



# Trenchless and Dry Watermain Rehabilitation using Tomahawk in Victoria and Vancouver BC

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TRENCHLESS TECHNOLOGY ROADSHOW

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

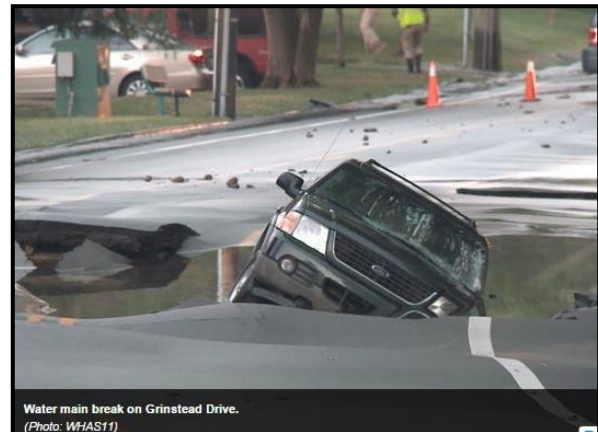


These aging, deteriorated pipes are often congested with deposits, leaking and too often...failing!



# Impact to Municipal Owners

- **Deposits** create poor water quality, reduce fire fighting flows and increase pumping demand
- **Leaks and failures** increase pressure on water supply, often create service outages and can damage other infrastructure
- **Are these issues impacting your municipality?**



Water main break on Grinstead Drive.  
(Photo: WHAS11)



Source: Associated Press

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

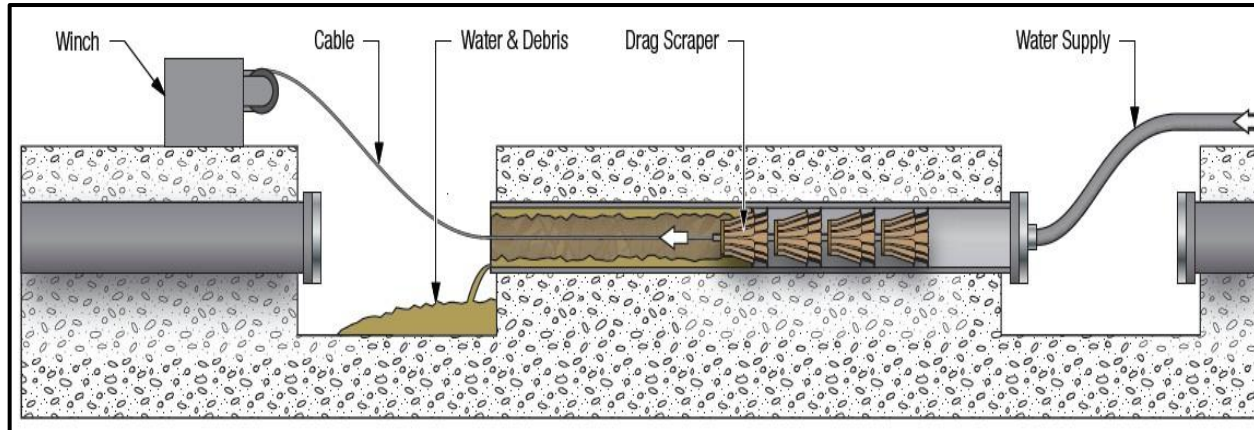


- They keep the pipe healthy and corrosion free
- Applied to the pipe interior after the cleaning process has removed all deposits and corrosion

