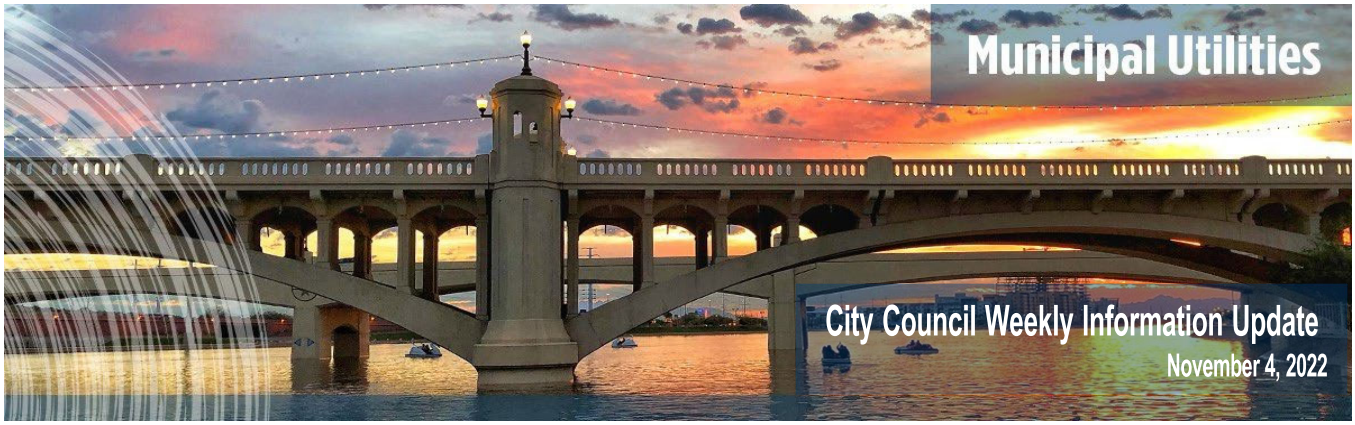

Tempe addresses aging infrastructure, reduces waterline breaks

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While attention to water main breaks in Tempe has risen recently, actual breaks throughout the city have declined over the past several years, reducing from a 15-year high of 82 in 2016 to a low of 36 in 2021. Crews have responded to 42 breaks as of October 2022.

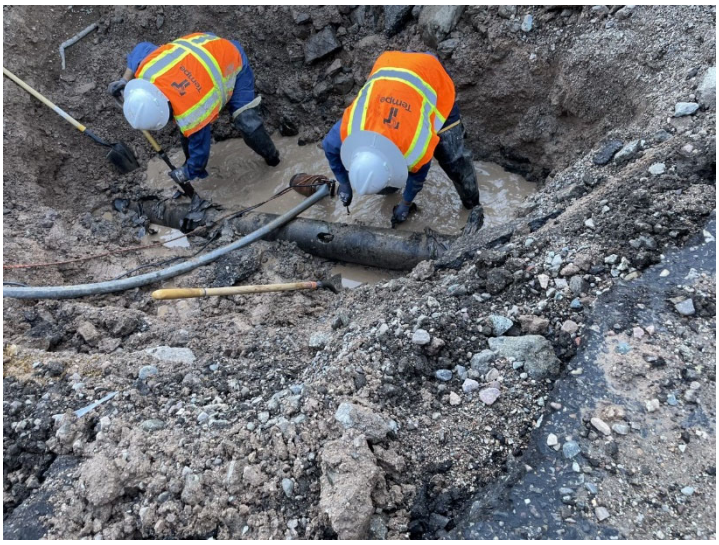
One reason for the added attention to water main breaks is a change in Tempe's reporting system. In 2018, the city implemented a Water Emergency Communication/Outreach Guideline that outlines operation and communication response processes based on criteria, such as location disturbance, water service disruption, transportation impact and overall damage. This more robust reporting system created "tiers" to rank severity of the break (i.e., Tier 1, least severe; Tier 3 most severe). Prior to the Summer of 2022, only Tier 3 breaks were reported to City Council**. Currently, all three tiers are being reported.**

The system sets into action a city-wide plan for notifying internal staff (i.e., those from Communications & Marketing, Risk Management, Police, Environmental Services and Neighborhood Services), who, in turn, notify customers, Mayor and Council and the media, if needed. Communication efforts can range from placing door hangers throughout neighborhoods to social media updates and press conferences, depending on the severity of the break.

Water main breaks happen for numerous reasons. Age, accident, pressure changes and corrosive soils are the most common. The average age of water mains when they fail is 47 years; however, 43% of water mains are between 20 and 50 years old, with 28% well more than 50 years.

To mitigate breaks in Tempe, the Water Utilities Division (WUD), along with the Engineering and Transportation's Engineering Division, has implemented waterline replacement projects as part of its greater asset management program. This program aligns with City Council's Strategic Priority for Safe and Secure Communities.

WUD, in addition to overseeing the wastewater collection system, is responsible for maintaining and repairing the entire water distribution system,



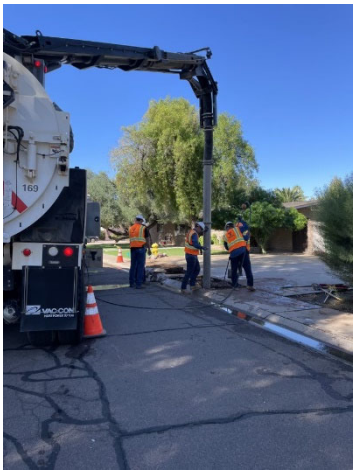
From 2012-2018, water main breaks increased by 27% nationwide, according to the American Water Works Association.

which includes about 860 miles of water lines, 27,000 water valves, 9,000 fire hydrants, 14 wells and three booster stations. To date, about 38.5 miles of water mains have been replaced, with another 4.8 miles currently being designed for replacement and scheduled to start construction in the summer of 2023.

Tempe's water mains are comprised of varying pipe materials.

- Cast iron pipe (oldest)
- Ductile iron pipe (newest)
- Asbestos Cement Pipe
- Steel Transmission Main

The vast majority (about 87%) of pipes in North America are made of cast iron. This material's break rate has increased as much as 43% in recent years. Cast iron represents 187 miles (21%) of Tempe's total pipe and 76% of its breaks. Ductile iron represents 31% of Tempe's total pipe (273 miles) and just 7% of its breaks; hence, WUD is prioritizing replacement of cast iron over other types of pipe.



With so much complexity and so many pipes working to serve our community, water main breaks can happen anywhere and at any time.

Why water mains break

Water main breaks happen for different reasons. Age, accident, pressure changes or corrosive soils are the most common.

Excavation work - When contractors, utility workers or homeowners dig into the ground, they can strike water pipes with a tool as simple as a shovel or, more commonly, heavy excavation machinery.

Pipe age and material - Water mains installed before 1980 often were made of cast iron, which is brittle and does not expand and contract easily with temperature changes. If your pipes are decades old, it may be time to examine their status.

Pressure changes - Pressure inside a water main can change through temperature changes or when fire hydrants are opened or closed too quickly.

Ground settling - Pipes running beneath the ground can become stressed over time as the soil around a water main settles.

Corrosive soils - Some soils are corrosive and can eat away at iron and other metal pipes.