

A clear path forward for City of Kamloops' most critical feeder main

PipeDiver inspection enables municipality to extend asset life, plan a critical repair and refine capital priorities



Kamloops, British Columbia sits at the confluence of two rivers in a valley flanked by dramatic silt bluffs. With one of the hottest, driest climates in Canada, the City of Kamloops sees some of the highest per capita water use in the country. Their water distribution system serves close to 100,000 people and spans nearly 1,800 feet in elevation across 65 pressure zones. The system complexity and arid climate leave little margin for failure on a critical main.

The City's concrete feeder mains represent just 3% of the network, but they are the most critical pipelines in the system. These mains are approaching the end of their assumed 50-year service life and have two past failures on record. Replacing the mains would cost over \$200 million, yet they could still have decades of remaining useful life. To understand their true condition, the City of Kamloops partnered with Xylem for their first comprehensive assessment.

Client

City of Kamloops, British Columbia

Challenge

Identify integrity threats on a complex, aging feeder main

Solution

PipeDiver® inline inspection platform

Project results

Identified a critical joint leak and measured pipe distress rates well below the national average

The challenge

The Victoria W Feeder Main runs through the core of downtown Kamloops, alongside the Canadian National Railway, beneath a major bridge and across the Thompson River. A failure could damage surrounding infrastructure and disrupt service to a large portion of the city.

The pipeline was installed in the 1970s, a period associated with higher rates of manufacturing defects in prestressed concrete cylinder pipe (PCCP). The main also operated for roughly 30 years without surge protection and experienced a joint failure in the 1990s from water hammer near the High Lift Station. This left questions about whether there was lasting pressure damage to the pipeline. Isolated pockets of highly corrosive silt soils distributed throughout the city added another layer of concern.

The City needed high-resolution condition data to assess remaining useful life and pinpoint any integrity threats. Inspection, however, would not be straightforward. The route included six inline butterfly valves in varying orientations, multiple offtakes and a river crossing. Adding to the complexity, the pipeline comprises both PCCP and bar-wrapped pipe (BWP) ranging in diameter from 750 to 1050 millimeters, and the locations of those transitions were unknown.

The solution

Inspecting the Victoria W Feeder Main required technology that could assess both PCCP and BWP while limiting service disruption. That solution was Xylem's PipeDiver® platform, a free-swimming inline inspection tool that operates while the pipeline stays in service. The tool detects both leaks and broken wires or bars in a single inspection run, pinpointing problem areas to inform targeted repairs.

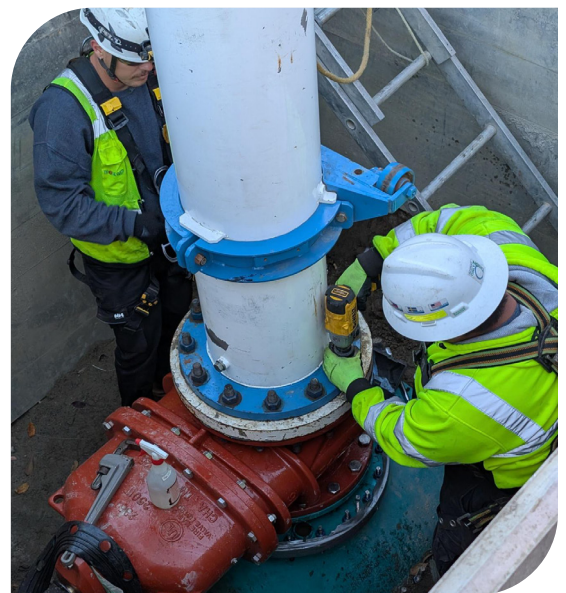
Broken wires and bars are the most actionable sign of structural risk in concrete pressure pipe. In PCCP, broken wires can lead to sudden, catastrophic failure while BWP fails progressively through corrosion of both its steel bars and cylinder. Leaks serve as a reliable early indicator of distress in BWP and can signal joint issues in both materials.

Xylem provided turnkey assessment services, including civil and mechanical work to prepare the pipeline for inspection. The team manually inserted the PipeDiver at the High Lift Station, a critical section to inspect given its history of failure and potentially damaging pressure surges. At the extraction point, the team installed a hot tap and isolation valve to remove the tool from the live pipeline.

During the inspection, Xylem tracked the tool's progress in real time, enabling the City to perform just-in-time closures at multiple offtakes and keep service interruptions to neighboring areas as brief as possible. The tool passed all six valves and completed the



Launching the PipeDiver® platform from City of Kamloops' High Lift Station



Preparing the pipeline for pressurized extraction of the PipeDiver platform

7.7-kilometer route in seven hours. Collecting both leak and structural data in a single run reduced operational risks and minimized field time.

“Replacing the Victoria W Feeder Main would be a massive capital project for a municipality of Kamloops’ size. We can now extend the main’s useful life and refine our capital plan accordingly. The Xylem assessment helped us confirm that we’re spending money in the right place.”

Travis Pahl, Utilities Engineer, City of Kamloops

The results

PipeDiver data showed that 99 percent of pipes had no signs of distress. Where distress was identified, finite element analysis confirmed the affected pipes remain well below their yield limits. Predictive modeling indicates one pipe will approach its yield limit at current operating plus surge pressure by 2055.

PipeDiver detected a joint leak on one of the most critical sections of the main, a stretch with no redundancy located adjacent to a bridge and the main rail corridor. The City plans to repair the leak in the fall, when lower seasonal demand provides greater operational flexibility. Despite the challenging repair location, the fix is estimated to cost less than 3% of fully replacing the feeder main.

Based on the inspection results, the City of Kamloops can continue operating the Victoria W Feeder Main with plans to reinspect in seven years. The City now has defensible data to extend the depreciation life of this pipeline from 50 to 80 years and to direct capital toward other priority pipelines in their network. This condition assessment gave Kamloops a cost-effective path to restore infrastructure integrity, extend asset life, and confirm their capital priorities.



Tracking the free-swimming PipeDiver platform during the 7.7-kilometer inspection