Random Pipe Selection Found Similar to CCTV

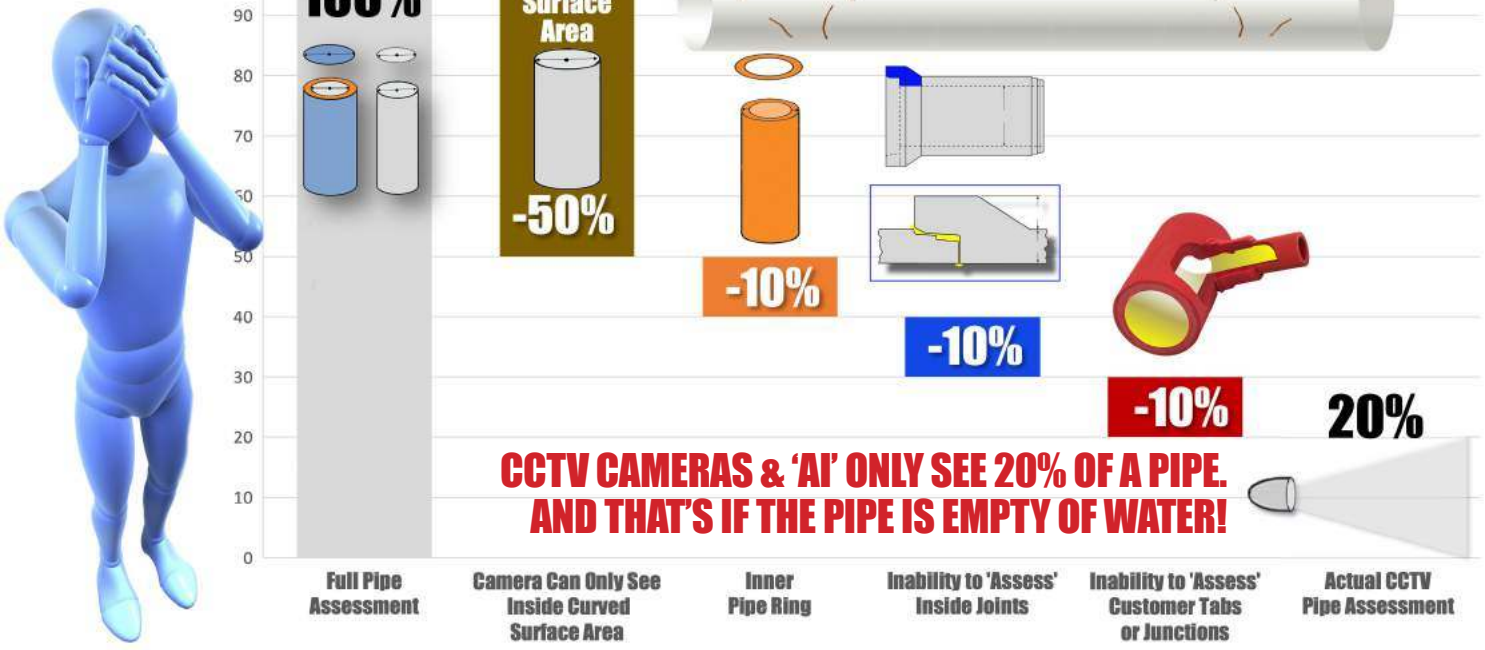
74,000LF Benchmark Test Compares CCTV and FELL

North American Study Finds CCTV

- Unable to Detect Infiltration
- Unreliable Selecting Repairs
- Can't Assess Joints for Leaks
- Can't Assess Taps for Leaks
- Can't Assess CIPP for Leaks
- Can't Assess New Pipes

Worldwide Testing Confirms That CCTV Cameras Miss 80-100% of Leaks

Challenge of CCTV Missing Key Defects

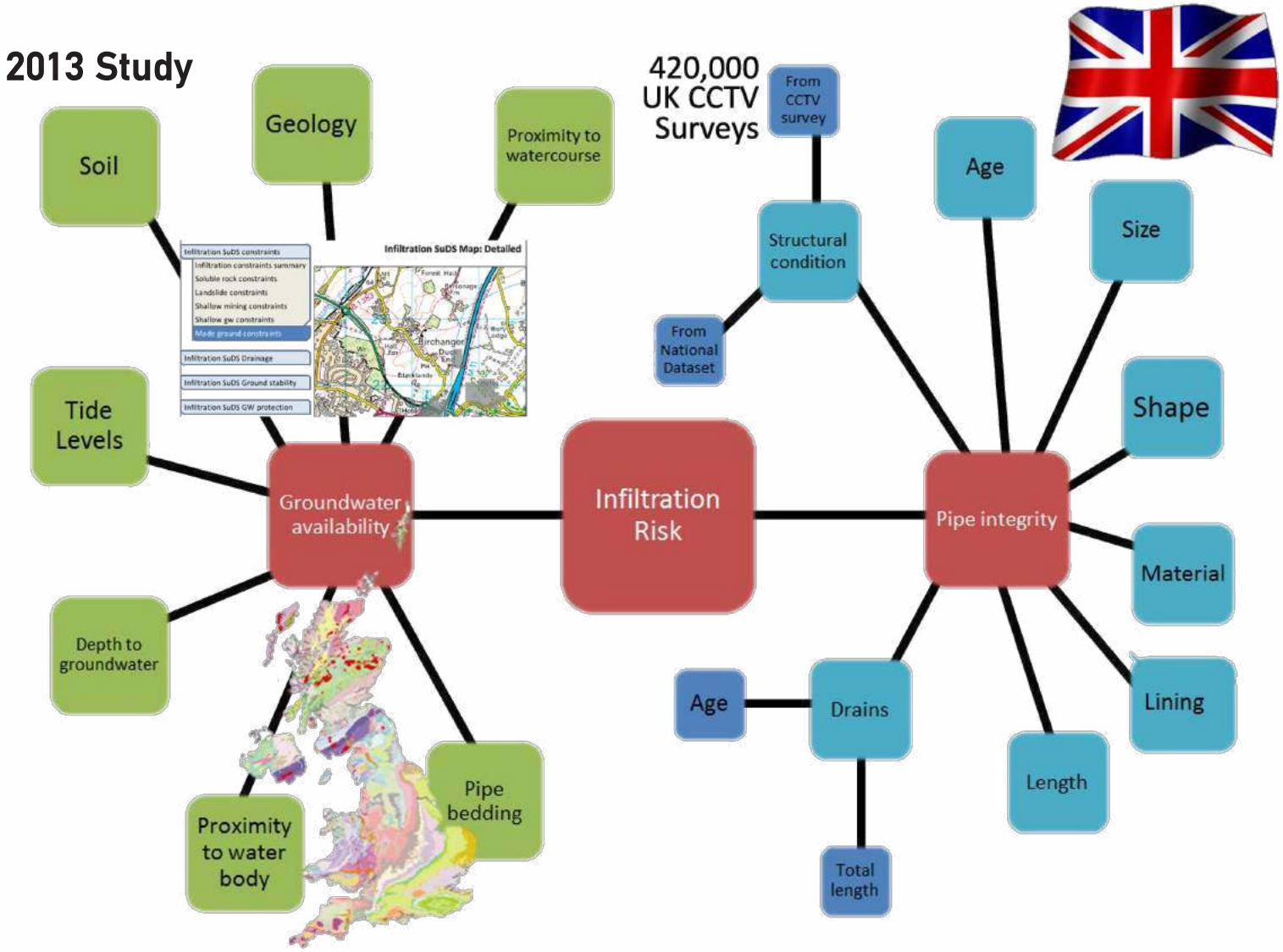


CCTV Can't Tell if Cracks or Bad Joints Leak Through Outer Wall of Pipe.

And... AI CAN'T SEE WHAT CCTV CAN'T SEE!

New Tech Was Needed to Evaluate 100% of Pipe Wall.

UK Has Been A Leader in Infiltration Research Without a Breakthrough… Until Now!



CCTV

- May highlight faults with the pipe
- …. but not necessarily key infiltrations points

In-situ flowmeter

- May provide a good data set over a range of flow conditions
- Flow meter likely to get ragged up – risk of flooding
- Limited number of locations

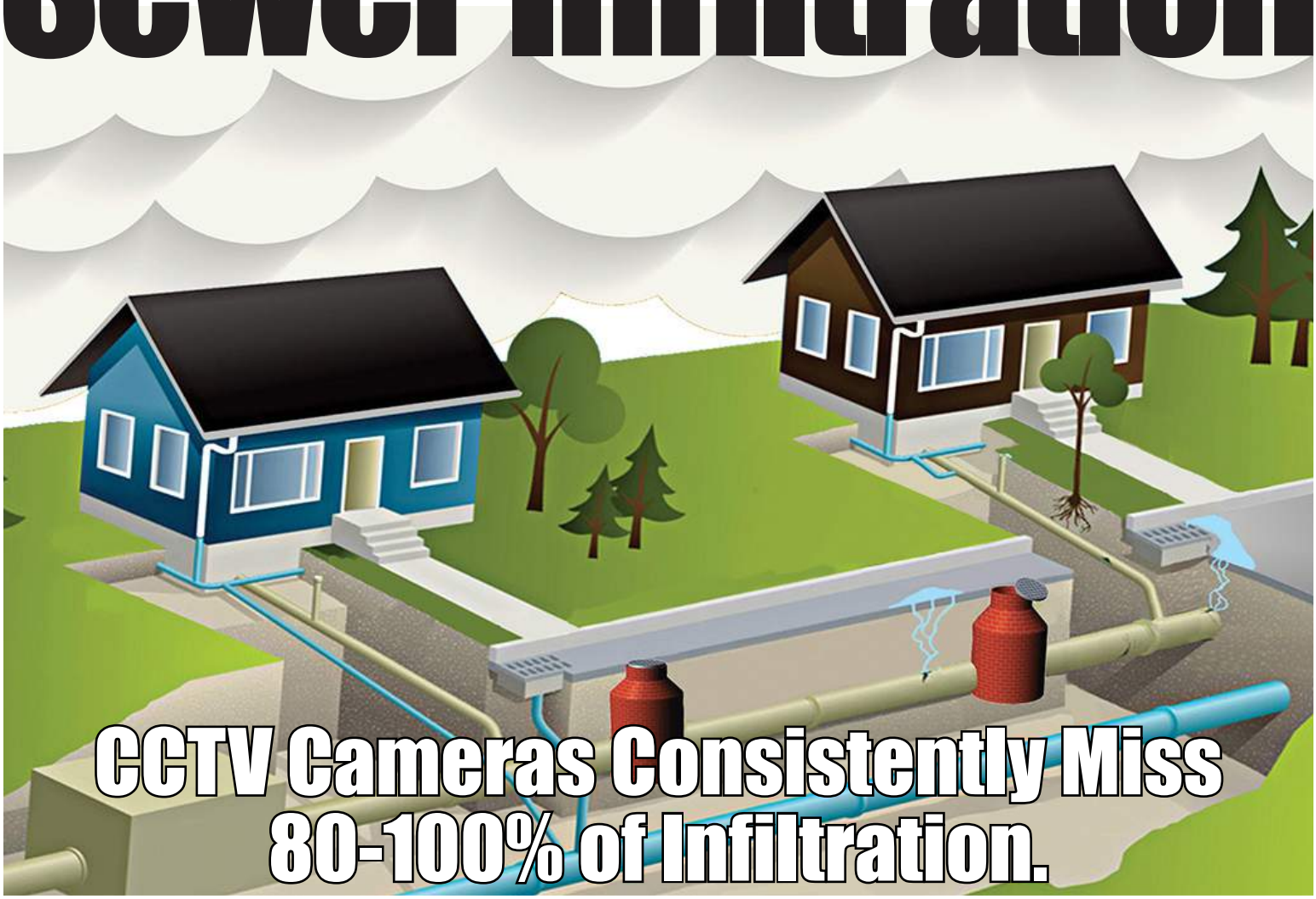
Portable flowmeters

Tracer study

Source:

