

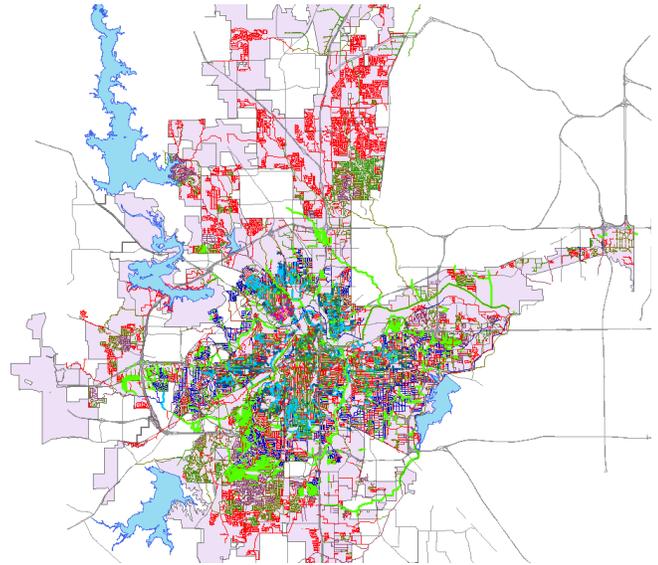
Case Study: Fort Worth, Texas

THE CHALLENGE: PRIORITIZING PIPELINE REPAIR AND REPLACEMENT

The city of Fort Worth, Texas has a 260-mile sprawl of large diameter interceptor sewers that are vital to its wastewater handling. Recognizing that the aging pipelines needed to be assessed – and replaced or repaired according to priority – the city embarked on a six-year Interceptor Condition Assessment Program (ICAP) in 2010. Leaders also expected the program findings to inform realistic expectations for a long-term capital improvement program.

Rather than simply giving a pass/fail rating to each pipe segment, the city wanted to assign a score that accurately reflected the pipeline's condition – and consequently, how urgently repair, replacement or cleaning was needed. This directive required sophisticated new technology, and a proven partner who could execute in the field.

Enter RedZone Robotics.



260 miles of large diameter interceptor sewers • \$6.86 million cleaning cost reduction • \$26 million in CIP savings

SUPERMD

- Laser/Sonar/CCTV
- 1000mm - 3200mm
- 3000m Inspections



THE SOLUTION: A TECHNOLOGY TRIFECTA

In order to ascertain the true condition of the pipeline, RedZone recommended a technology trifecta: HD CCTV, sonar, and laser technology.

- 1) **HD CCTV inspection:** the most advanced method for capturing high resolution video images. The data is stored in a digital format and can be reviewed using conventional software.
- 2) **Sonar inspection:** checks the pipe below the water level flow line. The technology sends a sonar signal and measures how long it takes the signal to return, identifying accumulation of debris, deformation due to deflection in the pipe, breaks in the pipe, or other abnormalities.
- 3) **Laser inspection:** creates a three-dimensional model of the pipeline above the water flow line by sending a rotating beam of light around the pipe surface and measuring the length of time required for the light to bounce back. In this program, the most important defect to identify was hydrogen sulfide corrosion.

Based on the results gathered, RedZone assigned condition scores from 1 (very good) to 5 (failing) for each segment of pipe.

Since the wall thickness varied considerably within each segment, the score was based on the thinnest point of wall thickness.

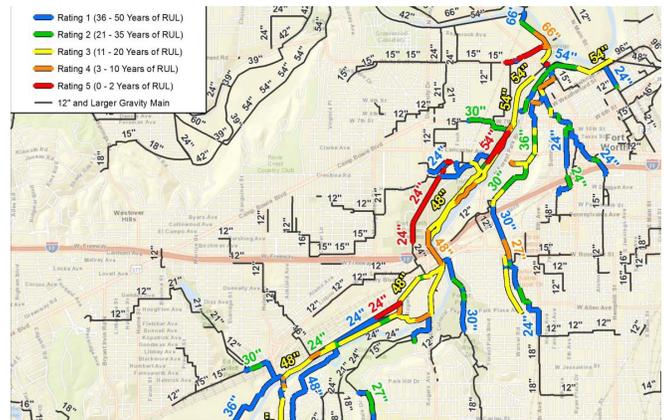


THE RESULTS: REDUCED SPENDING, ENHANCED UNDERSTANDING

One of the most immediate conclusions of the project was that pipe age and material don't necessarily correspond to condition. If replacement had been based on those two factors alone, without inspection, funds would have been misspent on serviceable pipeline and sorely needed repairs would have gone unmet.

Capital Improvement Spending Declines

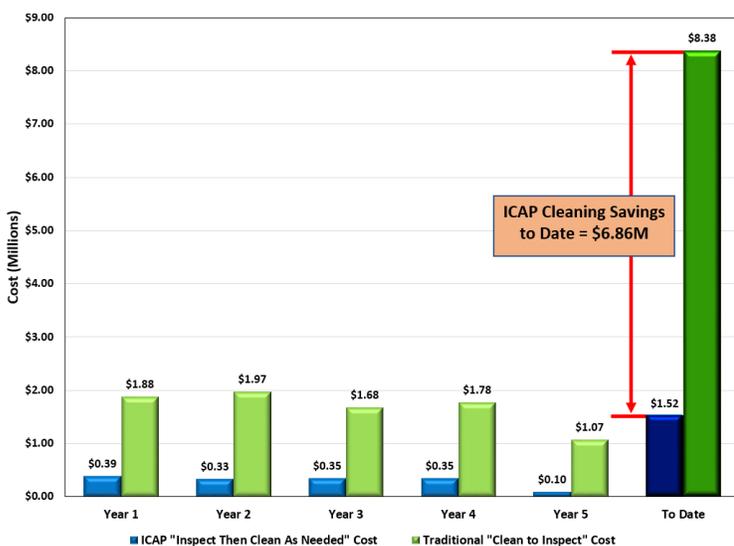
The program resulted in reduced spending through two primary means: focused cleaning and removal of large debris in multiple interceptors, and replacement of portions of pipeline instead of the entire interceptor.



Results of the condition scoring demonstrate that pipe age and material are not necessarily an accurate indicator of condition.

FORT WORTH, TEXAS Interceptor Condition Assessment Program (ICAP)

Reduced Cleaning Costs Over 5 years



Knowledge of Asset Status and Life Cycle Expands

Inspection data was neatly bundled into a single software package, allowing quick access to previous inspections and current condition of assets. Now information is easy to retrieve for development reviews and budgeting.

Reactive Maintenance and Cleaning Costs Drop

Before ICAP, the city employed the industry standard, "clean to inspect" to determine pipe condition and restore capacity. Now, the amount of cleaning has been reduced because the areas in greatest need have been pinpointed, and the city is able to inspect pipes in half the time that would be required with traditional CCTV. The total cleaning costs have been reduced by \$6.86 million in the first five years.

In the first four years the total identified CIP savings realized by ICAP is approximately \$26 million – a testament to the power of preventative maintenance over reactive maintenance.