

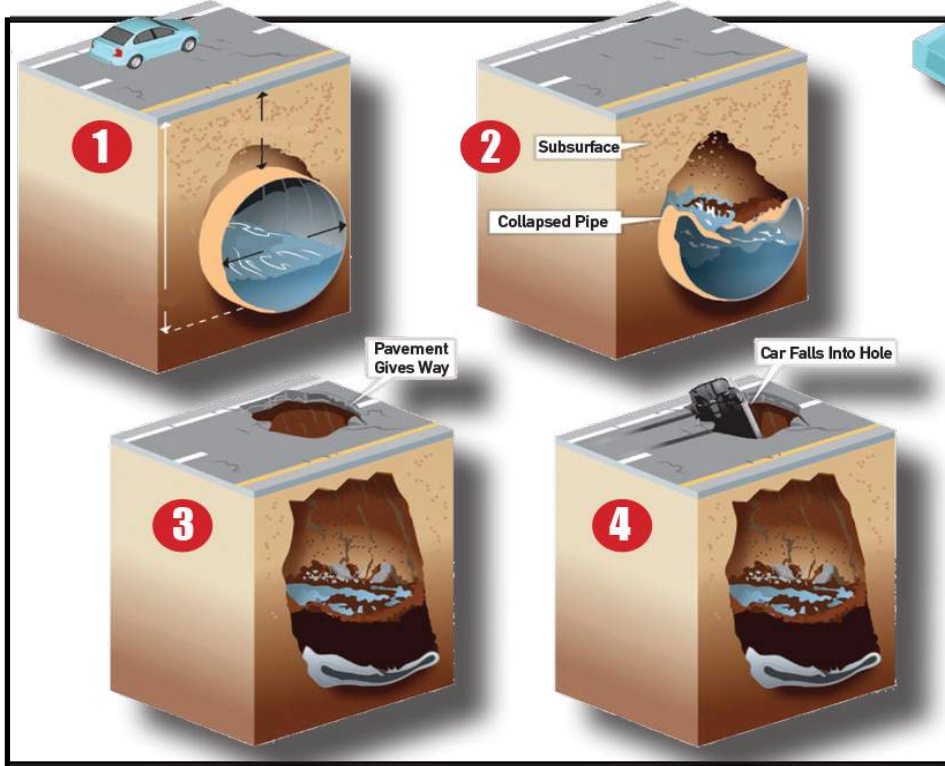
**WARNING:**

**ACOUSTIC DEVICES AND CCTV NOT SUITABLE TO CERTIFY SUB-SURFACE LEAKS.**

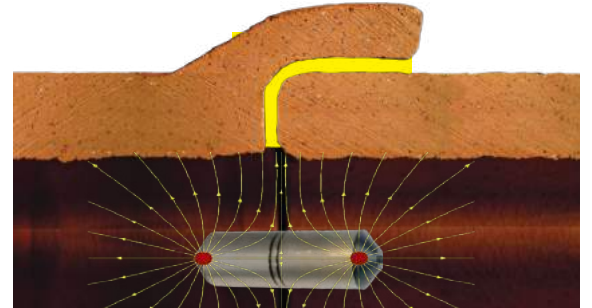
# Underground Pipes



**ANATOMY OF A SINKHOLE & STREET COLLAPSE CAUSED BY SEWER OR WATER PIPE LEAKAGE.**



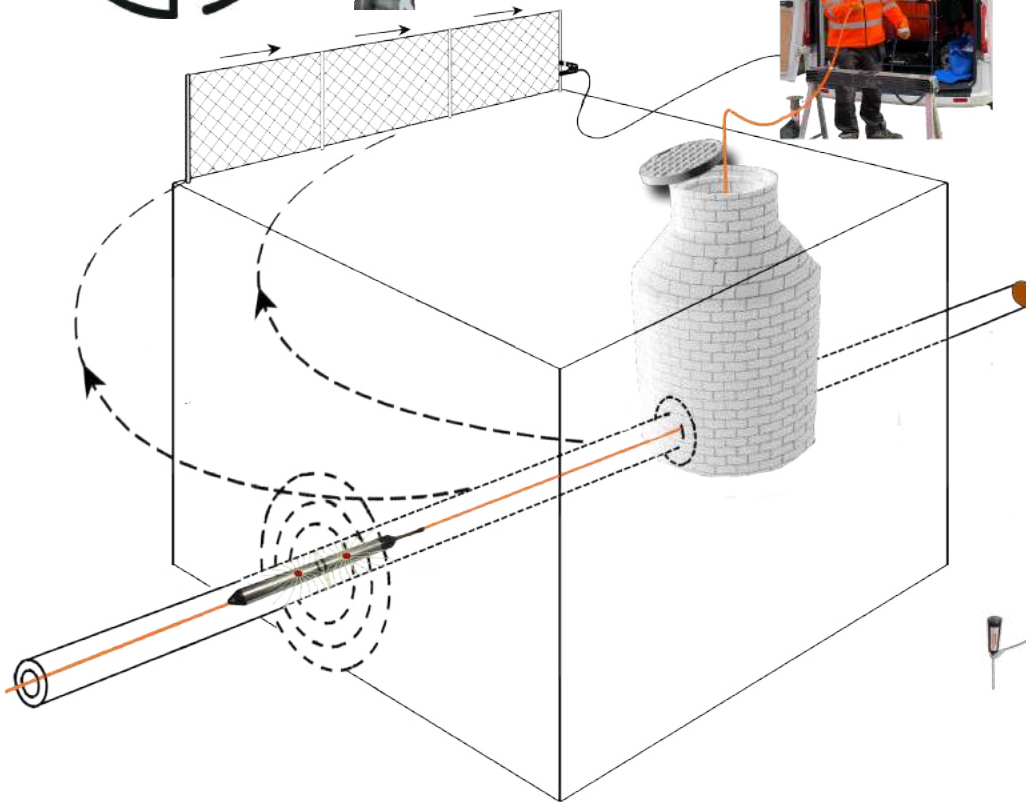
**ACOUSTICS CAN'T 'HEAR' & CCTV CAMERAS CAN'T 'SEE' IF JOINTS ARE WATERTIGHT. BUT ELECTRO SCAN, CAN.**



