Unique Methods to Rehab Both Ends of the Spectrum

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LMK® TECHNOLOGIES

Discussion Points

- Mainline CIPP and Gasket Sealing
- Main-to-Lateral Technologies

Leaking and Deteriorating Mainline Pipes

Mainline CIPP Only

Water-Tight Solution Required

Why isn't CIPP Water-Tight?

- We can not adequately prepare the mainline pipe for bonding
- Resins do not bond to the mainline pipe
- All resins shrink
- There is always an annular space between the host pipe and CIPP lining

The system needs gaskets just like;

- New Pipe
- Water Hoses
- Valves

Water-Tight Solution Required

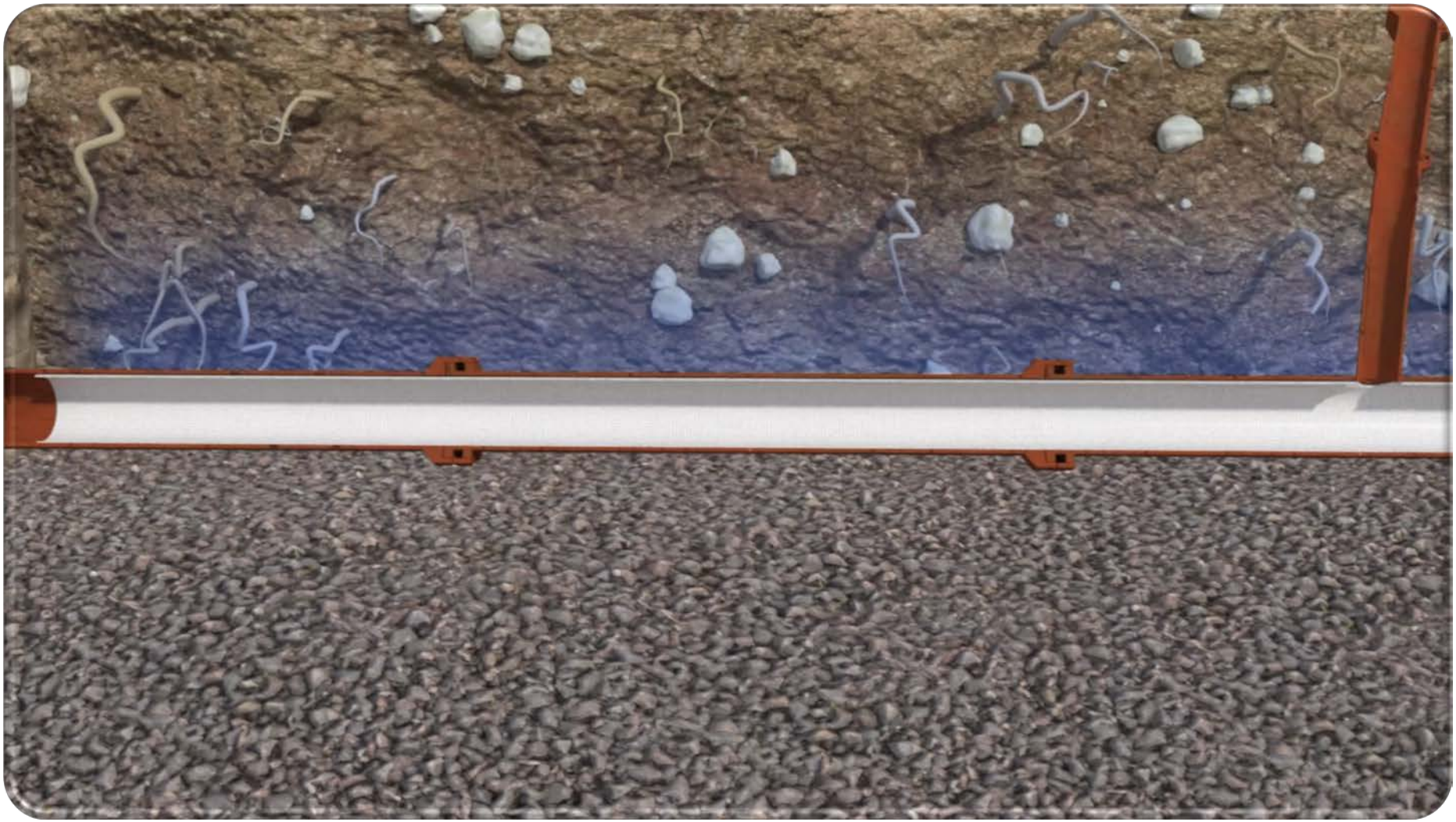
Must:

- Be installed between lining and host pipe
- Swell with water
- Withstand hydration and dehydration cycles

