



infraPLAN
Water Mains R&R & AI

Ask the Experts! #1 1pc Water Main R&R Rate

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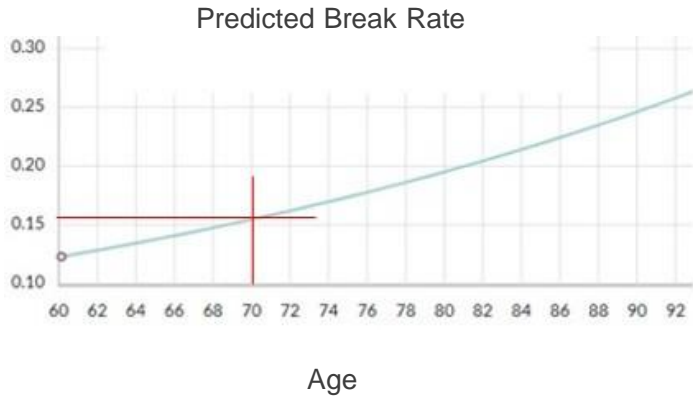
**Concerned a 1% R&R rate for your water pipes is too much?
Consider an alternative approach that can save up to 80% in
R&R over the next 12 years**

An example

In 2019, a Northeastern utility managed 2,855 miles of water distribution pipes averaging 59 years old. The projected break rate by 2020 was 0.120 breaks per mile per year, assuming no replacements or repairs. The utility aims to keep the Break Rate at or below this 2020 level.

Using the PREDICT module of **infraSOFT**, **infraPLAN**'s proprietary Machine Learning-powered R&R planning platform dedicated to water mains, we generated a Likelihood of Failure (LoF) score for **each pipe** and for **each year in the future** which we are then able to translate into a future Break Rate represented by the “do-nothing” curve in the chart below.

That chart shows how the future Break Rate will increase with age, absent any R&R. For example, the Break Rate would reach 0.155 breaks/mi/yr. in 10 yrs by age 70.



Absent any R&R the Break Rate would reach 0.120 breaks/mi/yr. by age 60, and 0.155 in 10 years by age 70.

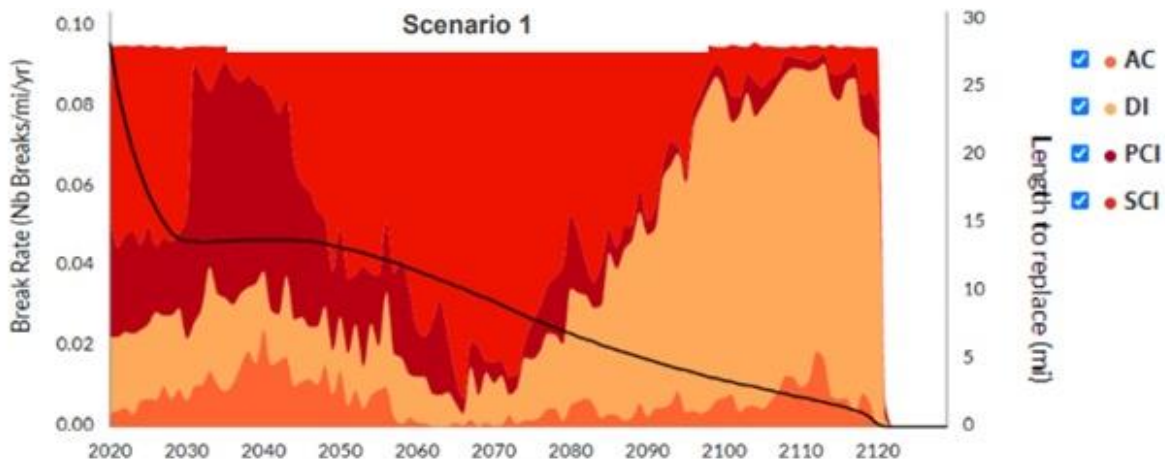
Using the PLAN module of **infraSOFT**, we then created scenarios of R&R for which specific pipes are selected based on criteria set by the utility, including, but not limited to, their LoF.

The two charts below illustrate two such scenarios. More specifically, they show how the Break Rate (represented by the black curve on the left y-axis) is controlled at each year if a certain length of pipes is replaced (shown by the colored bars on the right y-axis; each color represents a material).

