

Watermain Cleaning, and Preparation



Innovative Solution for Water Utility Owners

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General Manager

...Many watermains are now reaching the end of their useable lives



6" tuberculated water main. Photo by Envirolitics



Water main break and repair. Source: Google Maps

These aging, deteriorated pipes are often congested with deposits, leaking and too often...failing!

Good News! Trenchless linings offer cost effective renewal solutions that extend the pipe's life

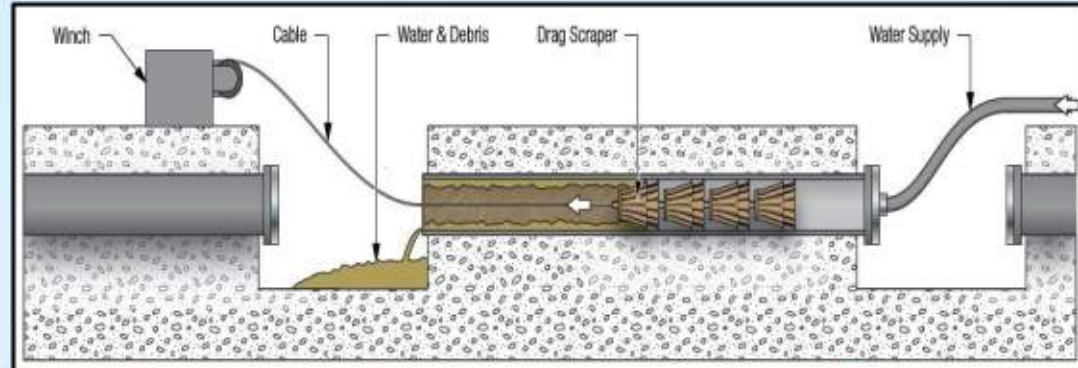


- Applied to the pipe interior after the cleaning process has removed all deposits and corrosion
- They keep the pipe healthy and corrosion free!

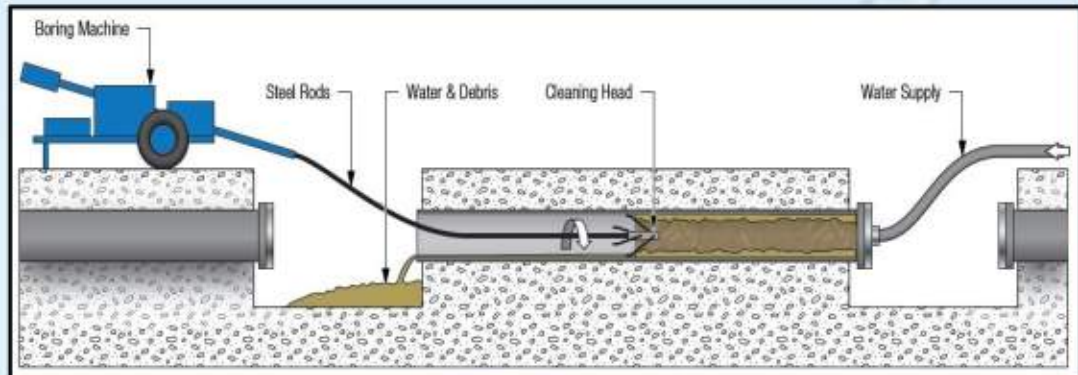
Examples of Current Cleaning Methods

American Water Works Association (AWWA) Manual M28

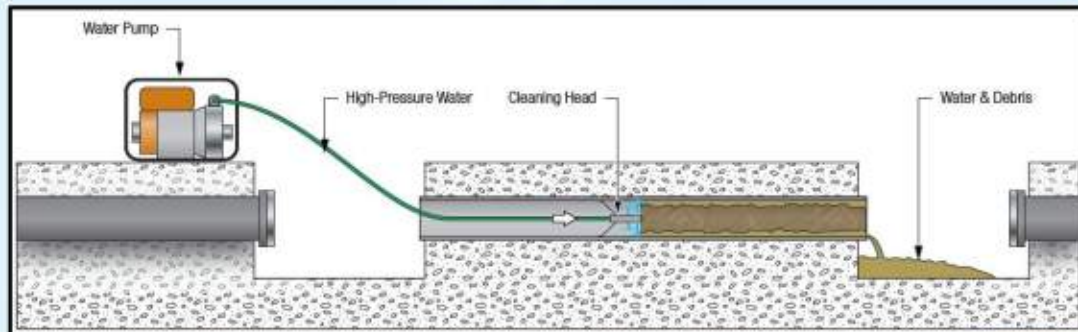
Drag Scrape



Power Bore



Water Jet



Current Cleaning Methods

- Can foul thousands of gallons of clean water and may require containment and treatment depending on contents
- May not remove all deposits, corrosion and bitumen to fully expose pipe wall
- Leave the pipe wet
- Further surface preparation is required to meet ASTM F3182



ASTM F3182 – Standard Practice for the Application of Spray-Applied Polymeric Liners Inside Pipelines for Potable Water

- 7.6.1 “The quality of cleaning and preparation is paramount if polymeric linings are to be applied successfully.”
 - SSPC-SP 7/NACE No. 4 standard for the pipeline
 - SSPC-SP 6/NACE No. 3 standard for service connections and terminations
- “7.6.4 Previously-applied coatings are typically removed unless the residual coating is tightly-bonded...”