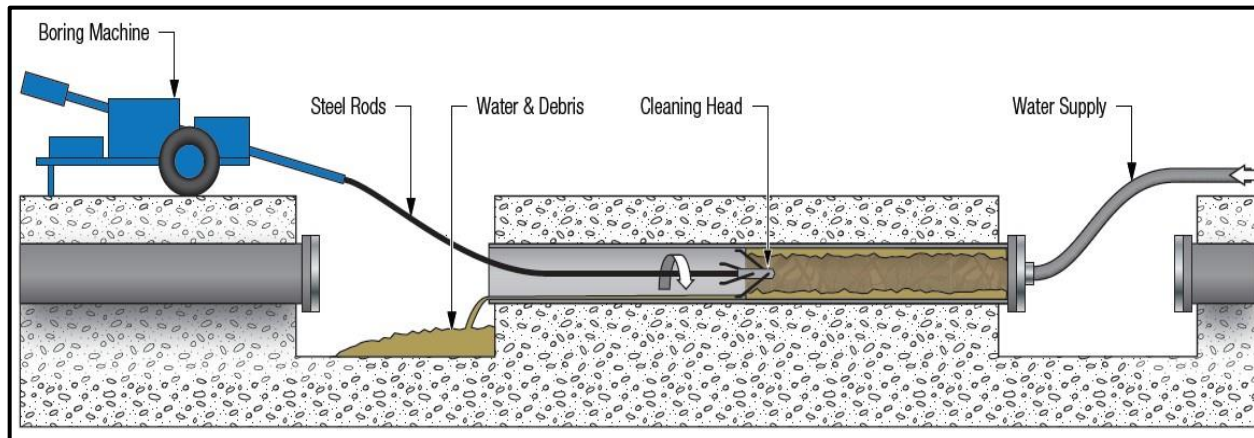


# Conventional Trenchless Pipe Cleaning Methods

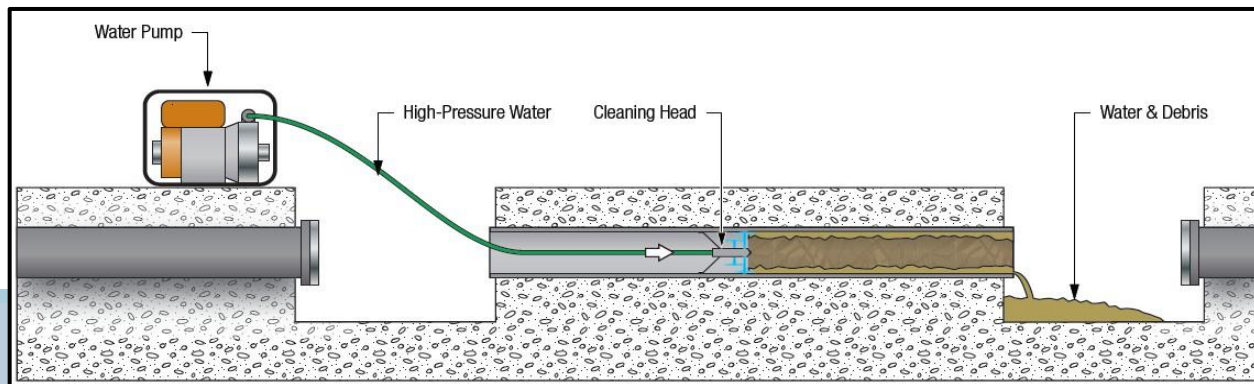
Drag Scraping



Power Boring



