

I&I Mitigation: Rehabilitation of Sewer Laterals and Sealing the Collection System

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Discussion Points

- Mainline CIPP and Gasket Sealing
- Main-to-Lateral Technology Advancements
- Common Misconceptions

Markets Served with Cured-in-Place Pipe Lining (CIPP)

- Industrial
- Commercial
- Private
- Municipal



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Leaking and Deteriorating Mainline Pipes



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Mainline CIPP Only



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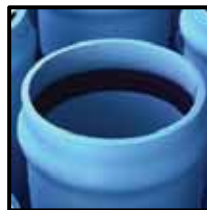
Water-Tight Solution Required

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



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Water-Tight Solution Required

Must:

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

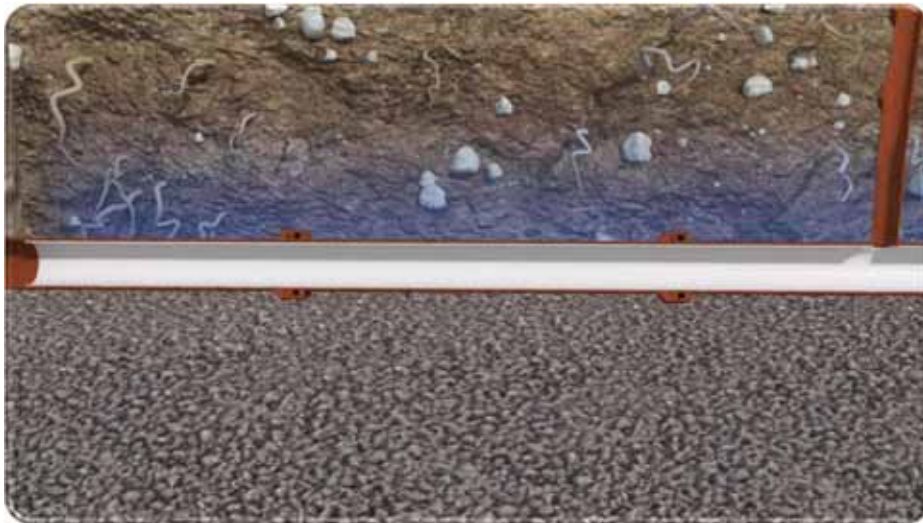
Solution:

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



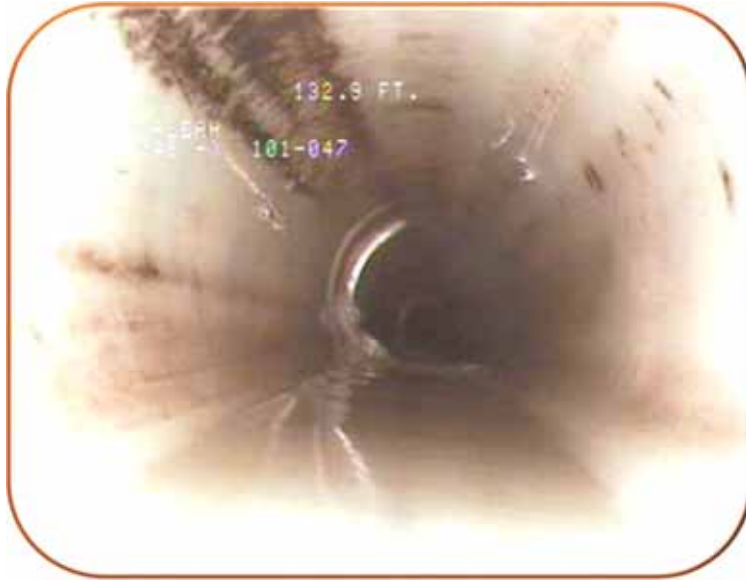
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Mainline CIPP and Molded End Seal Gaskets



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Rehabilitated Mainline



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Design Life vs. Service Life

- Design Life = Structural CIPP / ASTM F1216
- Service Life = Structural CIPP plus Leak Free / ASTM F2561

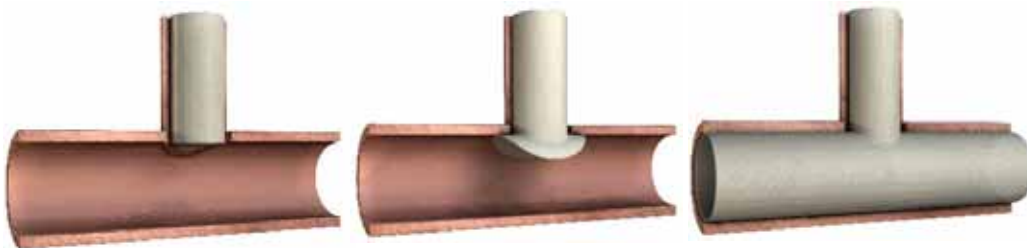
CIPP rehabilitation design should take into consideration service life.