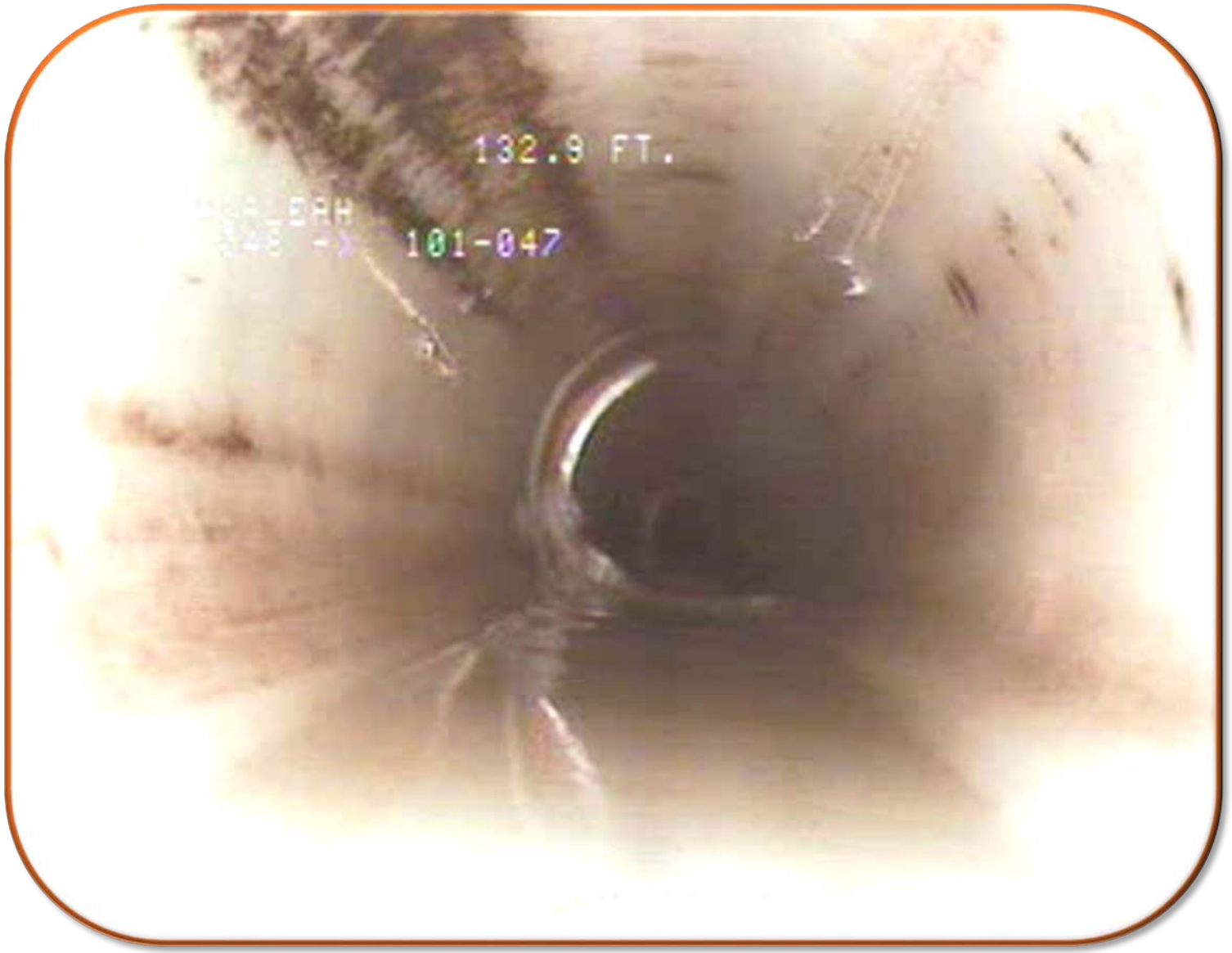
Solution:

