THE TOTAL SOURCE

educational sessions

Service Lateral Rehabilitation

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Introduction

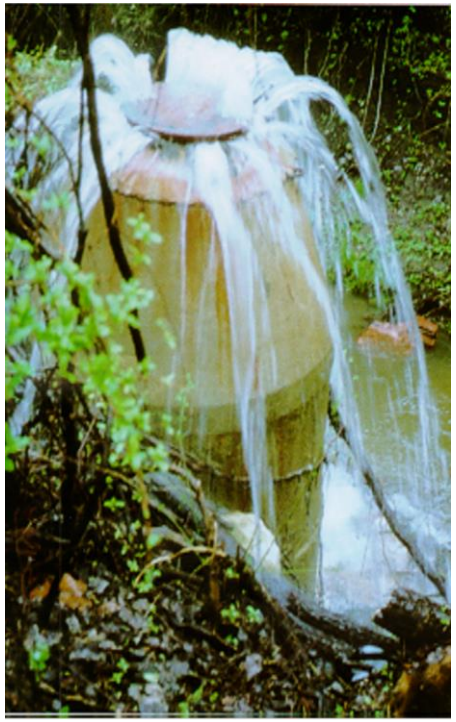
- Intent, to provide information on:
  - Lateral rehabilitation
  - Sealing options
- Studies have shown that 40% to 70% of I/I come from laterals
- Studies have confirmed that many lateral pipes have reached their life expectancy and are failing

Outline

Provide information on:

- Main Line Rehabilitation…Not the Entire Solution
- Understanding the Problem(s)
- Inflow and Infiltration (I/I) from Laterals
- History of Lateral Rehabilitation
- Private Lateral Dilemma
- Product/Process Options

Inflow/Infiltration



Corrective Actions

Main Line Rehabilitation is Not Enough

"Jefferson County (Birmingham, AL) has rehabilitated more than 3 million LF of main line sewers and SSO's still occur at an unacceptable rate. We've discovered that we must address the laterals"

- *Daniel White, PE – Deputy Director (Sewer), Jefferson County, AL*

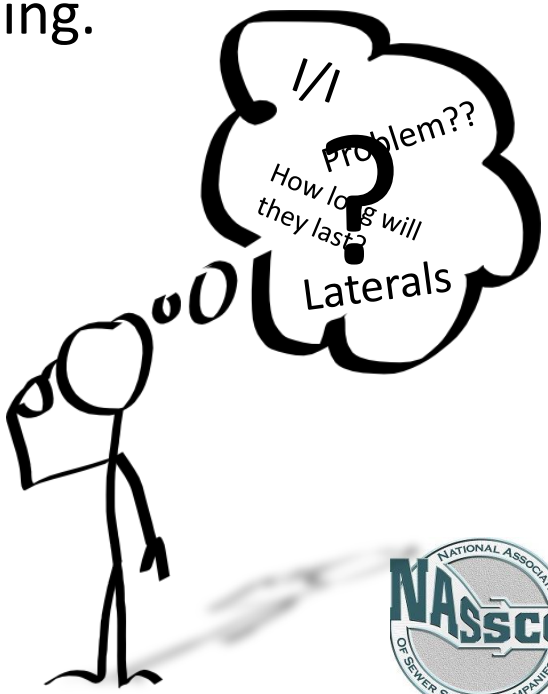
" Lateral rehabilitation was successful in reducing the occurrence of surcharging to less than once in two years, whereas the system was still surcharging about 15 times a year after the mainline rehabilitation only."

- *Metro Water Services & Davidson County (Nashville, TN)*

Survey Conducted – I/I from Laterals

- 45% of the participating agencies had **estimated** how much laterals contribute to total I/I.
- **Estimates** varied from 7%-80% with an average of 40%.
- Majority **felt** lateral pipes, like main line pipes, have reached their life expectancy and are failing.

Laterals are a major source of I/I within collection systems!



Service Laterals

- Over 76 million sewer laterals in U.S.
- Lateral piping from 4” to 6” in diameter
- Estimated 3.8 billion feet of lateral piping

