

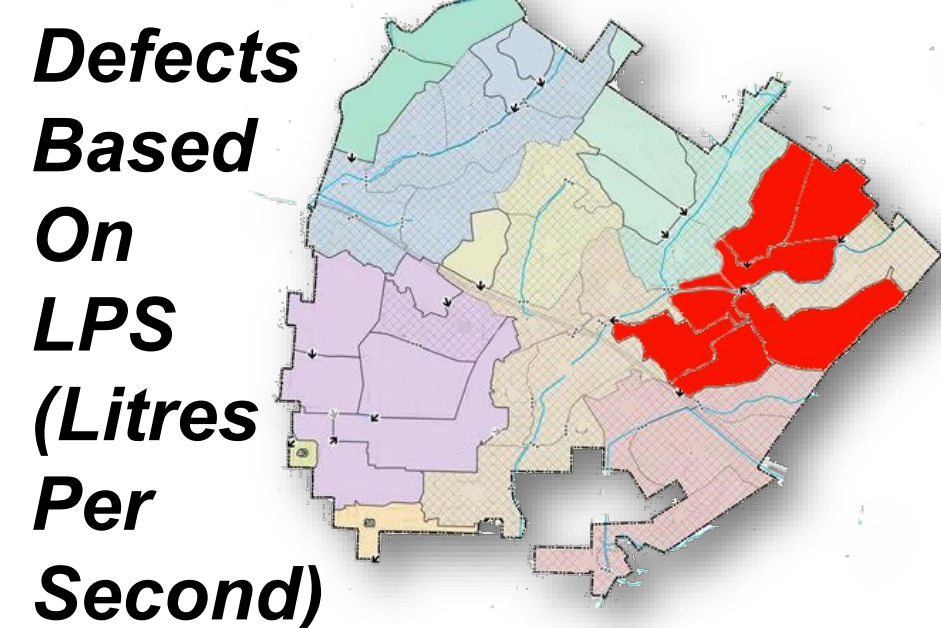
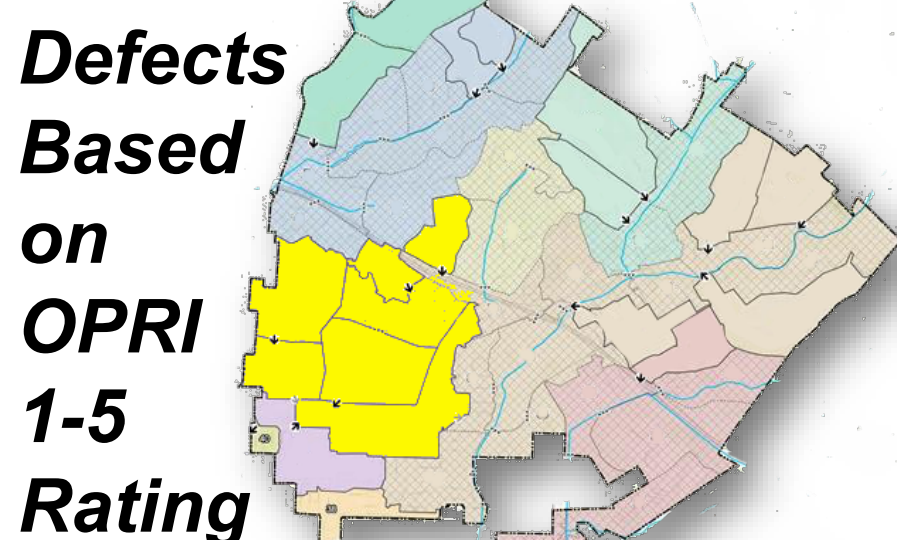
Focused Electrode Leak Location (FELL) ASTM F2550-18