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Lateral Lining Technology Advancements

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Evolution of Lateral Lining



1st Generation
No connection
seal

2nd Generation
"Brim Style or
Top Hat"

3rd Generation
Full wrap,
Hydrophilic
Caulk

**Unsealed
Design life \neq Service Life**

Most of the CIPP Industry

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Hydrostatic Pressure Test of Silicate Resin



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

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Evolution of Lateral Lining



4th Generation
Full wrap,
sealed in main

5th Generation
Full wrap, sealed
in main and
lateral

6th Generation
enhanced seal
using "Hydro
Hat"

**Permanently Sealed
Design Life = Service Life**

ASTM F2561

Just because it's trenchless, doesn't mean it's equal!

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Service Life Includes Water-Tightness

So what are the sealing options?

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Non-Verifiable Sealing Choices

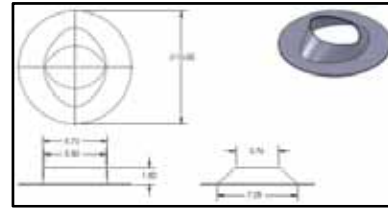
- Hydrophilic Caulk
 - a) Fluid material
 - b) Several days to cure
- Hydrophilic Rope
 - a) Difficult to create hoop
 - b) Difficult to install



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Verifiable Sealing Choice

- Molded engineered gaskets
- “Verifiable”
 - a) Seamless
 - b) Profile can be seen through CIPP
- 50 Plus Year “Service Life”
 - a) 10,000 hour hydration/dehydration testing complete
- Strategic Fixed Position
- Part of ASTM F2561 standard for main-to-lateral connection lining



Hydrohat CAD Drawing



End Seal

Hydrohat

O-Rings

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Hydrostatic Pressure Test of Molded Gaskets



CIPP rehabilitation design should take into consideration service life.

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ASTM F2561

Standard Practice For the Rehabilitation of a Sewer Service Lateral and its Connection to the Main using a One-Piece Main and Lateral Cured in Place Liner

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Why use ASTM F2561?

Incorporates

 Designation: F2561 - 11

Standard Practice for Rehabilitation of a Sewer Service Lateral and Its Connection to the Main Using a One Piece Main and Lateral Cured-in-Place Liner^{1,2}

This standard is issued under the fixed designation F2561; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last approval. A superscript symbol (s) indicates an editorial change since the last revision or approval.

1. Scope

1.1 This practice covers requirements and test methods for the reconstruction of a sewer service lateral pipe having an inner diameter of 3 to 12 in. and its connection to the main pipe having an inner diameter of 6 to 24 in. without excavation. The lateral pipe is accessed remotely from the main pipe and from a lateral cleanout. This will be accomplished by the installation of a resin impregnated one-piece main and lateral cured in-place lining (MLCPL) by means of air or water inflation and inversion. The MLCPL is pressed against the host pipe by pressurizing a bladder and is held in place until the thermoset resin have cured. When cured, the MLCPL shall be a continuous, one piece, tight fitting, corrosion resistant lining extending over a predetermined length of the lateral pipe and the adjacent section of the main pipe providing a verifiable non-leaking structural connection and seal.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

2. Referenced Documents

2.1 ASTM Standards³

D618 Practice for Conditioning Plastics for Testing
D790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
D1060 Terminology for Abbreviated Terms Relating to Plastics
D3681 Test Method for Chemical Resistance of "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe in a Deflected Condition
D5813 Specification for Cured-In-Place Thermosetting Resin Sewer Piping Systems
F412 Terminology Relating to Plastic Piping Systems
F1216 Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube
2.2 MASCOC Guidelines⁴
Recommended Specifications for Sewer Collection System Rehabilitation

ASTM F1216 - 09 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube
NOTE: ASTM F1216 addresses tube design and is not applicable to the connection of the lateral to the main.

