Advanced Condition Assessment

For better Decision Making

SewerVUE IN-PIPE GPR

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Outline

- About the company
- Pipe Penetrating Radar
- SewerVUE Surveyor
- MPIS Float
- Case Study
- Economic Arguments

SewerVUE Track Record

Core Competency

- Technology development company
- Performs inspections to prove its technologies and train service providers

Corporate Background

- Founded as Terraprobe Geoscience 2001
- SewerVUE Technology incorporated in 2009
- Over 50 years industry and PPR/GPR experience

Customers and Partners

- Over 300 clients in the USA and Canada
- Over 100,000 ft inspected with PPR

SewerVUE Solutions

Deploy 4 sensors:

1. PPR
2. LiDAR
3. Sonar
4. CCTV

3 different ways:

1. Manned entry
2. Tracked ROV
3. Float

What's the most commonly used pipe inspection technology today?

CCTV

- Visual only
- Qualitative
- Operator dependent
- Often unreliable, especially in large diameter trunks and interceptors

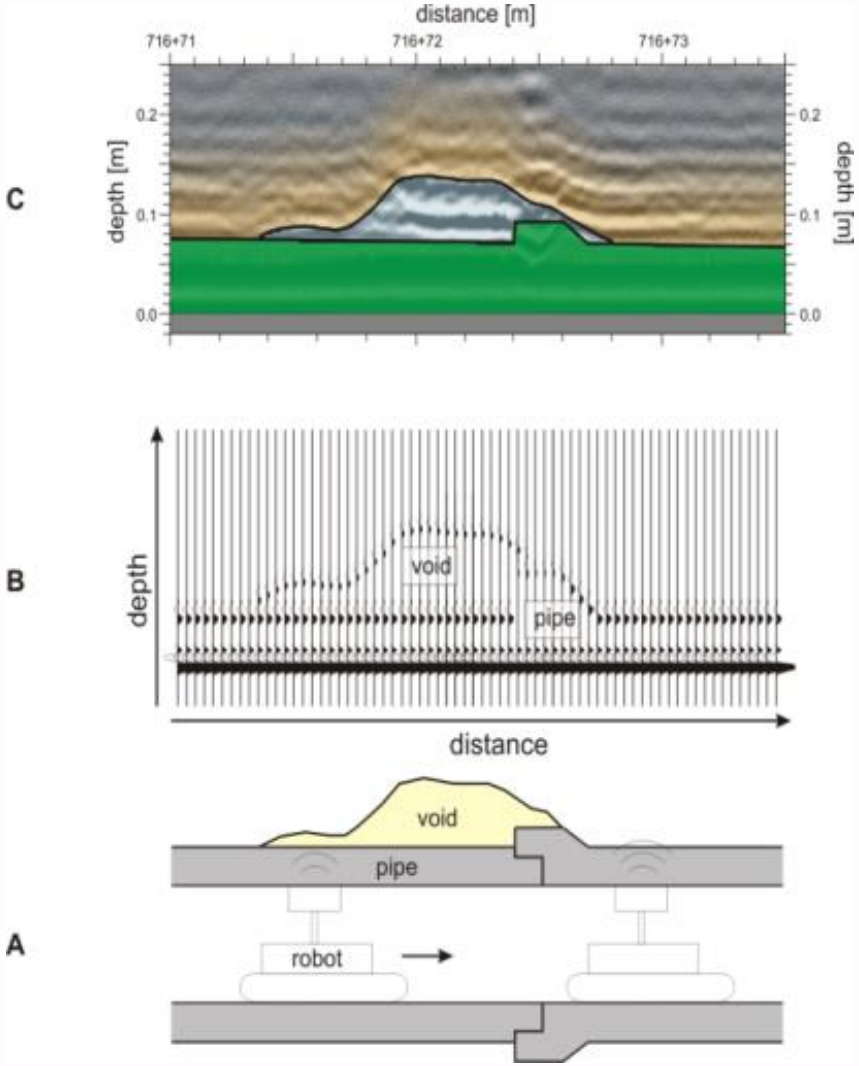
Is there a technology to see through the pipes and detect voids before they become sinkholes….

… and front page news?

There's Superman!

