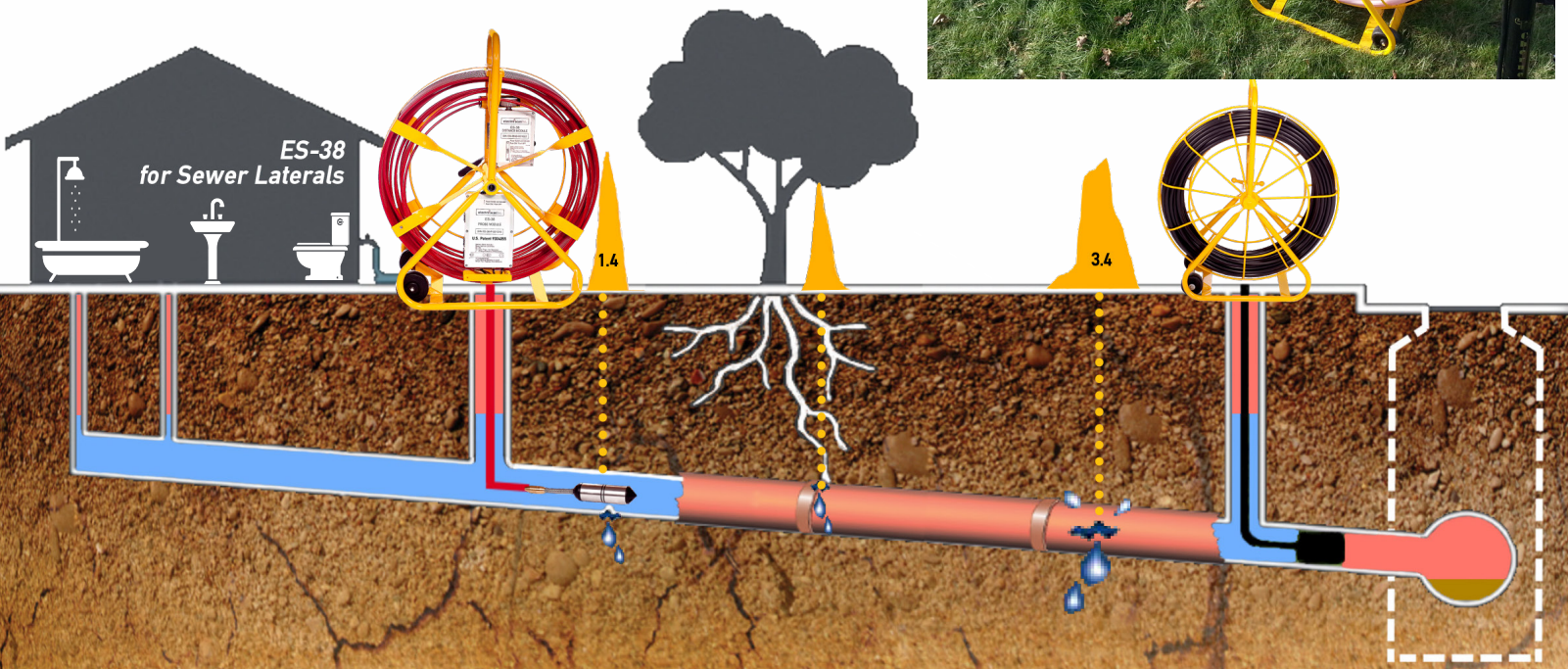
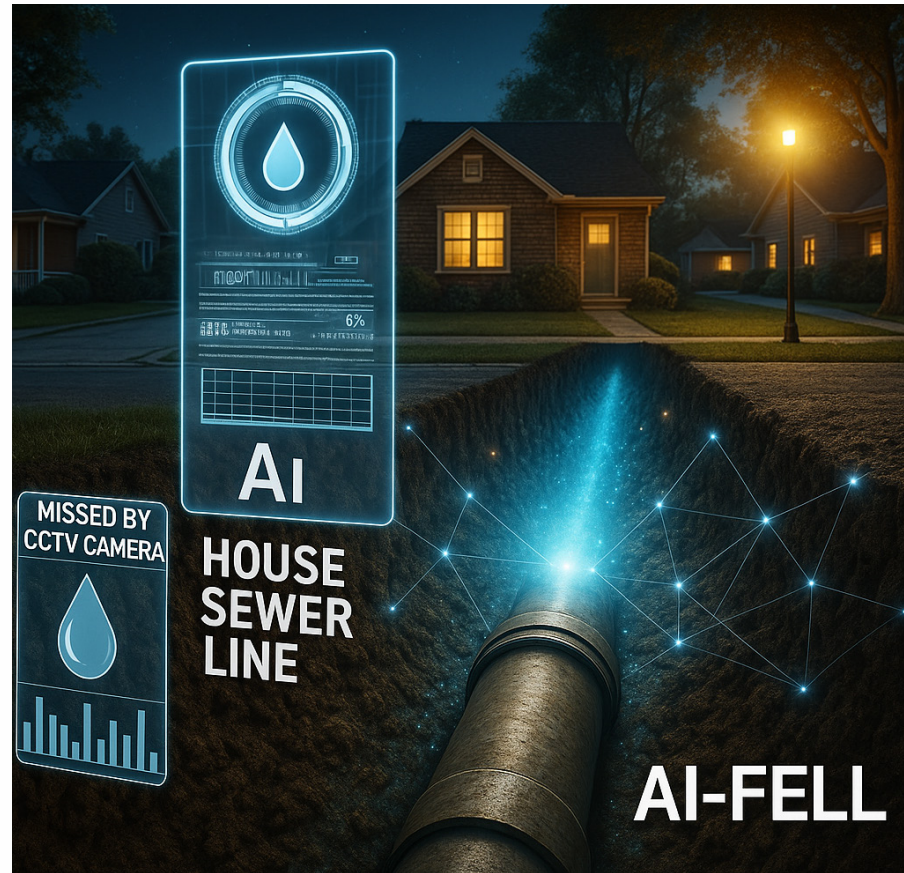