ASTM D2990 - 09 Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics

ASTM D790 - 07 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

ASTM D5813 - 04(2012) Standard Specification for Cured-In-Place Thermosetting Resin Sewer Piping Systems

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Benefits of using the ASTM F2561 System

- Reduce SSOs and CSOs by eliminating leaking at the connection and the lateral termination by using molded and seamless gaskets
- Reduce the amount of infiltration entering the system by extending the lateral lining as far as possible
- Use one comprehensive specification, no need to recreate
- Improve treatment plant utilization
- Standard liner manufacturing process

Do It Right ➡ Do It Once

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How to Optimize Cost per Foot



Length	2 ft.	15 ft.	30 ft.
Average Installed Cost	\$2,000 installed	\$2,500 installed	\$3,500 installed
Cost per lateral foot of water table	\$1,000/ft.	\$167 /ft.	\$117 /ft.
Above Localized Water Table	No	Maybe	Yes
Infiltration Reduction	✓	✓✓✓	✓✓✓✓✓

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Generation 6 Exceeds ASTM F2561



- Full wrap/full length lateral provide structural rehabilitation and is engineered for 50+ year **DESIGN** life
- Molded gaskets at connection and lateral termination provides 50+ year **SERVICE** life
- Tapered ends on mainline wrap provide maximum flow
- Up to 150 feet with a cleanout
- Up to 15 feet without a cleanout
- Cured (Steam or Ambiently)
- **Manufacturer's 10 Year Limited Warranty**

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How Is An ASTM F2561 Compliant Liner Built?

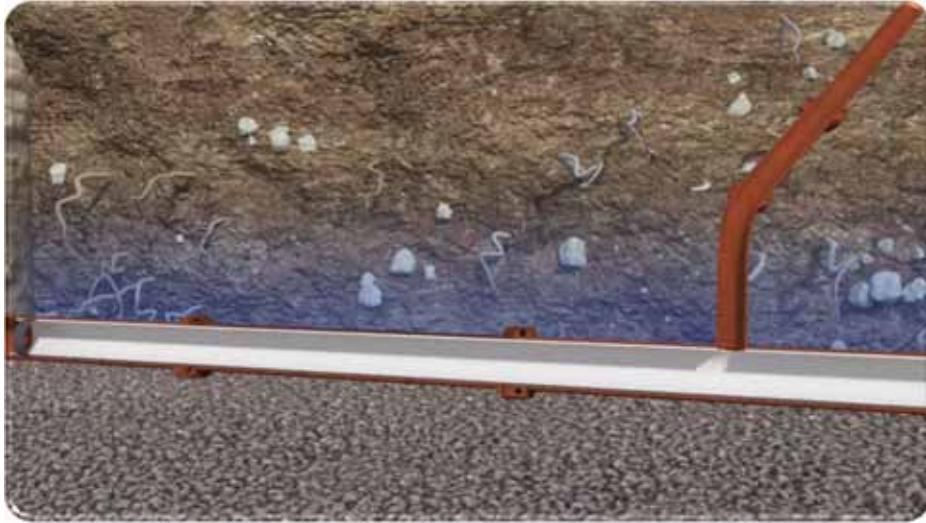
- Factory Controlled Setting
 - Standard operating procedures guarantee consistency
 - Die Stamp Cutouts for accuracy in TEE and WYE connections
 - Machine stitched seams
 - UV and/or tape sealed seams prevent leakage during wetout



Do It Right ➡ Do It Once

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ASTM F2561 Main to Lateral Connection



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Main-to-Lateral Lining Misconceptions

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Myths

- The competition will tell you that specifying ASTM F2561 creates a sole sourced situation
 - NOT TRUE
- **What is TRUE, Specifying ASTM F2561:**
 - Will guarantee a 50-Year Design/Service Life
 - Is truly comparable to dig and replace
 - Is available from two manufacturers
 - Is installed by a large network of independent licensed distributor-contractors
 - Over 25 distributor-contractors with over 40 crews
 - Installed pricing is set by the contractor not manufacturer
 - Distributor-contractors available throughout North America



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More Myths

- Gasket Sealing is not needed because the resin bonds and doesn't shrink
 - NOT TRUE
- **What is TRUE:**
 - All resins shrink during cure
 - Pipes are not properly prepared for adhesion
 - CIPP resins do not bond to: Fats, oils and greases (FOG), wet surfaces made of clay, concrete, PVC, cast iron, polyethylene and polypropylene
 - Molded and Seamless Hydrophilic Gasket Sealing is absolutely needed to ensure a watertight system.
 - Gaskets at:
 - Manhole penetrations
 - The connection
 - The lateral termination



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In Conclusion

- Use ASTM F2561 in your specification
- You have to seal the system - CIPP installations must have hydrophilic molded gaskets at all terminating ends
- Specifying ASTM F2561 is not specifying a sole source product

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Do It Right ➡ Do It Once



**Thank You
for Your Time**

Q&A

Collection System After Mainline and Main to Lateral Rehabilitation
Installation and Post Installation Video performed by Musson Bros., Inc., Brookfield, WI

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