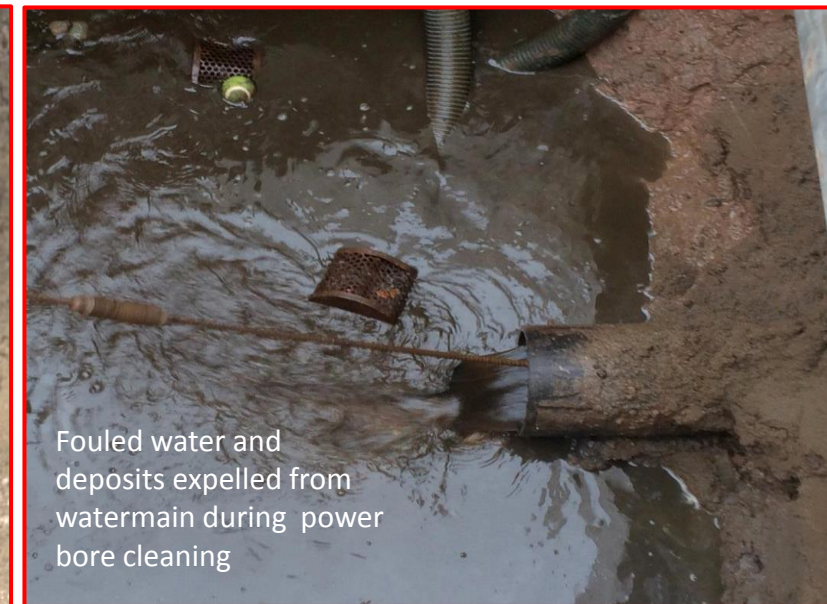
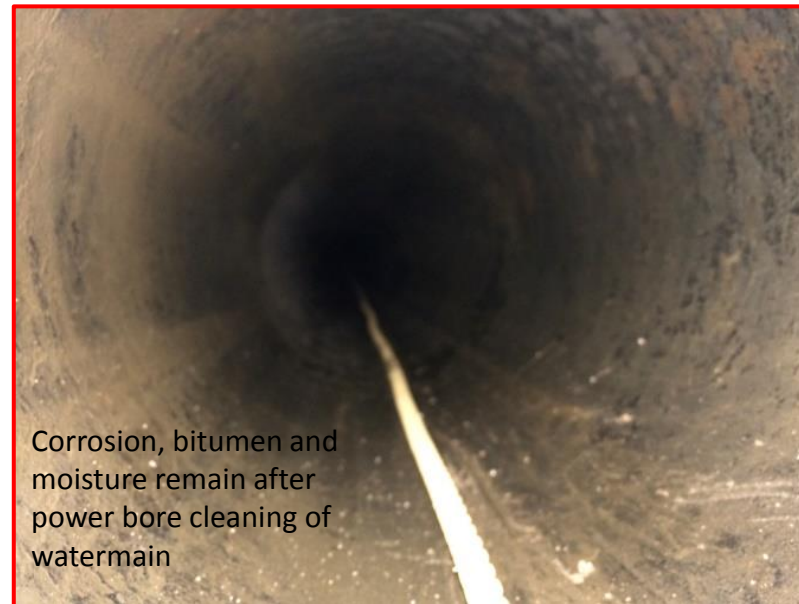
Water Jetting



Source: AWWA M28

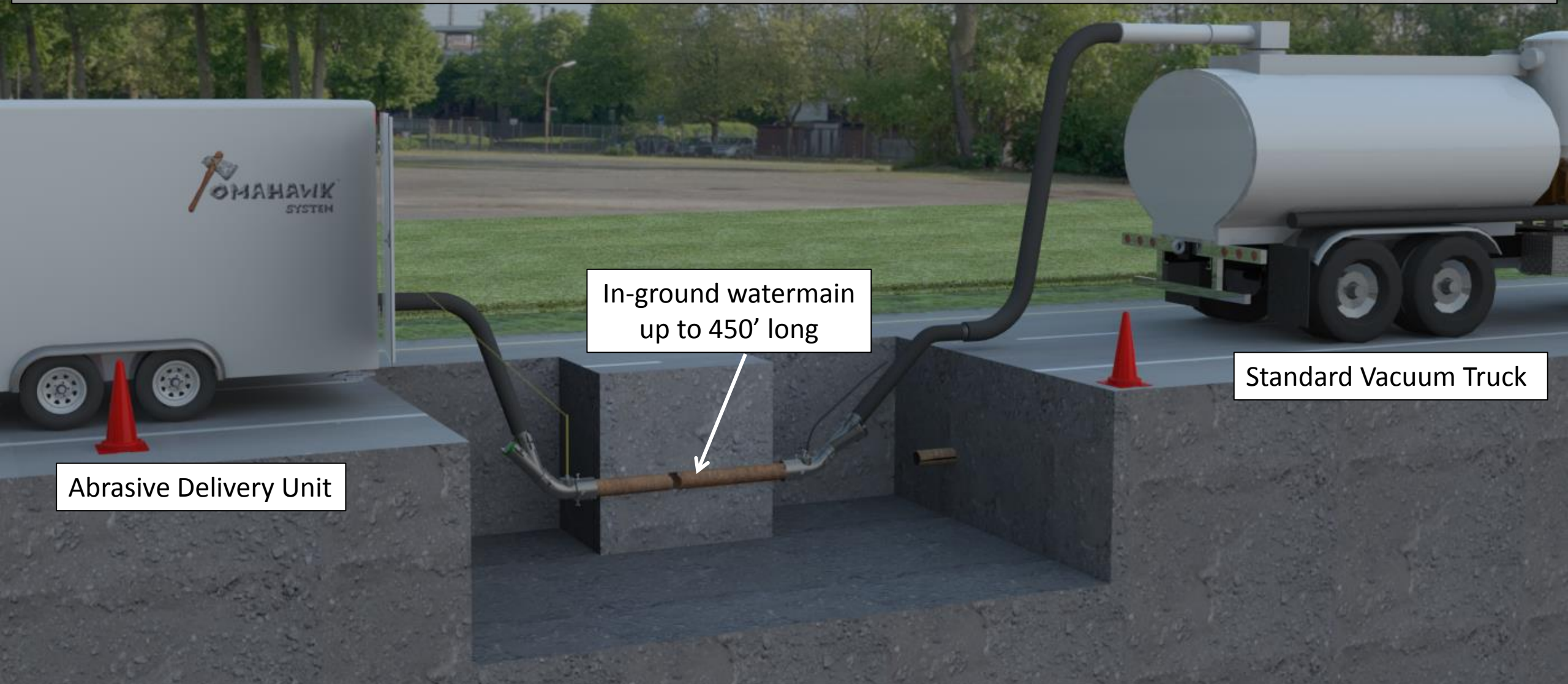
# Conventional Trenchless Pipe Cleaning Methods

