



CWEA – Collections System Fall Seminar

Presented by:
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December 1, 2016

Agenda

Introduction

Pressure Pipe Rehabilitation Options

Michels – CIPP Overview



Rehabilitation Options

Non Structural Rehabilitation

- Spray-on Products – cement, epoxy, poly-urea
- Pulled in flexible reinforced (Kevlar) hose systems

Rehabilitation Options

Structural Rehabilitation

- Dig & Replace
- Pipe Bursting
- Slip-lining
- Horizontal Directional Drill (HDD)
- Fiber Reinforced Polymer (FRP)
- Cured-in-Place Pipe (CIPP) lining systems

CIPP Overview

- Industry has used CIPP to rehabilitate infrastructure for more than 45 years
- CIPP – A joint-less lining system, a “pipe within a pipe”
- Adds 50 years design life to most host pipes
- Liners are designed specifically for each application and specific site conditions
- Pressure pipe liners add a layer of fiberglass to provide “hoop strength” for the lining system.



CIPP – Step by Step Process

- Requirements for temporary by-pass – take into account fire protection, commercial buildings, multifamily housing, cold temperatures
- Access Pits are normally required for access
- Pre-CCTV, Cleaning, and Plugging Services
- Installing the CIPP liner – Inversion, either water or air; or via pull-in and inflate
- Curing the liner – air/steam, water
- Pressure Testing – Per ASTM F-1216 or F-1743
- Opening Services