**COMPREHENSIVE UNDERGROUND INSPECTION REQUIRES 360-DEGREE LEAK DETECTION.**

# SEWER PIPES

MACHINE-INTELLIGENT SEWER LEAK DETECTION.  
**FELL**



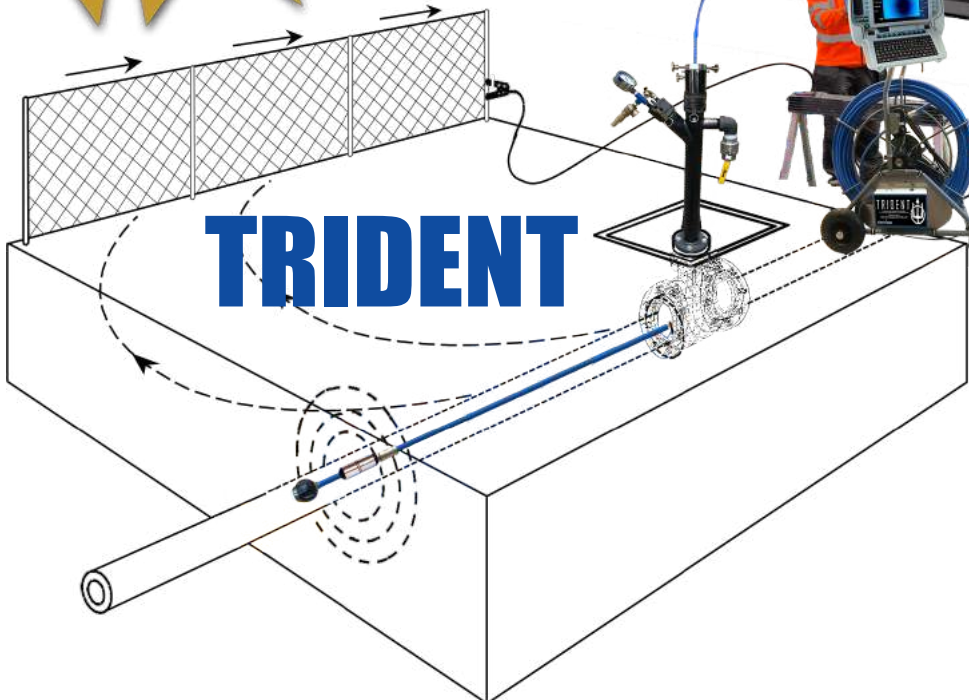
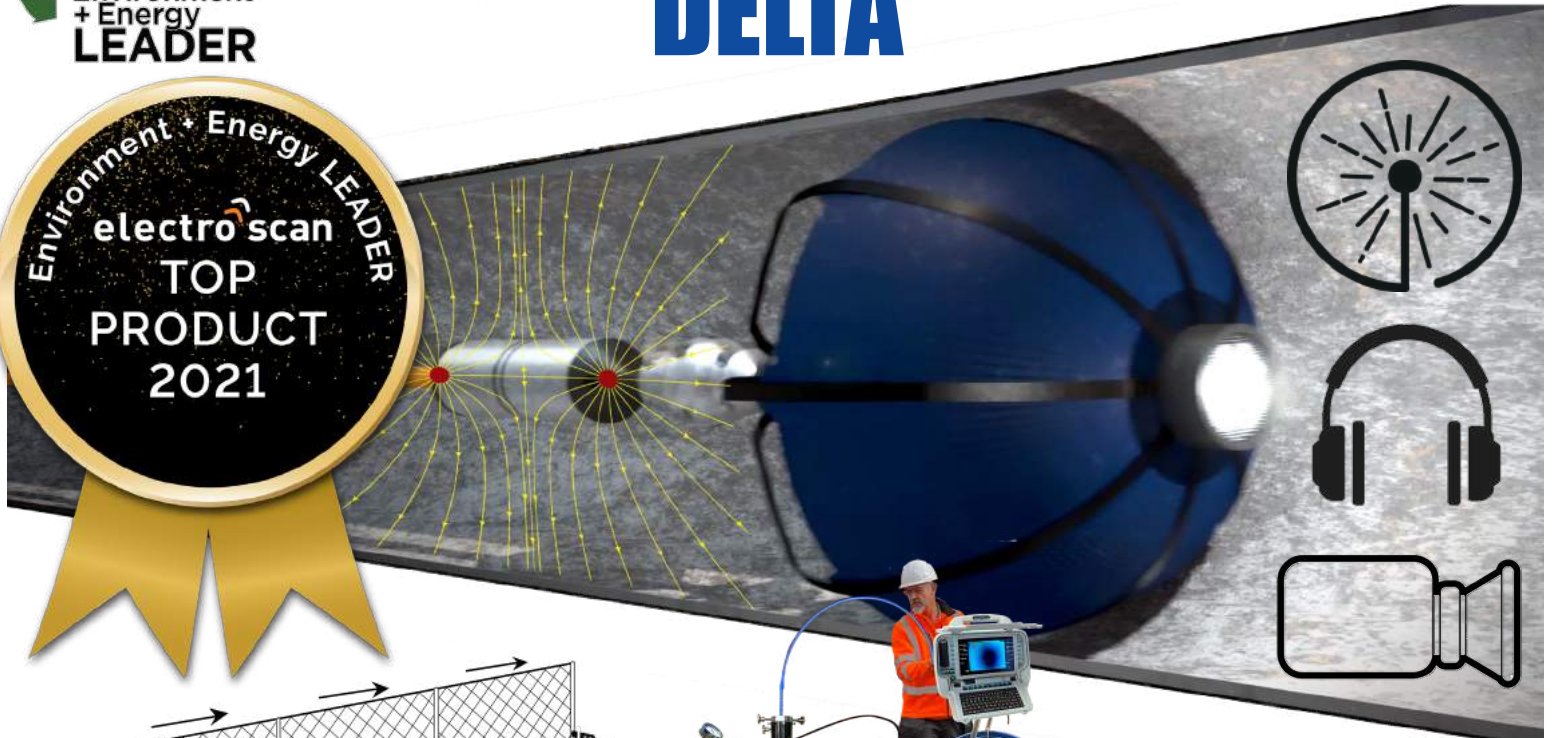
**Leading Cause of Voids, Sinkholes, and Underground Erosion**