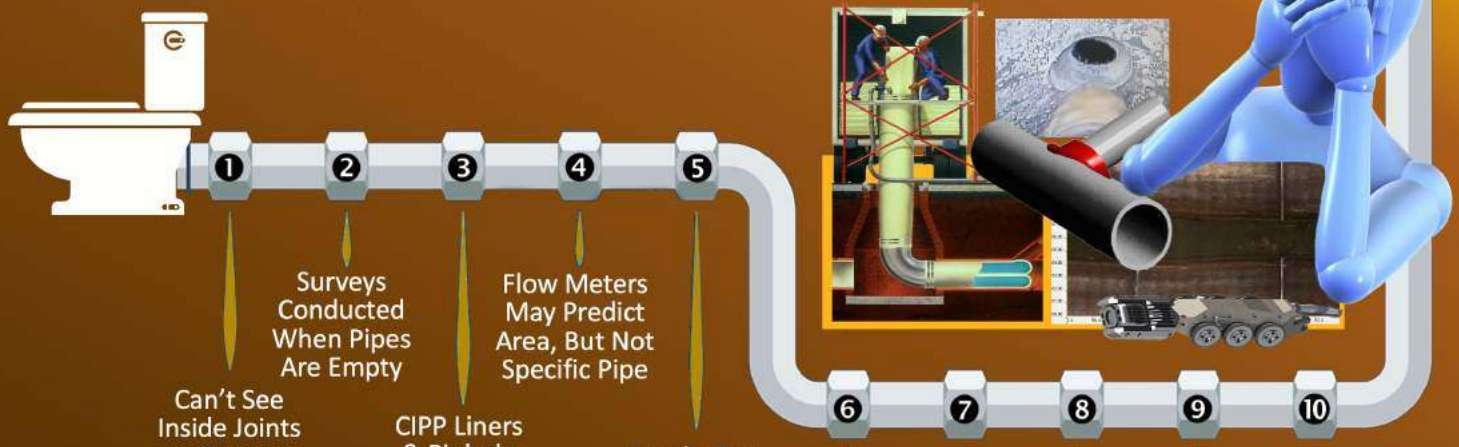
Dr. John Grimm
Anglian Water
Flow Surveys in Sewer Networks and at WwTW

Sewer Infiltration



CCTV Cameras Consistently Miss 80-100% of Infiltration.

WHY CCTV CAMERAS MISS SO MANY LEAKS?



AND CAN'T BE USED TO ACCEPT NEW PIPES OR CURED-IN-PLACE PIPE AS WATERTIGHT.

ASTM F2550

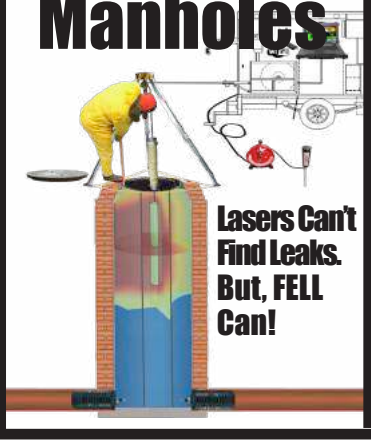
Standard Practice for Locating Leaks By Measuring the Variation of Electric Current Flow Through the Pipe Wall 2018, 2013, and 2006

Infiltration of groundwater into a sewer through defects in the pipe can considerably increase the operation and capital costs of a sewer system. Exfiltration of sewage out of a sewer pipe may cause degradation of aquifers and shoreline waters. Accurate location, measurement, and characterization of all potential pipe leak defects are essential inputs for cost-effective design, testing, and certification of pipe repairs, renewal, and new construction.

Pre- and Post-Rehabilitation Condition Assessment

Sewer Mains

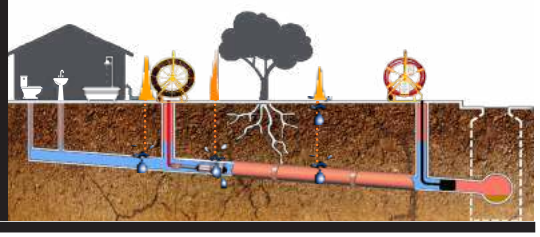
Manholes



Lasers Can't Find Leaks. But, FELL Can!

Service Laterals

Infiltration is not being found in laterls, but at the Customer Connections!!!!!! Leaks missed by CCTV Inspection.



CCTV Cameras or Lasers Miss 80-100% of Leaks in Pipe or Manhole Walls.

AI-CCTV Helps Bring Badly Needed Standards to Visual Inspection. But, Still Does Not Provide Needed Condition-Based Assessment to Drive Repairs or Rehabilitation Selection or Approval as Watertight

Top Drawbacks of Manual CCTV Inspection

Drawbacks of Manual-Based CCTV		CCTV
1	Automatically Finds Potential Sources of Infiltration 360° of Pipe Wall	No
2	Automatically Finds Leaks Inside Joints Through Bell and Spigot	No
3	Automatically Finds Leaks at Service Connections	No
4	Automatically Finds Sources of Infiltration at Cracks	No
5	Automatically Finds Leak Locations (within 1cm)	No
6	Automatically Measures Size of Leaks - Estimated in GPM	No
7	Automatically Finds Defects That Leak from Bad Couplings	No
8	Automatically Finds Defects That May Still Leak After Repairs	No
9	Automatically Finds Defects That Leak in CIPP Lining Projects	No
10	Automatically Finds Defects After Service Re-Connections	No
11	Automatically Finds Leaks, if Hidden by Silt or Debris on Bottom of Pipe	No
12	Able to Conduct Inspections, When Sewer Pipe is Full of Water	No
13	Able to Determine Size of Potential Leak, if Roots are Present	No
14	Automatically Finds Leaks, if Hidden by Fats, Oils or Grease (FOG)	No
15	Able to Determine Size of Leaks, if Pipe Has Encrustation	No
16	Requires Active Infiltration to Identify Infiltration	Yes
17	Contains Moving Parts That Can Clog from Excess Debris or Silt	Yes
18	Requires Bypass Pumping During Inspection, if Pipe is Full	Yes
19	Requires Special Training and Certification to Identify Defects	Yes
20	Relies on Visual Observations to Record Defects	Yes
21	Avg. Speed of Inspection - *Depends on Camera Type & Speed*	3m/min

Source: WRc Master Class, Peter Henley, 2016, Peterborough, UK.

Top Drawbacks That Remain With 'AI CCTV'

Drawbacks of Machine-Based AI CCTV		CCTV
1	Automatically Finds Potential Sources of Infiltration 360° of Pipe Wall	No
2	Automatically Finds Leaks Inside Joints Through Bell and Spigot	No
3	Automatically Finds Leaks at Service Connections	No
4	Automatically Finds Sources of Infiltration at Cracks	No
5	Automatically Finds Leak Locations (within 1cm)	No
6	Automatically Measures Size of Leaks - Estimated in GPM	No
7	Automatically Finds Defects That Leak from Bad Couplings	No
8	Automatically Finds Defects That May Still Leak After Repairs	No
9	Automatically Finds Defects That Leak in CIPP Lining Projects	No
10	Automatically Finds Defects After Service Re-Connections	No
11	Automatically Finds Leaks, if Hidden by Silt or Debris on Bottom of Pipe	No
12	Able to Conduct Inspections, When Sewer Pipe is Full of Water	No
13	Able to Determine Size of Potential Leak, if Roots are Present	No
14	Automatically Finds Leaks, if Hidden by Fats, Oils or Grease (FOG)	No
15	Able to Determine Size of Leaks, if Pipe Has Encrustation	No
16	Requires Active Infiltration to Identify Infiltration	Yes
17	Contains Moving Parts That Can Clog from Excess Debris or Silt	Yes
18	Requires Bypass Pumping During Inspection, if Pipe is Full	Yes
19	Requires Special Training and Certification to Identify Defects	Yes
20	Relies on Visual Observations to Record Defects	Yes
21	Avg. Speed of Inspection - *Depends on Camera Type & Speed*	3m/min

ELECTRO SCAN BRINGS SWEEPING CHANGE TO THE PIPELINE LEAK DETECTION MARKET

The Switch is 'ON' to a new way to locate & measure leaks in GPM or LPS!

Acoustic, Visual, & Smelling Miss 80-100% of All Leaks.

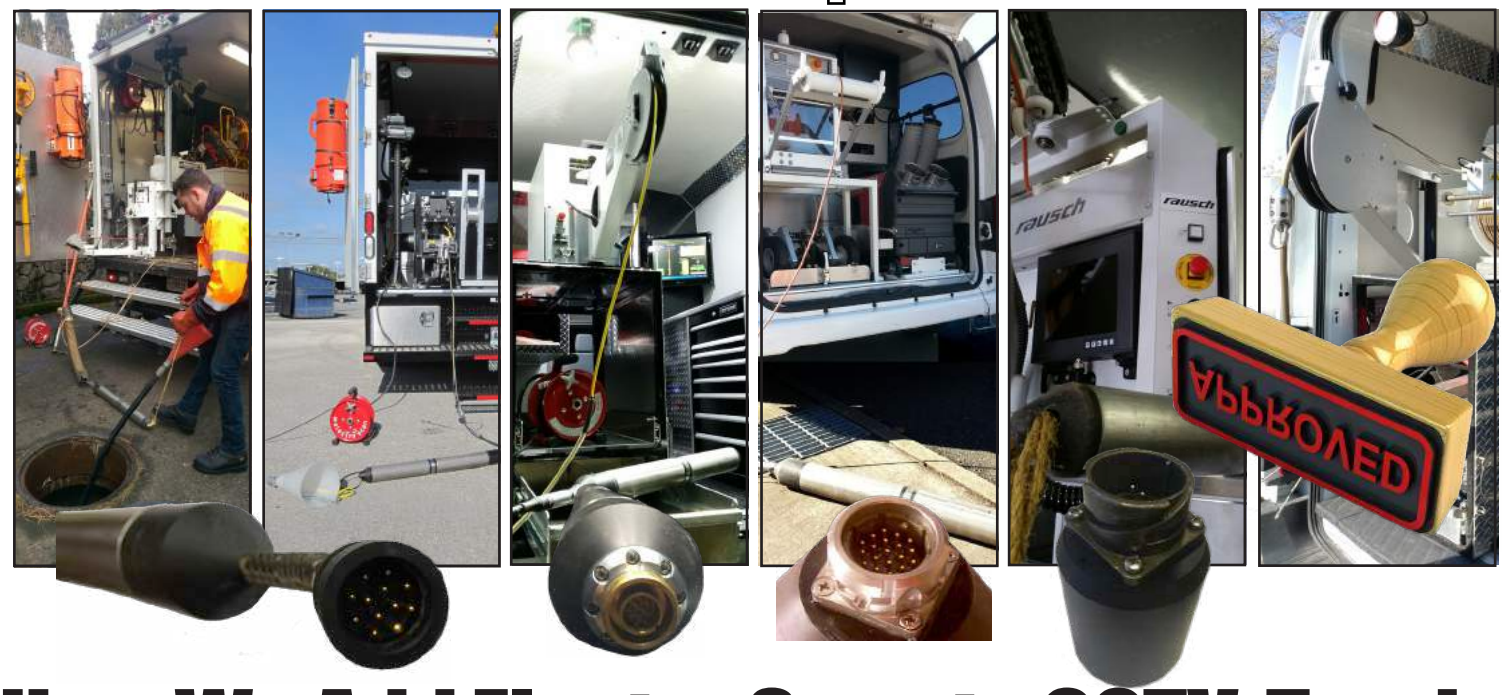
And, 'AI' Applied to Old Tech... 🤔🤯

CCTV vs. FELL

		CCTV	FELL
1	Automatically Finds Potential Sources of Infiltration	NO	YES
2	Automatically Finds Leaks Inside Joints	NO	YES
3	Automatically Finds Leaks at Service Connections	NO	YES
4	Automatically Finds Sources of Infiltration at Cracks	NO	YES
5	Automatically Finds Leak Locations (within 0.4 in or 1 cm)	NO	YES
6	Automatically Measures Size of Leaks (Estimated in GPM)	NO	YES
7	Automatically Finds Defects That Leak from Bad Couplings	NO	YES
8	Automatically Finds Defects That May Still Leak After Repairs	NO	YES
9	Automatically Finds Defects That Leak in CIPP Lining Projects	NO	YES
10	Automatically Finds Defects After CIPP Service Re-Connections	NO	YES
11	Automatically Finds Leaks, If Silt or Debris on Bottom of Pipe	NO	YES
12	Able to Conduct Inspections, If Sewer Pipe Is Full of Water	NO	YES
13	Able to Determine Size of Potential Leak, If Roots Are Present	NO	YES
14	Automatically Finds Leaks at Joints, If Grease Is Present	NO	YES
15	Able to Determine Size of Leaks, If Pipe Has Encrustation	NO	YES
16	Requires Active Infiltration to Identify Defect at Source	YES	NO
17	Contains Moving Parts That Could Clog from Debris or Silt	YES	NO
18	Requires Bypass During Inspection, If Pipe Full	YES	NO
19	Requires Special Training and Certification to Identify Defects	YES	NO
20	Relies on Visual Observations to Record Defects	YES	NO
21	Ave. Speed of Inspection (6-30” Sewer Main Diameters)	3ft/min	50ft/min

