrastructure, concrete is inherently fire-resistant. Concrete pipe provides the safest, and most fire-resilient solution for infrastructure projects.

Although some agencies permit the specification of plastic products in pipeline construction, pipes made from plastic present a serious threat to infrastructure and the welfare of communities in a fire-related event. Simply put, plastic pipes burn. Concrete pipes don't.

The design engineer is ultimately responsible for the structure's performance throughout the design life of the project, and the engineer accepts liability each time he or she stamps plans and specifications. Box culverts, bridges and drainage pipelines are critical infrastructure elements. When plastic is selected for pipelines, the public's safety is threatened. Engineers must be vigilant to specify concrete products to protect their infrastructure and communities in a fire-related disaster.

## DID YOU KNOW?

Wildfires are a reality in all parts of the United States, not just a few regions. Nearly half of the country's population reside in states affected by wildfire. The top 10 states for wildfires, ranked by the number of fires include\*:



\*Insurance Information Institute, 2017

When ranked by the number of acres burned, the top 10 states for wildfires\*\*



\*\* Insurance Information Institute, 2017

## EVACUATION ROUTES

When plastic pipe burns under roadways, the roads become potentially unusable, which affects communities – and evacuation routes. Concrete provides sustainability as well as resiliency to both natural and man-made catastrophic events. Climate scientists and meteorologists can try to predict changing climate and weather patterns. Yet, it's nearly impossible to predict human carelessness, deliberate attacks such as acts of terror, or acts of vandalism such as starting fires. Acts of destruction such as this can easily close vital thoroughfares used by first responders or during an evacuation.

The loss of evacuation routes in any part of the country would be catastrophic, potentially stranding hundreds of thousands of people and placing them in harm's way. While we cannot completely secure our roadway system, we can at least eliminate potential failures that are under our control. Selecting concrete pipe helps ensure evacuation routes remain open and keeps the public safe.

*It's vital in these times of fiscal responsibility, uncertain weather patterns and man-made catastrophes that we understand the startling difference between concrete and plastic pipes*

## THE REAL DANGERS OF PLASTIC

The public realizes we can't afford to ignore the dangers of plastic. When plastics ignite, they burn hotter and faster than other fires and release harmful chemicals to the environment due to the fuels inside of them.

When a burning bridge collapsed in 2017 along I-85 in Atlanta, plastics played a key role. According to the NTSB, the fire's probable cause was "excessive heat from the ignition of 76 reels of high-density polyethylene conduit and nine racks of fiberglass conduit stored beneath the overpass."

In response to the I-85 fire, the Georgia State Fire Marshal Dwayne Garriss said: "Plastic products are petroleum based and basically when it starts heating up, it starts deforming from a solid to a liquid. Once it becomes heated up to a certain temperature, it becomes basically a liquid fire. Three-dimensional fire is what we call it, and it flows."

Plastic fires are difficult to extinguish as was found in the I-85 fire, where water alone was inadequate and foam trucks had to be brought in from the Atlanta Airport. Plastic not only burns hotter and faster, but also releases dangerous chemicals when combusted. When heated or ignited, plastic releases carcinogenic dioxins and harmful chemicals such as benzene.

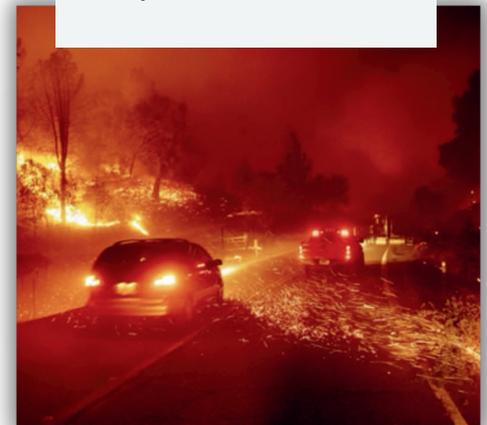
When products are chosen for infrastructure development, it will be increasingly important that they demonstrate a longer life span and increased resiliency. That's why engineers specify concrete. Federal, state and local agencies will confirm it's easier to obtain funds to design and build a job properly in the beginning than to obtain funds for repairs later. Concrete is the wise choice for resiliency and sustainability of materials and products that are required to perform at least as long as the project's design life.



### DID YOU KNOW?

When plastic pipe burns and melts, it--and the roadway above it--must be replaced. The drainage culvert is unusable until the replacement is made. This affects the environment and community while increasing the risk of flooding.

Plastic pipe products may have lower initial material costs but are not as cost-effective when considering structural design, installation and maintenance over the life of the system.



## CLEAR EVIDENCE OF LIABILITY RISK

Natural and man-made fires have caused the failure of culverts on critical access roads.

Texas: Northwest of Dallas/Fort Worth, an April 2009, 25,000-acre brush fire threatened the entire town of Stoneburg. The town of about 100 residents had two thoroughfares for evacuation: FM 1806 and US 81. A section of FM 1806 collapsed when three plastic culverts, used for drainage and support for the road, ignited and melted. The incinerated HDPE caused a crater in the road, which an unsuspecting driver named Jason Ratliff of FX5 Construction and Excavation, drove into. He sustained severe injuries and a wrecked truck, and this crater also broke the axle of a fire truck, leaving only one main evacuation route out of the region.

“I cannot believe that plastic pipe can be used in this setting,” said Ratliff. “I do not understand how a product that catches fire and continues to burn can be used in an area so receptive to brush fire.”

After this incident, TxDOT modified the criteria for use of thermoplastic pipe on its projects to minimize the chance of fire-related damage in the future.

California: In 2007, a wildfire in Riverside County in California burned plastic culverts that were installed along natural watercourses. After the burn, the watercourses filled with dirt and debris, which impacted sensitive wildlife species living in that area.

After the 2018 Santa Rosa fire, firehouse.com stated, “residents reported a foul smell in their water supply. An investigation determined that the underground PVC piping was damaged by the fire and began leaching. Plastic is permeable and prone to seepage and leaching. Scientists discovered that the pipes had emitted benzene, a carcinogen and petrochemical used in HDPE plastic pipes.”

Arizona: In May 2011, a fire inside of a plastic storm culvert in Diamond Valley, AZ, caused the roadway to give way. The roadway was closed after 20 feet of the 250-foot length of the culvert burned. This fire was intentionally set.

There are numerous examples of similar dangerous situations caused by flammable and toxic HDPE conduit. Fire is an issue with this type of conduit, even if the pipe meets AASHTO specifications. The plastic industry is downplaying the risk. Minimize the risk to critical, under-ground infrastructure in a fire-related event by choosing concrete pipe.



## THE FACTS ABOUT FIRE

1. Concrete pipe doesn't burn.
2. Plastic pipe does burn.
3. Concrete has the highest fire-resistance classification.
4. Burning plastic FUELS a fire.
5. The burning temperature of a lit match is 600 to 800 degrees Fahrenheit, while the flash/burning temp of HDPE is 349 to 570 degrees Fahrenheit.
6. Burning plastic releases harmful toxins.
7. Concrete pipes are made from non-toxic, naturally occurring materials.
8. Because of its fire-resistance, concrete is the material chosen for rocket launch pads.
9. Concrete pipe is the ideal choice for fire-resilient infrastructure.



concretepipe.org