Pipe Penetrating Radar (PPR)

PPR Principle



- Ideal for gravity sewer and water pipes.
- Uses high frequency EM wave
- Reflected energy recorded for subsequent analysis.
- Antennas make direct contact with pipe wall.

PPR Deployment

Manned Entry

Used for:

- Large diameter water pipes
- Where manned entry is safe

4th Generation Surveyor

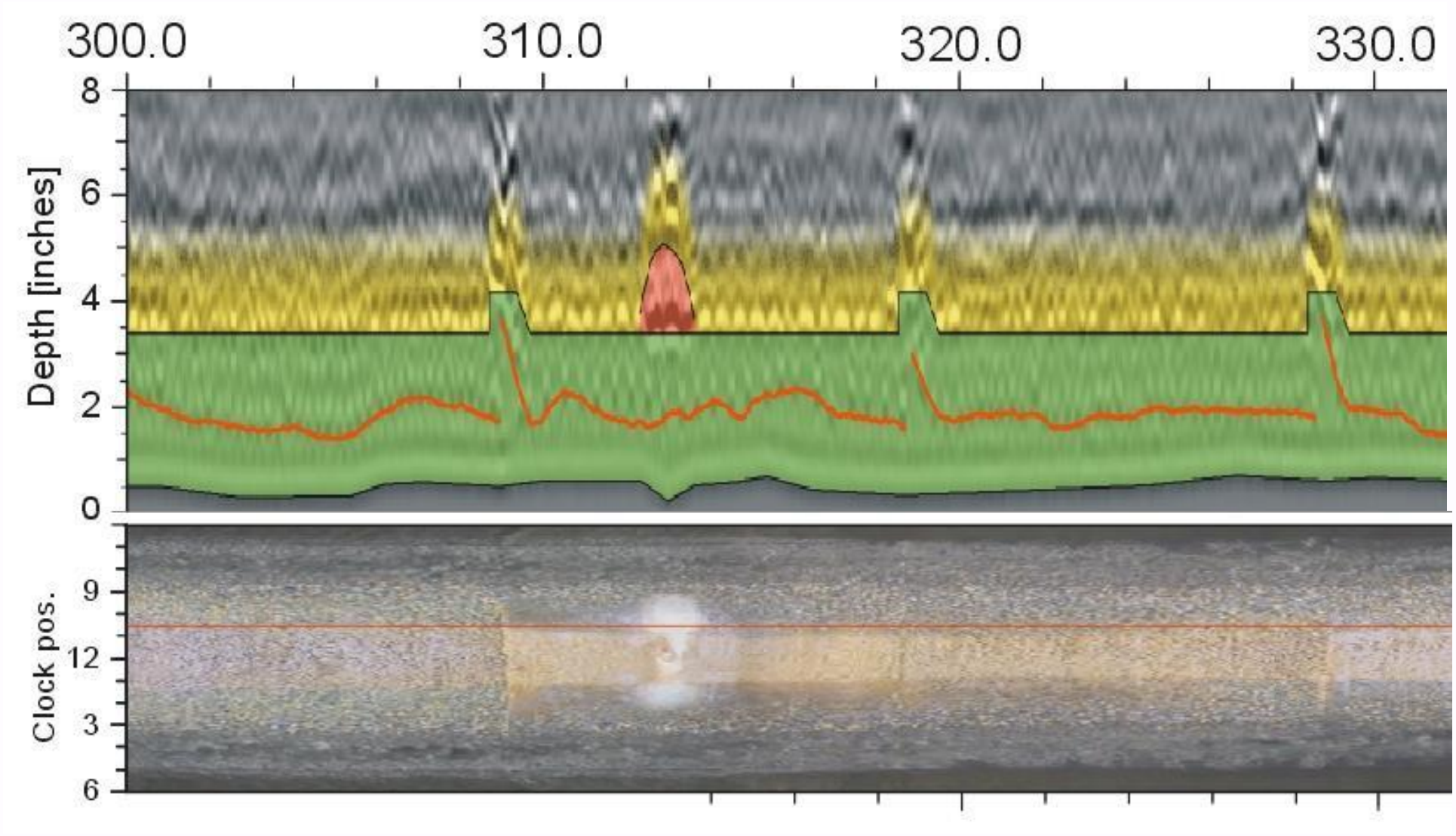
Capabilities

- “Swiss army knife”
- 21-60 inch, (520-1500 mm)
- 6000 ft deployment capability
- 30 ft/min inspection speed