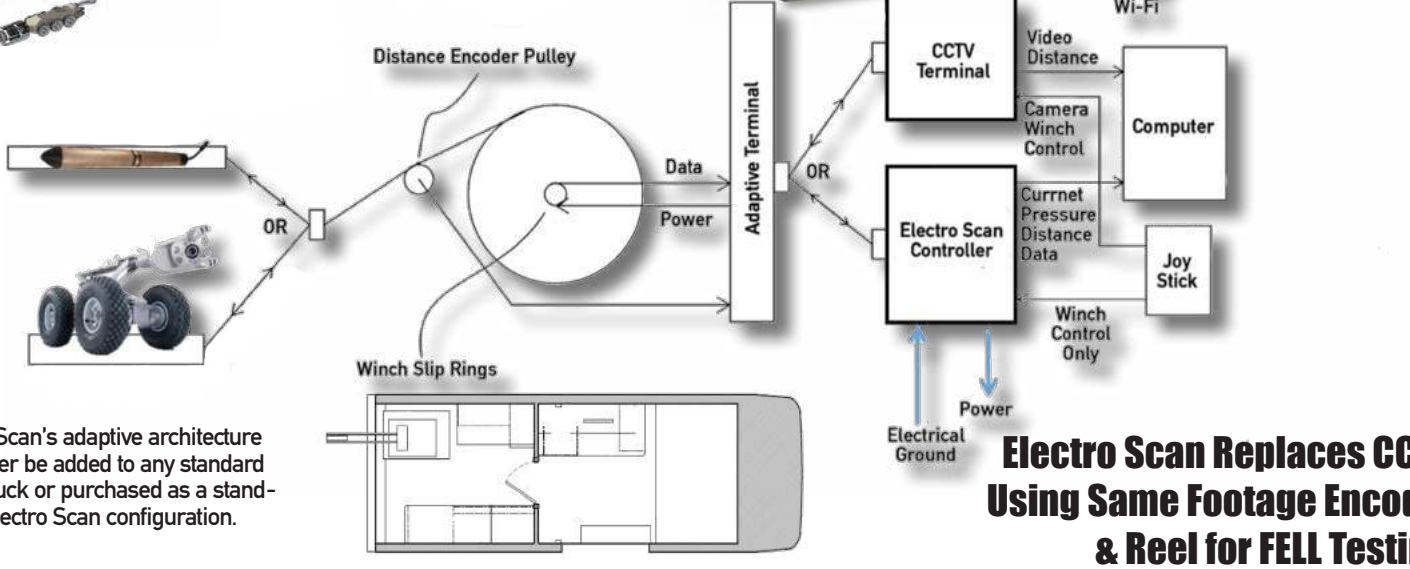
Adding FELL to CCTV Trucks & Start Finding Infiltration

Aries Cues IBAK Ipek Rausch Custom



How We Add Electro Scan to CCTV Trucks

Convert from CCTV to FELL & Back Again In Minutes.

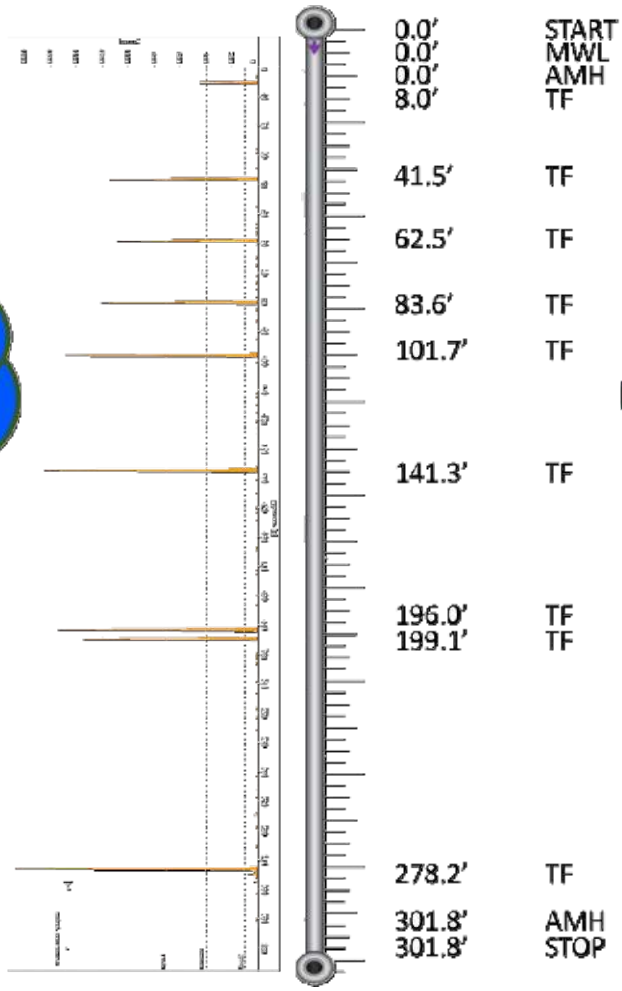


Electro Scan's adaptive architecture can either be added to any standard CCTV truck or purchased as a stand-alone Electro Scan configuration.

Electro Scan Replaces CCTV Using Same Footage Encoder & Reel for FELL Testing.

ELECTRO SCAN v. CCTV

FELL
20 Defects
82.22 GPM

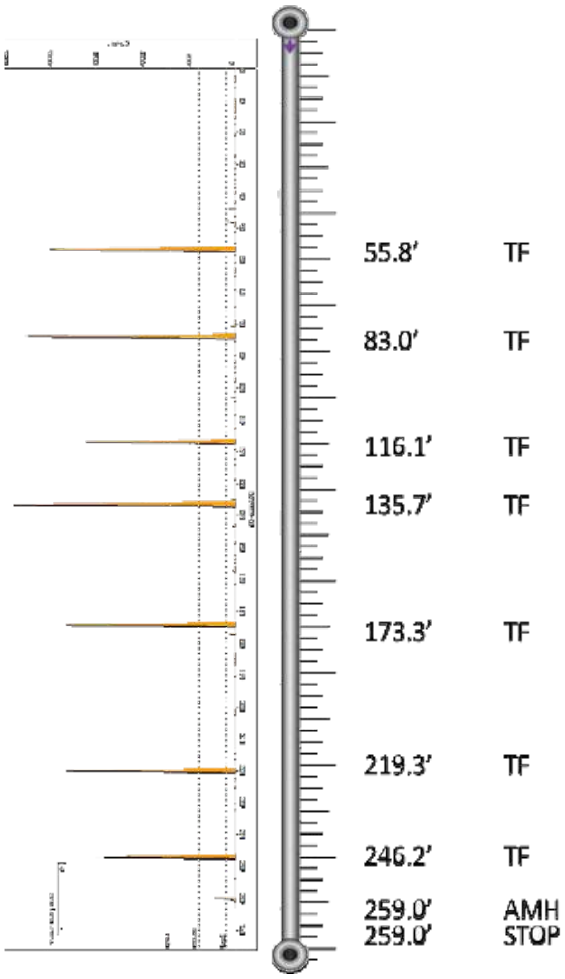


CCTV
0 Callouts
Causing I&I

Electro Scan Testing Performed Independent from CCTV With All Data Machine-Generated Without Modification.

ELECTRO SCAN v. CCTV

FELL
28 Defects
71.22 GPM

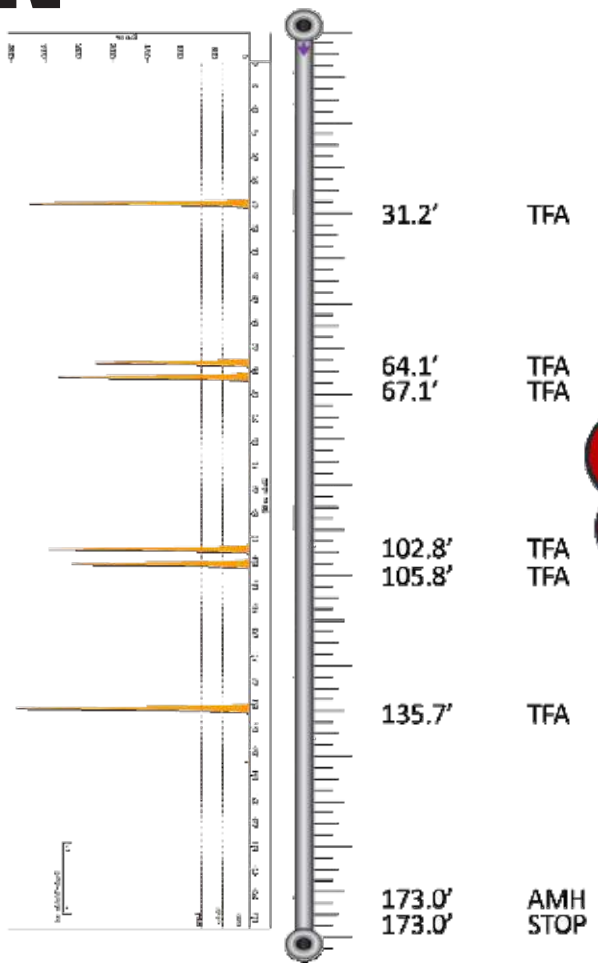


CCTV
0 Callouts
Causing I&I

Electro Scan Testing Performed Independent from CCTV With All Data Machine-Generated Without Modification.

