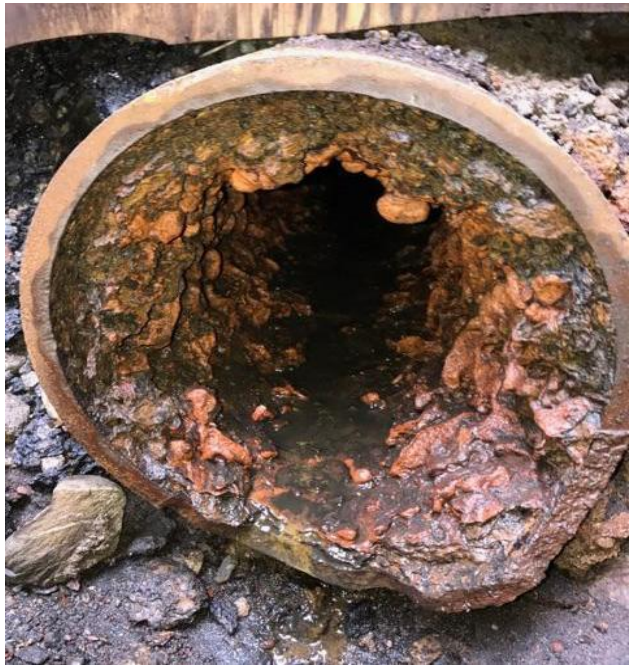
Structural

Spray-In-Place Pipe Rehabilitation

'Camera, Clean and Coat' ™ with High-Build Epoxy ('HBE')

Before



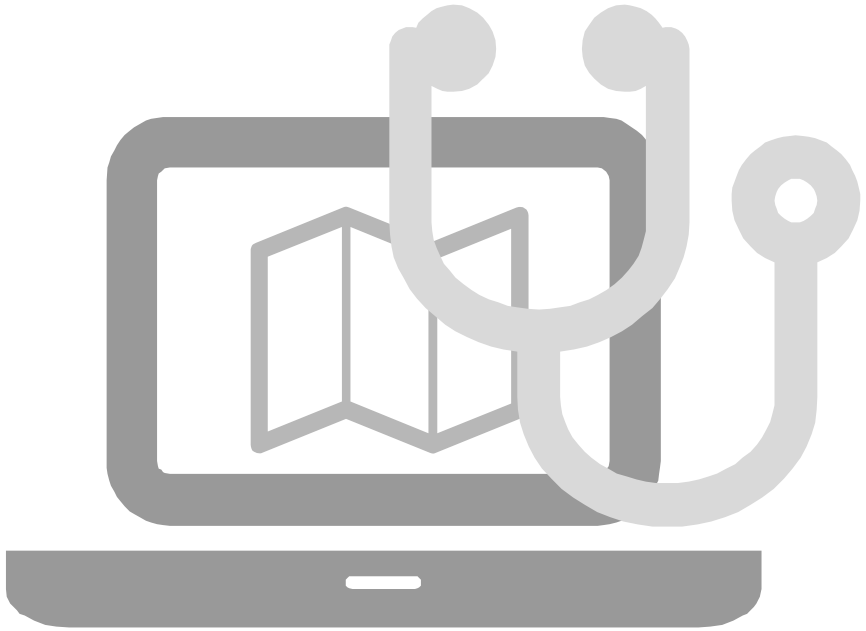
During

After

Structural Spray-In-Place Pipe ('SIPP') rehabilitation provides the perfect solution for the restoration of aging underground piping systems, for both cast iron and ductile infrastructures. With state of the art equipment including robotic spray application rigs, computer-controlled for more refined application and curing. High-Build Epoxy ('HBE') material bonds to piping systems– preventing and sealing cracks– and moves with the structure, abating leaks caused by settlement.