# WATER PIPES



**MACHINE-INTELLIGENT WATER LEAK DETECTION.**

## DELTA



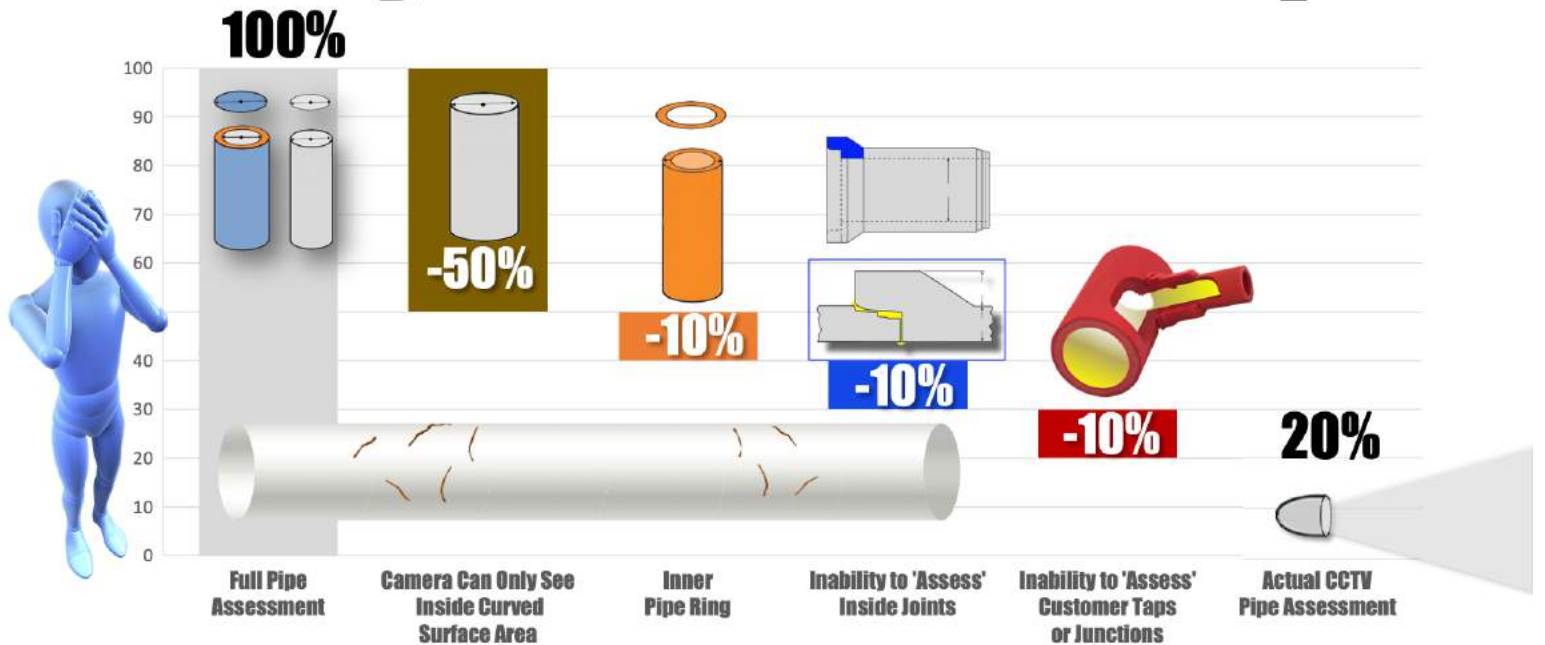
**Leading Cause of Voids, Sinkholes, and Underground Erosion**