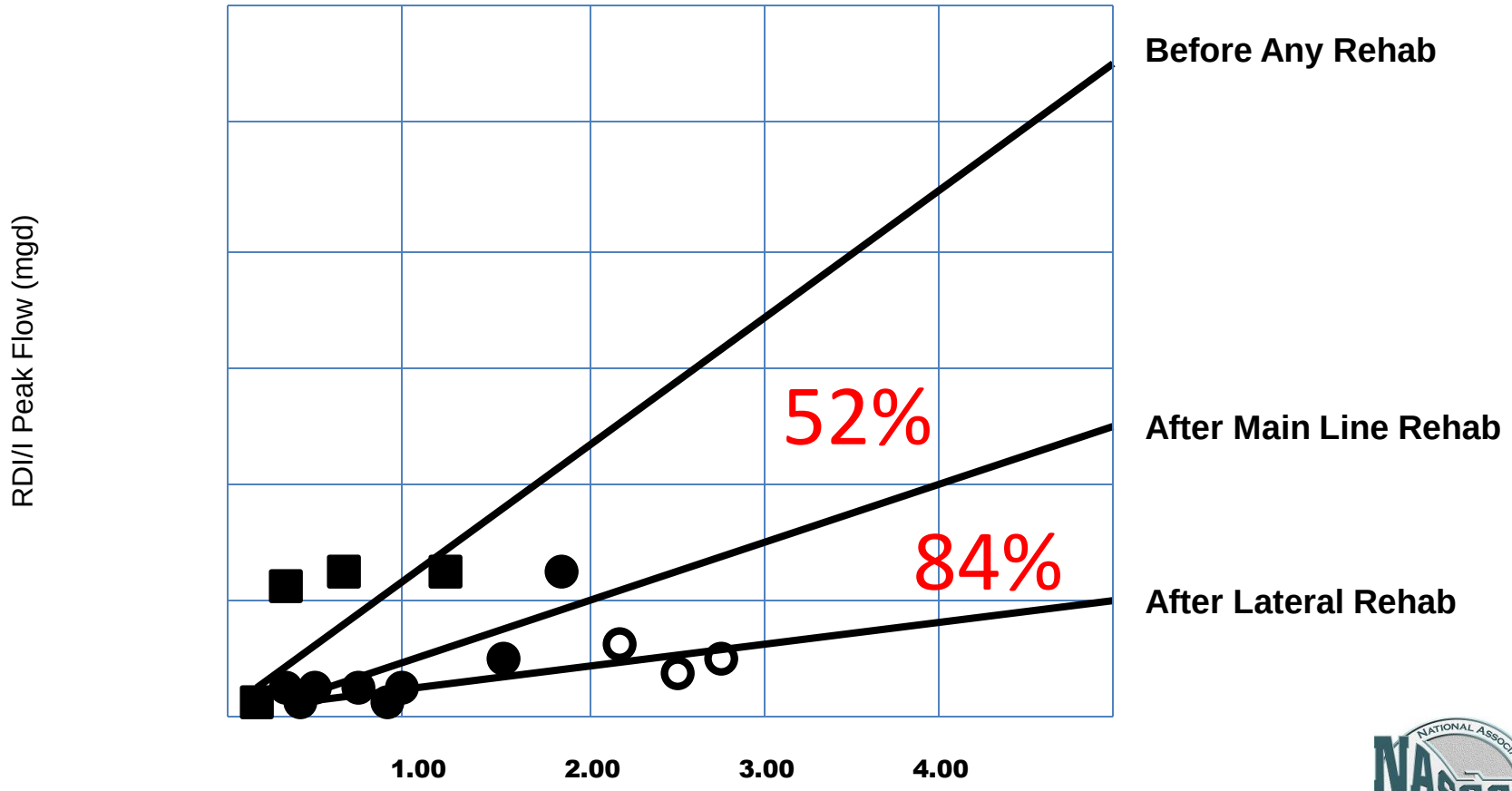
Lateral Rehabilitation History

The emphasis on service lateral rehabilitation was fueled in 1993 by an extensive study* conducted in Nashville, TN to evaluate the effectiveness of lateral rehabilitation on the reduction in I/I.

*(*awarded the first Rehabilitation Project of the Year by Trenchless Technology Magazine*)