ELECTRO SCAN v. CCTV

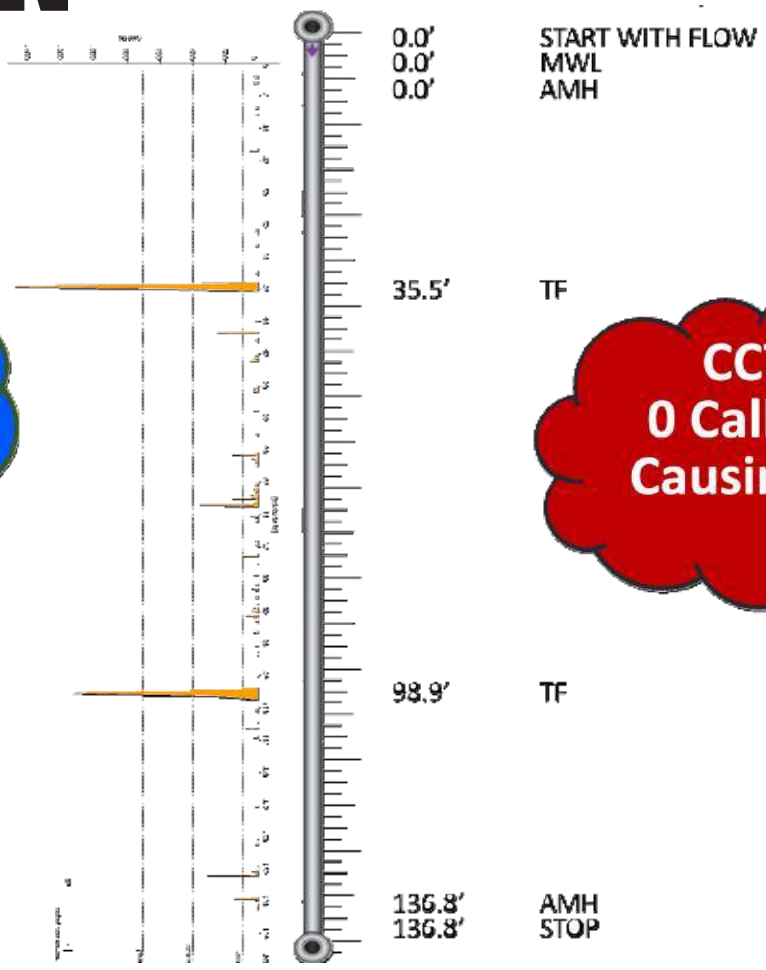
FELL
8 Defects
60.14 GPM



CCTV
0 Callouts
Causing I&I

Electro Scan Testing Performed Independent from CCTV With All Data Machine-Generated Without Modification.

ELECTRO SCAN v. CCTV



FELL
46 Defects
24.96 GPM

CCTV
0 Callouts
Causing I&I

Electro Scan Testing Performed Independent from CCTV With All Data Machine-Generated Without Modification.

POKE & HOPE: How CIPP Suppliers Make Millions While Utility CAPEX Suffer & Raise Rates

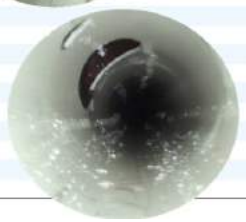
Downstream Manhole Number	Rim to Invert	Grade to Invert	Rim to Grade	Use of Sewer	Direction	Flow Control	Height
	5			Sanitary	Downstream	D	8

Width	Shape	Material	Ln. Method	Pipe Joint Length	Total Length	Length Surveyed	Year Laid	Year Rehabilitated	Tape / Media Number
	Circular	VCP	CP			391.7			

Purpose	Sewer Category	Pre-Cleaning	Cleaned	Weather	Additional Information
C		Jetting		Dry	

Distance (Feet)	Code		Continuous defect	Value				Joint	Circumferential Location		Image Ref.	Struct. Grade	O&M Grade	Remarks
	Group/ Descriptor	Modifier/ severity		S/M/L	Inches 1st	Inches 2nd	%		At / From	To				
0.0	AMH													Starting Manhole: 0
0.0	MWL						10							
11.3	TF	A			6				9					
11.6	MGO													grouted 3 Mis-cuts
12.9	TF	A			6				3					
74.8	TF	A			6				3					
101.2	MGO													grouted 2 Tears in liner
106.9	TF	A			6				9					
233.1	MGO													grouted 2 mis-cuts
233.9	TF	A			6				3					
251.2	TF	A			6				9					
377.2	TF	A			6				3					
391.7	AMH													0297MH019

CCTV Video Showed Leaks at Every Mis-cut. This is frequently called 'Poke & Hope.'

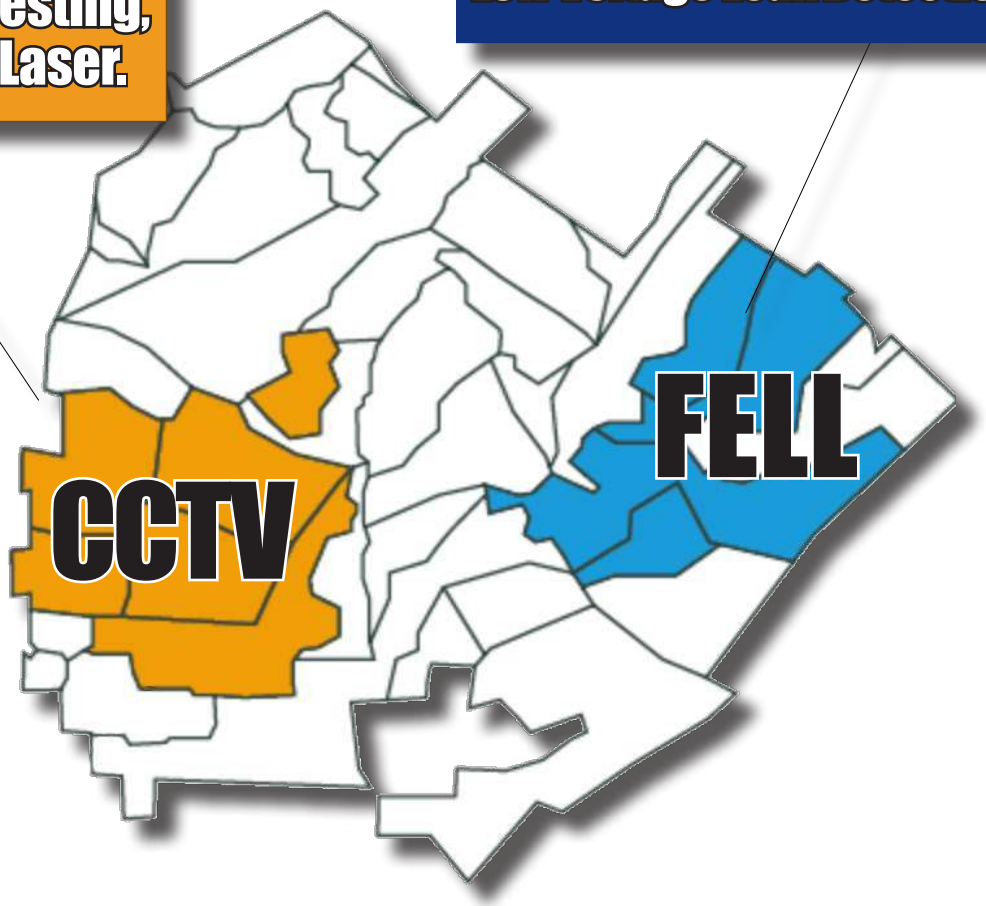


NO CCTV DEFECTS

Structural								O & M								Overall							
Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index
0	0	0	0	0	0	0000		0	0	0	0	0	0	0000		0	0	0	0	0	0	0000	

OLD WAY TO FIND LEAKS.
CCTV, Smoke & Dye Testing, Acoustic, Sonar, and Laser.

NEW WAY TO FIND LEAKS.
Machine-Intelligent FELL Low Voltage Leak Detection.

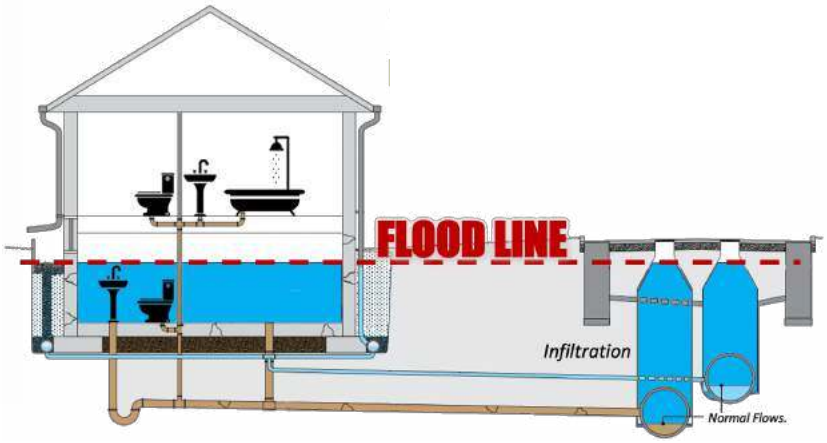


Studies Find CCTV Misses Majority of Infiltration.