ASTM F3182 – Standard Practice for the Application of Spray-Applied Polymeric Liners Inside Pipelines for Potable Water

Continued...

- “7.6.6 The pipeline shall also be dried and left free of visible moisture (free standing water) in both the pipe and the pipe joints prior to lining.”
- 8.3 Liner Bonding:
 - Field samples tested using ASTM D4541
 - Minimum of 250 psi

Tomahawk™ System

Developed by Envirolomics Engineering Inc.

Patented Tomahawk™ System
Aggregate Delivery Unit

Standard Vacuum Truck

In-ground water main
up to 450' long

The Tomahawk™ System restores deteriorated pipes using abrasives and a high-volume, low-pressure airstream to clean and dry the pipe in preparation for lining using minimal to no water.

Tomahawk™ System Process Overview



[Click here to view video](#)

Tomahawk Advantage



- ✓ Dust-free, environmentally friendly, trenchless process
- ✓ Uses little to no water, reducing waste by up to 98% over wet cleaning methods
- ✓ Quickly removes tuberculation, biofilms and old bitumen or coal tar linings
- ✓ Best-in-class surface preparation for superior bond and long-term, leak-free performance
- ✓ Dry pipe allows for immediate liner application



Small Access Pit



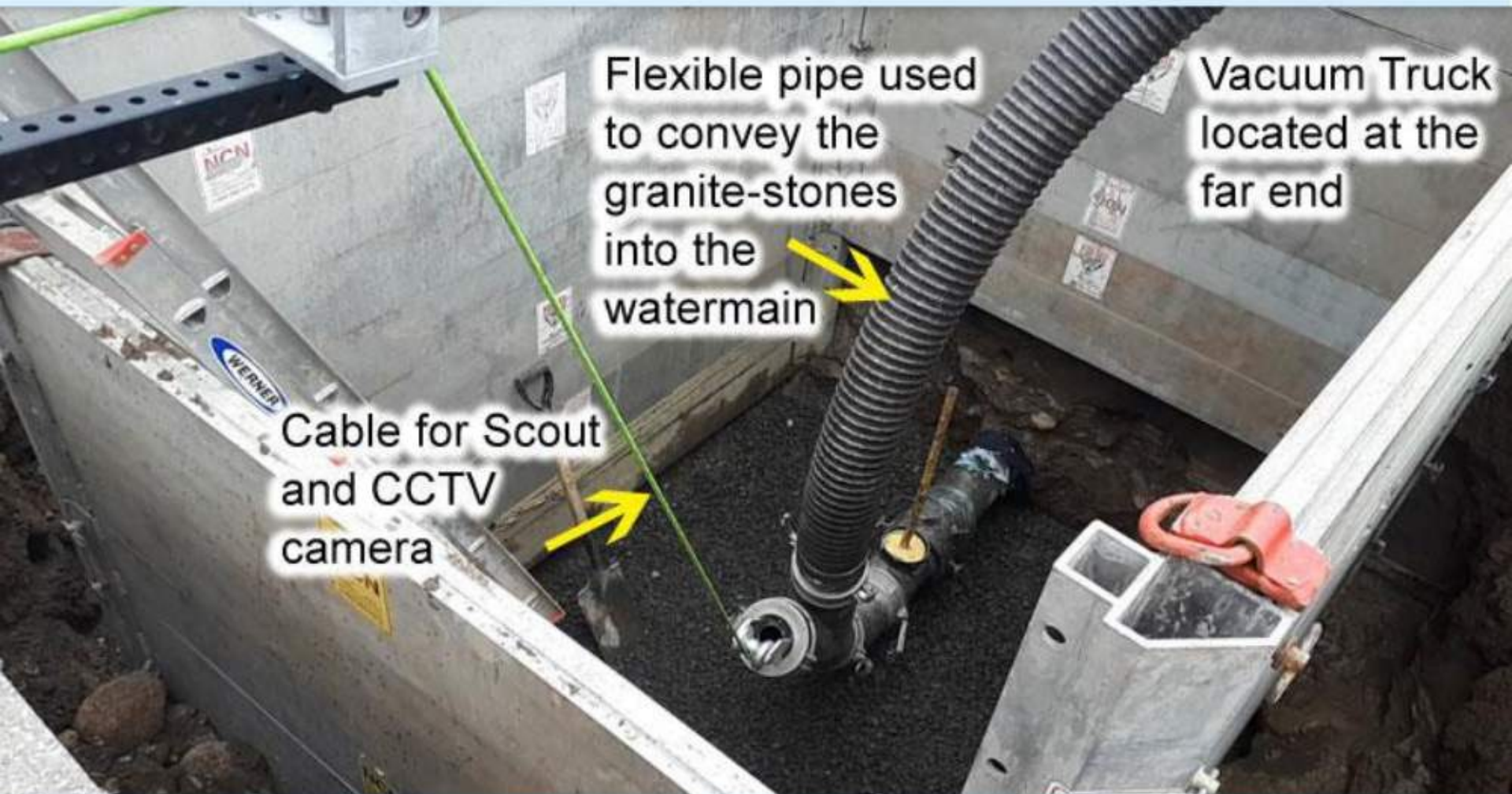
- ✓ Trenchless watermain rehab with minimal surface disruption
- ✓ Small footprint vs dig and replace
- ✓ No service bypass installed