Laterals are Part of the I/I Equation

Flow Monitoring (Oak Valley) – Metro Water Services & Davidson County



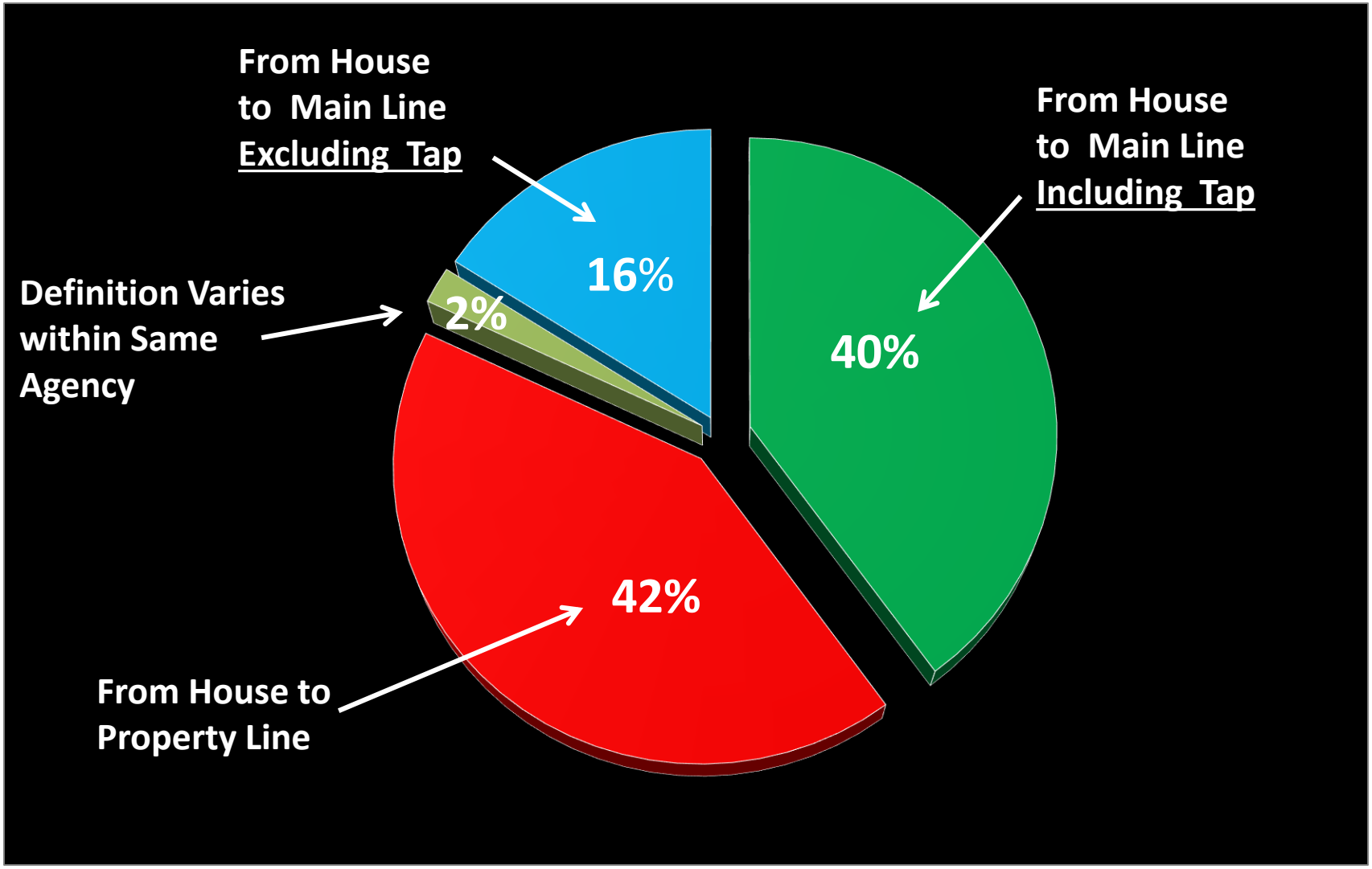
Lateral Renewal Programs

- Sewer laterals have been called the “Final Variable” of the collection system rehabilitation equation
- Laterals have been given less attention in the past due to:
  - Sheer number of laterals
  - “Snow Flake Effect”
    - No two laterals are alike
  - Lack of consistent effective and affordable inspection and renewal methods for small diameter lines
  - Complex issues of ownership and maintenance responsibilities

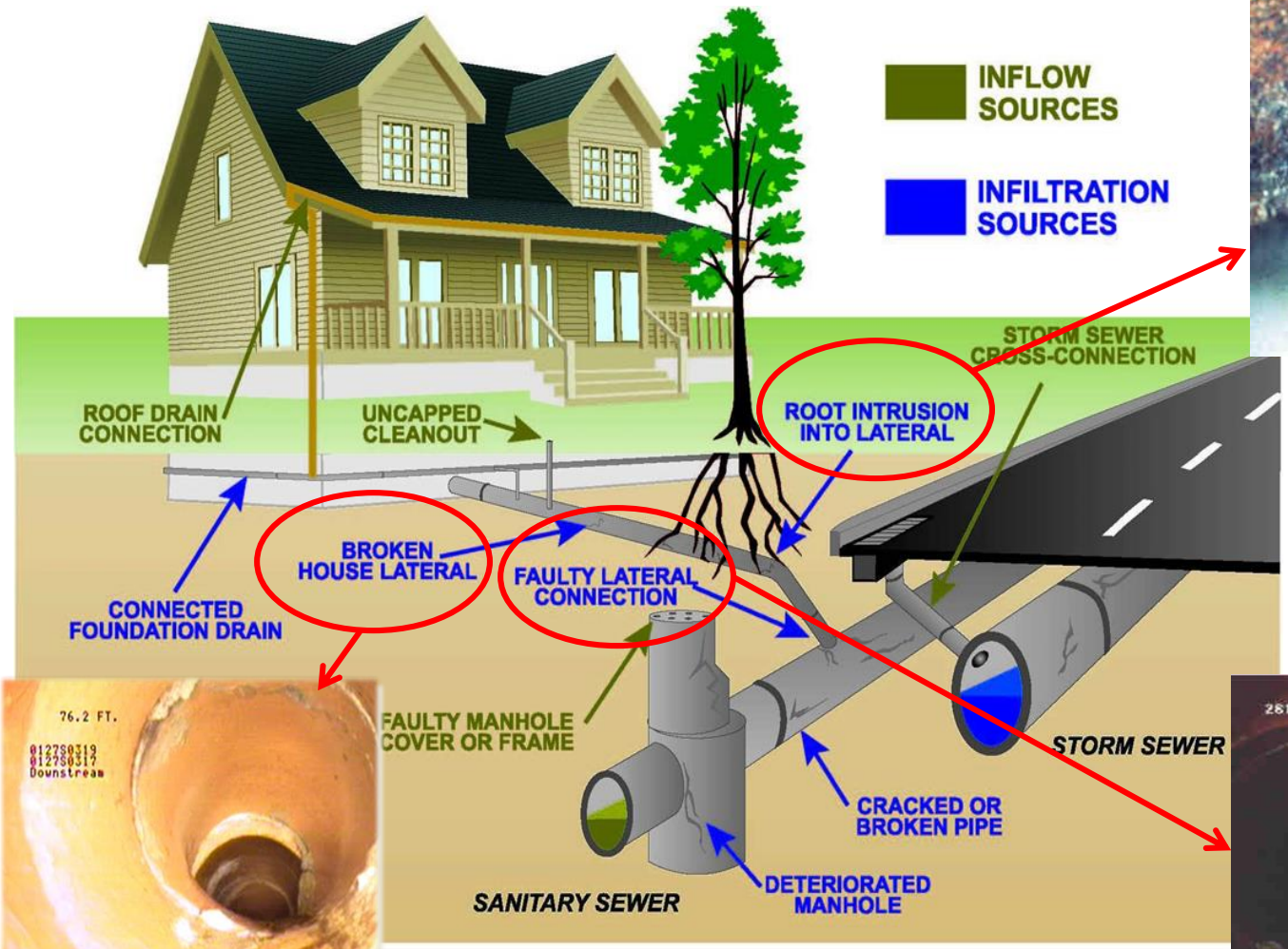
Lateral Market – Where is it Going?