New Standard for Targeting High Risk Flood Locations

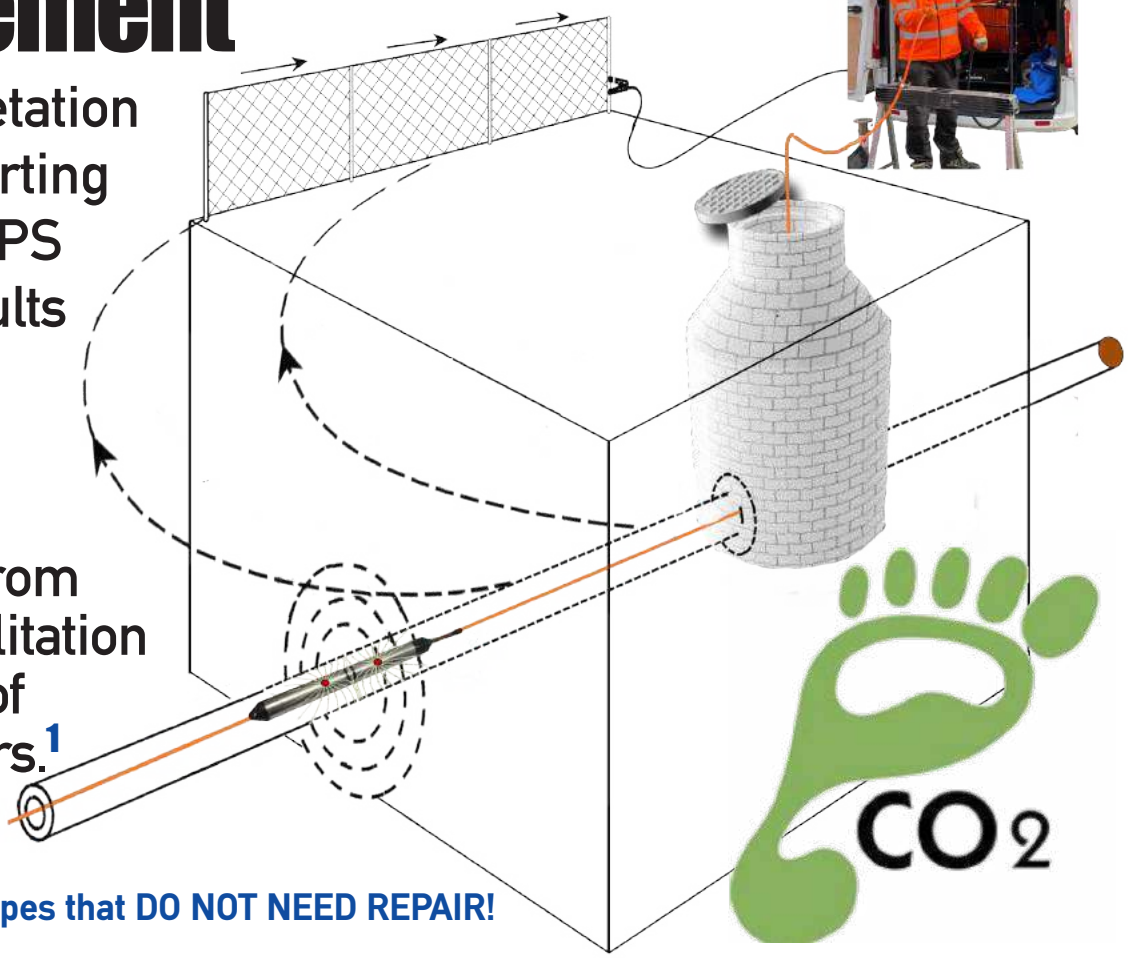
Top 3 Causes of Flooding

1. Wet-Weather Infiltration into Sewers
2. Pipe Blockages
3. Equipment Failure



Science-Based Leak Location & Measurement

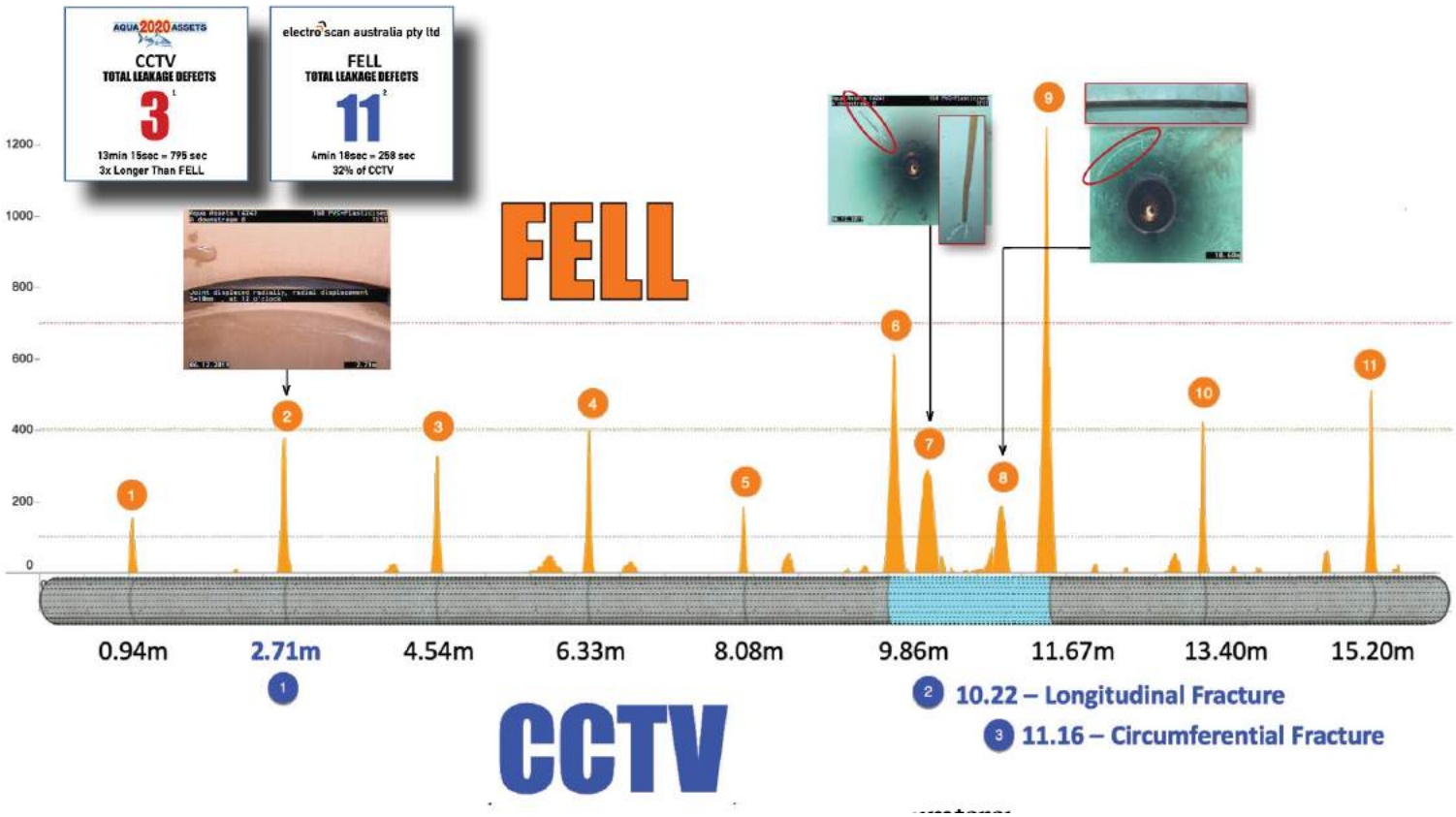
- No Data Interpretation
- Real-Time Reporting
- Leaks in GPM/LPS
- Repeatable Results
- Unambiguous
- Unbiased
- Unprecedented
- CO_2 Reduction From Targeted Rehabilitation & Certifications of Watertight Repairs.[1]



[1] Know right away which pipes that DO NOT NEED REPAIR!

CCTV & FELL Found Same Utility-Planted Defects But, CCTV Missed Leakage at Every Pipe Joints

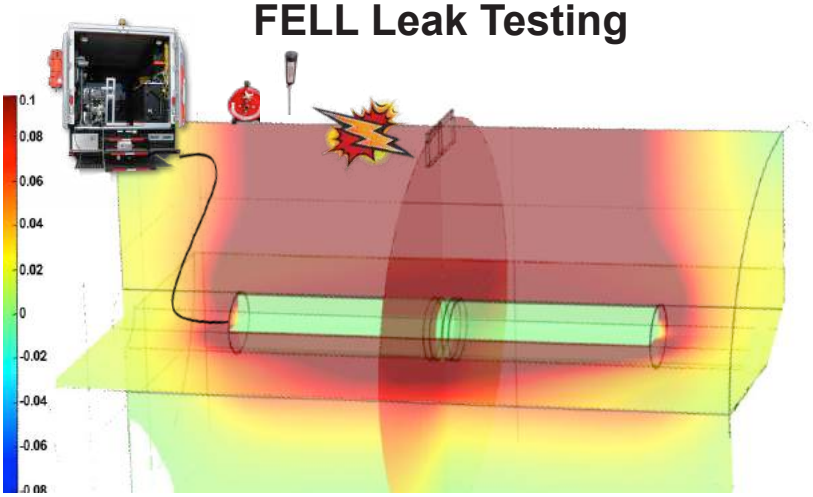
FELL = FOCUSED ELECTRODE LEAK LOCATION



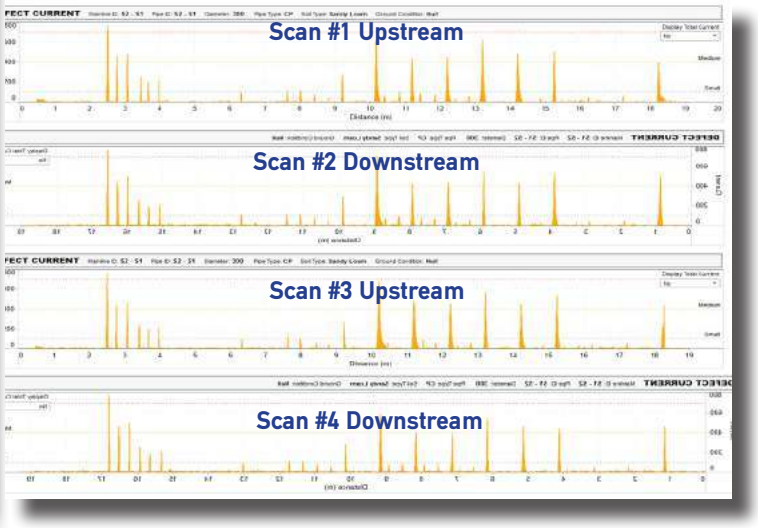
IKT FELL Tests of CIPP Liners

IKT Leak Testing

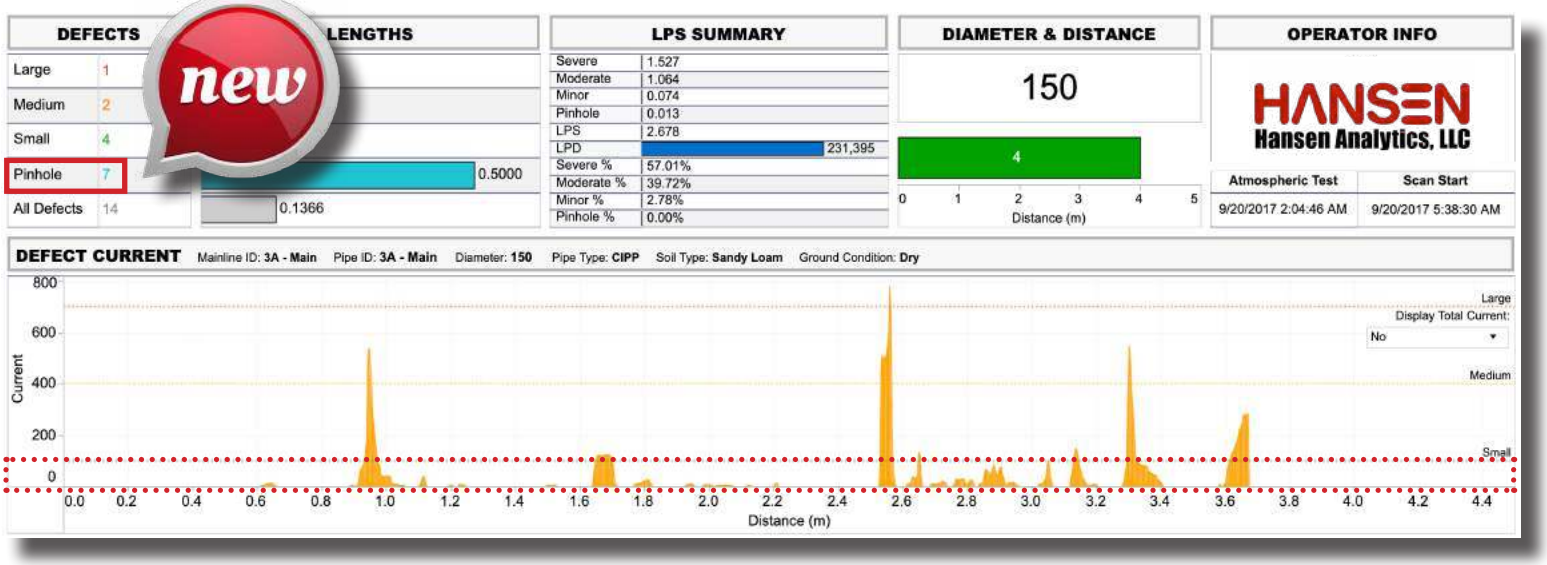
FELL Leak Testing



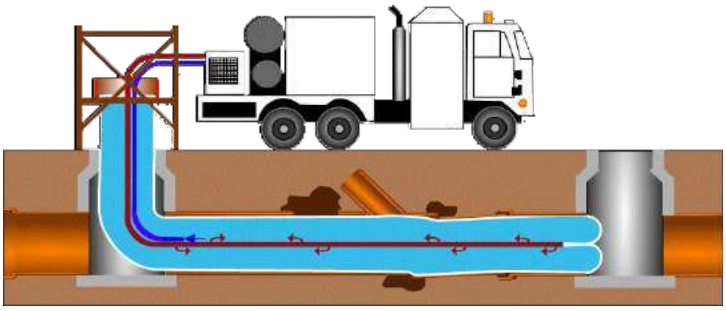
IKT Repeatability Testing



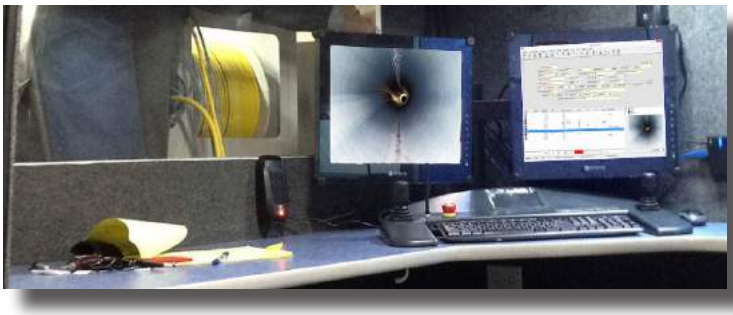
New Release of Cloud-Based CIPP Leak Assessment Application