Scenario 1 – 1pc R&R per year

The first chart below represents the 1% scenario (Scenario 1) where the utility replaces 1% of its system every year (which equates to keeping pipes in service for 100 years), or 28 miles of pipes as follows:

- 70% of the 28 miles are pipes that contribute the most to the Break Rate increase; those pipes have, at each year, the highest LoF as identified by **infraPLAN's** proprietary Machine Learning-powered break prediction model.
- 30% are replaced for other reasons such as to coordinate with other projects, meet fire flow or hydraulic capacity requirements.



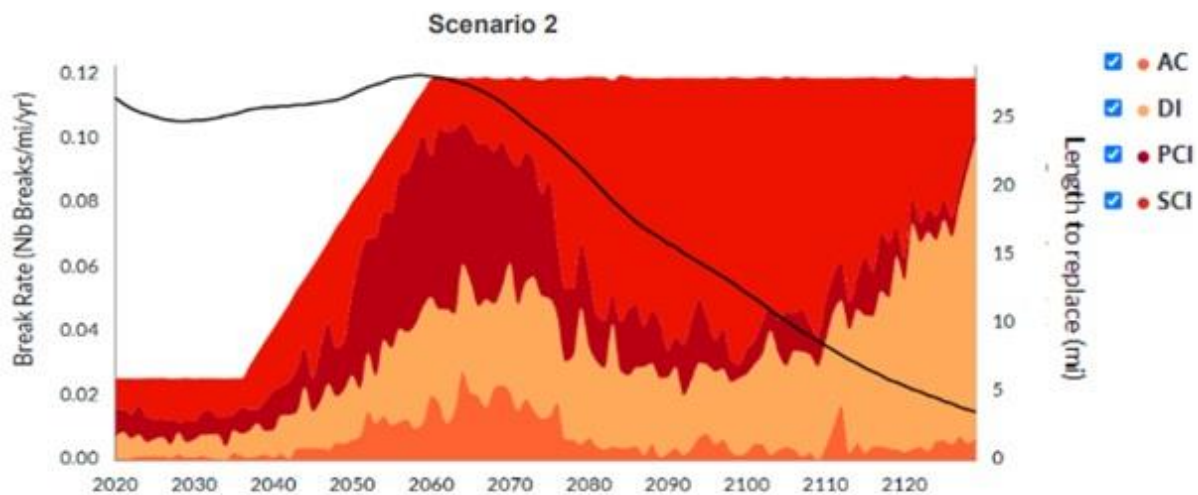
The above chart shows that, following a 1% scenario, the resulting Break Rate (black curve on the left y-axis) would decrease steeply from 0.100 breaks/mi/yr. in 2020 (after 28 mi of R&R that year), to 0.050 breaks/mi/yr. at age 70 (10 years later), a Break Rate that is lower than what the utility wants to achieve (0.120 breaks/mi/yr.).

The unnecessarily sharp reduction of the Break Rate experienced in Scenario 1 points to the fact that the utility may be able to reduce its R&R expenses while still meeting its Break Rate objective.

In Scenario 2, we look at reducing R&R expenses while still staying below 0.120 breaks/mi/yr

Scenario 2

Scenario 2 is illustrated in the chart below. The utility achieves its goal (stay below 0.120 breaks/mi/yr.) this time with only 6 mi of R&R per year for the first 15 years (instead of 28 mi in Scenario 1), at a cost of \$18 million per year; a saving of \$66 million compared to Scenario 1; or close to 80% of the original price tag of \$84 million.



Then, to remain under 0.120 breaks/mi/yr., the utility has to ramp up R&R from 6 mi in 2020-2035 to 28 mi/yr. in 2060. Cost of R&R is estimated to be \$3M/mile.

Adopting Scenario 2 versus Scenario 1 (1pc) results in a total saving of over 40 years of \$1.815 billion.

How did we complete this project?

- **infraSOFT CLEAN** module was used to clean the data.
- **infraSOFT PREDICT** module. The Machine Learning break prediction model of PREDICT was used to generate a LoF score, and predict the future break number, for each pipe and at each year in the future.
- **infraSOFT STATS** module was used to detect data issues and interpret results.
- **InfraSOFT PLAN** module was used to simulate various R&R scenarios.

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Contact us for a free discussion on using advanced analytics to maximize your R&R plan!

infraPLAN-LLC helps water utilities, large and small, achieve savings on CIP expenses using our ground breaking platform, **infraSOFT**.

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