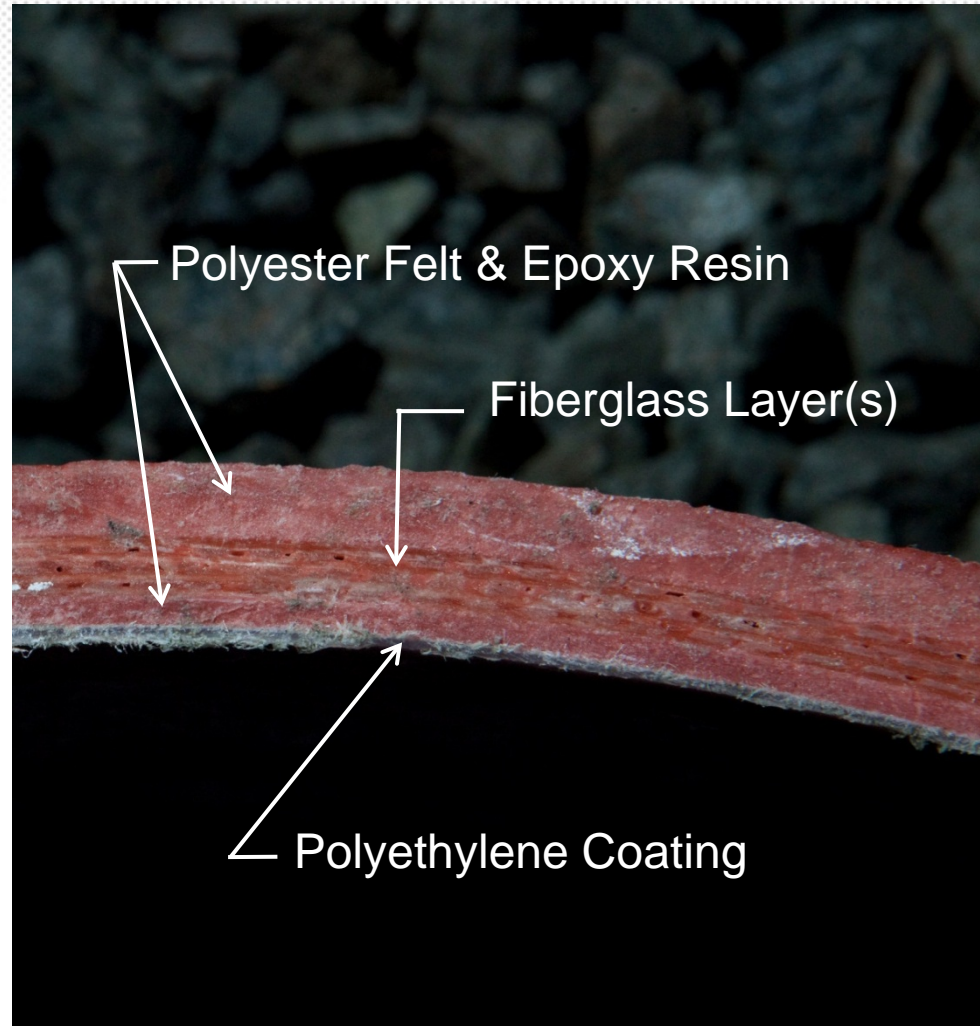
Pressure Pipe Lining System

- Michels is a licensed installer for the NordiPipe lining system
- All drinking water pressure pipe lining systems must meet the NSF / ANSI Standard 61
- Liners are designed to meet AWWA's Class IV fully structural lining system – per M-28 Manual, 3rd Edition
- Most pressure pipe lining systems are available from 6 to 48 inches in diameter
- Designed for normal operating pressures
- Pressure testing up to 150 psi

Benefits of CIPP Pressure Pipe Liners

- CIPP liners are composite lining system – felts, fiberglass & coating
- Ensures a close fit to host pipe
- Provides superior physical and mechanical properties
- Designed to meet the ASTM F-1216 or ASTM F-1743 Standard for installation and curing
- May bond or adhere to the host pipe – dependent on the condition of the host pipe and host pipe materials, and extent and method of cleaning performed
- Can usually reinstate later connections without excavation

