

Municipalities in British Columbia have billions of dollars invested in their buried infrastructure systems. Inspection and maintenance of the infrastructure is a key asset management tool that municipalities use to protect this investment.

As part of the management program, Levelton Consultants Ltd. has a long history in assisting municipalities inspect and maintain the infrastructure from bell hole inspection programs to cathodic protection to trenchless technology rehabilitation.

Levelton Consultants Ltd. has the capabilities to inspect and test municipal water systems including:

### Failure Analysis Inspection Program

- Visual inspection of the pipe once it has been excavated.
- Sampling of the soil and laboratory and on-site tests to assess the corrosivity of the native soil and the backfill material including an immunoassay test for soil bacteria that may be responsible for the corrosion failure.



*Leak in a steel water transmission pipeline*

- Measurement of the pipes AC and DC potential to determine whether there may be a problem with stray electrical current corrosion.



*Corrosion on a ductile iron distribution water main*



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Once these tests are completed, the pipe is cleaned and inspected in situ or a section is removed for detailed laboratory inspection:

- Inspection and measurement of the pipe surface for deep pitting as per ASTM G16.
- Visual inspection of the welds or riveted joints depending on the age of the pipe and the material of construction.

Measurement of the wall thickness of the pipe as per ASTM E797-95.



*Ultrasonic thickness inspection grid on steel pipeline*

If the pipe inspection was completed in situ, the pipe can be wet-tapped to obtain a coupon of the pipe to gain information on the condition of the interior surface and any lining material that may be present.

If the pipe was sectioned and sent to our laboratory, an inspection would be completed on the interior of the pipe including a visual inspection and pit depth and remaining wall thickness measurements similar to the condition assessment performed on the exterior of the pipe.

The pit depth corrosion data is analyzed using extreme value statistical analysis software to project the likelihood of leaks occurring in the water system from either internal or external corrosion. On electrically continuous pipelines, soil data and mathematical equations can be used to project the number of leaks that are likely to occur over a period of years to allow the municipality to plan for the replacement or trenchless rehabilitation of the water pipeline.



*Corrosion nodules on interior of cast iron water main*



*Pitting corrosion on interior of the same cast iron pipe*