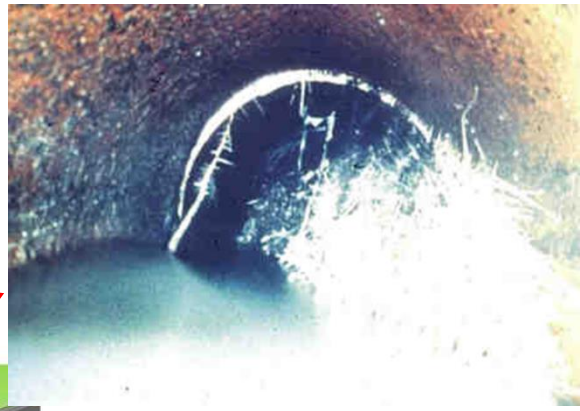
- Municipalities are increasing focus on service laterals by including in rehab projects
- Insurance policies are now readily available for private ownership
- Creative pay terms are being implemented for private laterals that have to be repaired
- Inspections of laterals are becoming more common at the time of buy/sell of a house
- Municipality/Utility taking back ownership

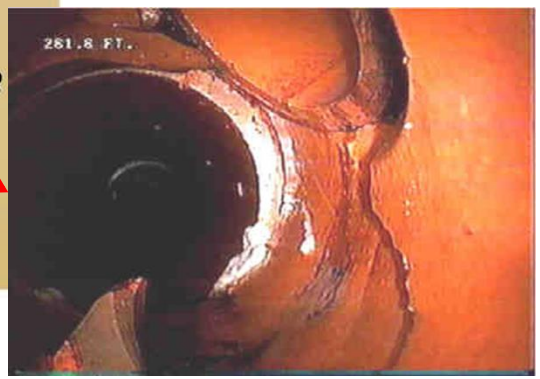
Where Does Ownership Take Place?



Understanding the Problem



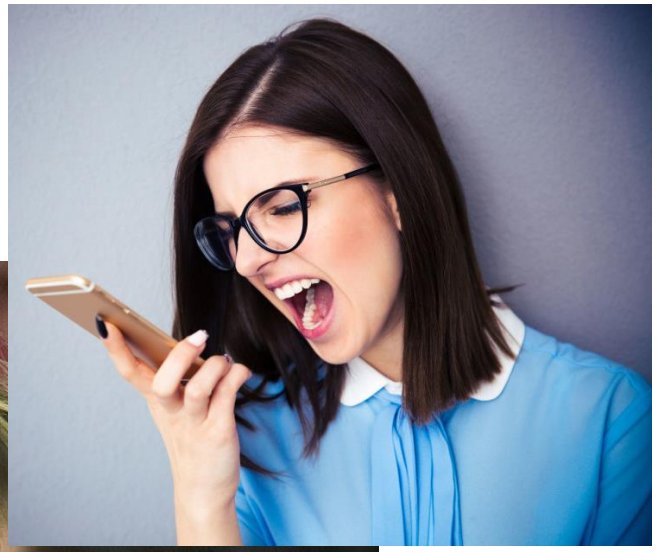


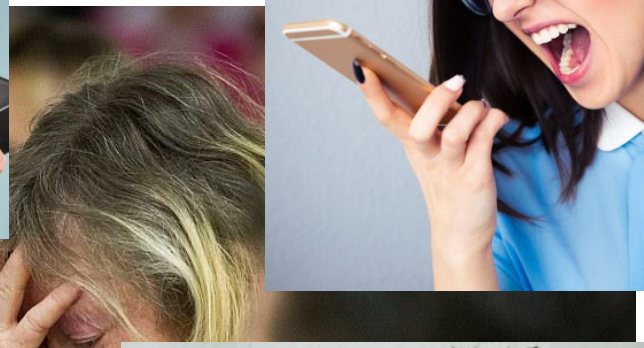


Project Scope

Street Repairs

Taxpayer Reaction





Contents

- Introduction
- Rehabilitation Alternatives
  - Sectional Pipe Lining
  - Lateral Pipe Lining
  - Main/Lateral Connection Lining
  - Lateral and Main/Lateral Connection Lining
  - Main/Lateral Connection Sealing
  - Lateral and Main/Lateral Connection Grouting
  - Lateral Pipe Bursting

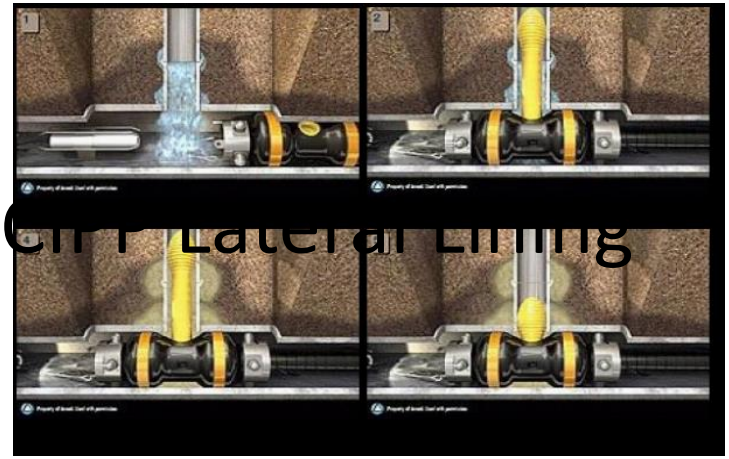
CCTV – Lateral Inspection

- CCTV capabilities have dramatically improved
- Up to 80+ ft from the mainline Pipe
- No cleanout needed
- Pre & Post rehabilitation CCTV Inspection