More Third Party Testing Than Any Other Coating

Spray-In-Place Pipe Lining Process



1. System Diagnosis

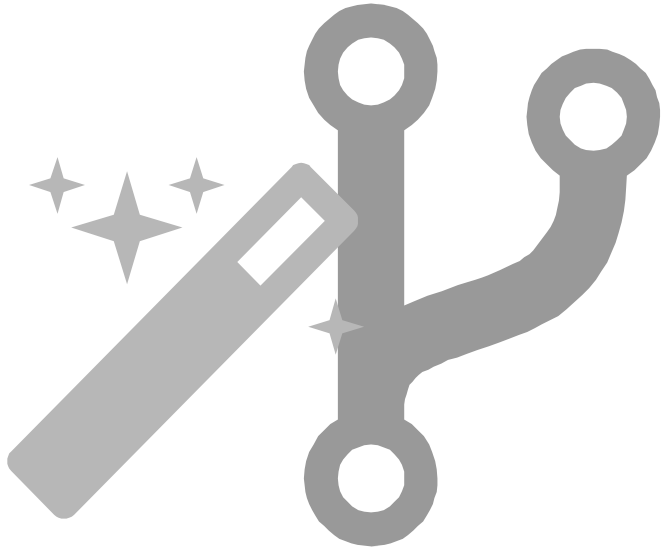
- Map system
- Utilize computerized pipe video surveillance to inspect and digitally record findings
- Review findings with property management
- Diagnose and identify restoration plan

Spray-In-Place Pipe Lining Process

2. Repair/Replacement

- Repair or replace damaged pipe sections
- Flushing & drying
- Tuberculation removal
- Grit blasting

Spray-In-Place Pipe Lining Process



3. Abrasive Cleaning

- Abrasive cleaning with conical spray head to near-white metal finish *(as specified by manufacturer)*
- Pipe is now in a good state of repair

Spray-In-Place Pipe Lining Process

4. Epoxy Lining and Reassembly

- Pipe's state of good repair enhanced with epoxy lining
- Extends life of repaired or replaced pipe
- Prevents corrosion & biological buildup
- Enhances flow capacity
- Dampens vibration

Spray-In-Place Pipe Lining Process

5. Final Inspection & System Testing

- TV inspection
- Epoxy inspection of pipe lining for thickness and need for coating repair
- Hydrostatic pressure testing
- Leakage pressure testing
- Bacteriological disinfection
- Leaching test
- Restoration of system

Spray In Place Pipelining Process

Spray-In-Place Pipe Lining Process

Sample Project

	SIPP Epoxy Cleaning and Lining	Traditional Pipe Replacement
Time Required	**3-5 days**	4-6 weeks
Access Requirements	**4 access points needing just 3 feet of pipe access**	Trench the entire street causing severe and long traffic disruptions

Coatings Specification Details

	Spray In Place	Cured In Place (PSI)	ASTM F-1743
Tensile Strength	7,000	6,000	3,000
Flexural Strength	11,000	7,000	4,500
Compressive Strength	12,000	Not listed	Not listed
Flexural Modulus	500,000	350,000	250,000

AWWA M-28 Standards for rehabilitation of water mains.
This specifies ASTM F-1743 as the class 4 structural lining standard.

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ASME PCC-2 Design considerations for buried pipe test standards were utilized and documented by Madero Engineering, Houston, TX. Certified wall thickness for our lining material for partially deteriorated pipe to resist both internal and external loads.

ASTM F1216 Standard practice for rehabilitation of existing pipeline standards were utilized and documented by Madero Engineering, Houston, TX. Certified wall thickness of our material comply with this standard.

"the ultimate capacity of all specimens exceeds 400 psi hydrostatic pressure"

– Kent Harries, Ph.D., FACI, P.Eng.

Associate Professor of Structural Engineering and Mechanics University of Pittsburgh.