- Can foul thousands of gallons of clean water that may require containment and treatment depending on contents and infrastructure owner requirements
- May not remove all deposits, corrosion and bitumen to fully expose pipe wall
- They leave the pipe wet





The patented Tomahawk™ System restores deteriorated pipes using abrasives in a high-volume, low-pressure airstream to clean and dry the pipe in preparation for lining without using water



Abrasive Delivery Unit

In-ground watermain  
up to 450' long

Standard Vacuum Truck

# Tomahawk™ System Process Overview



[Click here to review video from PDF](#)





Small access pits

## Tomahawk Advantage

- ✓ Waterless, dust-free, environmentally friendly, trenchless process
- ✓ Up to 98% waste reduction over wet cleaning methods
- ✓ Fast, 2-3 hours to clean typical pipe section, service bypass optional
- ✓ Removes tuberculation and old bitumen or coal tar linings to restore water capacity and quality
- ✓ Superior clean and dry surface preparation
- ✓ Dried pipe allows for immediate liner application

# Tomahawk's Proven Cleaning Capability

- 100mm (4") to 300mm (12") pipe
- Cleaned up to 135m (450 feet) per pipe segment
- Up to 40% tuberculation/encrustation
- One 22.5° elbow per line segment
- Surface preparation equivalent, NACE No. 4 up to NACE No. 3 if required

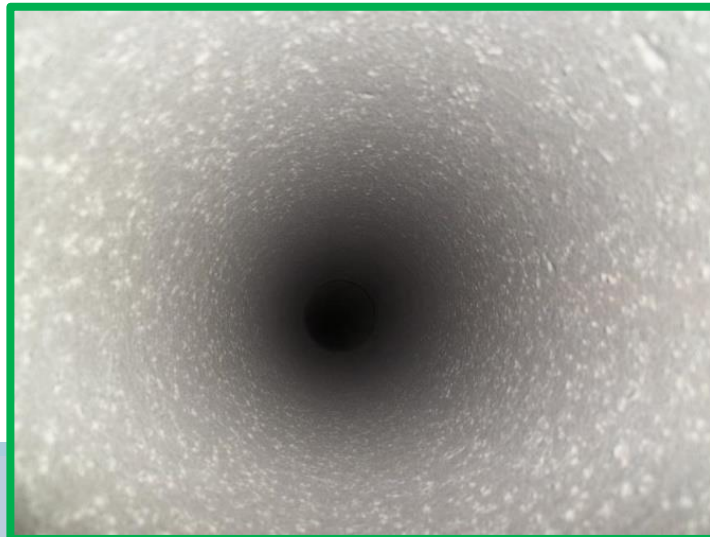




# Tomahawk Cleaning and Preparation Results



Tuberculation, corrosion, bitumen and coal tar removed leaving dry metal surface





# Victoria, BC. Trenchless Watermain Rehab

## Tomahawk Cleaning, SIPP Lining

- Water quality and capacity improvement
- Completed November 2014
- 480 meters, 5 pipe sections completed
- 150 mm (6") CLM lined and 200 mm (8") unlined
- 1908 cast iron pipe, structurally sound
- 3M™ Scotchkote™ Pipe Renewal Liner 2400 (SIPP), Canadian Induracoat Corp., located in BC