Project Details

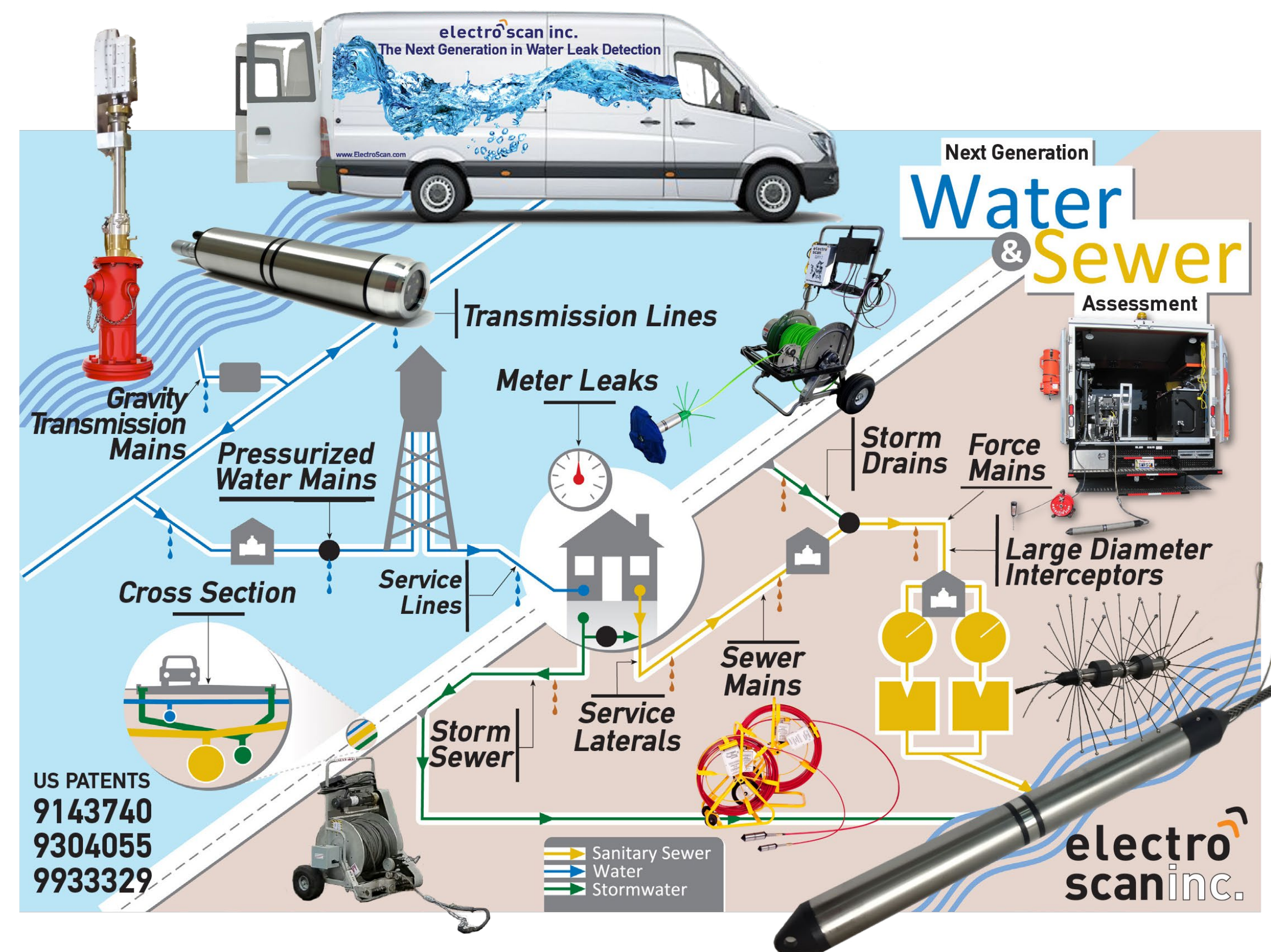
Client: Major US City Municipal Utility

Goals: Verify Pipeline Rehabilitation Effectiveness & Evaluate Pipeline Rehabilitation Priorities

Summary: Over 12M USD were invested to install 40,500 meters of Cured-In-Place Pipe (CIPP) for both mainline & lateral rehabilitation. An 80% reduction in infiltration (water entering a pipe through a defect) was projected, but measured reduction was <30%.

