

Entwistle Sanitary Sewer CIPP (Cured in Place Pipe) Lining Project

January 23, 2017 to February 3, 2017

Consultant: AECOM Canada Ltd.

Contractor: Insituform Industries Ltd.



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Project Background

In the Entwistle Infrastructure Assessment Report completed in September of 2014, AECOM recommended that approximately 2,300 m, or 42%, of Entwistle's 5,456 m sanitary sewer collection lines be rehabilitated by installing Cured in Place Pipe (CIPP) liners.

Parkland County retained Insituform Industries Ltd. who between January 23, 2017 and February 3, 2017 performed this work.

Project Cost

The total cost of the CIPP lining the 2,300 m of sewer line was \$270,000 or \$117 per metre. This included mobilization, demobilization, pre-lining cleaning and camera, cast in place pipe lining, reinstating service connections, pipe joint sealing, post construction report and warranty cleaning and camera works.

What is Cured in Place or CIPP Lining?

Cured in Place Pipe or CIPP lining is a trenchless rehabilitation method that is used to rehabilitate cracked, broken, aged and failed sanitary sewer or storm sewer pipes. CIPP lining is less expensive and more efficient than traditional open cut replacement methods as it is installed with little or no surface disruptions and with minimal impacts to area residents.

CIPP liners are often referred to as being a "new pipe within a pipe". The liner bonds to the existing host pipe and is designed to be independently structurally strong. The CIPP liner does not rely on the host pipe for any structural strength contribution. The liner slightly reduces the diameter of the host pipe, but this loss in diameter is offset by increased characteristics of the smooth liner surface material.

Properly installed CIPP liners have a minimum life span of 50 years. They do not experience deterioration from hydrolysis or from chemical attack.

Prior to lining a pipe, residents are notified and are asked to limit their water consumption. The pipe is flushed and cleaned. A remote controlled robotic video camera is sent into the pipe to record the number and location of all service connections.

CIPP liners are constructed of tubular layers of non-woven polyester felt with an exterior polyurethane coating. The exterior polyurethane coating performs two functions:

1. It acts as an impervious exterior that ensures once the felt liner is impregnated with resin, the resin does not seep out while it is being transported and installed.
2. When the resin impregnated liner is turned inside out or inverted and inserted into the host pipe, the polyurethane liner becomes the smooth new inside surface of the lined pipe.

Polyester felt liner with exterior polyurethane coating



During a process called “wet-out”, the felt liner is impregnated with a calculated amount of catalyzed thermosetting resin mixture. The felt acts as both a resin carrier and adds flexible strength to the finished liner.

Liner wet-out process



Upon completion of the wet-out, the CIPP liner is transported to the installation site in a refrigerated truck.