# Victoria, BC. Trenchless Watermain Rehab Tomahawk Cleaning, SIPP Lining



6" CML lined CI pipe, corrosion and bio film removed, dried and lined



# Victoria, BC. Trenchless Watermain Rehab Tomahawk Cleaning, SIPP Lining



8" unlined CI pipe, cleaned and lined



# Vac Truck - Waste Capture

- Creates the pipe airstream during cleaning
- 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



# Lead Joint Cleaning and Encapsulating

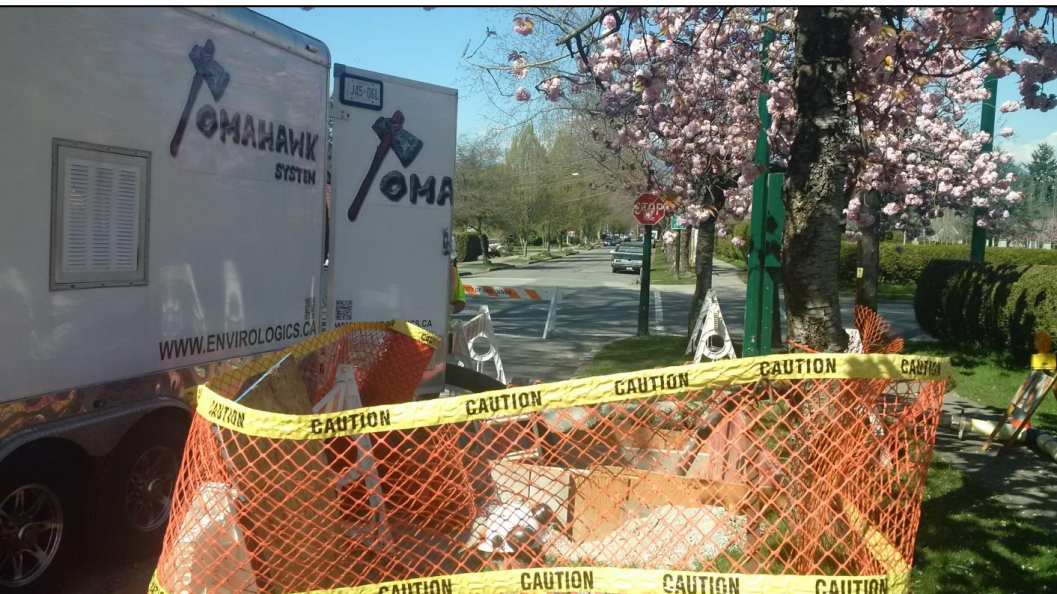
- The cast iron watermain contained lead packed joints, exposed to drinking water
- Excess lead from several joints was removed during cleaning
- Subsequent lining encapsulated lead, eliminating future contact with drinking water, improving water quality





# Vancouver, BC. Trenchless Watermain Rehab Tomahawk Cleaning, SIPP Lining

- Water quality and capacity improvement
- Completed April 2015
- 608 meters, 6 pipe sections, cleaned in 4 working days
- 150 mm (6") and 200 mm (8")
- 1949-51 cast iron pipe, structurally sound
- 3M™ Scotchkote™ Pipe Renewal Liner 2400 (SIPP), Canadian Induracoat Corp., located in BC





# Vancouver, BC. Trenchless Watermain Rehab

## Tomahawk Cleaning, SIPP Lining



Middle: Pockets of graphitic corrosion were removed leaving visible, shallow voids, exposing solid wall below.



