

Introduction

- Trenchless Methodology
- Codes and standards related to the repair of existing house sewers or lateral pipes
- Legal issues surrounding private property and impact on public utilities
- Selection of materials and technology
- Design, specification and procurement
- Effectiveness of methods

Service Laterals

- Nomenclature:
 - Service Laterals
 - Building Sewers
 - Building Drains
- Over 76 million sewer laterals in USA
- Lateral piping from 4" to 6" in diameter
- ~3.8 billion feet of lateral piping
- All types of pipe material
 - Cast iron, clay, AC, Orangeburg, PVC

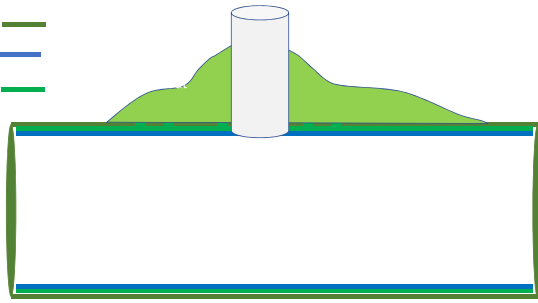
Trenchless Methodology

- Grout
- Pipe Bursting
- Cured In Place Pipe (CIPP)
- Main Line Connection Seal

Grout

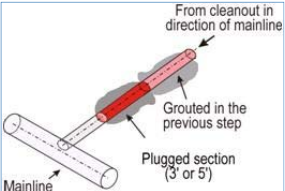
- Chemical Grouts
 - Chemical catalyst
 - Water activated
- Application and Use

Lateral Grouting After Mainline Lining



Lateral Grouting – Push Type

- Access through cleanout
- Grouting along lateral
- Partial or full length



Lateral Tap Connection Grouting

- Mainline diameters from 6"-30"
- Effective sealing distances from 8" through 30 feet
- Diameter of laterals 4", 5" or 6"



10

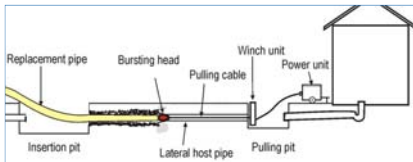
Pipe Replacement

- Pipe Bursting
- Application and Use
- Replacement Pipe



Lateral Bursting

- Lateral upsizing is desired
- Badly damaged laterals
- Replaces existing lateral with new pipe



Cured-In-Place Pipe Technology

- Invented in 1971 for use in mainline sewers
- Introduction to USA in 1976
- Over 300,000,000 feet of pipe repaired with CIPP

A textile (fabric or tube) impregnated by a thermosetting resin is inserted (pulled or inverted using air or water) into an existing pipe, expanded and cured (ambient, hot water, steam or light) to form a new pipe within the existing pipe without excavation, or at least minimal excavation to gain access to the existing pipe.

Lateral Lining Systems

- Proven technology
- New technologies and methods of installation
- Documented successes
- Less disruption
 - Infrastructure
 - Business / Residents



Purpose of Lateral Lining



- Increase service life of critical asset to its Owner

Application

- Service Laterals or Building Sewers
- Building Drains
- Vents
- Connection to Public Sewers

Alternatives / Selection

- Sectional Pipe Lining
- Lateral Pipe Lining
- Control Leakage
- Watertight
- Structural
- Reduce infiltration entering public sewer
- Extended service life of the existing pipe

Application Variables

- Access – Physical and Legal
- Diameters from 2” to 10”
- Multiple bends
- Diameter changes
- Offset joints
- Cracks
- Deposits
- Roots
- Connection to public sewer

Materials

- Resin systems
- Liner/tube or fabric

Liner Tubes or Fabric

- Various types
 - Fiberglass fabric
 - Felt
 - Woven
- Applications
 - Straight pipe
 - Bends
 - Single point or sectional repair
 - Vertical installation

Resins

- Polyester
- Epoxy
- Vinyl ester
- Silicate

Installation Methods

- CIPP
 - Pull or Push in Place
 - Inversion
- Grouts
- Pipe Bursting

Curing Methods

- Ambient
- Hot water
- Steam
- Hot air
- Light – UV and LED

Pre-Lining Process

- Access
- Inspection
- Cleaning
- Repairs

Lateral Rehab Evaluation

- Review CCTV inspection videos – PACP
- Determine extents of defects and deterioration
- Identify location and extents of spot repairs
- Determine service sizes, material, depth, number of service connections (open/capped)
- Evaluate lateral ownership

Inspection – Pan & Tilt

- Mainline sewer CCTV camera with pan & tilt
- Inspection performed from mainline sewer
- No cleanout/access point needed
- Can typically only see up a few feet



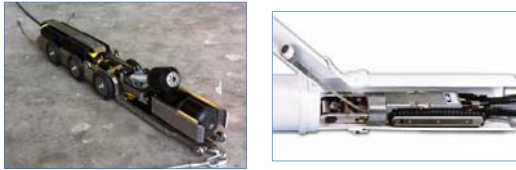
Inspection - Push

- Insert camera through cleanout or other access point
- Distance up to 150 ft



Inspection - Lateral Launch

- Launch camera from the mainline sewer
- No cleanout/access point needed
- Can traverse 80+ feet