# Sewer Service Line Condition Assessment Using AI to Find Leaks Missed by CCTV

## ES-38

### AI-Based Sewer Service Line Assessment

- ES-38 is a non-acoustic, non-visual machine-intelligent solution to locate & measures multiple leaks in a single pipe.
- ES-38 utilizes a low-voltage high frequency electrical current to locate all leaks with 1cm (0.4in) locational accuracy, including defect flow in Gallons Per Minute (GPM).



## ES-38

Leader in Service Line Assessment



|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                     |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Conveyance    | Service Laterals Connecting Residential, Commercial, and Industrial Customers to Municipal Sewer Mains.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                     |
| Required Flow | None. Dry Pipe or Fully Surcharged Flow.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                     |
| Pipes         | Pipe Diameters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 3 to 8 inch (76 to 200mm)                                                                                                                                                                                                                                                                                                                           |
|               | Pipe Shape                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Any, including Circular, Box, Oval, and Trapezoidal. Able to navigate 90° bends or elbows.                                                                                                                                                                                                                                                          |
|               | Pipe Materials                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Electrically Non-Conductive Pipe Walls, including, Asbestos Cement, Brick, Cement Mortar Lined and Coated Steel, Cured-In-Place Pipe, Ductile Iron with Epoxy Coatings, Fiberglass Reinforced Pipe, High-Density Polyethylene Pipe, Prestressed Concrete Cylinder Pipe, Polyethylene, Polyvinyl Chloride, Reinforced Concrete, Vitrified Clay, etc. |
| ES-38         | Dimensions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Length: 6.5 inches (165mm); Diameter: 0.57 inches (15mm)                                                                                                                                                                                                                                                                                            |
|               | Scan Recorder                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Critical Sewers® Field Laptop PC, Wifi Connection to Critical Sewers® Cloud Application.                                                                                                                                                                                                                                                            |
|               | Scan Speed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 30 ft/minute (10m/minute)                                                                                                                                                                                                                                                                                                                           |
|               | Environmental                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | IP 67. Able to withstand rain and low pressure wash down. 20°F to 120°F (-7°C to 50°C)                                                                                                                                                                                                                                                              |
|               | Power Supply                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 14ea 3.7V Rechargeable Lithium-Ion Batteries -or- 12V DC External Power Supply.                                                                                                                                                                                                                                                                     |
|               | Cable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1/4 inches (6.5mm) fiberglass push rod. 200 ft (60m) range from single point of access.                                                                                                                                                                                                                                                             |
|               | Reel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Diameter 26 inches, L26 inches, W12 inches, H32 inches (L66cm, W30cm, H81cm)                                                                                                                                                                                                                                                                        |
|               | Weight                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 39 lb (17.7kg)                                                                                                                                                                                                                                                                                                                                      |
|               | Current (max)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 40 mA                                                                                                                                                                                                                                                                                                                                               |
|               | Electrical Array                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Focused tri-electrode array.                                                                                                                                                                                                                                                                                                                        |
|               | Defect Flow Calculation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ± 30% Accuracy measured in Gallons Per Minute (GPM) or Liters Per Second (LPS).                                                                                                                                                                                                                                                                     |
|               | Defect Location                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ± 0.4 inches (1 cm)                                                                                                                                                                                                                                                                                                                                 |
| Air Push Rod  | Manual pump air source, 25 psi. Tire valve compatible with standard test balls.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                     |
| Advantages    | <ol style="list-style-type: none"> <li>1. No manual coding required.</li> <li>2. Finds 90-100% of leaks missed by CCTV.</li> <li>3. Locates and measures leaks in GPM or LPS.</li> <li>4. Tracks pre- and post-rehabilitation I/I reduction.</li> <li>5. Use in field either rain or shine.</li> <li>6. Replaces Smoke Testing, Soaker and Dye Testing.</li> <li>7. Finds defects inside joints not seen by CCTV.</li> <li>8. Differentiates superficial cracks from cracks through pipe.</li> <li>9. Find &amp; measure defects hidden by grease, silt, &amp; encrustation.</li> <li>10. Automatically evaluates 360° of pipe wall.</li> <li>11. Determines water tightness of service laterals.</li> <li>12. Fewer breakdowns. No moving parts.</li> <li>13. Recommended by WRC, developers of NASSCO CCTV Codes.</li> <li>14. Reports available in minutes, not hours, days, or weeks.</li> </ol> |                                                                                                                                                                                                                                                                                                                                                     |
| Limitations   | <ol style="list-style-type: none"> <li>1. Does not provide a clock position of defect location inside the pipe, but location is accurate to within 0.4 inches (1cm).</li> <li>2. Does not scan metallic pipes or fittings, unless there is a coating or liner (minimum of 1-2mm).</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                     |