Lateral Cleaning

- Lateral cleaning techniques have improved
- Up to 80+ ft from the main line Pipe
- No clean out needed
- Done during CCTV inspection
- Removal of roots & debris

Lateral Rehabilitation Methods



Chemical Grouting

Pipe Bursting

Flood Grouting

CIPP Lining (most common)

CIPP Lateral Lining

- Liners are similar to those used in main line CIPP rehabilitation
- Multiple Resin Systems
  - Polyester – Vinylester – Epoxy - Silicate
- Cure Systems
  - Ambient – Steam – Water – UV
- Meet typical ASTM specs for CIPP

Specifications

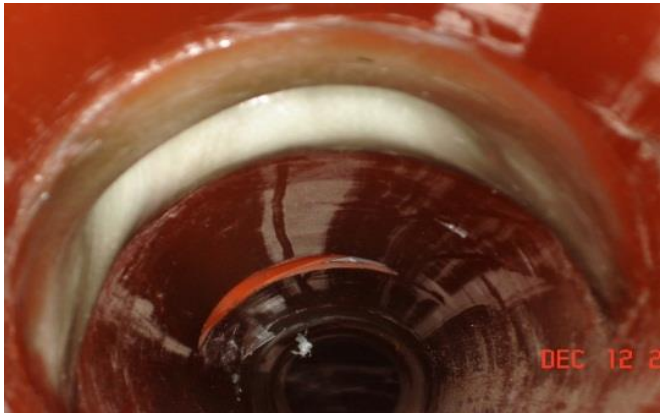
- F1216, F1743, D5813, D790, D2990
- Specifications for CIPP Laterals
  - Demand experience
  - Request and check references
  - Allow multiple products to bid

Hydrophilic Materials

- Used to seal lateral connection at the main
- Expands upon contact with water
- Various Configurations
  - Paste
  - Gaskets
  - O-Rings
- Air pressure testing confirms the sealing at the lateral connection to the main
- Various materials have been tested after years of service and confirmed effectiveness to seal through hydration/dehydration cycles

“Brim” Style of CIPP Lateral

- Industry terminology – “Top Hat”
- Process installed from the mainline
- No clean out is required
- Typically installed after mainline CIPP
- A bladder is used to inflate to put in place the resin saturated liner
- Hydrophilic material is used to seal the connection at the main
- Generally installed in shorter lengths

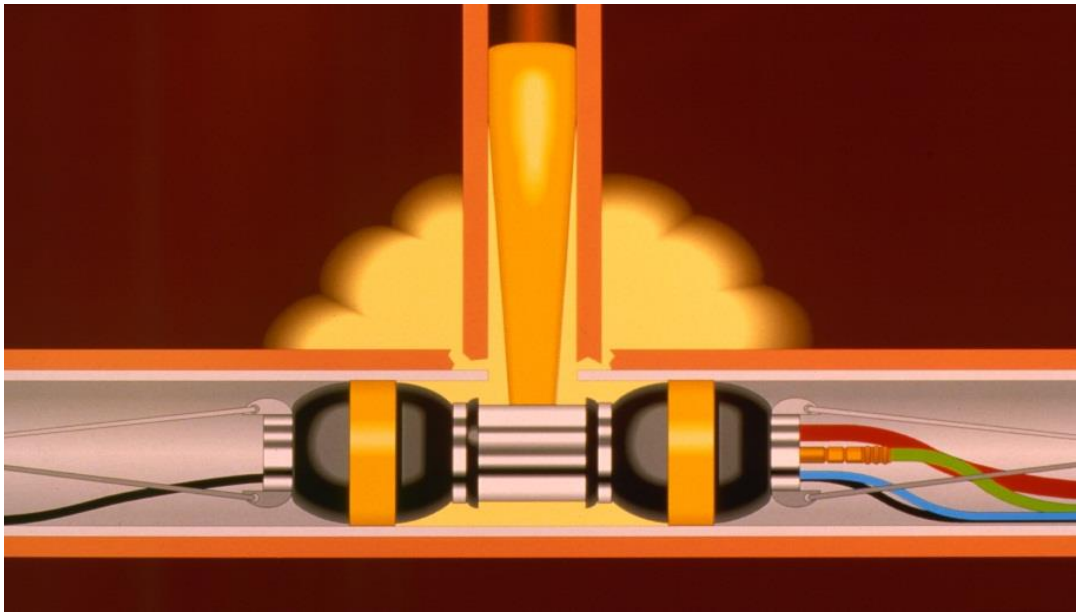


“Full-Wrap Style of CIPP Lateral

- Can be installed before or after main line rehabilitation
- Installed from mainline
- No clean out is required
- A bladder is used to inflate and position the resin saturated liner in place
- Liner forms a full circle around the inside of the main sewer pipe
- The main liner is approx. 16” in length and is 360^0 within the main line pipe
- Typical lateral lengths are from main line up to 60 ft.
- A clean out is usually required for lengths longer than 60 ft.
- Hydrophilic material is used to seal the lateral connection at the main and the terminating end of the CIPP lateral