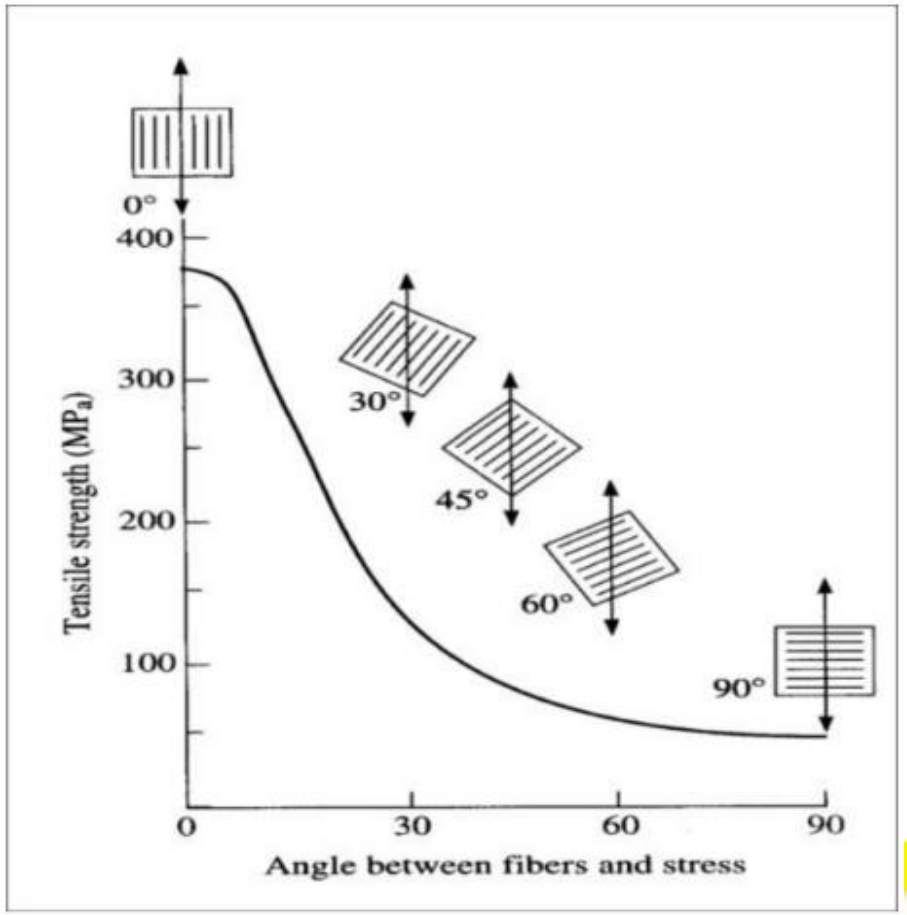
SIPP versus CIPP for Pressure Systems

The SIPP lining system navigates through bends. This factor accounts for the variance in required access point excavations.

A significant variance between CIPP and SIPP is stated in ASTM 1216: CIPP liners are tight-fitting, but not adhered to the host pipe. Our SIPP system creates a fully adhered composite structural lining, which strains and flexes with the host pipe.

ASME PCC-2-2011 repair of pressure piping states:
"Epoxies are perhaps the best of thermoset polymers for buried pipe restoration due to their versatility, strength, adherence to the host pipe, low coefficient of friction, and chemical and abrasive resistance."

Both systems significantly improve the Hazen-Williams coefficient of friction rating. Typically, a 50-year-old tuberculated cast iron are in the 50-c factor range and lined pipes improve to over 100-c factor.