**WHY TV CAMERAS  
CAN'T 'SEE' MOST  
UNDERGROUND  
SEWER LEAKS?**



# What Prevents 'SEEING' Leaks to Locate & Quantify SEWER INFILTRATION?

## 10 VISUAL-BASED CCTV CAMERAS & AI ALGORITHMS Only 'See' 20% of a Pipe



## 9 FALSE-POSITIVE CCTV READINGS MAY CONTRIBUTE TO Missed Sinkholes & Voids



# 8 CURRENT WRC & NASSCO STANDARDS MAKE NO ATTEMPT TO Identify or Measure Leaks

<b>C CRACK</b> 6-1 CL Longitudinal 5-2 CC Circumferential 5-2 CM Multiple 5-2 CS Spiral 5-2	<b>F FRACTURE</b> 6-7 FL Longitudinal 5-7 FC Circumferential 5-7 FM Multiple 5-7 FS Spiral 5-7	<b>B BROKEN</b> 5-4 BV Void Visible 5-4 Beyond Defect BVV Void Visible 5-4 Beyond Defect	<b>H HOLE</b> 5-4 HV Void Visible 5-4 Beyond Defect HVV Void Visible 5-4 Beyond Defect	<b>D DEFORMED</b> 5-18 DV Deformed 5-18 Vertically (Heckel) DH Deformed 5-21 Horizontally (Heckel)	<b>X COLLAPSE</b> 5-23 XP Pipe Collapse 5-23 XB Rib Collapse 5-23 XA Joint Angular 5-23	<b>J JOINT</b> 5-25 JO Joint Other 5-25 (Heckel) JO Joint Separated 5-25 (Open) JA Joint Angular 5-25	<b>D DEPOSITS</b> 6-1 DA Attached 6-1 DD Detachment 5-1 DS Disl. 5-1 DZ Disl. 5-2	<b>D DEPOSITS</b> 6-1 DS Detrital 6-1 DSE Fine 5-2 DSC Coarse 5-2 DZ Disl. 5-2	<b>D DEPOSITS</b> 6-2 DSD Ingress 6-1 DSE Fine 5-2 DSC Coarse 5-2 DZ Disl. 5-2	<b>R ROOTS</b> 6-7 RF Root 6-7 RFL Local 6-7 RFLC Local 6-7 RFLC Connected 6-7	<b>R ROOTS</b> 6-7 RM Median 6-7 RML Local 6-7 RMLC Local 6-7 RMLC Connected 6-7	<b>R ROOTS</b> 6-7 RH Root 6-7 RHL Local 6-7 RHLC Local 6-7 RHLC Connected 6-7	<b>R ROOTS</b> 6-7 RT Root 6-7 RTL Local 6-7 RTLC Local 6-7 RTLC Connected 6-7
<b>S SURFACE DAMAGE</b> 5-30 SD Surface Damage 5-30 SDI Roughness 5-30 SDM Mechanical 5-31 SDC Chemical Attack 5-31 SDZ Not Insured 5-31	<b>S SURFACE DAMAGE</b> 5-30 SAV Aggregate 5-30 SAP Aggregate Preparing 5-30 SAPM Mechanical 5-31 SAPC Chemical Attack 5-31 SAPZ Not Insured 5-31	<b>S SURFACE DAMAGE</b> 5-30 SAM Aggregate 5-30 SAP Aggregate Preparing 5-30 SAPM Mechanical 5-31 SAPC Chemical Attack 5-31 SAPZ Not Insured 5-31	<b>S SURFACE DAMAGE</b> 5-30 SAR Reinforcement 5-30 SAP Reinforcement Preparing 5-30 SAPM Mechanical 5-31 SAPC Chemical Attack 5-31 SAPZ Not Insured 5-31	<b>S SURFACE DAMAGE</b> 5-30 SRP Reinforcement 5-30 SRM Reinforcement Preparing 5-30 SRM Mechanical 5-31 SRM Chemical Attack 5-31 SRMZ Not Insured 5-31	<b>S SURFACE DAMAGE</b> 5-30 SRE Reinforcement 5-30 SRP Reinforcement Preparing 5-30 SRM Mechanical 5-31 SRM Chemical Attack 5-31 SRMZ Not Insured 5-31	<b>I INFILTRATION</b> 5-47 IW Weeper 6-15 ID Drifter 6-15 IB Bubbler 6-15 IG Gusher 6-15	<b>OB OBSTACLES</b> Obstructions --- 6-19 OOB Block or Masonry 6-19 OOP Pipe Material In-Sight 6-19	<b>OB OBSTACLES</b> Obstructions --- 6-19 OOB Block or Masonry 6-19 OOP Pipe Material In-Sight 6-19	<b>OB OBSTACLES</b> Obstructions --- 6-19 OOB Block or Masonry 6-19 OOP Pipe Material In-Sight 6-19	<b>OB OBSTACLES</b> Obstructions --- 6-19 OOB Block or Masonry 6-19 OOP Pipe Material In-Sight 6-19	<b>V VERMIN</b> 6-31 VR Rat 6-31 VC Cockroach 6-31 VO Other 6-31		
<b>S SURFACE DAMAGE</b> 5-30 SDW Mining Wall 5-31 SDM Mechanical 5-31 SDC Chemical Attack 5-31 SDZ Not Insured 5-31	<b>S SURFACE DAMAGE</b> 5-30 SSS Surface Spalling 5-31 SDM Mechanical 5-31 SDC Chemical Attack 5-31 SDZ Not Insured 5-31	<b>S SURFACE DAMAGE</b> 5-30 SZ Other 5-31 DZM Mechanical 5-31 DZC Chemical Attack 5-31 DZZ Not Insured 5-31	<b>S SURFACE DAMAGE</b> 5-30 SCP Corrosion 5-31 (metal pipe)	<b>LF LINING FAILURE</b> 5-41 LFI Insulated Lining 5-41 LFIH Insulated Lining 5-41 LFIU Uninsulated Lining 5-41 LFIUW Uninsulated Lining 5-41 LFIUWZ Not Insured 5-41	<b>LF LINING FAILURE</b> 5-41 LFI Insulated Lining 5-41 LFIH Insulated Lining 5-41 LFIU Uninsulated Lining 5-41 LFIUW Uninsulated Lining 5-41 LFIUWZ Not Insured 5-41	<b>WF WELD FAILURE</b> 5-46 WFI Longitudinal 5-46 WFC Circumferential 5-46 WFM Multiple 5-46 WFS Spiral 5-46 WFZ Endbush 5-46	<b>RP POINT REPAIR</b> 5-42 RPP Pipe Repair 5-42 RPID Defective 5-42 RPP Patch Repair 5-42 RPFD Defective 5-42	<b>RP POINT REPAIR</b> 5-42 RPL Local Lining 5-42 RPD Defective 5-42 RPD Defective 5-42 RPZ Other 5-42 RPZD Defective 5-42	<b>BRICKWORK</b> 5-48 BR Displaced 5-48 BR Missing 5-48 BR Dropped Level 5-48	<b>BRICKWORK</b> 5-48 BR Missing Starter 5-48 BR Missing 5-48 BR Large 5-48			