Specifications

- High frequency PPR antennae
- 3D LIDAR scanner
- HD CCTV (pan, tilt, zoom)
- Accurate x,y,z coordinates


SewerVue
IN-PIPE GPR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320.0
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Depth [inches]
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Clock pos.
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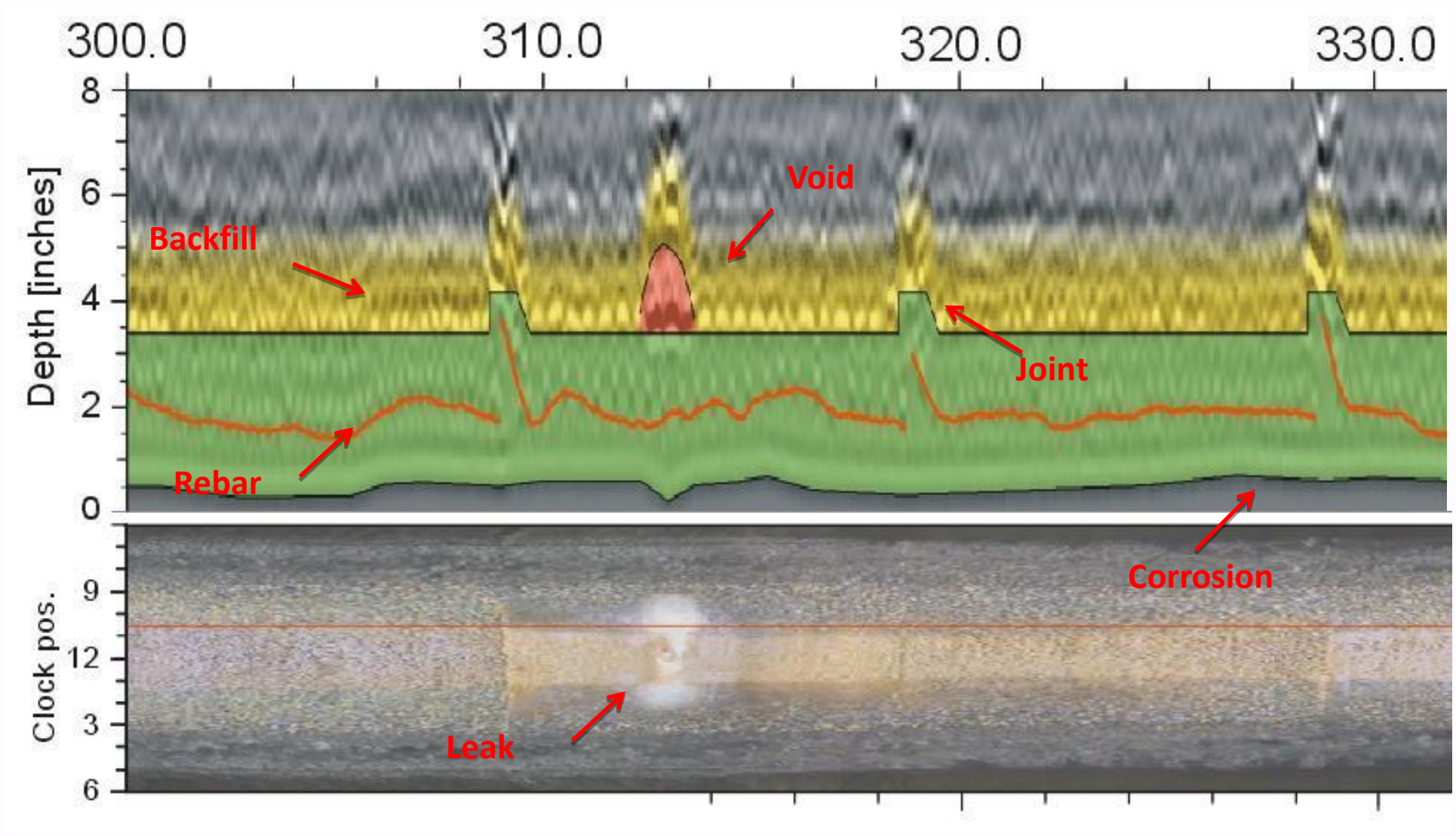
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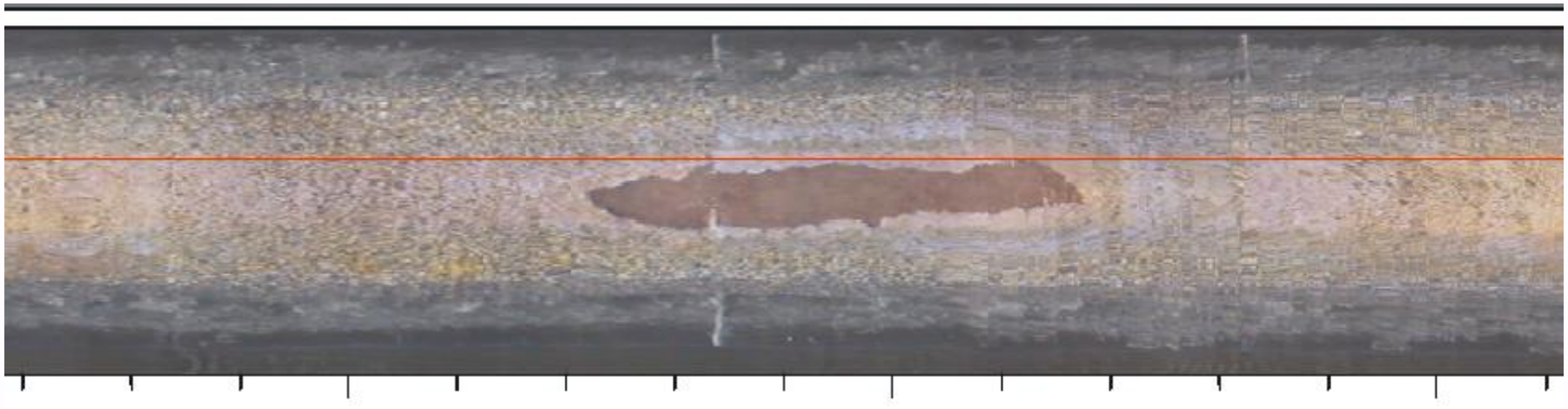
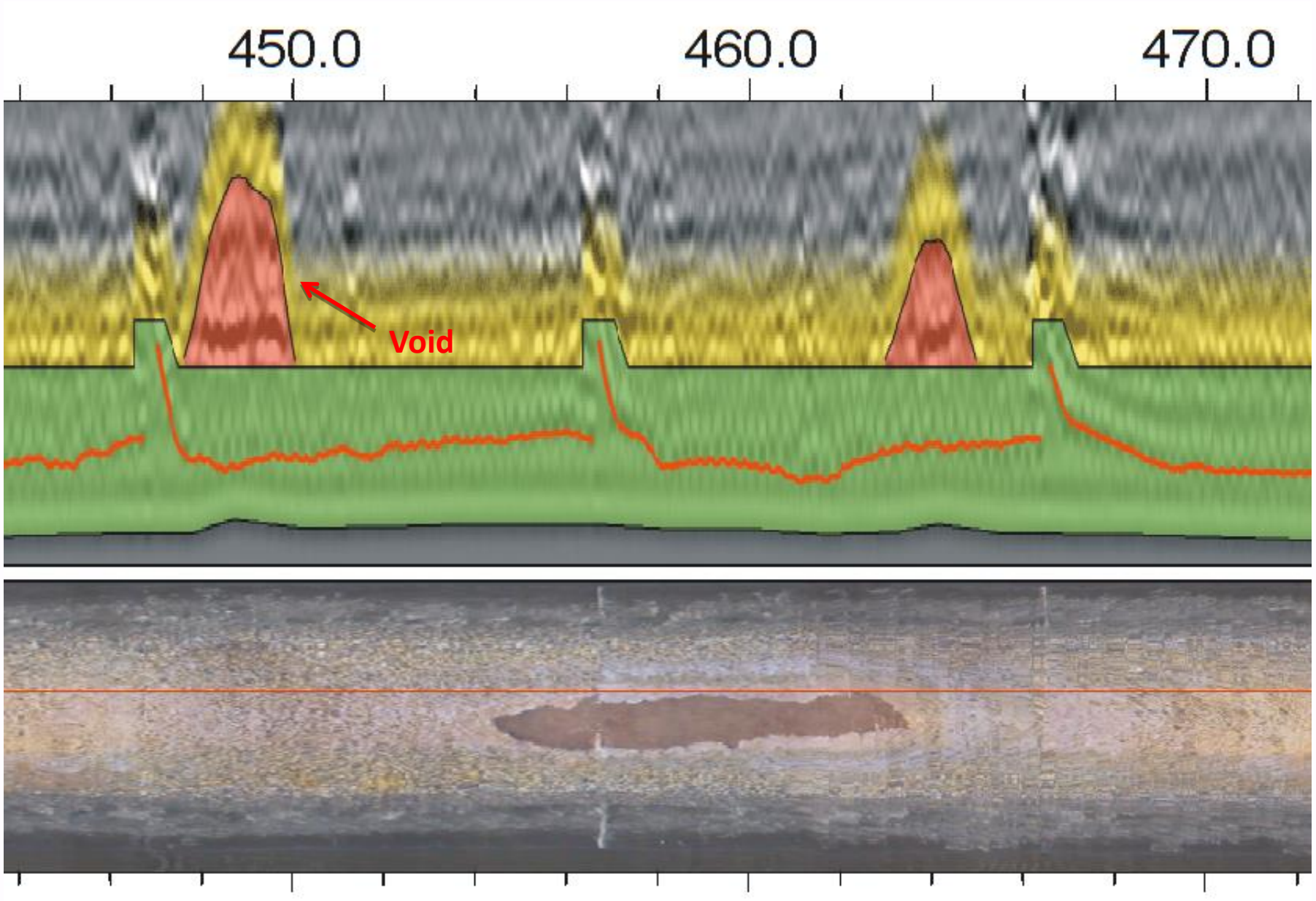
Leak