After 50-Years, CIPP Can Finally Be Tested For Water Tightness



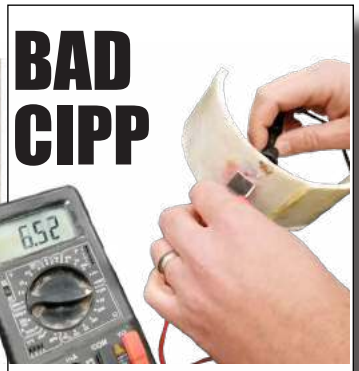
CCTV and Visual Inspection Is NOT ABLE To Test CIPP Liners



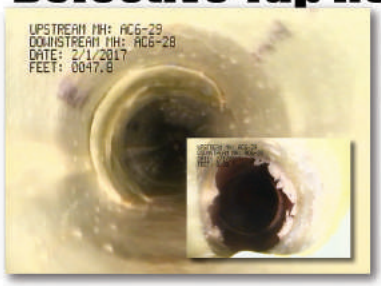
Common CIPP Defects, Missed By CCTV

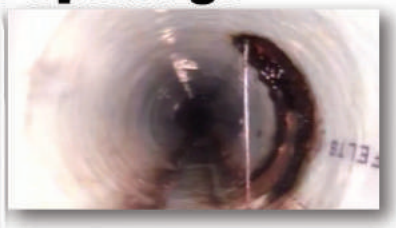
- Accelerant Burns
- Accidental Cuts
- Bad Service Reconnections
- Bad Lateral Liners
- Blisters
- Delamination
- Defective Epoxy
- Equipment Damage
- Foreign Objects
- Improper impregnation
- Lower than Recommended Resin-to-Felt Ratios
- Pinholes
- Peeling
- Poor, Incomplete, or Uneven Curing
- Overheating
- Stretching
- Top-Hat Defects
- Wet-Out Failures
- Wrinkles, including Buckling, Fins, Folds, Lifts, & Ridges

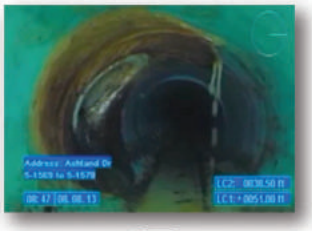
CIPP Lining Process



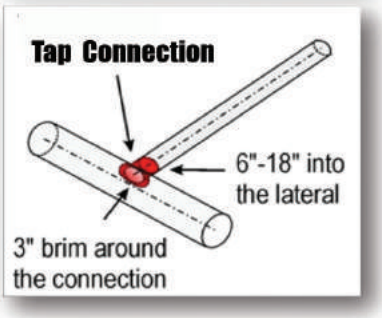
Defective Tap Re-Openings

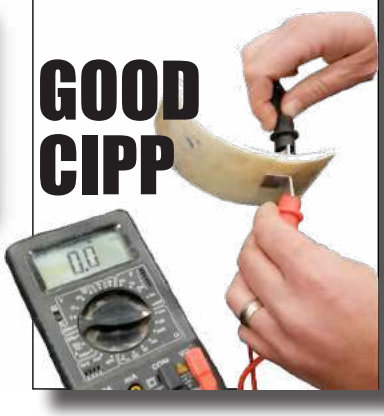






CIPP May Leak More After Lining Due To Poorly Restored Tap Connections.





Electro Scan Ground-Truths CIPP Watertight Condition.

CCTV vs. FELL Benchmark

WRc-Electro Scan U.S. Field Test

(Below). The Lone Pine, Pebble Beach, Calif.

SOURCE: NASSCO CERTIFIED CCTV OPERATOR

A. POST-CIPP NASSCO CCTV REPORT – February 2, 2015

P/O No.	Pipeline Segment Reference	Date	Time	Location (Street Name and number)	Locality
14277	Shot 12 CITY ID L12	20150205	06.18	LA VINA AVENUE	

Further Location details	Upstream Manhole Number	Rim to Invert	Grade to Invert	Rim to Grade
	D08-019			

Downstream Manhole Number	Rim to Invert	Grade to Invert	Rim to Grade	Use of Sewer	Direction	Flow Control	Height
D08-020				Sanitary	Downstream		8

Width	Shape	Material	Ln. Method	Pipe Joint Length	Total Length	Length Surveyed	Year Laid	Year Rehabilitated	Tape / Media Number
	Circular	VCP	CP		512	506.7			

Purpose	Sewer Category	Pre-Cleaning	Cleaned	Weather	Additional Information
C		Jetting			

Distance (Feet)	Code		Continuous defect	Value				Joint	Circumferential Location		In
	Group/ Descriptor	Modifier/ severity		S/M/L	Inches 1st	Inches 2nd	%		At / From	To	
0.0	AMH										
0.0	MWL						0				
33.6	TB	A			6				2		
37.8	TF	A			6				10		
117.4	TF	A			6				2		
123.4	TB	A			6				2		
140.7	TB	A			4				10		
255.3	TF	A			6				10		
286.5	TF	A			6				12		
332.3	TB	A			4				10		
358.3	TB	A			4				10		
390.6	TB	A			6				2		
506.7	AMH										

End Inspection MH D08-020

WRc U.S. Field Demonstration included a California Post-CIPP Sewer Evaluation.

A CCTV RATING **ZERO NASSCO OPRI SCORE**

B ELECTRO SCAN **15,998 GPD DEFECT FLOW RATE**

Zero CCTV Defects

Segment	Structural								O & M								Overall							
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index
14077_D08-019_D08-020_20150205_06.18	0	0	0	0	0	0	0000		0	0	0	0	0	0	0000		0	0	0	0	0	0	0000	

Electro Scan Found & Measured All Leaks, Missed by U.S. CCTV

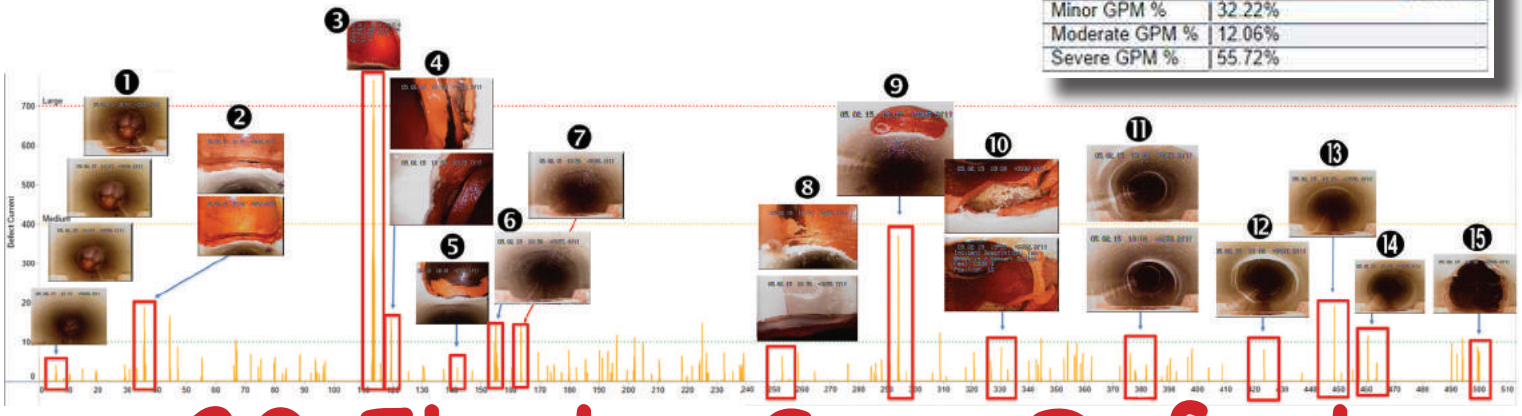
CITY OF MONTEREY
Colton Hall, California Constitution Hall 1849

Post-CIPP Assessment

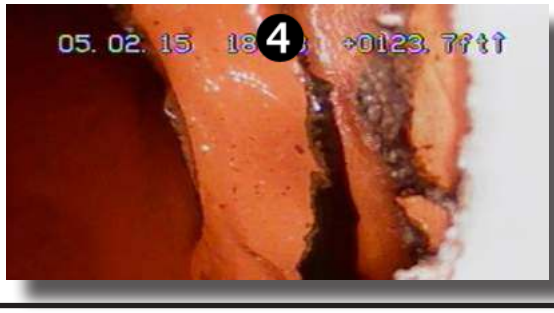
SOURCE: ELECTRO SCAN CERTIFIED FELL OPERATOR

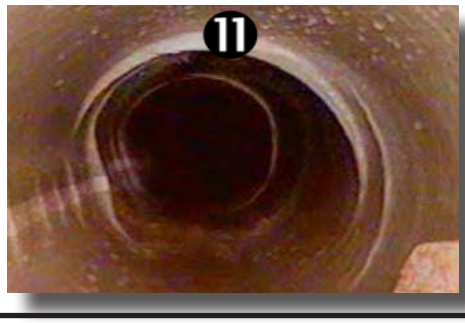
B. ELECTRO SCAN INSPECTION – July 8, 2015 Ⓑ

GPM SUMMARY	
Minor GPM	3.580
Moderate GPM	1.340
Severe GPM	6.190
Total GPM	11.110
GPD	15,998
GPD IDM	21,101
Minor GPM %	32.22%
Moderate GPM %	12.06%
Severe GPM %	55.72%



+20 Electro Scan Defects



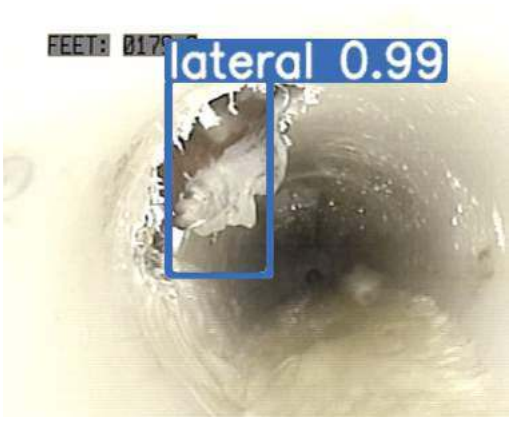


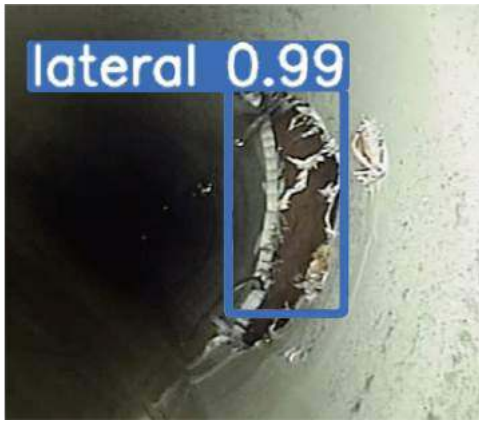
Why Water Leaks & Sewer Infiltration Need AI-Electro Scan Leak Detection?