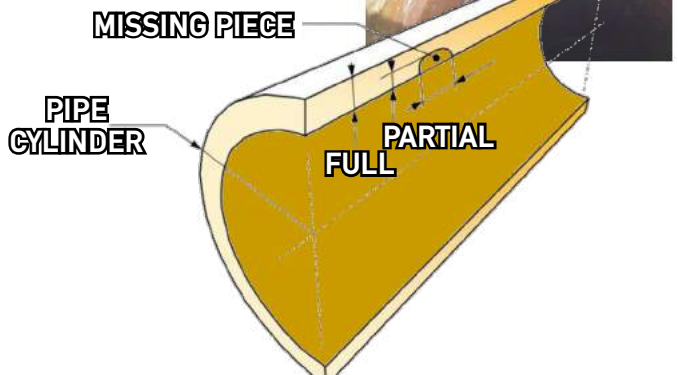
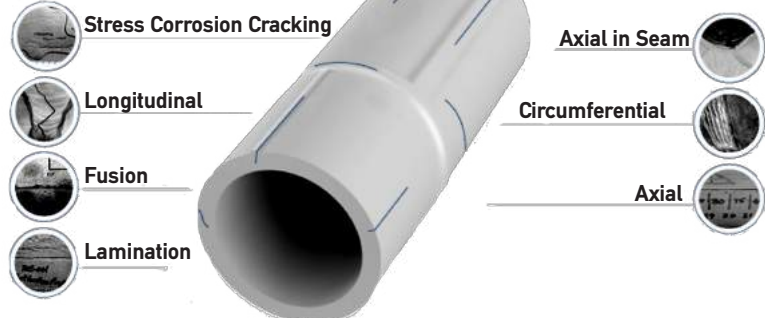
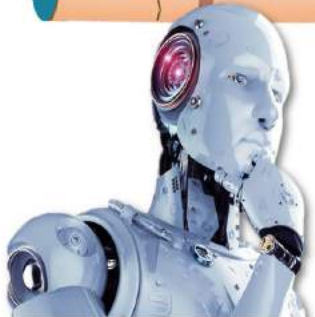
# 7 SUPERFICIAL CRACKS CALLED OUT BY CCTV, CANNOT CONFIRM IF Cracks Go Through Wall



CCTV Cameras Can't Tell if Cracks or Bad Joints Leak Through Pipe Wall Leading to Poor Repair Decisions.



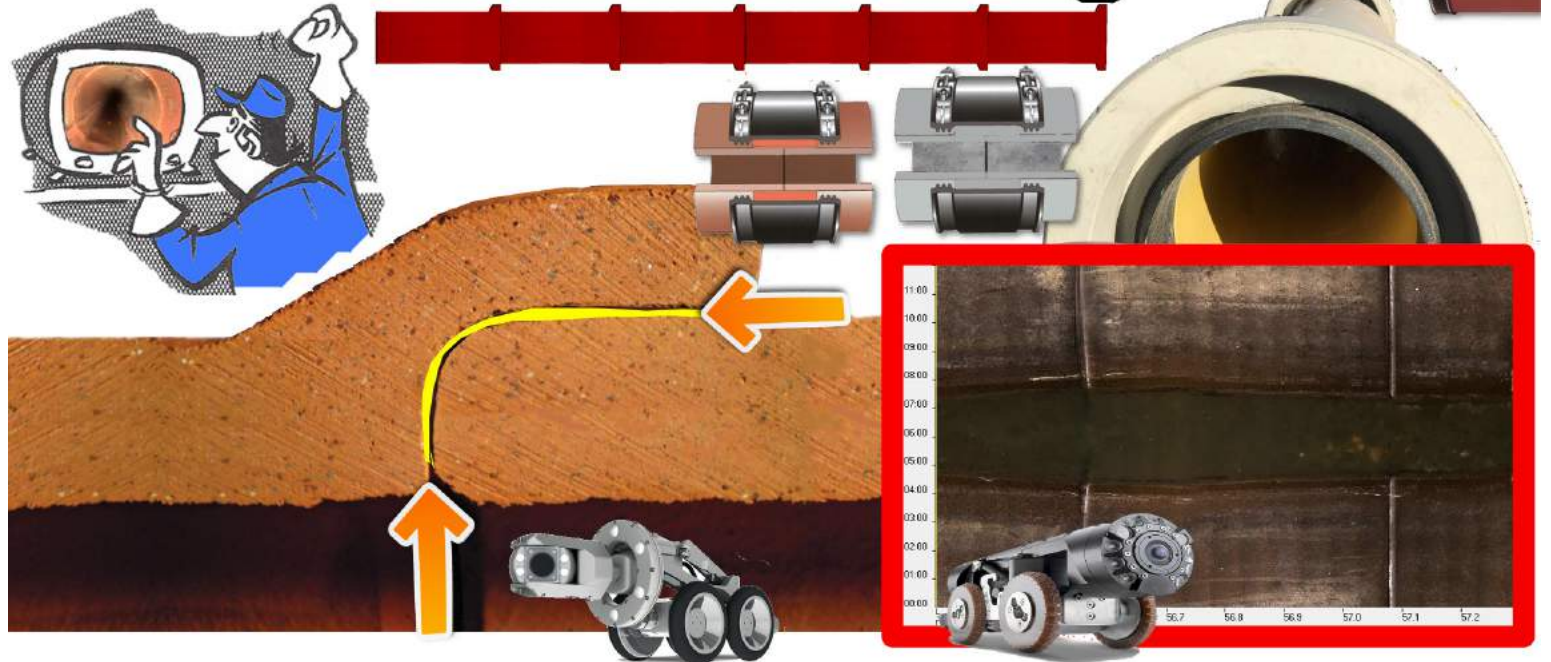
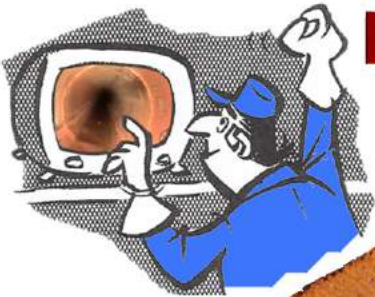
## AI CAN'T SEE WHAT CCTV CAN'T SEE!