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Void

MPIS Float

Tethered ROV

CCTV

- HD Pan, Tilt, Zoom

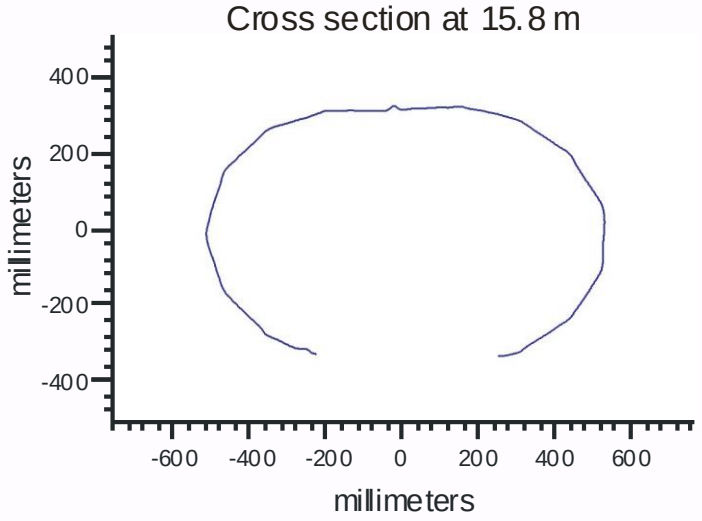
LiDAR

- Point cloud, sub-mm profiling.

Sonar

- Sediment volume, below flow profiling.

Capabilities of MPIS Float



- Measure 90yr old wood stave pipe
- Must precisely measure pipe for CIPP linier

Technology Comparison / Evolution

CCTV

- Visual Only
- No info from pipe wall or outside pipe

CCTV
Sonar
LiDAR

- Quantitative
- Sediment volumes
- Corrosion
- Visual
- Limited value in lined pipes

CCTV
Sonar
LiDAR
PPR

- Visual +
- Inner pipe diameter +
- Pipe wall thickness, voids outside the pipe, sees thru liner
- Complete solution for non-metallic pipes

A Case Study:

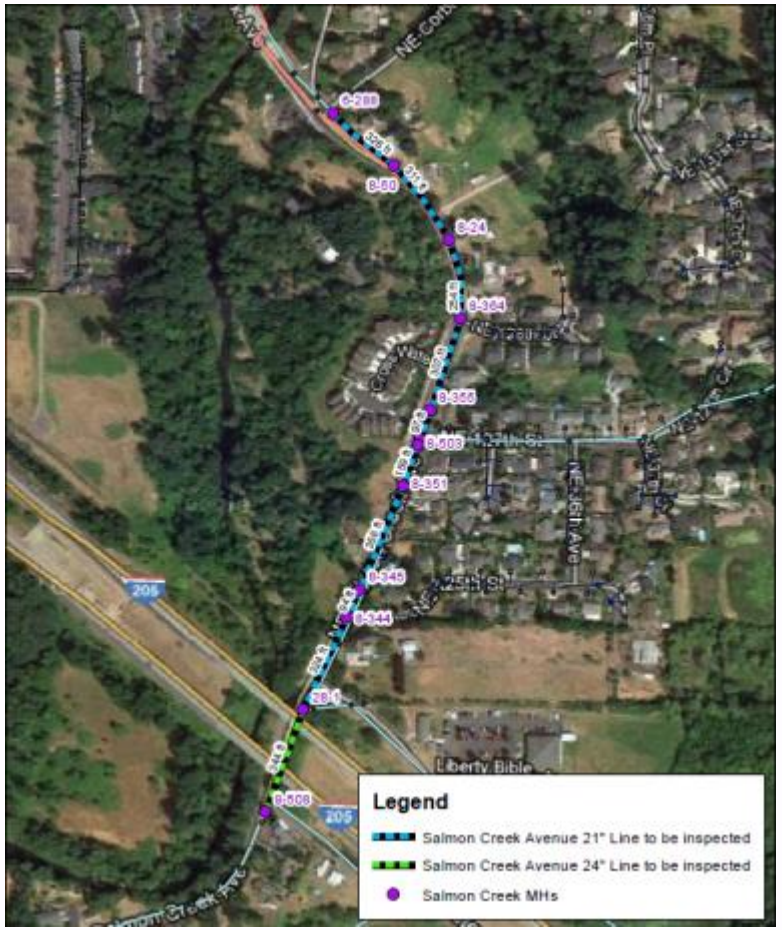
The Salmon Creek and St John's Creek Interceptors, Vancouver, WA

PPR & CCTV Condition Assessment

About the CRWD

- Equivalent Residential Units (ERU) – 35,000+
- Collection System – 500+ miles gravity and pressure pipe

Salmon Creek Interceptor & St John Trunk



Lines:

- 21, 24 inch and 36 inch
- RCP line

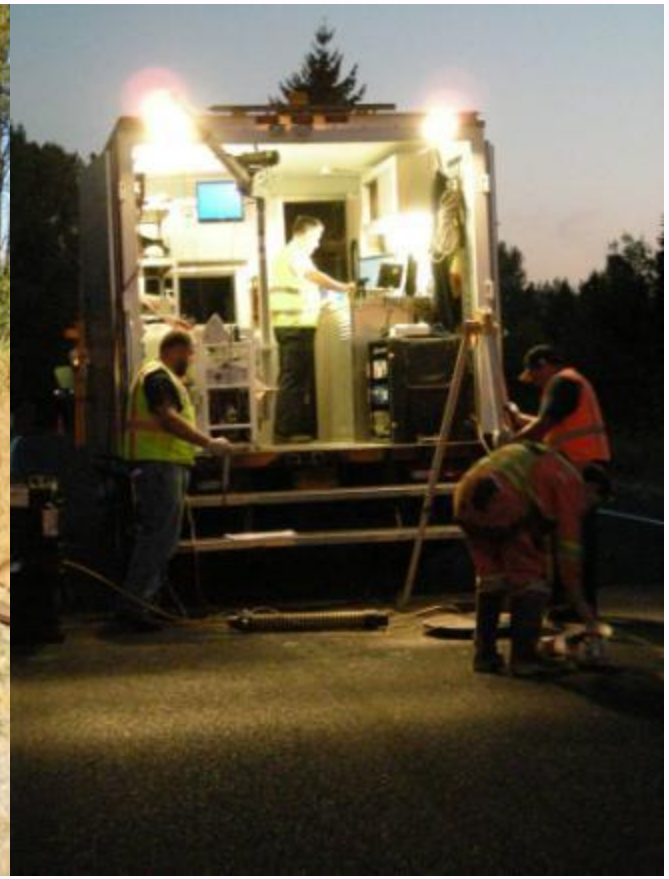
Issues:

- Corrosion and deteriorated inner cement layer (H2S)
- Structural integrity

Task:

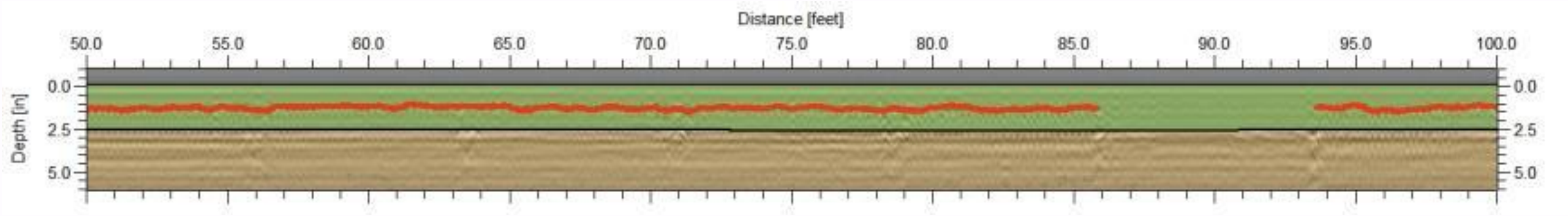
- Quantitative determination of corrosion
- Timing of rehabilitation and/or replacement
- Inspected length:
- -2200 ft (21 in), 1600 ft (36 in)

Some good days… and a long night

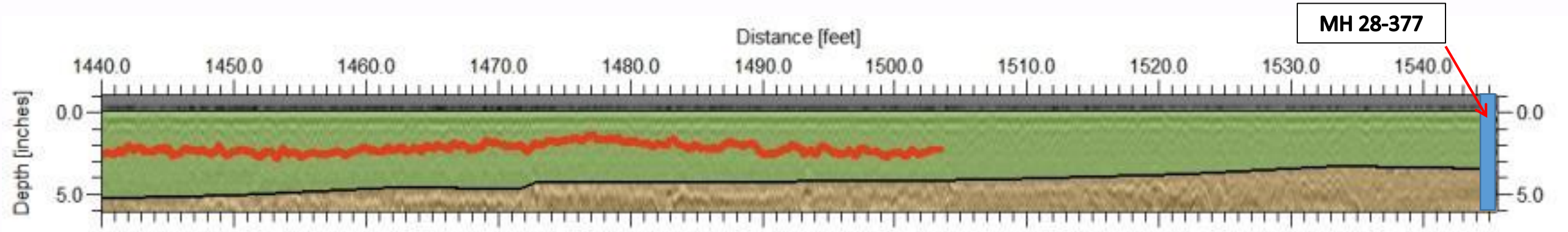


Didn’t look too good for CRWD, at first…

Results



Pipe segment with no rebar between 86 – 93.5 ft



Significant pipe loss and corroded rebar at MH 28-377

Summary

- PPR fully quantified the extent of the corrosion damage.
- Found missing rebar in upstream 75 ft - a concern for railroad loading.
- PPR and visual CCTV provided the necessary condition information to make intelligent lining decisions.

What did they learn?

- “Age of pipe is about the worst criteria to use in judging condition or assumed condition of sewer.” - Robin Krause
- They can save $1.21mm in rehabilitation costs. (1475’ of lining at $900/ft)
- It’s possible to collect and present objective data to the Commissioners and Management.

A “no-cut” and dry case for rehabilitation.

How much does it cost?

Price ranges based on public bid information (30” and up):

- CCTV 2 to 8 $/ft
- Multi-Sensor 5 to 9 $/ft
- Relining (CIPP) 200 to 900 $/ft
- Replacement 400 to 2500 $/ft
- PPR 8 to 12 $/ft

Advanced condition assessment technology is only incrementally more expensive than traditional CCTV.

Sign me up! – next steps:

- Point us at your large diameter problem pipes.
- Include Multi-Sensor Inspection and PPR into your long range asset management program.
- Help us gain access to early technology adopters.

Thank you!

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Depth Verification