Aggregate delivery trailer



Flexible black hose used to convey abrasives into watermain

Set-up in Access Pit



Vacuum truck connected to pipe at far end



Vac truck

- Generates pipe airstream for cleaning process
- Captures dust and debris, maintaining a clean and safe worksite, protecting both public and workers
- Eliminates public viewing of the nasty waste released from their drinking water pipes
- Allows for ease of disposal

Cleaning progression.....



Tuberculation



Partial tuberculation
removal



Full tuberculation removal,
bitumen liner visible



Preparation progression.....



Bitumen liner being removed



Partial liner and graphitic corrosion removal



Fully prepared for liner bonding



“Best-in-Class” Surface Preparation and Inspection

- Tomahawk Scout™, air driven CCTV inspection camera and vaculator, used during preparation
- The green arrows indicate where loose graphitic corrosion was removed
- Preparation meets or exceeds ASTM F3182
- Service connection was cleaned to an SSPC-SP6/NACE No. 3 condition for superior liner bond
- Scout videos can be viewed on our [Envirolitics YouTube](#) channel



"Tomahawk provides 'best-in-class' pipe cleaning and surface preparation of any system commercially available".

**Dr. Mark Knight, Associate Professor and
Director of CATT, University of Waterloo,
ON.**

Abrasives - Stone

- Various sizes, 50lb bags
- Stone is clean and dried at high temperature
- Verified bacteria free



Health and Environmental Laboratory Inc. - 1-800-Certificate of Analysis

3239 Penetanguishene Rd.
Barrie, ON L4M 4Y8
Telephone: 705-722-5227
Fax: 705-722-5224
Email: aquaenvirolab@gmail.com

Certificate of Analysis

Sample Receipt Date & Time: 2016-09-15 10:59
 Total Number of Samples Received: 2
 Arrival Temperature of Samples (°C): 19.1
 Bacterial Analysis Start Date & Time: 2016-09-15 11:25
 Analysis Date: _____

REPORT TO: Client: Envirologics
 Address: 193-5 Manitoba St. Bracebridge, ON.
 Contact: David Moore
 Email: dmoore@envirologics.ca
 Phone: 705-706-5778
 Fax: _____
 After Hours Contact: _____

Water Works Address: _____
Water Works Number: _____
Health Unit: _____
Comments: _____

Regulation: D/D/0 258/08-316/08 Private N/A

Date and Time Sampled	Sample ID, Location and Type: Raw, T = Entry/Treated, D = Distribution, RC = Raw Water Consumed	Chlorine		Temp. Sample (°C/°F)	Laboratory Number	Total Coliform		E. coli	Background		HPC	pH	Turbidity MTU	Microcystin	
		Total	Free			CFU	CFU/100 ml		CFU/100 ml	CFU/ml				µg/L	
2016-09-15	Control Sample - D				08096	0			0						
2016-09-15	1/4 stone				08097	0			67						

Results refers only to aliquots submitted. CFU = Colony Forming Units. HPM = Heavy Particulate Matter
 Report not to be reproduced, except in full, without written approval of Aquatic and Environmental Laboratory Inc.