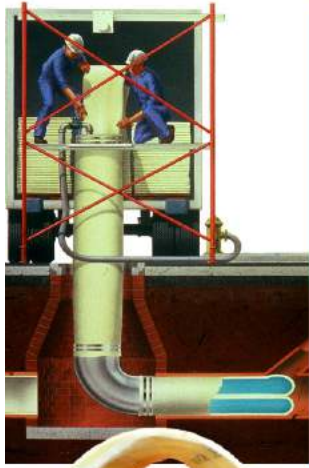
# 6 CAMERAS ARE NOT RECOMMENDED TO ACCEPT OR CERTIFY Post-Rehabilitation



# 5 CCTV, VISUAL, OR AI INSPECTIONS CANNOT TELL WHETHER Joints Are Watertight?

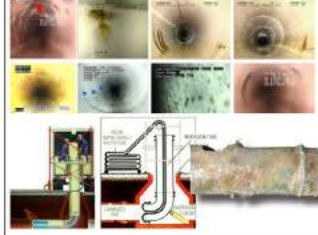


# 4 CCTV, VISUAL, OR AI INSPECTIONS CANNOT TELL WATER TIGHTNESS OF CURED-IN-PLACE PIPE LINER



## CIPP By Curing Method

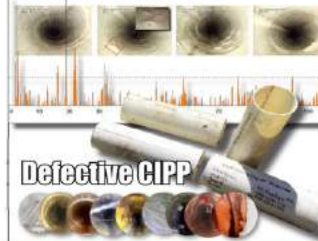
### 1. THERMAL-CURED CIPP



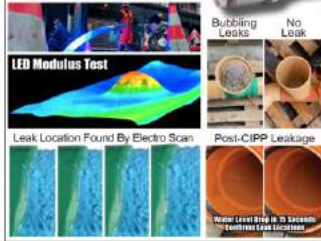
### 3. UV-CURED CIPP



### 2. STEAM-CURED CIPP



### 4. LED-CURED CIPP



# 3 CCTV CANNOT BE USED TO ASSESS THE INSIDE OF SEWER MAINS WHEN PIPES ARE Full of Water or Surcharged





# 2 FALSE-POSITIVE CCTV MAY INADVERTANTLY APPROVE Leaks in Plastic Pipe



# 1 NOT POSSIBLE FOR CCTV OR AI TO TELL WHETHER Laterals Are Watertight?



Watertight?