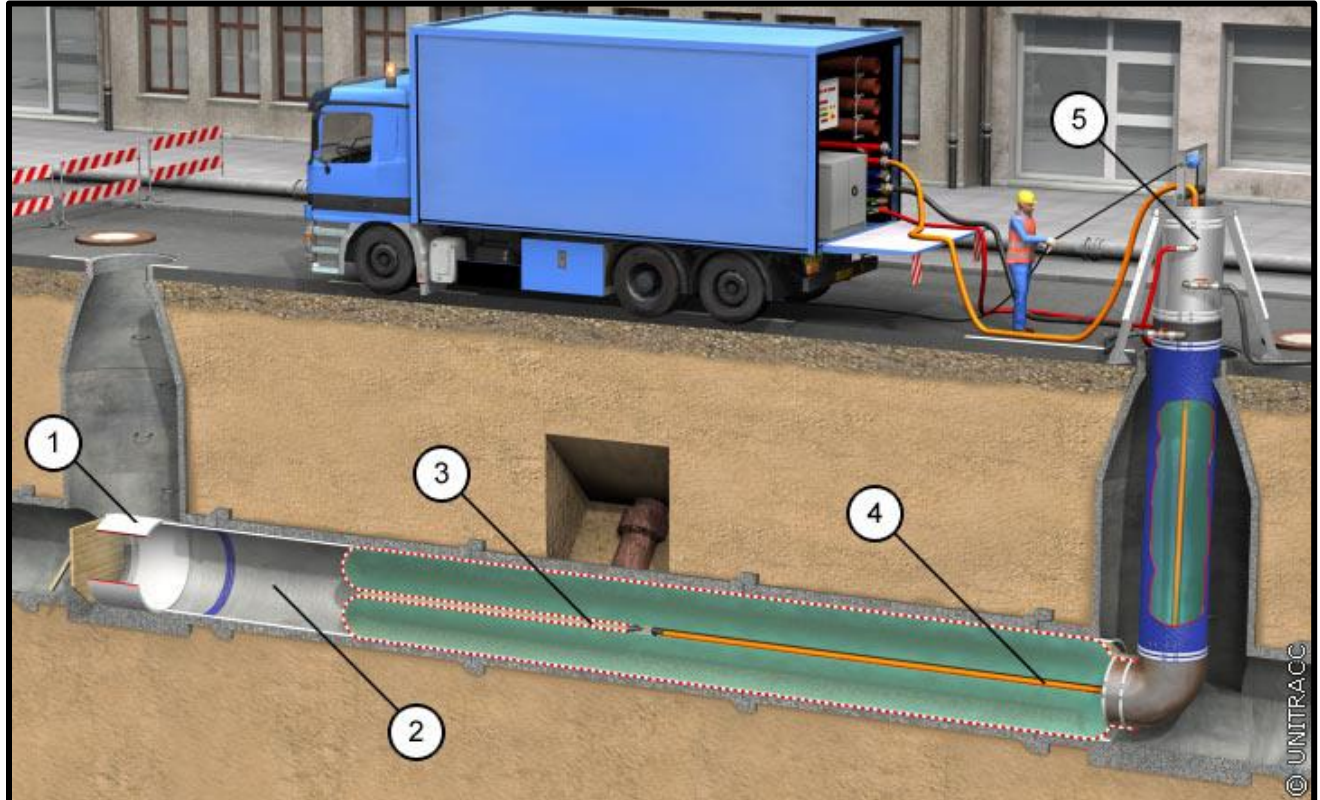
Wet-out liner being loaded into refrigeration truck



At the installation site, the CIPP liner is positioned or “blown” into the host pipe by air inversion. Once in position, the CIPP liner is inflated by air pressure or by a water column to press the material against the host pipe wall. When fully inflated, steam or hot water is circulated within the liner to start the thermosetting resin to cure or harden. After the cure has completed, the liner is slowly cooled to prevent shrinkage.

Cured in Place Pipe (CIPP) liner installation process

- 1. Test pipe section to be sent to laboratory for quality control and quality assurance testing.***
- 2. Host pipe.***
- 3. Inverted wet-out resin impregnated polyester felt liner being inverted into the host pipe.***
- 4. Tag line for controlling rate of entry into the host pipe.***
- 5. Inversion and air / steam injection frame.***



To reinstate the service connections that were closed off when the liner was inserted, a remote controlled robotic cutting tool is sent down the CIPP lined pipe. Each service is cut open. The pipe is then flushed and cleaned. A final video is taken after cleaning for quality control and quality assurance purposes.

For each section of pipe lined, a test sample is taken. The sample is tested in a laboratory to ensure the installation specifications have been met.

Project Photos of Insituform Installing the CIPP Liner in the Hamlet of Entwistle

Insituform steam truck and liner truck set up at manhole preparing insert a liner.



Resin impregnated felt liner in loading frame – ready to be inserted into the manhole and sewer pipe.



To provide a barrier to stop sewage from leaking between the liner and the original sewer pipe, end seals are placed where the sewer pipe connects to the manhole. The CIPP liner covers these end seals. If sewage leaks between the CIPP liner and the original sewer pipe within the manhole, the end seal will swell and stop the sewage from further getting between the CIPP liner and original sewer pipe.



Resin impregnated liner being inserted into a manhole using high pressure air.



Steam curing the liner. The liner is steam cured for 2 to 3 hours. Steam is blown in the insertion manhole end and released at the receiving manhole end.