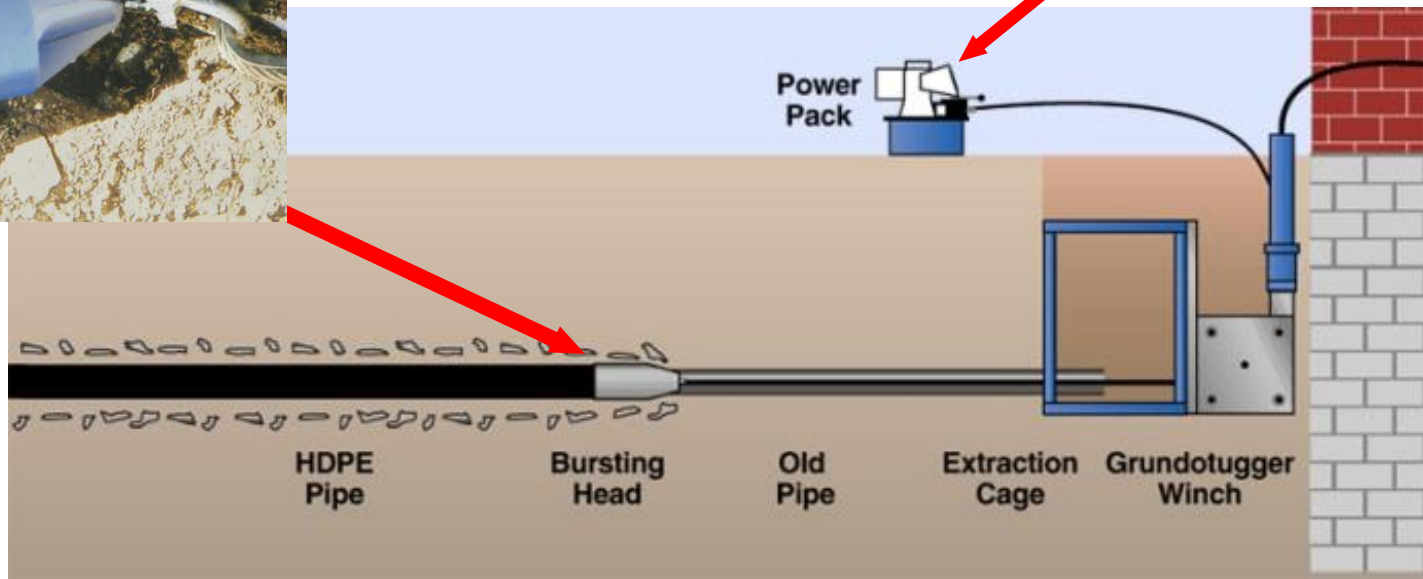
Grouting

- Packer is positioned inside the sewer at the lateral location
- The packer bladders are inflated isolating the predetermined portion
- A two component chemical grout is pumped



Lateral Pipe Bursting

- The bursting head is either pulled or pushed in
- A “power pack” is used for pushing/pulling
- The majority are pulled in
- The new pipe can be a larger size



Sectional Pipe Lining

- Used when just a few areas need rehabilitation
- Three Cured-In-Place liner methods:

  -Pull-In-Place
  -Push-In-Place
  -Inversion

Sectional Pipe Lining

- Inversion Method:
  - Resin saturated liner tube
  - Inversion bladder
  - Liner can be positioned at any distance
  - Varying diameters/lengths

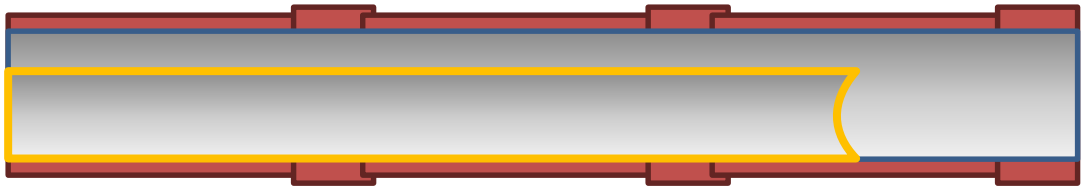
Lateral Pipe Lining

- Involves rehabilitating laterals from a lateral access point
  - At or near the sewer main
  - At or near the building foundation

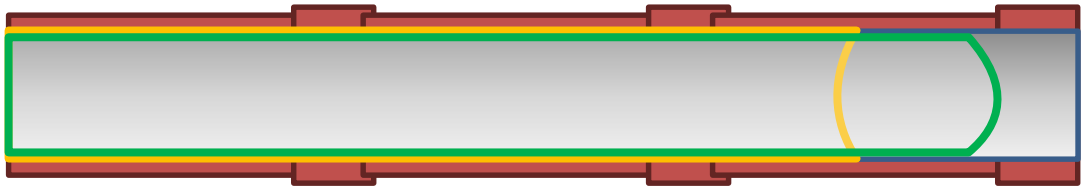
- Four Methods:
  - Double inversion
  - Single inversion
  - Pull-In-Place
  - Clean-Out Inversion