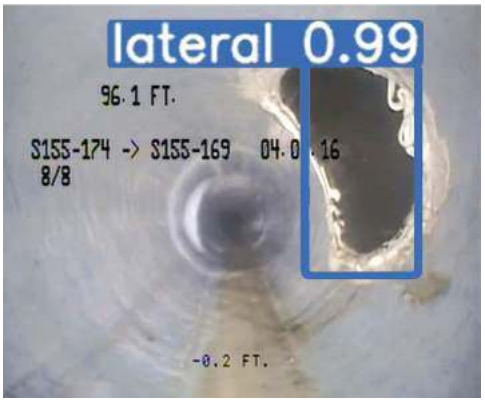
Structural								O & M								Overall							
Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index
0	0	0	0	0	0	0000		0	0	0	0	0	0	0000		0	0	0	0	0	0	0000	

CCTV & CCTV-AI Is Not Able To Find Leaks

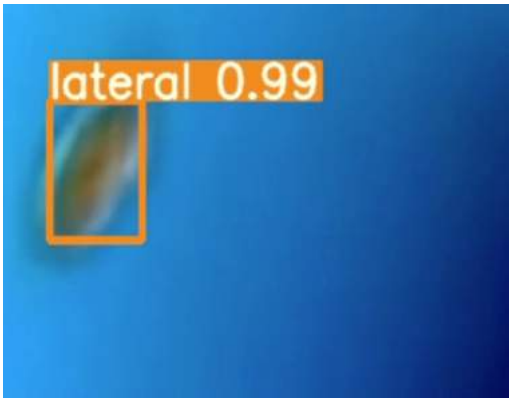
SEWER Leaks Found By Electro Scan. Approved By CCTV Cameras.

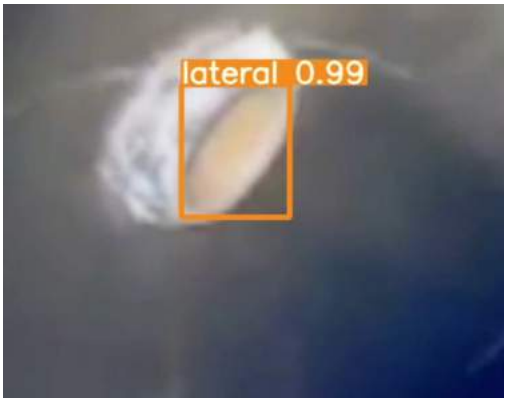




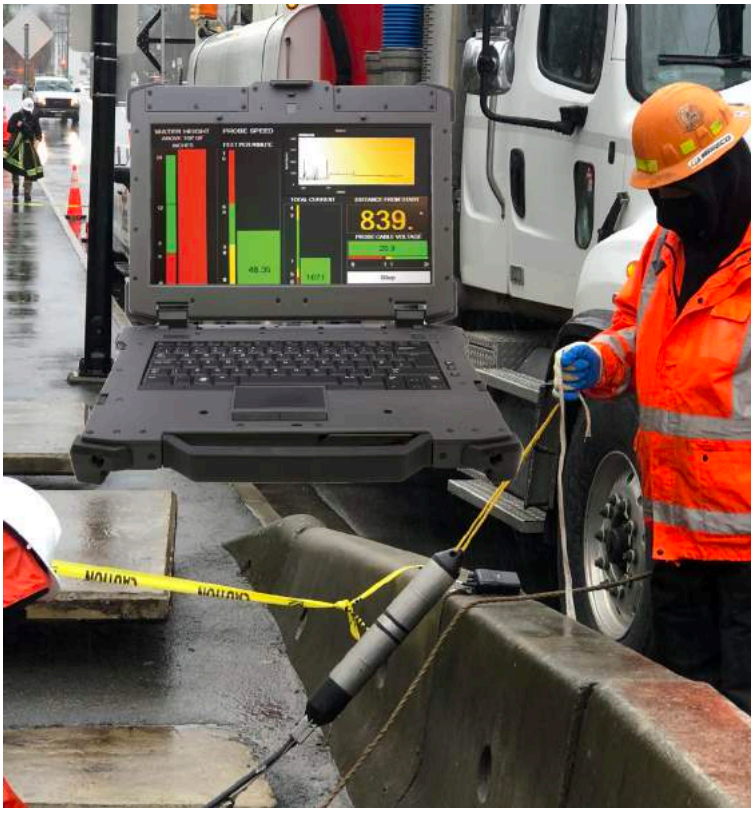


WATER Leaks Found By Electro Scan. Approved By Acoustic Sensors.





ELECTRO SCAN v. ACOUSTIC BALL



SAME DAY. SAME PIPES.

		# Leaks
ELECTRO SCAN	REPORT IN MINUTES	55
ACOUSTIC BALL	REPORT TOOK WEEKS	0

SELECTED DAILY PRODUCTIONS

Electro Scan Inc. Daily Production

Rank			Footage	Pipes	Length (ft)
1.	12/19/19	Town of La Grange, NC	7,163	23	311
2.	10/26/2018	Washoe County Community Services Department, NV	6,143	14	439
3.	5/27/20	Union Sanitary District, CA	5,828	6	952
4.	5/26/20	Union Sanitary District, CA	5,722	16	347
5.	2/14/2017	Salt River Project, AZ	5,715	30	181
6.	8/4/2015	Hamilton Township Municipal Authority, PA	5,551	18	299
7.	5/14/20	Hillsborough County, FL	5,423	22	232
8.	10/13/2017	Iowa Great Lakes Sanitary District, IL	5,419	22	231
9.	5/18/2016	East Bay Municipal Utility District, CA	5,377	18	280
10.	9/13/2018	Jurupa Community Services District, CA	5,108	25	199
11.	5/11/20	Hillsborough County, FL	5,087	25	198
12	7/7/2015	Hamilton Township Municipal Authority, PA	5,041	19	259
13.	12/13/2016	City of Frankfort, KY	4,985	18	271
14.	12/3/2014	Upper Montgomery Joint Authority, PA	4,948	27	177
15.	11/15/2019	Town of La Grange, NC	4,919	24	199
16.	9/21/2017	RAKWA, UAE	4,870	20	236
17.	10/27/2015	Eagle River Water & Sanitation District, CO	4,788	20	234
18.	12/14/2016	City of Frankfort, KY	4,772	18	301
19.	2/4/2015	Miami [illegible], FL	4,724	17	[illegible]
20.					








What's In?

Pipe Leak Testing Results In Real Time

Points of Interest 'Only' In Days or Weeks

What's Out?

Electro Scan – By Pipe Material

ABS	Acrylonitrile-butadiene-styrene
ACP	Asbestos Cement Pipe
BRK	Brick
CMLSP	Cement Mortar Lined Steel
CON	Concrete
CIPP	Cured-In-Place Pipe
DIP	Ductile Iron (w/Protector 401)
FRP	Fiberglass Reinforced Pipe
FRPM	Fiberglass Reinforced Polymer
GRP	Glass Reinforced Pipe
HDPE	High Density Polyethylene
ORP	Orangeburg Pipe
PB	Polybutylene
PCCP	Prestressed Concrete Cylinder Pipe
PE	Polyethylene
PFP	Pitch Fiber Pipe
PP	Plastic Pipe
PVC	Polyvinyl Chloride
RCP	Reinforced Concrete Pipe
RPM	Reinforced Plastic Mortar
RTR	Reinforced Thermosetting Resin
SIPP	Spray-in-Place Pipe
SPR	Spiral Wound Pipe
TC	Terracotta or Clay Pipe
VCP	Vitrified Clay Pipe

PRE-REHABILITATION

Asbestos Cement Pipe

Electro Scan FELL is unique in its ability to geometrically map the remaining wall, i.e. corrosion of ACP.

Finding & Measuring Pipe Corrosion Using Electro Scan's Patented Data Analytics

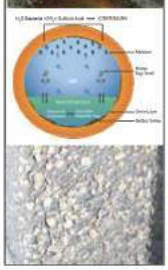
DEFECT CURRENT

LOW MEDIUM HEAVY

CORROSION

DEFECT FLOW

As demonstrated by independent benchmarks, since acoustic and transient pressure sensors are unable to provide detail geometric assessments of pipe walls, and therefore unable to estimate remaining pipe walls, Electro Scan represents a game changing solution to assess & prioritize ACP.



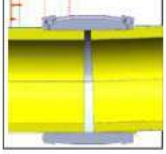
High Density Polyethylene Pipe

Poor mechanical or fused joints are the Achilles heel of HDPE, and not seen by CCTV cameras or heard by acoustic data loggers or sensors. But, found & quantified by FELL in accordance with ASTM F2550.

Evenly Spaced Defects Indicate Problem Joints.

What Electro Scan Finds Most?

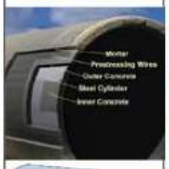
Inadequate Clamping or Restraint during Fusion (Below)



Prestressed Concrete Cylinder Pipe

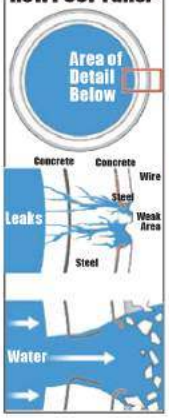
Electro Scan represents the only technology able to reliably & consistently find & measure leaks in GPM.

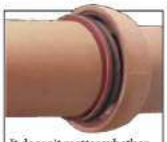
While other devices may attempt to locate corroded wire mesh that may or may not indicate a weakness in the pipe wall, Low Voltage Conductivity represents a game-changing solution to provide unbiased leak locations & severity for each defect.



Superior to acoustic and electromagnetic sensors, Electro Scan's Low Voltage Conductivity detects leaks other technologies miss.

How PCCP Fails?





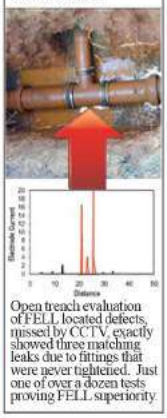
Vitrified Clay Pipe

It doesn't matter whether you evaluate VCP from the outside or inside of a pipe, CCTV, Laser, LIDAR, Sonar, GPR, or Acoustic, are not able to detect or measure defect flows.

ELECTRO SCAN ASSESSES 100% OF JOINTS

Electro Scan's FELL is the only technology, representing a Non-Destructive Test (NDT) able to follow a 90° pipe bend to locate a pathway for water to enter or exit a pipe.

By measuring the change in current and the amount of flow, the size of the opening can be computed and translated into an estimated GPM.



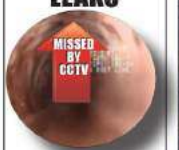
Open trench evaluation of FELL located defects, missed by CCTV, exactly showed three matching leaks due to fittings that were never tightened. Just one of over a dozen tests proving FELL superiority.

POST-REHABILITATION

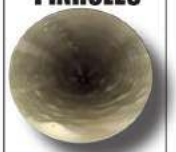
Cured-In-Place Pipe

CIPP liners may not be watertight and defects not seen by certified operators using CCTV cameras. As a result, ASTM F2550 should be added to CIPP specifications to ensure pipe quality & integrity.

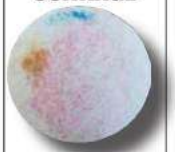
LEAKS



PINHOLES



SOAKAGE



RECOMMENDED USE:
To Find & Quantify Leakage From

- Accelerant Burns
- Accidental Cuts
- Bad Service Reconnect
- Bad Lateral Liners
- Blisters
- Delamination
- Defective Epoxy
- Equipment Damage
- Foreign Objects
- Pinholes
- Poor Curing
- Overcooking
- Stretching
- Top-Hat Defects
- Wet-Out Failures
- Wrinkles, including: Buckling, Fins, Folds, Lifts, and Ridges

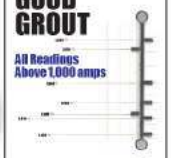
Grout

FELL is now preferred over using traditional packers to test joints for water tightness, due to FELL's Non-Destructive Testing (NDT) of joints, laterals, and cracks.

Unlike air testing, FELL does not force any added pressure on joints or laterals. Since air testing can open joints, shift pipes, and even temporarily correct out-of-round conditions in plastic pipes as areas around joints are inflated, packers are no longer recommended for testing the quality of joints or laterals.