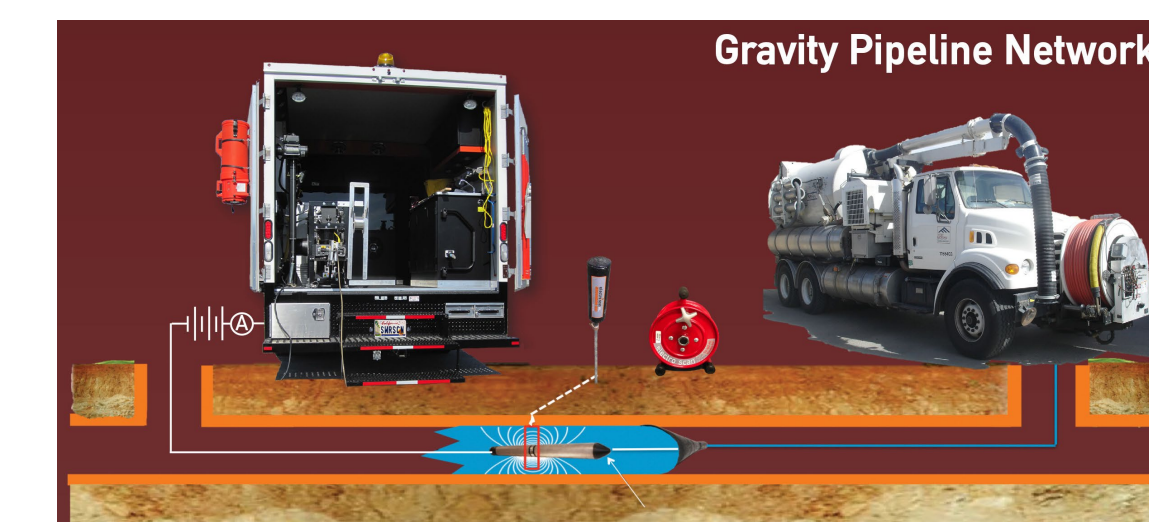


Legacy Acoustic Sensors (Water) & CCTV (Sewer) Miss Major Leak Locations **VS.** **Machine** Low Voltage Conductivity Pinpoints Leaks by Main, Lateral, & Connection



The Problem & Solution

Legacy CCTV pipeline inspection methods continue to be used to apply human-based condition codes that establish rehabilitation priorities.



DEFECTS	% OF DEFECT LENGTHS	GPM SUMMARY	DIAMETER & DISTANCE	OPERATOR INFO
Count	15	100000	8	electroscan
Mean	0.00000	1.000	312.00 ft	Assessment Tool
Median	0.00000	1.000	312.00 ft	Block Mark
Mode	0.00000	1.000	312.00 ft	Assessment Tool
Std Dev	0.00000	1.000	312.00 ft	Assessment Tool
Max	0.00000	1.000	312.00 ft	Assessment Tool
Min	0.00000	1.000	312.00 ft	Assessment Tool

FELL - a proven, machine-intelligent, repeatable data collection process - eliminates human bias in documenting actual pipeline defect conditions that contribute to inflow & infiltration. This is done by using electrical current to locate (within 1cm) and quantify (in LPS) all defects with a pathway to ground. If the pipe leaks electricity, it will leak water.

The precise and quantifiable data generated by FELL technology allows utility Owners to optimize capital spending programs.

Compelling Value Proposition

- Savings 15 X Multiplier**, \$5 deferred maintenance, \$4 not accepting poor rehabilitation, \$3 Not selecting wrong pipe to fix, \$2 Heads-Up location of pipe damage, \$1 Pumping and Treatment costs.
- Verify that work completed conforms to contract water tightness requirements to reduce infiltration.
- Use real-time inspection results prior to contractor demobilization to support contract compliance.

The Experience

- City consultant used closed circuit television (CCTV) inspection & overall pipe rating index (OPRI) scoring to develop rehabilitation priorities.
- CCTV was also used to conduct post-rehabilitation effectiveness; however, incomplete video evaluations allowed contractors to be paid for poor quality work.
- Flow monitors were used to further evaluate CIPP effectiveness, documenting *less than 30%* infiltration reduction achieved.
- Partial FELL inspection allowed City to compare actual defect locations and flow rates to CCTV inspection results.
- FELL inspection work verified inability of CCTV technology to prioritize rehabilitation program or validate contract compliance.

The Future

- Comprehensive FELL inspections establish unbiased rehabilitation priorities for mainlines & laterals, avoiding unnecessary capital spending.
- Repeatable & unbiased data collection and use is compatible with software applications for asset management, geographic information system (GIS) databases, hydraulic models, & related financial systems.
- Provides utility Owners with precise pipeline defect condition information & infiltration flow rates before & after rehabilitation to document effectiveness.