- Hydrophilic Molded Gaskets
- End Seal Sleeve installed in mainline CIPP

Mainline CIPP and Molded End Seal Gaskets

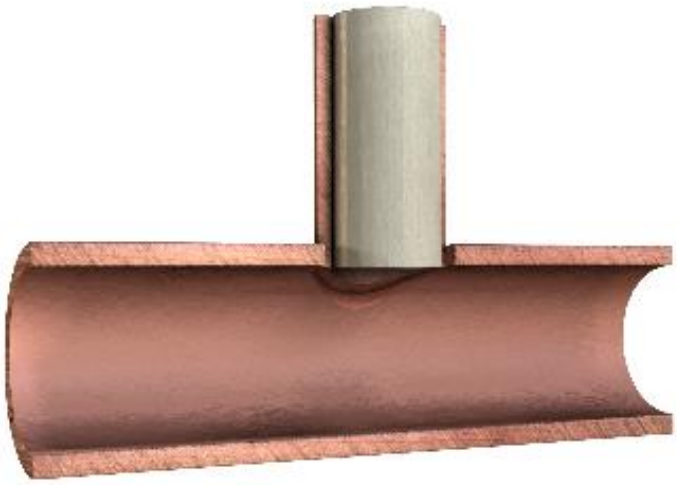


Rehabilitated Mainline

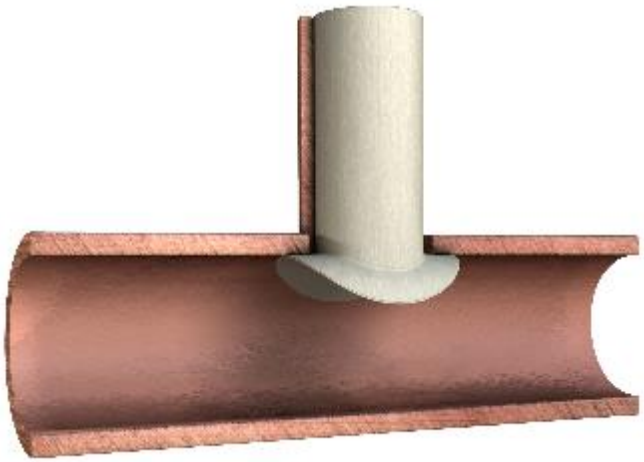


Lateral Lining Technologies

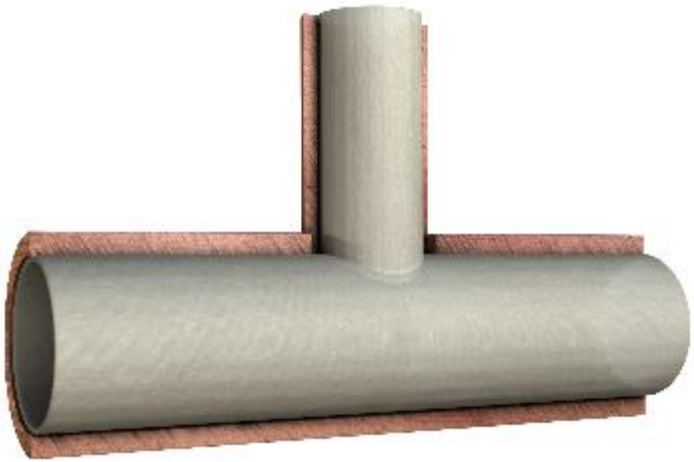
Lateral Lining Without Gaskets



1st Generation
No connection seal



2nd Generation
"Brim Style or Top Hat"

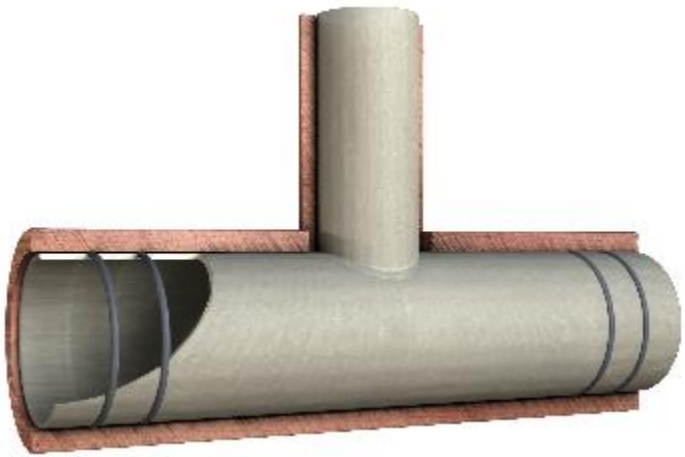


3rd Generation
Full wrap, Hydrophilic Caulk

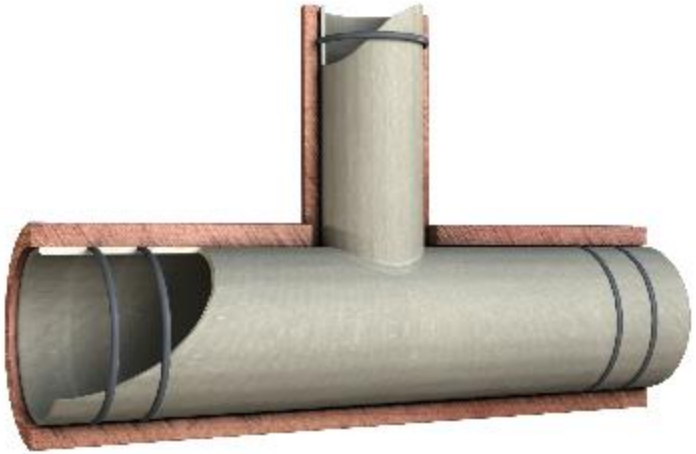
Hydrostatic Pressure Test
Silicate Resin and No Gaskets