# Vancouver, BC. Trenchless Watermain Rehab

## Tomahawk Cleaning, SIPP Lining

- Sections of deteriorated cement mortar lining (CML) were discovered
- Airborne abrasives were able to fully remove CML exposing metal surface below



# Pipe Preparation

- The pipe wall was prepared to a grit blast finish
- Surface was left dry
- The service connections were fully cleaned around their outer circumference by airborne abrasives
- This degree of pipe preparation helps to ensure liner bond to pipe for long-term, leak-free liner performance





# Waste Disposal

- Wet waste from watermain cleaning is required by the City of Vancouver to be taken to special drying pads prior to disposal
- However, dry waste from the Tomahawk process was contained in the vac truck until disposal, bypassing the drying pads
- Fewer trips for dry waste disposal allowed the truck to stay on site cleaning pipe





# Why was Tomahawk the right choice for Victoria and Vancouver?

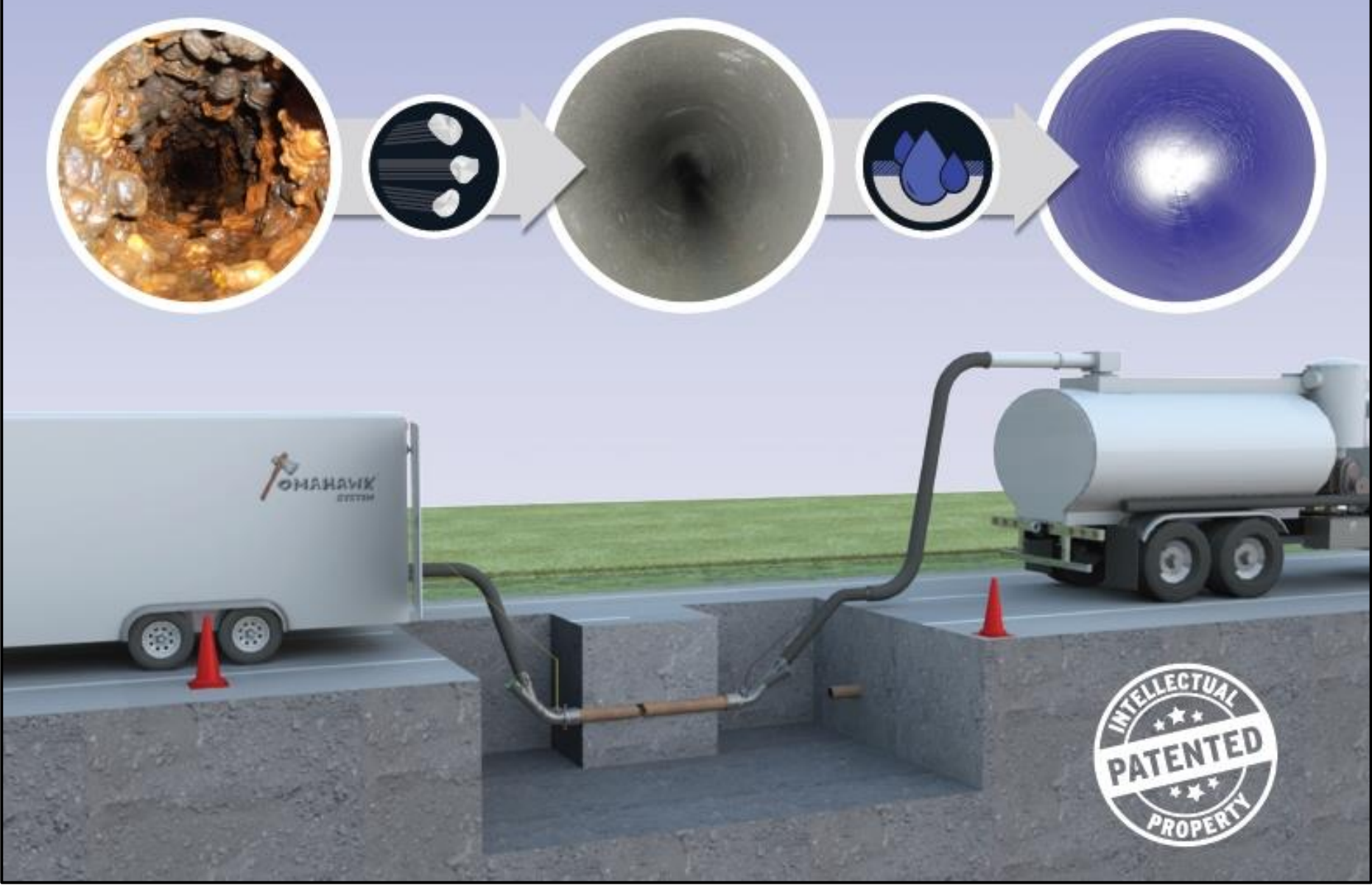
Both British Columbia cities are leaders in utilizing green technologies to promote the health of their citizens and natural surroundings.