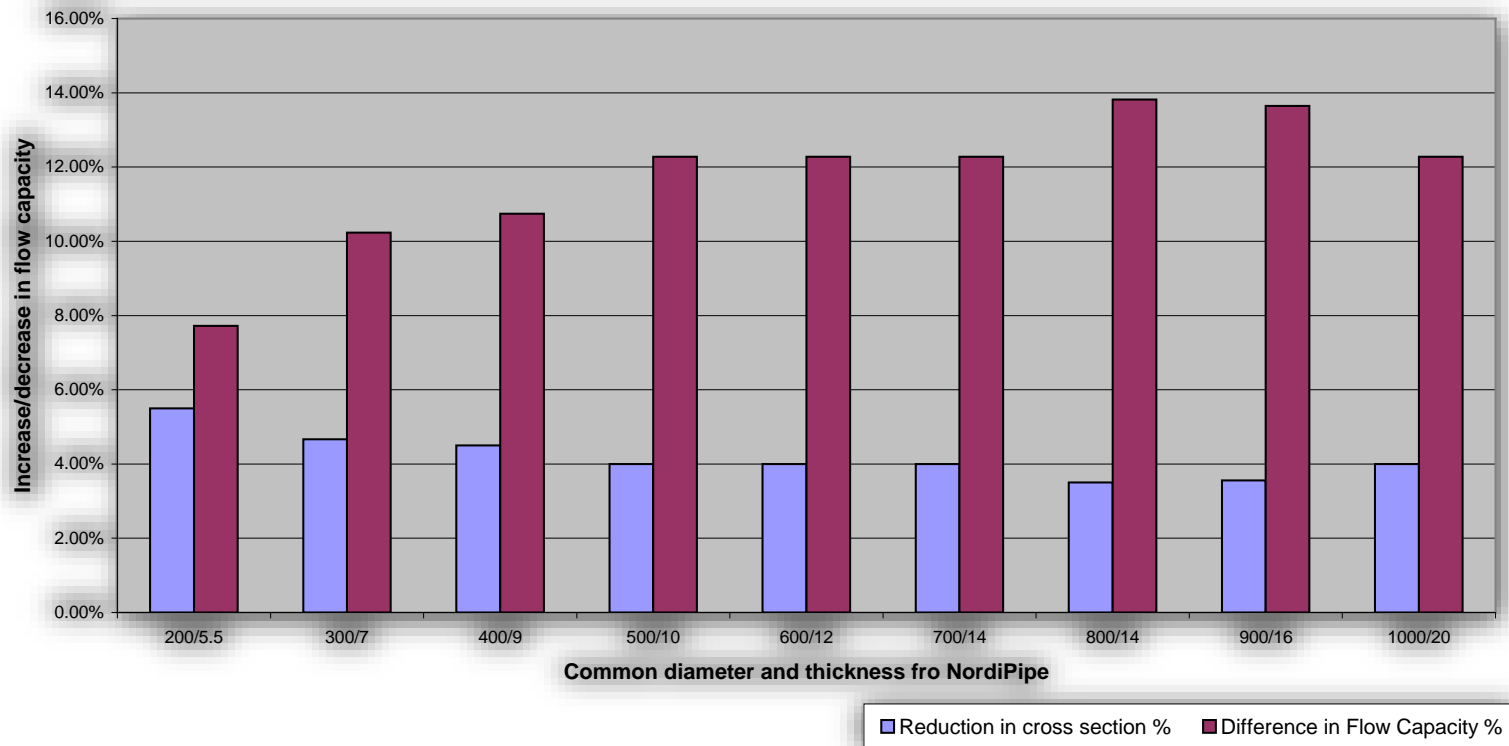
Composite Liner Structure



Flow Performance

Hazen-Williams Coefficient – C value of 140

NordiPipe vs concrete, Ductile Iron (new), or galvanized iron (C=120)



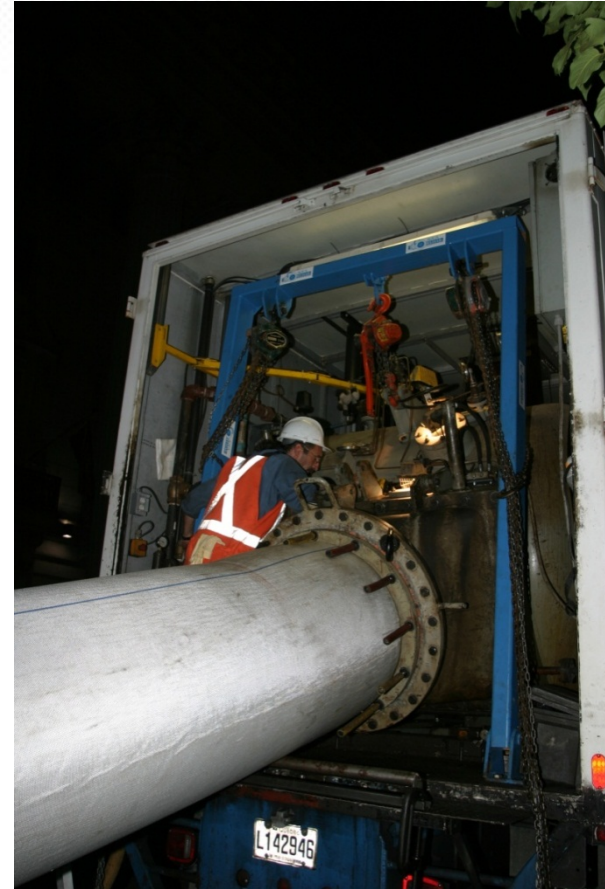
Access Pits used for Installation



Liner Installation Techniques - Inversion



WATER INVERSION METHOD
(typically 21 inch diameter and larger)



AIR INVERSION METHOD
(typically 6 to 18 inch diameters)

Liner Installation Techniques – Pull-in



“pull-in” and inflate – typically 6 to 18’ diameters

Reversion unit used to install a water main in Chicago, IL



Reversion unit used to install a water main in Chester, PA



Questions?

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Thank You For Your Time



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