Lateral Cleaning

- Lateral cleaning techniques have improved
- Up to 80+ feet from mainline sewer
- Done with or without a cleanout/access point



Cleaning from Mainline



Lateral Cleaning

Pre-cleaning



Post-cleaning



Sectional Pipe Repair

- Repair is needed in specific locations of a pipe vs entire length
- Repair is required as prerequisite to lining entire length of pipe

Installation Process

- Installation Methods
 - Pull in place
 - Push in place
 - Inversion
- Access
- Materials
- Purpose

Lateral Rehabilitation

- Full length lateral lining
- Connection seal to public sewer



Lateral Pipe Lining

- Double inversion method
- Single inversion method
- Pull-in-place method
- Clean-out inversion method

Main/Lateral Connection Lining

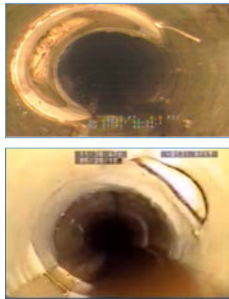
- Sealing the connection between lateral pipe and the public sewer
- Brim Style Connection Lining
- Full Circle Style Connection Lining

Lateral and Main/Lateral Connection Lining

- Pull in place
- Inversion
- Two-step method

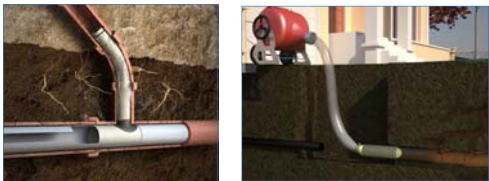
Lateral Connection Seal

- Rehabilitates lateral connection to mainline sewer
- Extends 24" – 36" into service lateral
- Installation performed from the mainline sewer
- Does not require cleanout/other access point
- Brim-Style or Full-Wrap in the main



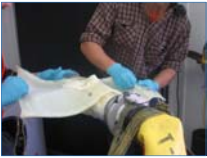
Full Length Lateral Lining

- Installed from mainline sewer or cleanout/other access point
- Extends various lengths and up to 4" cast iron from property
- Can seal connection to the mainline – installed from mainline
- Some products require a cleanout/other access point



Connection Liner or Full-Length Liner

- Distance up lateral needed for rehabilitation
- Goals of the program
 - Consent order driven
 - Structural issues
 - Infiltration issues
- Access - do cleanouts exist
 - Work on private property
 - Product limitations
- Ownership
- Available funding
- Location of groundwater table
 - Can help determine how far up the lateral to line



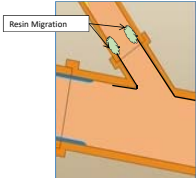
Installation and Sealing Properties

- Hydrophilic End Seals
 - Gasket
 - Paste
- Physical Bonding
 - Resin Migration
 - Epoxy Bond



Installation and Sealing Properties

- Often a contentious issue
- Opinions vary widely
- Installation
 - Inversion method – resin migration
 - Inflation/Packer system – mechanical bond



Codes and Standards

- IPC
- UPC
- ICC-ES
- NSF 14 SE
- IAPMO
- ASTM F1216
- ASTM F2561
- ASTM F3240
- ASTM F2599
- ASTM F1743

ASTM Standards

- Primary Standards for CIPP
 - ASTM F1216
 - ASTM F1743
- Standards for Lateral Rehabilitation
 - ASTM F2561
 - ASTM F3240
- Standards for Point/Sectional Repair
 - ASTM F2599
- Standards in Development

Certification Entities

- ICC-ES
 - ICC-ES LC1011 – Rehabilitation of Existing Building Drains and Building Sewers
- NSF
 - NSF-14 SE 13004 – Rehabilitation for Small Diameter Pipes
 - NSF-14 SE 10990 – Rehabilitation by Point Repair of Existing Pipe
- IAPMO
 - IGC 321

Resources

- NASSCO – NASSCO.org
 - *Overview of Lateral and Main/Lateral Connection Lining and Sealing Technologies*
 - Tech Tips and Specification Guidelines
 - Certification and Training courses for inspection
- NASTT – nastt.org
- ASCE – UESI Pipelines Infrastructure
 - Manuals of Practice
- WERF Studies
 - *Methods for Cost-Effective Rehabilitation of Private Lateral Sewers*
- Other

International Plumbing Code

- ICC Code Development
- Existing Code 2018
 - Section 105.2 – Alternative Materials
 - ICC-ES LC1011 – Rehabilitation of Existing Building Drains and Building Sewers
 - NSF SE 13004 – Rehabilitation for Small Diameter Pipes
- 2021 - Section 717 – Relining Building Sewers and Building Drains

Uniform Plumbing Code

- IAPMO Code Development
- Existing Code 2018
 - Section 301 – Alternative Materials
 - Section 715.3 – Existing Sewers
 - IAPMO IGC 321
 - NSF SE 13004 – Rehabilitation for Small Diameter Pipes
- 2021 - Section 715.3 – Existing Sewers

Quality Assurance /
Quality Control Practices

- Material qualification
- Pre-installation process inspection
- Installation process inspection
- Post-installation inspection

Challenges & Solutions

- Evaluating application specification and conformance to relevant Code
- Addressing installation issues
- Resolving post-installation defects

Future Outlook

- Education opportunities
- Awareness
- Code development

Questions??





**Thank You For
Attending**