GOOD GROUT

All Readings Above 1,000 amps

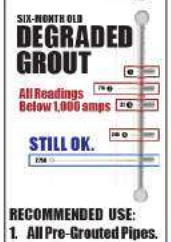


SIX-MONTH OLD

DEGRADED GROUT

All Readings Below 1,000 amps

STILL OK.

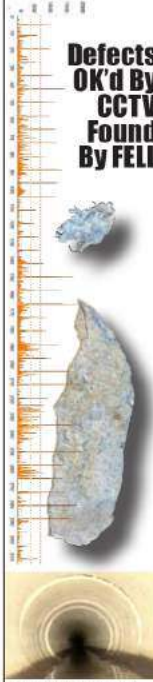


RECOMMENDED USE:

1. All Pre-Grouted Pipes.
2. Post-Grouted Pipes, 6-12 Months After Grout to Detect Drying or Shrinkage.
3. Prior to Warranty Acceptance.

Spray-In-Place Pipe

DEFECTIVE (NEW) SIPP



Defects OK'd By CCTV Found By FELL

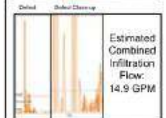
RECOMMENDED USE:

1. Pre-SIPP.
2. Post-SIPP All Liners.
3. Prior to Warranty Acceptance.

Spiral Wrap Pipe

Locking individual wraps is key to any successful Spiral Wrap Pipe project, with problems not identified by CCTV.

In contrast, Electro Scan FELL inspection can find defects to individual couplings.



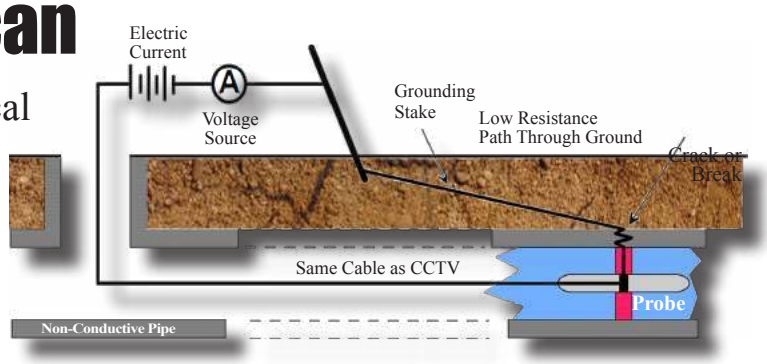
RECOMMENDED USE:

1. Pre-Spiral Wrap.
2. Post-Spiral Wrap.
3. Prior to Warranty Acceptance.

Fast & Repeatable Testing

The Science of Electro Scan

Electro Scan establishes a low voltage electrical circuit between the aboveground surface and inside of any pipe. If the circuit 'connects' then a leak is located with 0.4 inches (1cm) accuracy and can be measured to estimate Gallons per Minute or Liters per Second defect flow rate.



Literature Review of FELL Technology

FOCUSED ELECTRODE LEAK LOCATION (FELL)

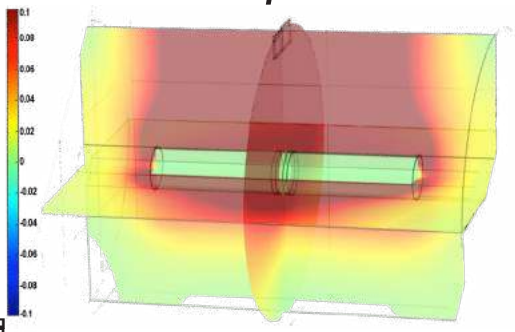
1. Flow Monitoring Calibration Using Teledyne Isco 4150 Area-Velocity Flow Meter.
2. AWWA M77, Condition Assessment for Water Mains, 2019
3. ASTM F2550, 2018, 2013, 2006
4. Exhumed CIPP Testing of Liners.
5. EPA/WE&RF Field Benchmark Testing.
6. COMSOL® Multiphysics® Testing.
7. Dye Testing Confirmations.
8. Open-Trench Smoke Testing
9. IKT Laboratory & Field Testing.
10. University Testing.
11. Ken Kerri, P.E., Ph.D., Author, Educator
12. Customer Testing.

Technology

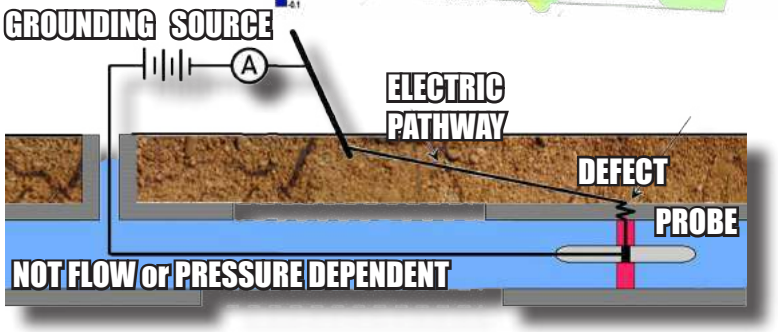
“Electro Scan’s Focused Electrode Leak Location, is a Game Changing Technology”

HOW DO WE FIND EVERY LEAK?

If a pipe leaks electricity, it leaks water. And can be measured in gallons per minute or litres per second.



Completing The Circuit Finds Every Leak!



Results independently calibrated using COMSOL Multiphysics®.

COMSOL

FELL FINDS LEAKS MISSED BY OTHERS

- CCTV
- Helium or Smoke Testing
- Acoustic Sensors
- Dye Flood Testing
- Sonar
- Conductivity

“Electro Scan’s Machine-Intelligent Data Replaces Time Consuming, Often Inaccurrate Acoustic & Visual Guesswork.”

SafeContractor APPROVED

SSIP
SAFETY SCHEMES IN PROCUREMENT

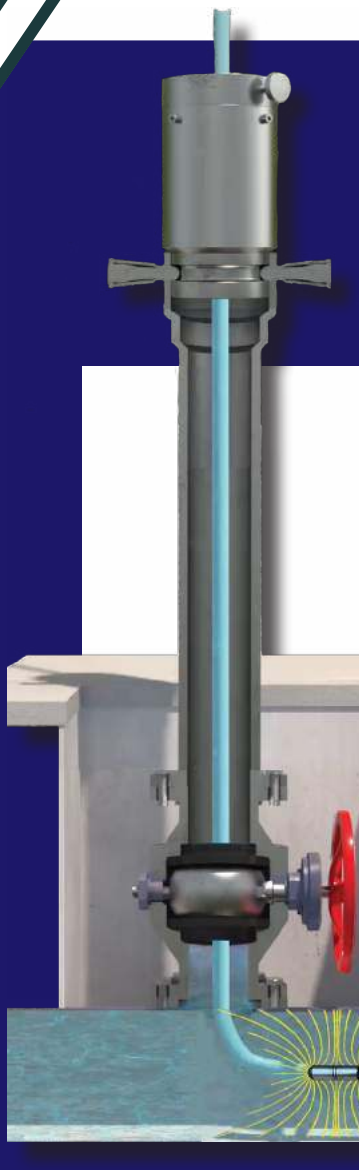
Services

Contract Services

Direct Services By Electro Scan (UK) Limited Staff

Technology Licensing

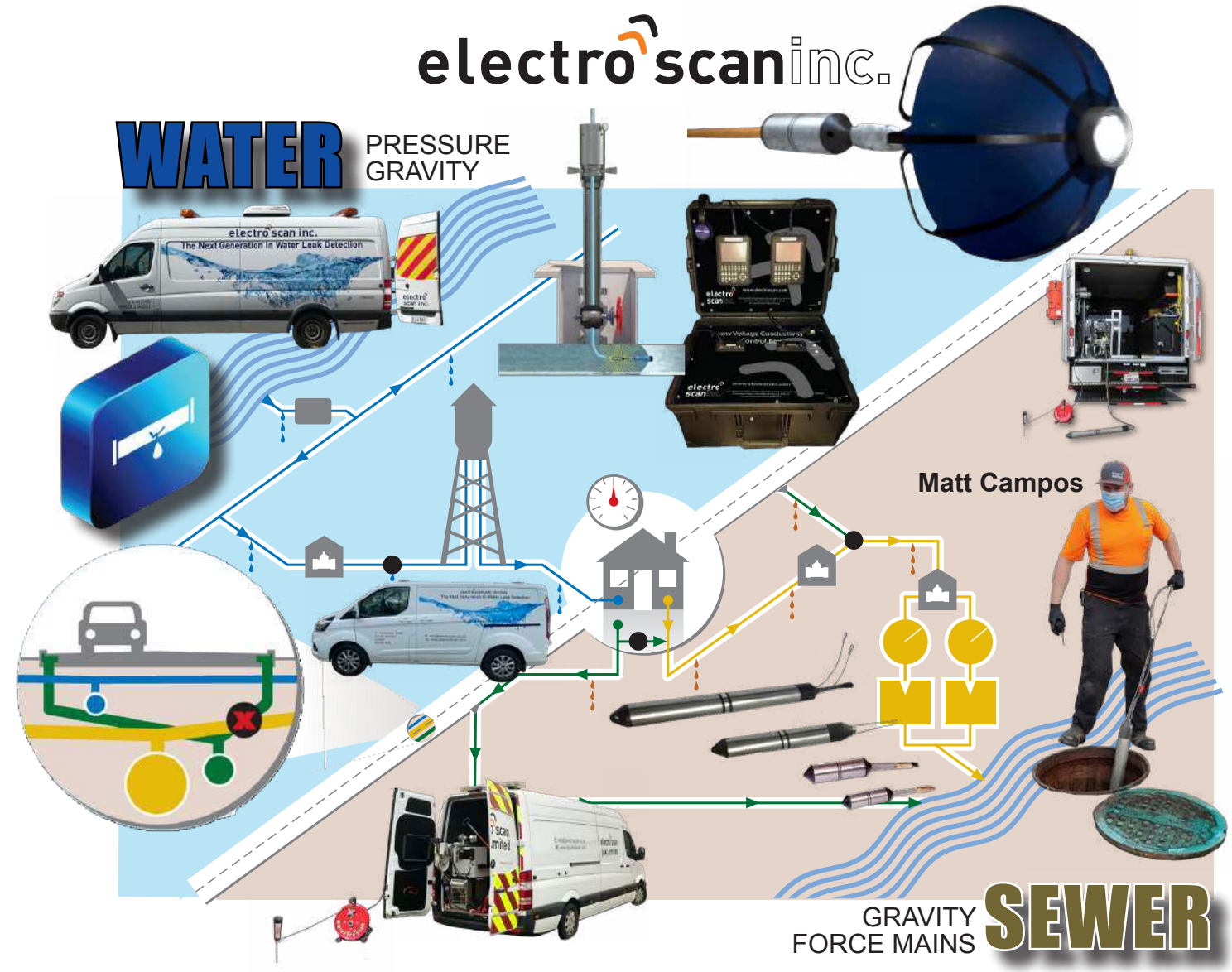
Licensing to 3rd Party Contractors Equipment Provided, But Not Sold to Perform Large Scale Projects



electro scan inc.

WATER

PRESSURE
GRAVITY



Accurate, Fast, Repeatable

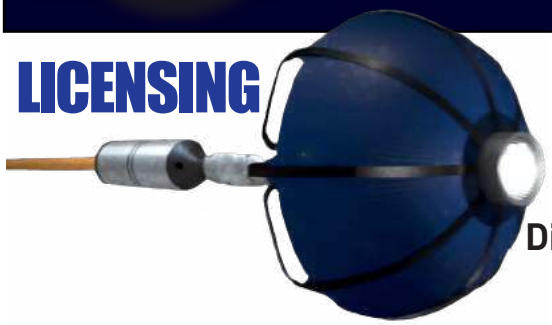
Field Data 5-Minutes or Less.

amazon web services

BEST PRACTICE

SERVICES

LICENSING



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