**WHY ACOUSTIC  
LISTENING DEVICES  
CAN'T 'HEAR' MOST  
UNDERGROUND  
WATER LEAKS?**

# THE TOP TEN LIST

## What Prevents 'Hearing' Leaks to Locate & Quantify Water Losses ?

Common Challenges

# 10 Household Usage



## 9 Groundwater



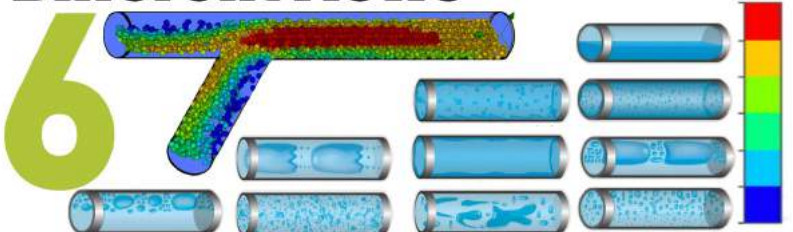
## 7 Coupling & Repairs



## 8 Pipe Size & Material



## Different Flows



# 5 Street Noise



# 4 Trenching & Bedding



# 3 Air Pockets

Air Bubbles

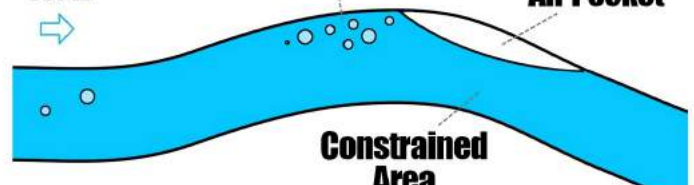
Air Pocket



Water Flow

Air Bubbles

Air Pocket



# 2 Judgment



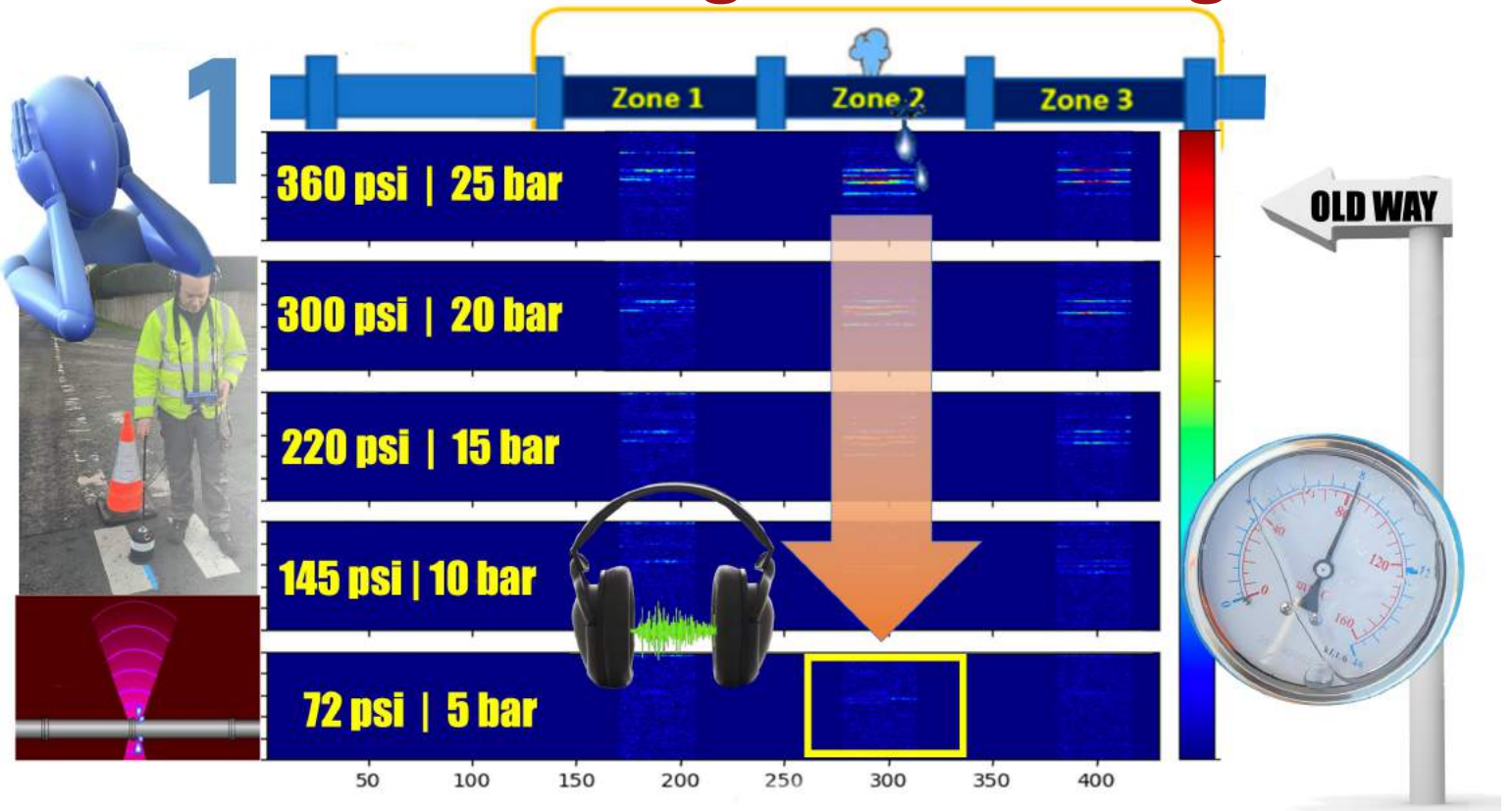
“Electro Scan Said What?”

“That Acoustic Data Loggers Miss 90-100% of All Leaks?”

“But, That’s Our Whole Buiness!”