3rd Generation, No Gaskets, 100% Solids, Minimal Shrinking Resin

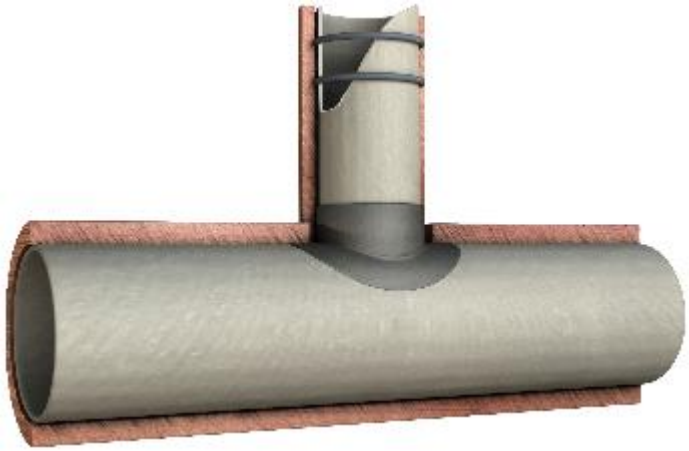
Lateral Lining With Gaskets



4th Generation
Full wrap,
sealed in main



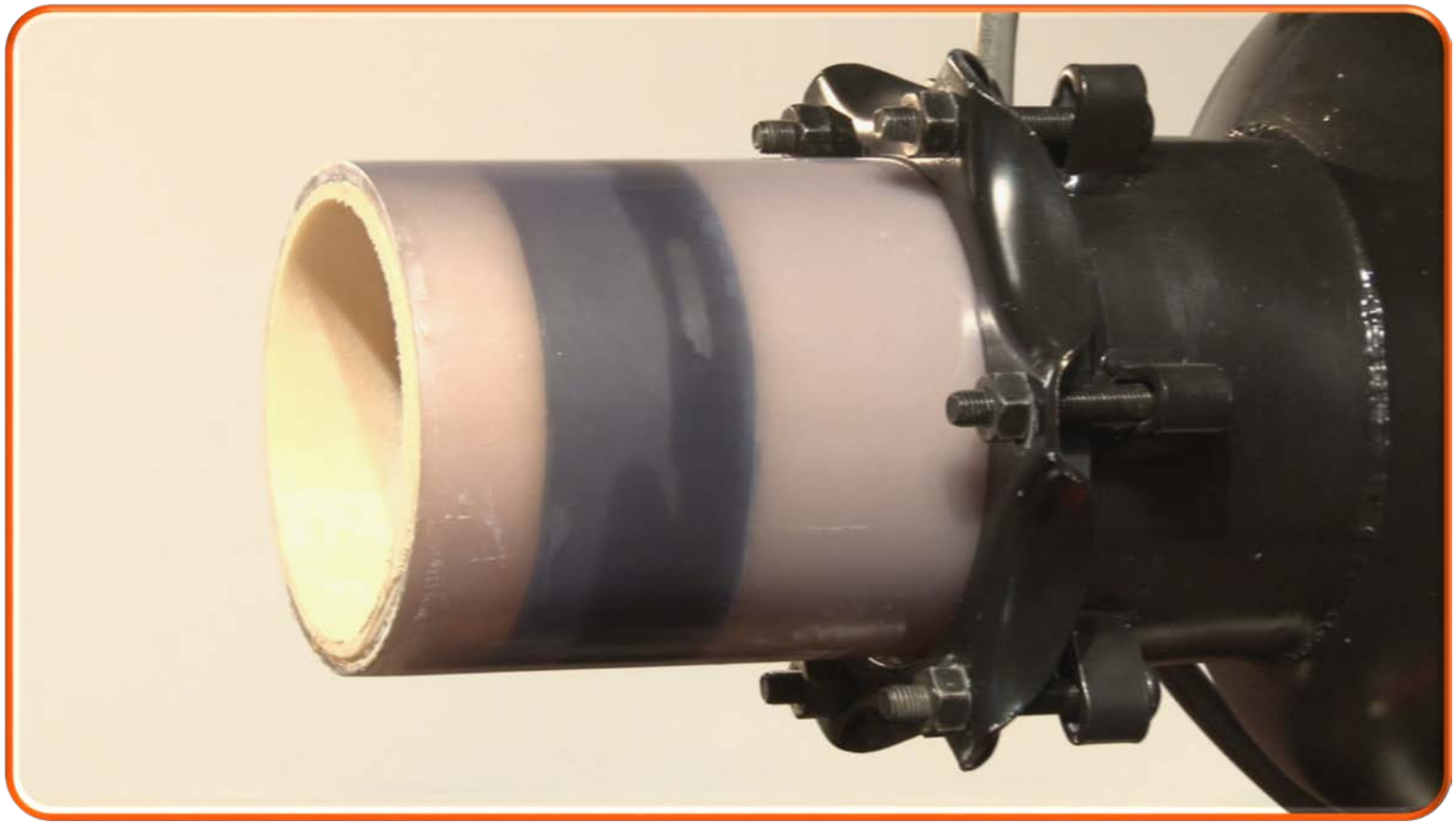
5th Generation
Full wrap, sealed
in main and
lateral



6th Generation
enhanced seal
using “Hydro
Hat”

ASTM F2561 Compliant

Hydrostatic Pressure Test
Polyester Resin and Molded Gaskets



How Much of the Lateral Can You Renew?