Date Approved: 2016-09-16 Approved By: DM Sample Collection: _____
 Sample Relinquishment: _____

Total Coliform: Detection Limit: 5 - 150 Reportable Limit: 1 Microcystin: Detection Limit: 0.15 µg/L Reportable Limit: 0.15 µg/L
E. coli: Detection Limit: 5 - 150 Reportable Limit: 1 pH: Detection Limit: 4 - 10 Reportable Limit: 6.5
HPC: Detection Limit: 10 - 2,000 + 100 Indicates Determination: +000 Turbidity: Detection Limit: 0.15 NTU Reportable Limit: 1.0 NTU Indicates Determination: 1.0

Trenchless Watermain Rehabilitation - Tomahawk™ Cleaning
150mm - 120 meter long watermain - cleaned and prepared for lining in 2 hours



[Click here to view video](#)

Cleaning Results: 4" Cast Iron Pipe Cleaned in London, England

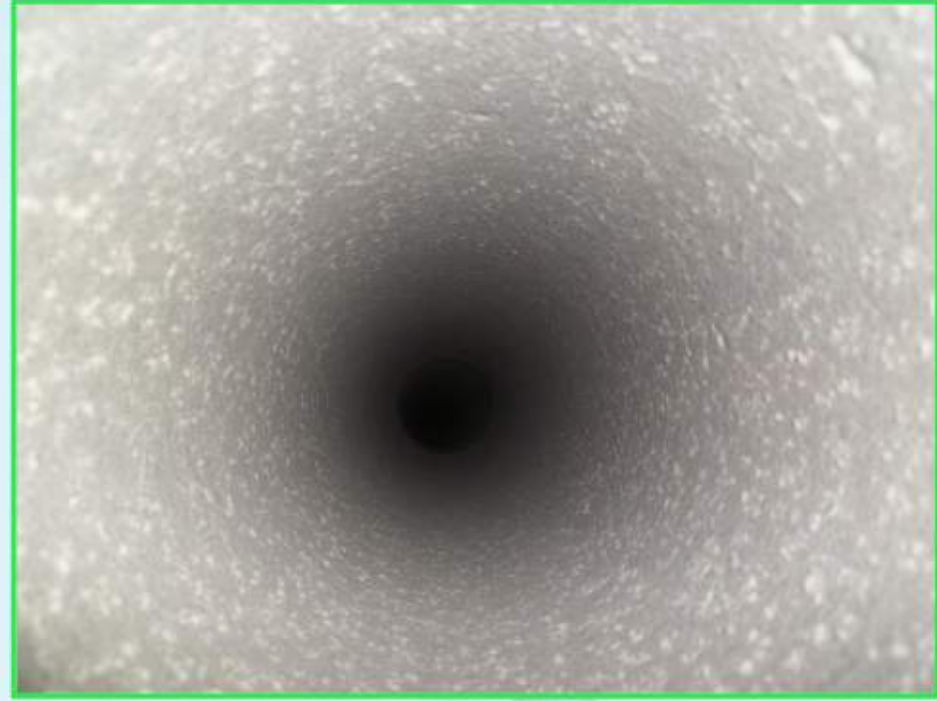


- 1889 unlined cast Iron pipes
- Panton McLeod UK, Tomahawk licensee

Corrosion and Coal Tar Liner Removed from 6" Cast Iron Pipe



Before



After

Tuberculation Removed From 6" Unlined Cast Iron Pipe



Before



After

Saint John, NB: Bitumen and Tuberculation Removal

- Project completed July 2014
- Objective: Water quality/capacity improvement
- 800 meters of CI pipe rehabilitated in 6 days
- 150 mm (6") and 200 mm (8") bitumen lined
- 1955 cast iron pipe; structurally sound
- Same day return to service; no service bypass
- Water quality lining: 3M Scotchkote™ 2400 Liner applied by Trenchless Solutions Inc. of Moncton NB.

Saint John, NB: Bitumen and Tuberculation Removal



Achievements:

- Improved water quality
- Hydraulic capacity restored
- Reduced power consumption to pump water
- Decades of additional service

12" CML Pipe Cleaned and Prepared for CIPP Installation

- 12" CML pipe with leak located directly under an active railway line in New York City
- Due to critical location, pipe sat abandoned for 2 years awaiting a cleaning and preparation solution
- Tomahawk completed cleaning and preparation of pipe segment in one hour
- Removed biofilm, tuberculation at joints, and deteriorated CML providing a smooth and dry surface for ease of pulling in CIPP liner and achieving excellent bond to pipe



Proven Cleaning Capability

- 100mm (4") to 300mm (12") pipe
- Cleaned up to 137m (450 feet) per pipe segment
- Up to 40% tuberculation/encrustation
- One 22.5° elbow per segment
- Cleaned and dried CML lined pipe
- Meets or exceeds surface preparation and bond requirements for ASTM F3182



Unique Bird's-Eye View of Tomahawk in Action



[Click here to view video](#)

The Innovative Pipe Cleaning and Preparation Solution

Fast. Dry. Bonded.

Phone: (800) 267-9810

Info@envirologics.ca

Follow us on Twitter @TomahawkWater

Envirologics on YouTube

[Check out our website for additional information](#)

www.envirologics.ca