Double Inversion Method

Liner Inversion



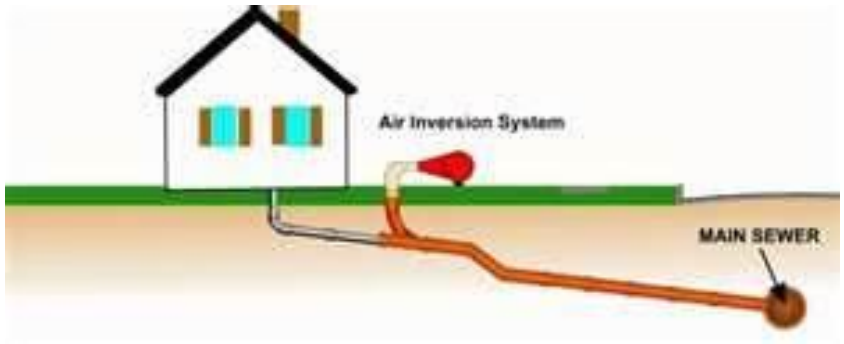
Bladder Inversion



Bladder & Liner pressurized

Single Inversion Method

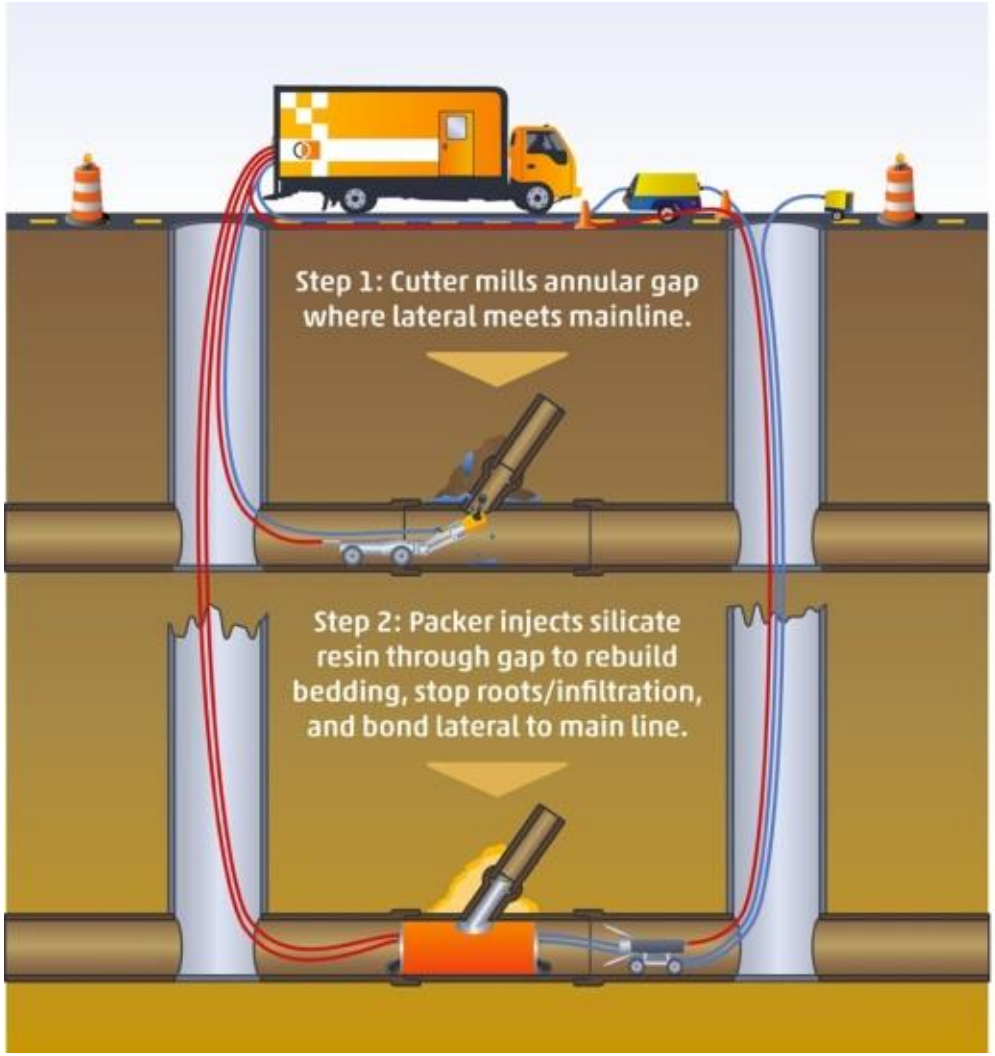
- Liner & bladder are simultaneously inverted
- Camera is inserted into the bladder
- Pressure is maintained and the liner cures