## The Biggest Reason That Acoustic Sensors Have Trouble Finding or Measuring Leaks?



# About the Founder

Chuck Hansen

## HIGHLIGHTS

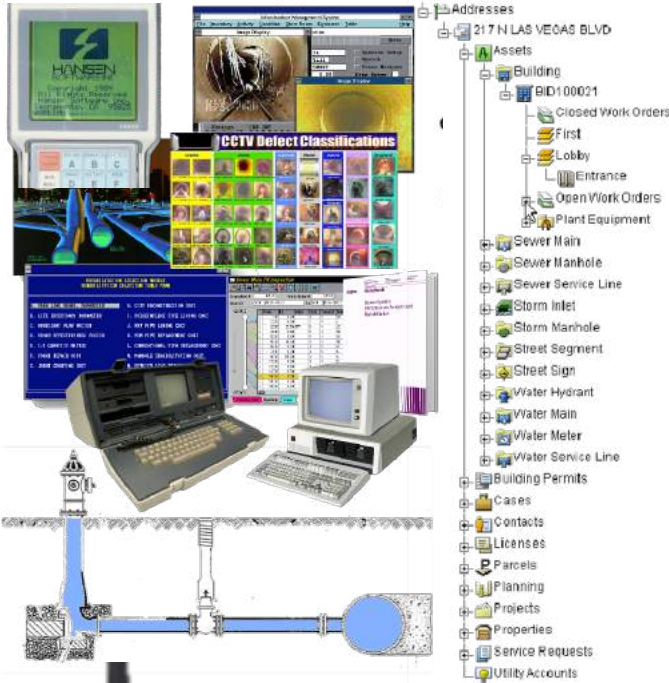


- +40 years in Water & Sewer Condition Assessment.
- Former Owner, HANSEN SOFTWARE (1980-2007).
- Multi-Patent Holder Condition Assessment Technology.
- Former Chair ASTM F36.2, Water & Sewer Inspection.
- ESG / Cleantech Private Equity Investor.
- Only Leak Detection Provider Able to Test Pipes in Pressurized & Gravity Pipelines.
- Current Member, AWWA Water Distribution Committee.



## 1980

## 2021



## Selected International Projects



## Awards

- 2021 Product of the Year Award - DELTA, E+E  
Leak Detection Solution of the Year, IoT  
Edison Award, Nominee
- 2020 GovTech 100  
UK Water Dragons, Finalist  
Sacramento, California's 'Best Start-Up'
- 2019 GovTech 100  
Fast Company World's Most Innovative Co.  
BlueTech Research, 15 Water Tech to Watch  
Red Herring, North American Top 100
- 2015 American Leadership Award
- 2014 UKSTT, Best Project Award (Severn Trent)
- 2013 North Am. Society of Trenchless Tech.  
'Most Innovative Product'  
Water Environment Federation (WEF)  
'Most Innovative Technology'  
South West Water Pure Award  
The New Economy CleanTech Award  
Sierra Nevada CleanTech Award

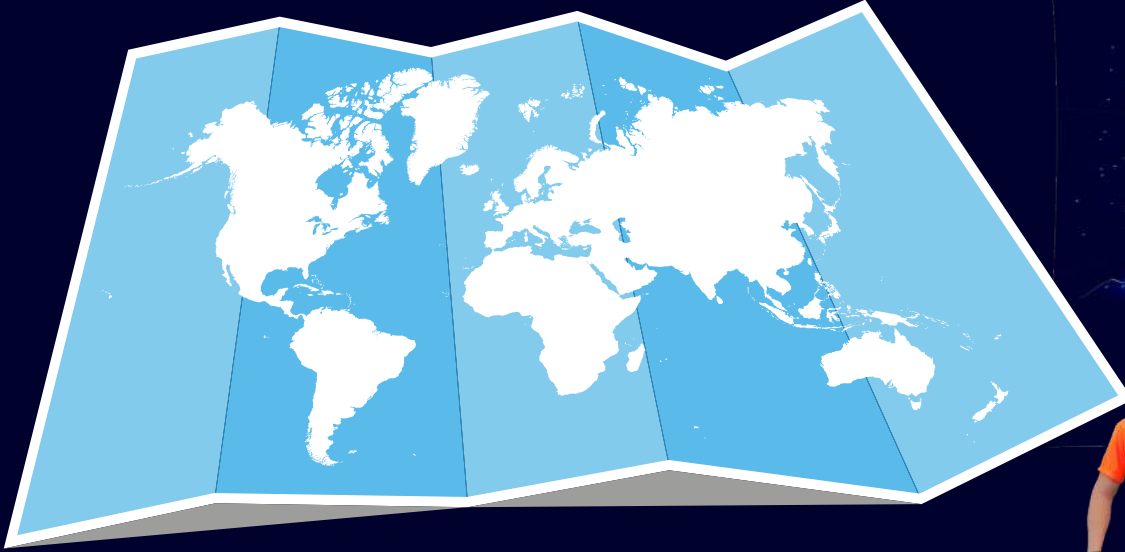
## Patents

United States	9143740	09-22-15
	9304055	04-05-16
	9933329	04-03-18
	10451515	09-19-19
	10557772	02-11-20
Canada	10816431	10-27-20
	2864503	05-05-20
European*	2874808	08-13-20
	2748576	05-19-19
Japan	13275131.4	04-15-21
	6062541	12-22-16
	6193893	08-18-17
New Zealand	6514284	04-19-19
	713053	02-02-21

### \* DESIGNATED COUNTRIES

- Austria
- Italy
- Belgium
- Liechtenstein
- Denmark
- Monaco
- France
- Netherlands
- Germany
- Spain
- Great Britain
- Switzerland
- Ireland

# Accurate, Fast, Repeatable



## SALES



## UK & EU

Contact: Brad Weston  
Director, UK Field Services  
Email: [brad@electroscan.com](mailto:brad@electroscan.com)  
Mobile: +44 7739 358611

## North America

Contact: Mike App  
VP, Business Development  
Email: [mike@electroscan.com](mailto:mike@electroscan.com)  
Mobile: +1 917 817 0090

## Asia Pacific

Contact: Chuck Hansen  
Tel: +61 08 8311 3950  
Email: [chuck@electroscan.com](mailto:chuck@electroscan.com)  
Mobile: +1 916 275 2921

**electro**scan<sup>inc.</sup>

1745 Markston Road  
Sacramento, California 95825  
Tel: +1 916 779 0660  
[info@electroscan.com](mailto:info@electroscan.com)  
[www.electroscan.com](http://www.electroscan.com)



## SERVICES



## Worldwide

Contact: Carrisa Boudwin  
VP, Marketing  
Email: [carissa@electroscan.com](mailto:carissa@electroscan.com)  
Mobile: +1 917 817 0090