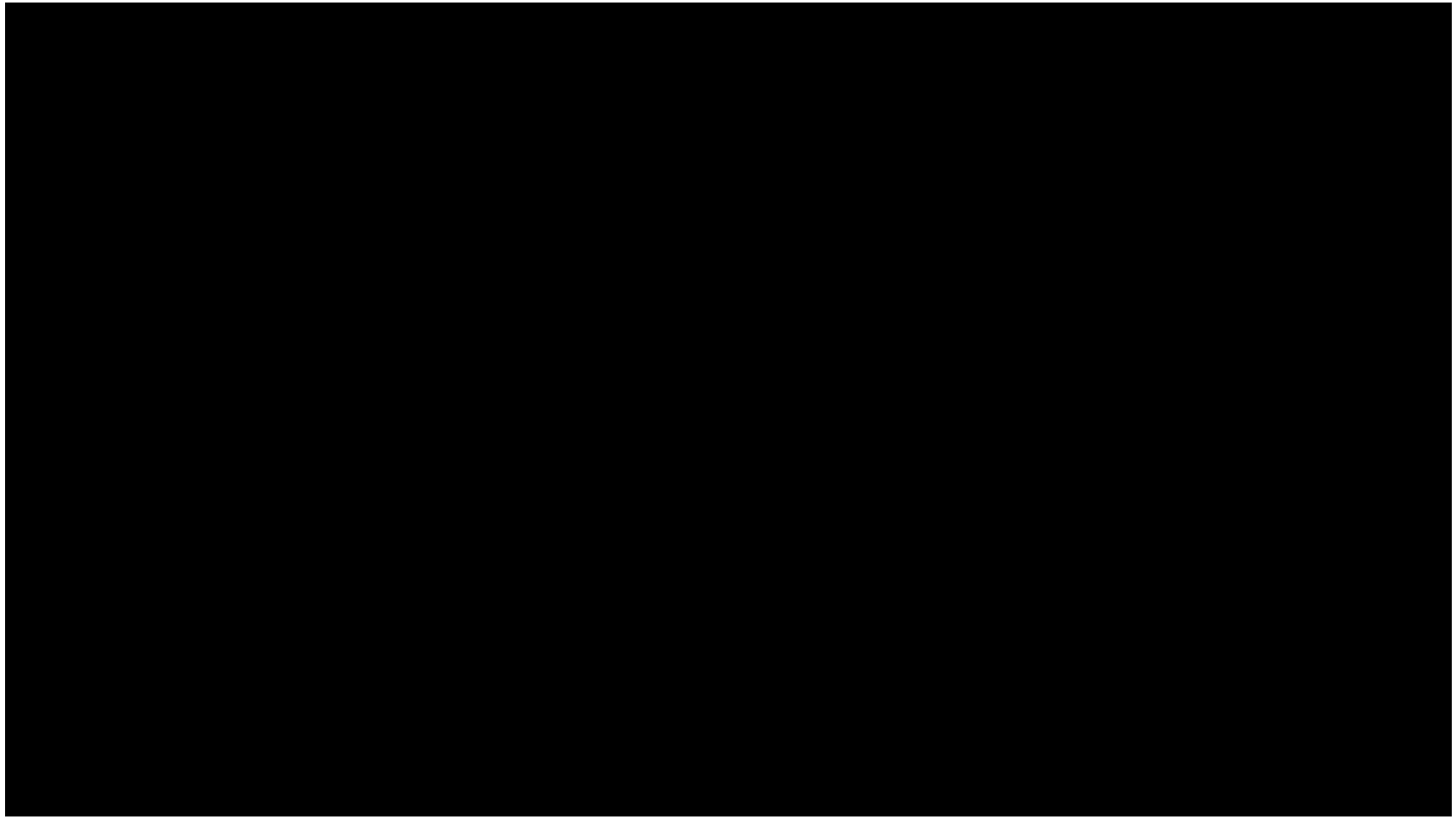


Featured Project

North Carolina Sewer Project

Featured Project

New Jersey Sewer Project



Featured Project

United States Government General Service Administration

Entire project was completed in just two working days.

Lined 230 feet of 3- and 4-inch underground steam condensate return piping

Successfully returned the system to full operating status

Coating insulated pipes, significantly increasing and enhancing the efficiency of the entire system

Featured Project

JFK Airport

Significantly increased system insulation values, allowed chiller output temperatures to be raised, boiler temperatures lowered, and subsequent consumption to be lowered.

Significantly increased flow inside the carrier pipes, which on pressurized systems, reduces the amperage draw on the pumps.

Completed multiple sections of pipe sections with sizes varying from 10” to 36” and up to 500 feet at a time.

Featured Project

Merrick Road - New York American Water

Restored a 100-year-old water main with a history of leaks, severe corrosion and poor water quality in Massapequa, NY

Successfully lined over a 2 month period in Spring 2016

Using our proprietary SIPP process, a structural 3 mil (1/8th”) epoxy coating was evenly applied through the entire length of 2 miles of 12” cast iron domestic water pipe under strict zero-VOC policy

Developed logistics to minimize disruption to 4-lane highway, despite multiple adverse conditions, such as multiple trapezoid sweeps, including underneath small rivers and other utility services

Jersey Shore Pennsylvania Domestic Water Lining Project

Rural town of Jersey Shore, Pennsylvania, has a gravity fed domestic water distribution system.

Successfully lined two miles of pipe on time and on budget.

Base infrastructure 16” and 12” cast iron mains originally installed in the 1890s, to supply steam locomotive station

System’s lead sealed joints had tuberculation levels as high as 50%

Bypass system for approximately 150 residences installed and successfully maintained Several trapezoidal pipe layouts under streams and rivers were successfully lined in place.

This was a turn key project: attended to all site safety, excavation, mechanical and road restoration.

Coatings Specification Details

Coatings are able to withstand prolonged exposure to heat, chemical and aggregate

Other situational applicable coatings include:

- HVAC
- Sewer
- High Temperatures
- Cooling Tower
- Fire hydrant lines / stand pipe
- Steam vaults
- Steam condensate lines
- Cogeneration
- Domestic Water

Our coatings are warrantied for 1 year and have a 75 year engineered life

Customized Solutions and R&D capabilities

Spray-In-Place Pipe Rehabilitation

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