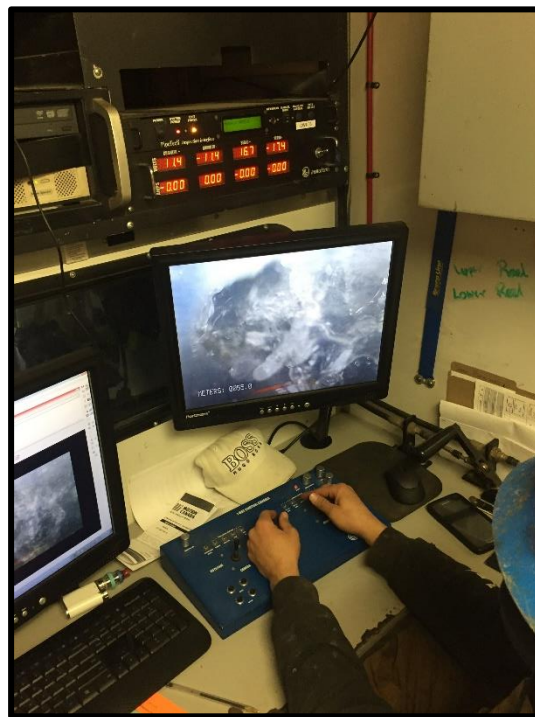
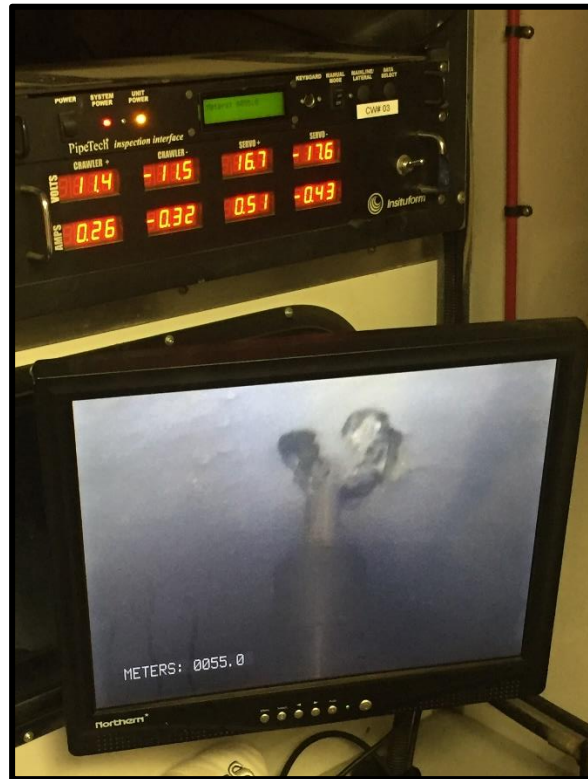
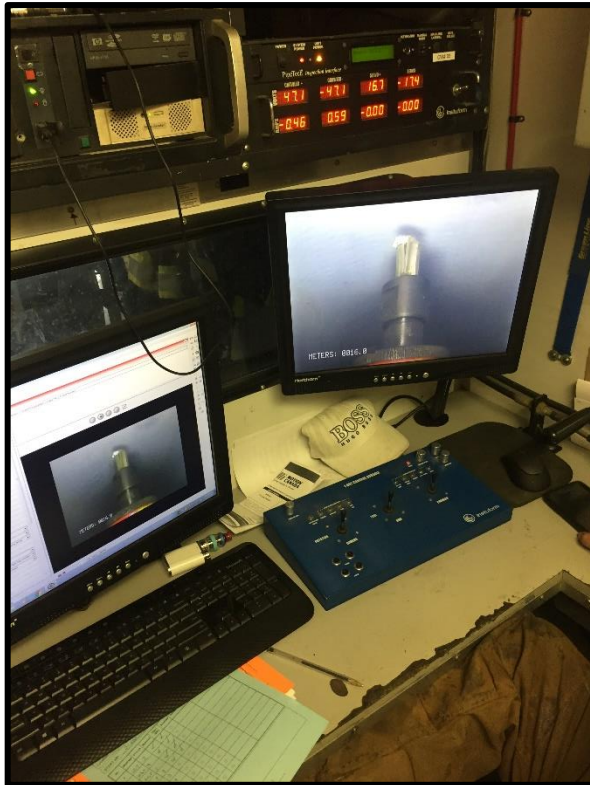
The blue section of CIPP liner protruding from the manhole and laying on the ground will be cut off inside the manhole once the curing has been completed.