6 inches into the Lateral

18 inches up the Lateral

15 feet up the Lateral or Greater

ASTM F2561 Compliant Post-Video

Collection System After Mainline and Main to Lateral Rehabilitation

Installation and Post Installation Video performed by Musson Bros., Inc., Brookfield, WI

Other Ends of the Spectrum

Best Practice: Access Outside Cleanout

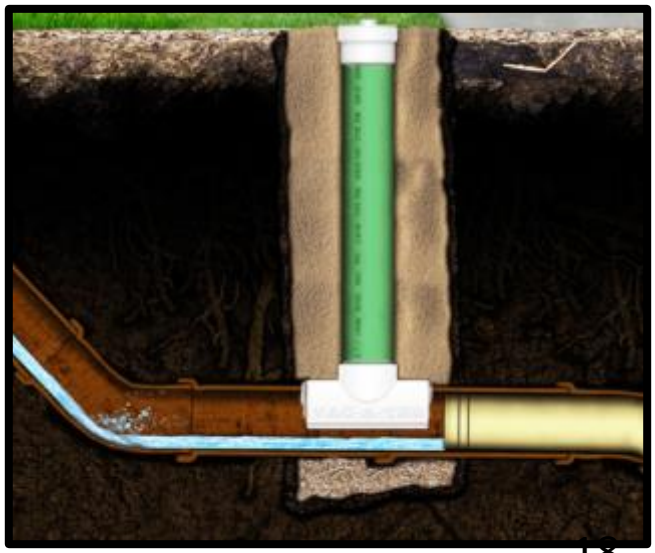
Laterals Needing CIPP Longer than 15 feet
Best Practice: Need a Cleanout

Benefits of a Cleanout:

- Optimizes cleaning and CCTV
- Better visibility during installation
- Mitigates resin slugs
- Prevent homeowner from flushing during lining
- Access for future need

Solution: ASTM F3097 Cleanout Compliant System

- Installed through a 20 inch diameter bore hole
- Minimal excavation and restoration
- Access upstream and downstream
- All work can be performed without entering the home



No Outside Cleanout

Concerns:

- Cleaning & CCTV
- Visibility is reduced during installation
- Potential for resin slugs
- Cannot prevent homeowner from flushing during installation

Solution: ASTM F2561 No Cleanout Installation Method

- Installed with a camera in main
- Up to 15 Feet of Lateral
- Cured (Steam or Ambient)
  - *Best Practice:*
    - *Never Exhaust Steam through House*
- Molded & Seamless gasket sealing system

Diameter Mains over 24 Inches

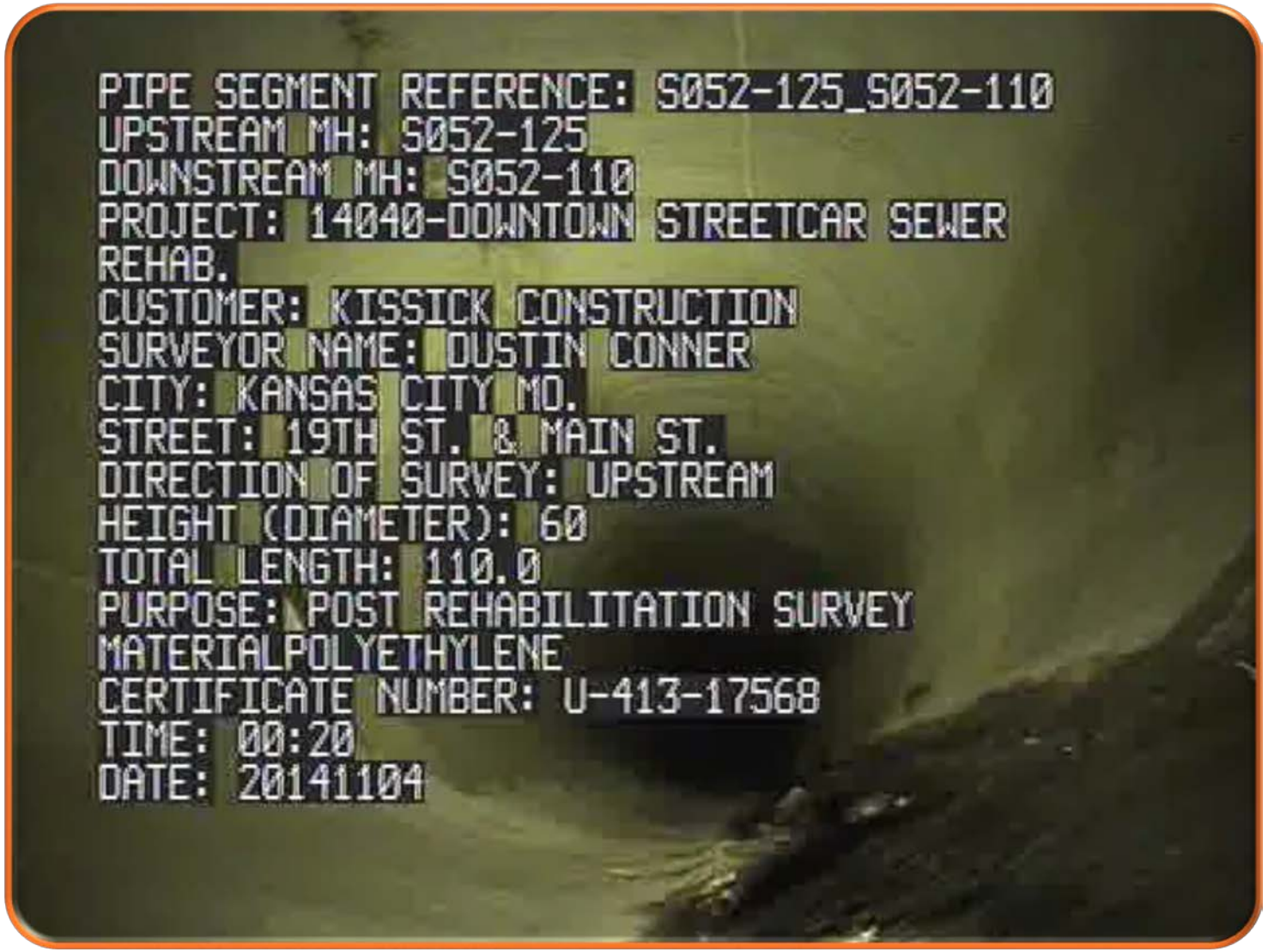
Concerns:

- Installation equipment too big for manhole
- Liner weight to heavy for successful installation
- Very difficult to line up lateral
- Large diameter lateral connections were just left unrehabilitated

Solution: Man Entry Connection Liner

- 27 inch and larger
- Mechanically fastened to liner and host pipe
- Hydrophilic gasket seals

60 in Main Diameter x 8 in Lateral Diameter Installed by Kissick Construction



Shared Service Laterals

Concerns:

- Very difficult
- Requires excavation
- Typically 2-3 linings to fully rehabilitate

Solution: Install from Main with One Installation

- Takes high quality trained crew
- Accurate measurements are critical
- Outside cleanouts are a must

Post CCTV of Shared Service Laterals

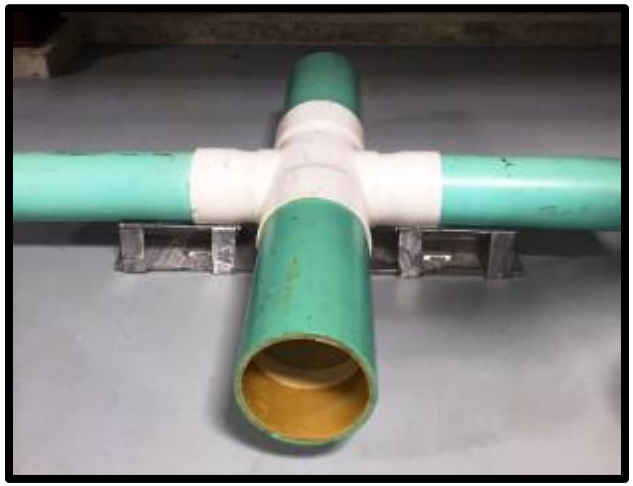
Opposing Laterals

Concerns:

- Normally requires a three step process
- Line the first connection
- Reinstate the opposing lateral
- Line the second connection

Solution: Multi-Lateral Lining System

- Section of main
- Both laterals to 8 feet long
- Achieved with one installation



Spot Repair Near Lateral

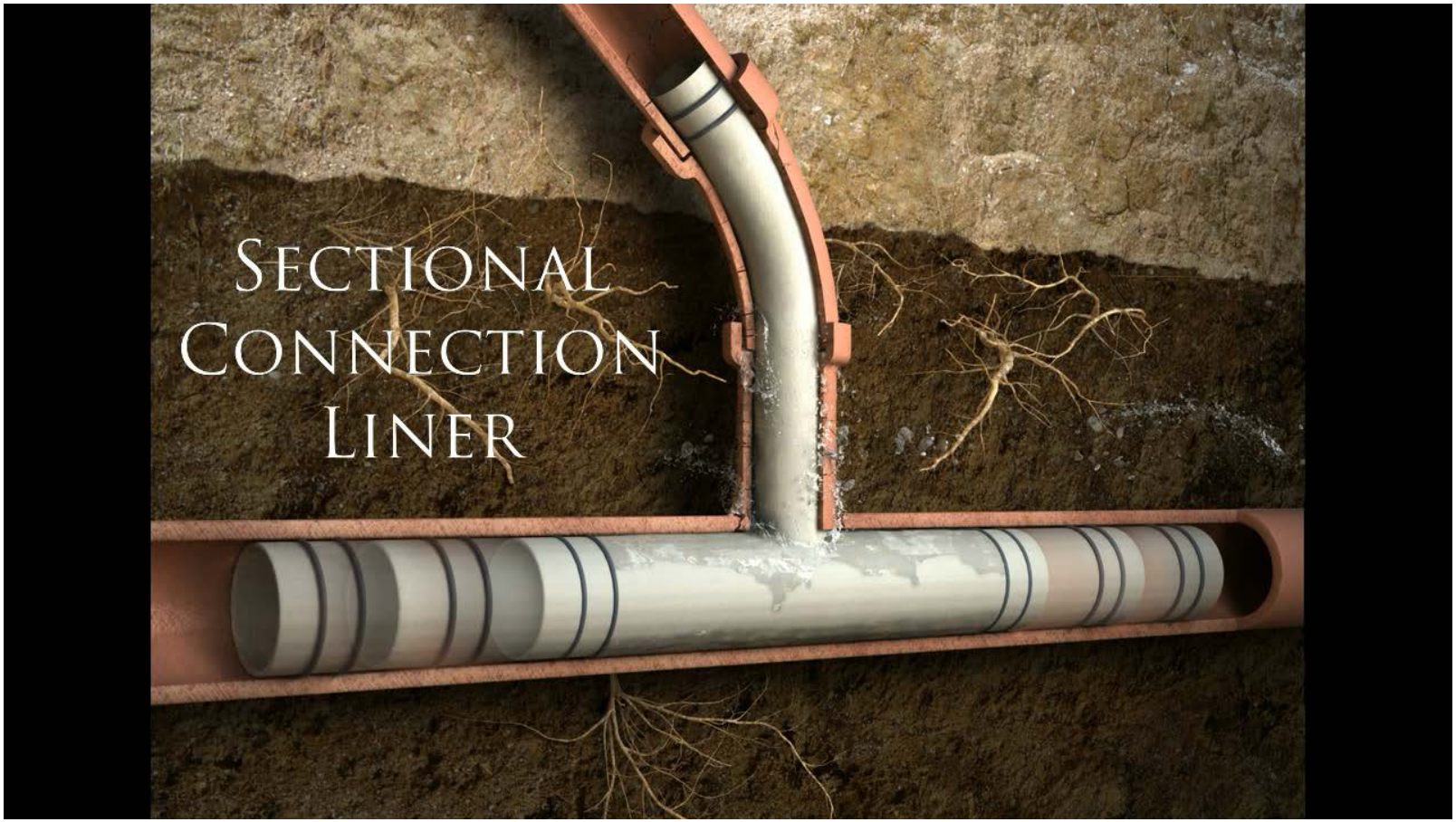
Concerns:

- 2 step lining process
  - Mainline spot repair
  - Lateral lining
- Reinstatement of service lateral required
- Leaky connection

Solution: Sectional Connection- Achieved with One Installation

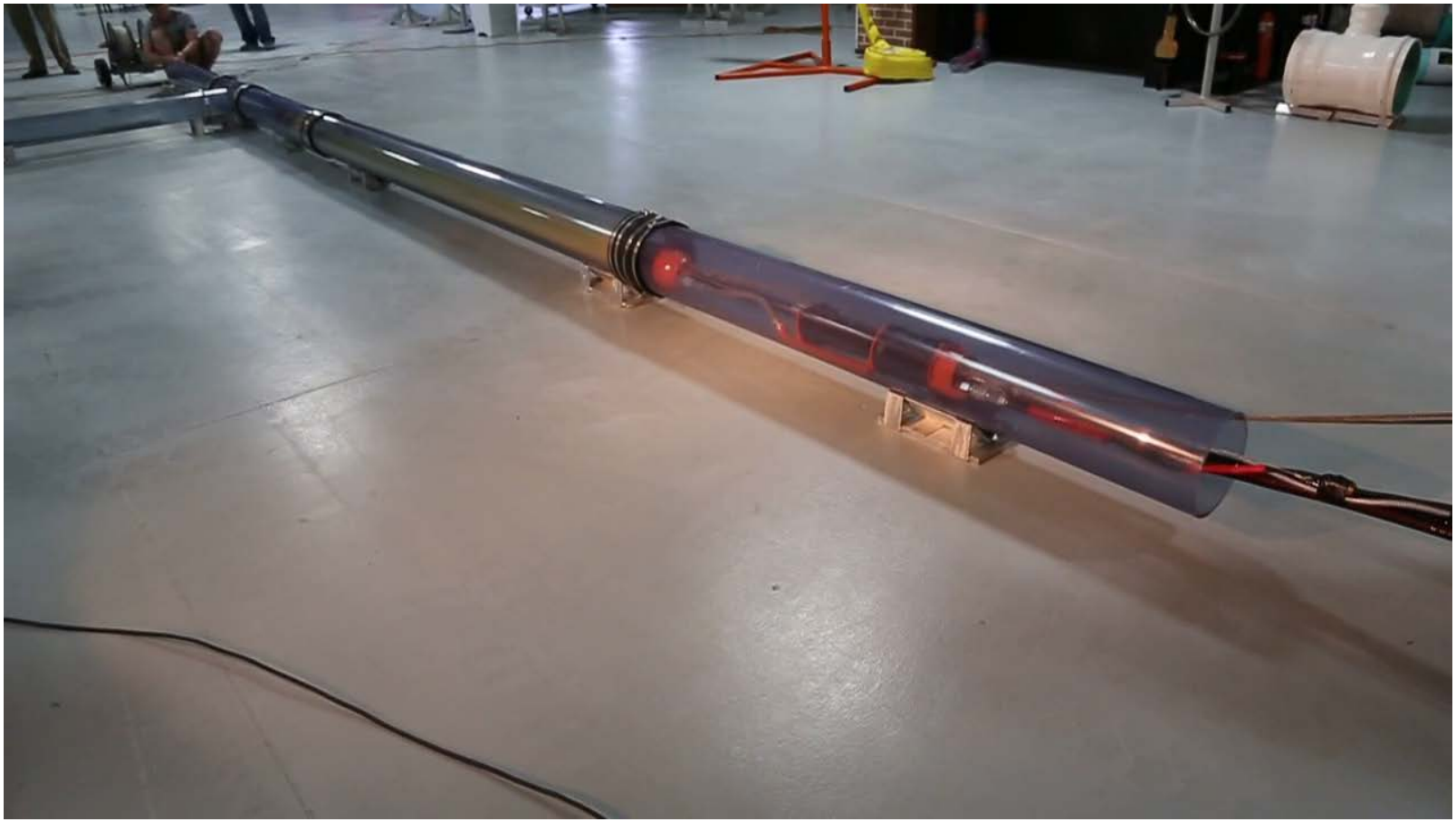
- No service reinstatement necessary
- 2-10 feet section of main
- Line lateral to 8 foot long
- Hydrophilic O-rings at every terminating end