- Watermain rehab improves drinking water quality
- Trenchless technology greatly reduces impact to mature urban trees and landscapes
- The Tomahawk cleaning process, consumes no clean water and generates less waste and disposal requirements





# In Development – Tomahawk Airborne Lining



# Novel Water Technology for Livable Communities



## Research Partnership





# Tomahawk Airborne Lining

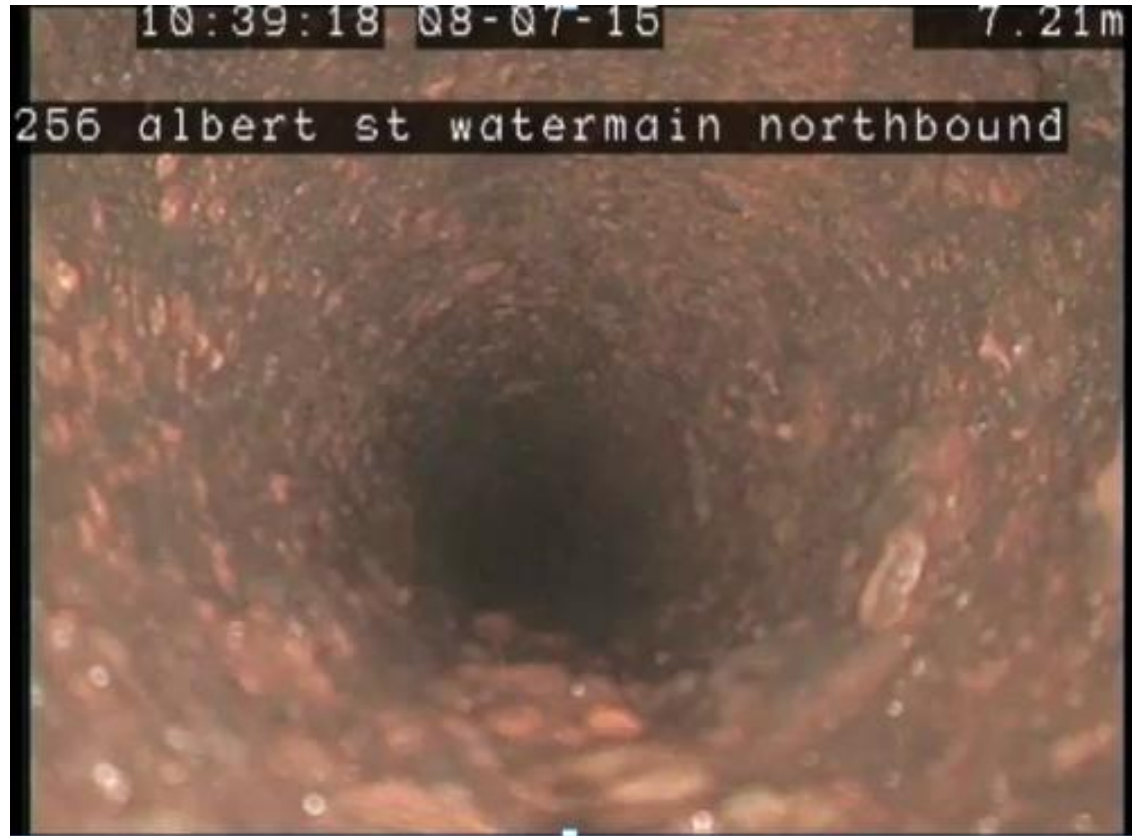
- Developing a low cost, NSF61, non-structural barrier coat lining system (AWWA Class I) for metallic pipes
- Prevent future interior corrosion, deposit build-up and water quality problems
- Large percentage of pipes are structurally sound

## City of Waterloo Demonstration – July 2015:

## Tomahawk watermain cleaning and lining



# Tomahawk Airborne lining –Waterloo - July 2015



Before cleaning inspection video

[Click here to view video from PDF](#)



[Click here to view video from PDF](#)

After Tomahawk cleaning and lining inspection video



# Thank You!

# Questions?



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