Installing cutting tool on remote controlled robotic cutting arm. The tool is sent into the cured CIPP lined sewer pipe to cut open each service connection that was blocked during the CIPP liner installation.



Remote control cutting out of the service connections. The location of each service connections was identified prior to the CIPP lining. The robotic cutting tool is sent down the CIPP lined sewer pipe to each location to open and reinstate the service connection.



LEGEND

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48 HOUR DOOR HANGER SAMPLE

Please Limit Your Water Usage;
Read Below For Details.

Important Notification On Front — Please Read.



Insituform®

**We'll be your new neighbour
but only for a day or so...**



**Don't worry.
We will be
good neighbours
and not make
a mess.**



Insituform®

**In the next few days, we will be in the
neighbourhood reconstructing certain
sewer pipes in need of repair.**

Insituform is under contract by your local government. The Insituform® process repairs pipes without digging up your neighbourhood. This helps to preserve your property and minimize any inconveniences.

Please bear with us as we repair your sewer system. We apologize for any equipment noise which may be created.

While the work is being performed, your sewer service connection will be temporarily sealed off (see Figure 1). We need your cooperation to avoid backup of sewer water into your residence or business by preventing water from escaping through any drain during the specified time period.

- ❶ Do not wash clothes or dishes.
- ❷ Do not take showers or baths.
- ❸ Do not flush toilets.
- ❹ Do not operate sump pumps which are connected to the sewer system.

If any problem occurs with your sewer service during this rehabilitation process, please visit one of our on-site representatives. If you have any questions after completion of the project, please call the local number listed below, not a plumber.

Insituform is sending this handout to provide advance notice before beginning actual work. Please do not use water during the hours of:

_____ to _____ on _____
Day and Date

Phone N3.

Thank you for your cooperation.
We have enjoyed being your neighbour—if only for a day.

DOC ID: COR/FRM-OPR-10 EFF DATE: 03/01/01
 APPROVAL: CO. MGMT. REP: ON FILE
 Revised 7/01 © 1999 Insituform Technologies®, Inc.

CONSTRUCTION NOTICE

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How This Work Affects You...

Insituform has been chosen by your local government to rehabilitate your sewers. Used worldwide for 30 years, our product is proven and reliable. The Insituform® process is the most widely used trenchless method for restoring full structural integrity to, and removing infiltration from, underground pipes.

As sewers age, they deteriorate in many different ways. Cracks appear, joints separate and roots penetrate. Infiltration through these cracks and joints creates external voids, accelerates structural deterioration and can overload collection systems and treatment facilities.

The Insituform method of sewer repair results in a seamless, jointless "pipe-within-a-pipe" creating a smooth, continuous inner surface which usually increases flow capacity. We typically complete installations in a single day, using robotic methods to restore active house connections from within the pipe. This quick and non-disruptive process allows our crews to work safely and efficiently.

We thank you for your cooperation, as requested on the front, and are glad to serve your community.

Typical Cross Section - Sanitary Sewer at Service Connection

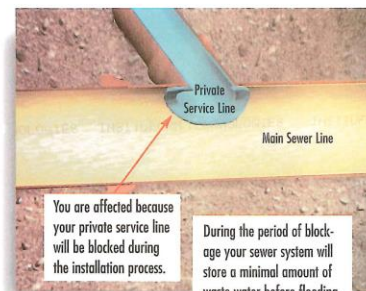


Figure 1 (After Rehabilitation)

*Insituform® is
a method of
repairing sewers
without disrupting
your neighbourhood.*

The Installation Process



1 The resin-filled Insituform® tube is inverted (turned inside out) through our patented Controlled Head Inversion Process unit into a deteriorated pipe.



2 The tube is installed by inversion into the host pipe using water or air pressure.



3 Following inversion, the resin is cured using hot water or steam.



4 Service laterals are restored internally. The finished Insituform® pipe is inspected and tested.

Insituform®
www.insituform.com®

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NOTICE**

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