Step #1 of Sectional Connection Installation
Preparing Launcher

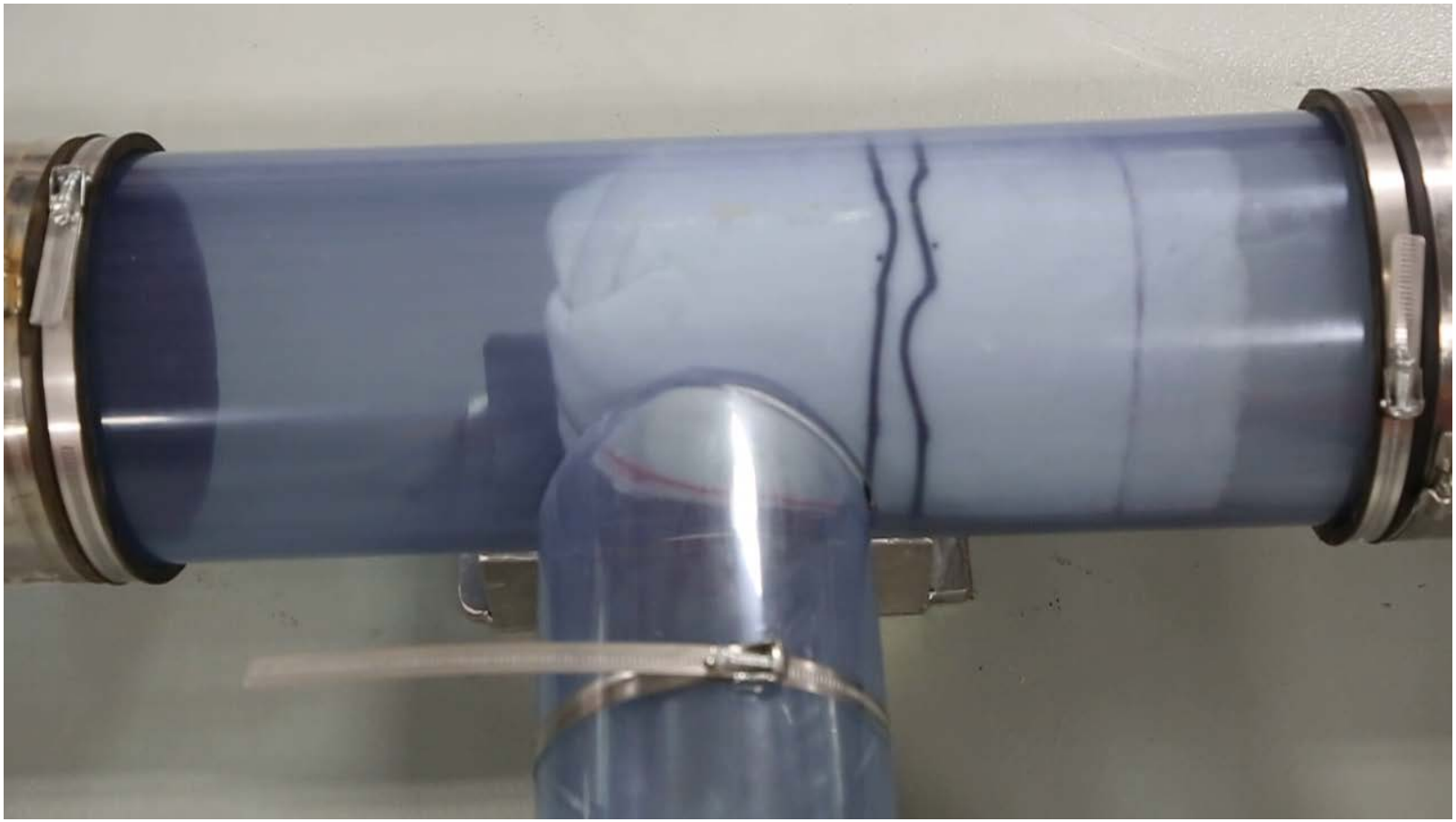


Step #2 of Sectional Connection Installation Pulling Equipment to Point of Repare

Step #3 of Sectional Connection Installation
Mainline Inversion and Positioning



Step #4 of Sectional Connection Installation
Lateral and Main Simultaneous Inversion



Thank You for This Opportunity
Q&A