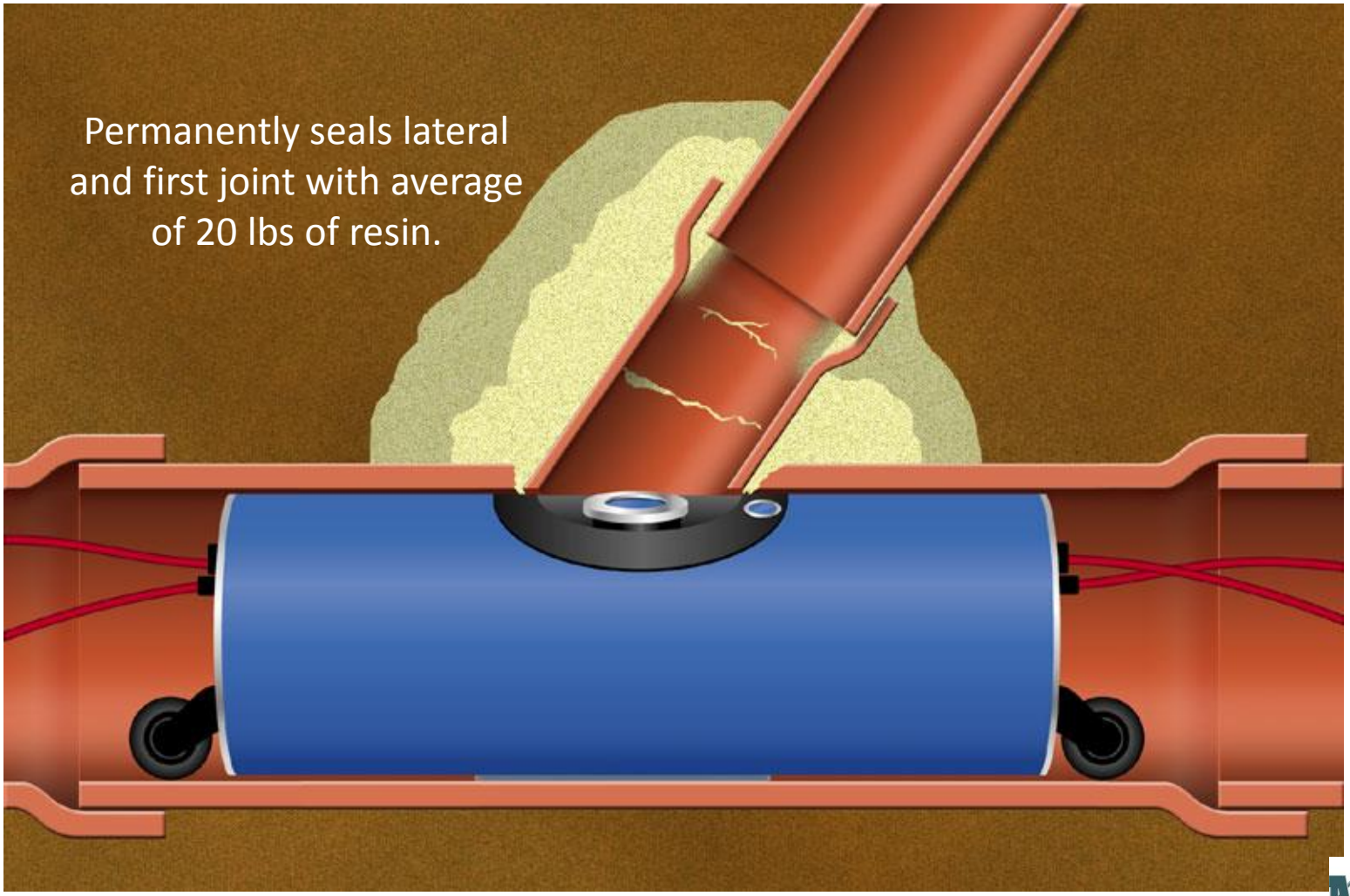
Main/Lateral Connection Sealing

- Connection prepared by cutting/milling robot
- Main line packer is positioned
- A lateral bladder is launched and isolates the connection
- A resin epoxy material is injected under pressure
- Resin is ambient or heat curedd

Main/Lateral Connection Sealing



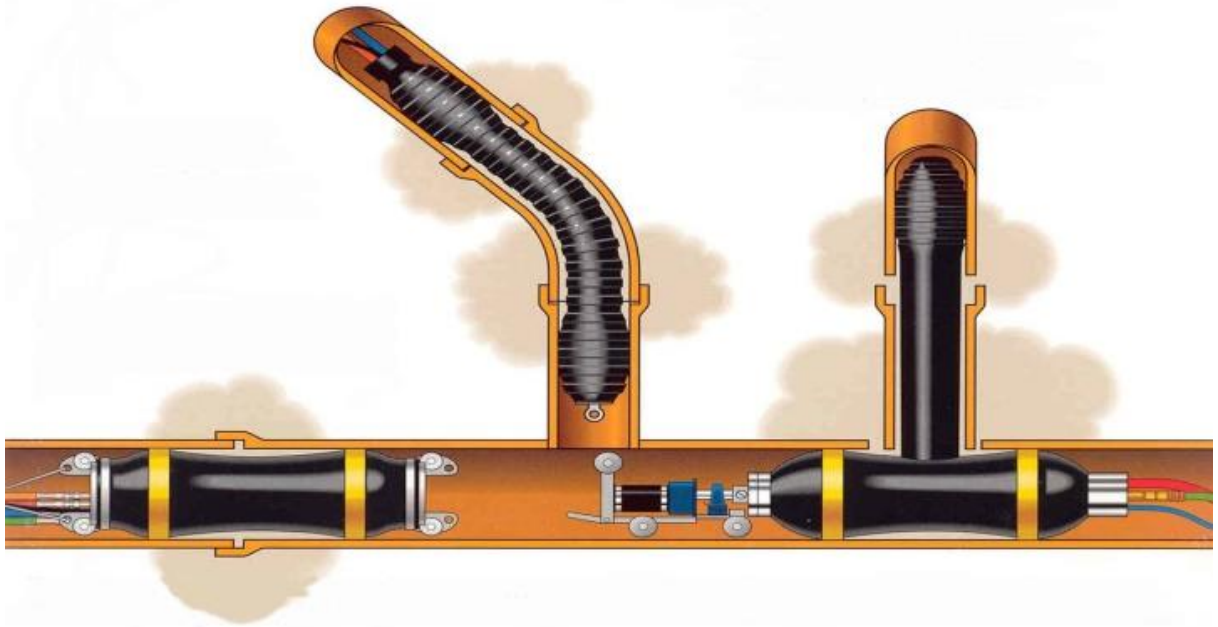
Main/Lateral Connection Sealing



Applicable for both lined and un-lined main pipe.

Lateral and Main/Lateral Connection Grouting

- A flexible push/pull packer allows grouting of laterals from above ground access
- The grout packer usually isolates an area of 3 to 5 feet



Lateral Resources

- NASSCO - Lateral Committee - 2012
  - *Overview of Lateral and Main/Lateral Connection Lining and Sealing Technologies*
  - http://nassco.org/industry_news/pdfs/lateral_rehab_white_paper.pdf
- WERF Studies
  - *Survey of Public Works Agencies – 2004*
  - *Methods for Cost-Effective Rehabilitation of Private Lateral Sewers – 2006*
- Miami-Dade Water and Sewer District
  - *Comprehensive Lateral Investigation Program - 2007*

Thank You

Questions?

BLD SERVICES, LLC

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NASSCO