

Municipal Case Study

First-ever TerraBrute® Product in Excellent Shape 20 Years after Installation

Rigorous testing proves PVC pressure pipe system still an industry leader



TerraBrute was removed and evaluated. when Ridout Street Bridge reached the end of service life in 2019.

THE CHALLENGE

At IPEX, we test all our products rigorously – both in our laboratories and in the field – before they go to market.

But what's just as important to us is knowing how our products have performed years after installation. We want to ensure our claims about industry-leading performance and longevity still hold up decades into our product's service life.

In 2003, the City of London replaced a failing watermain across the Ridout Street Bridge with TerraBrute® CR trenchless PVC pressure pipe for potable water applications.

This newly launched product was developed in collaboration with researchers from the University of Western Ontario. This revolutionary piping system boasts flexibility,

strength and compatibility with current municipal water and sewer systems, helping contractors tackle even the most complicated municipal projects.

TerraBrute® is used as an alternative to conventional high-density polyethylene pipe due to its fast installation, easy joint assembly and ability to withstand high tensile and bending forces. It's a great option for HDD and other types of installations.

In fact, the Ridout Street bridge crossing was an ideal application for TerraBrute® and its non-metallic ring-and-pin joint design. This innovative design provided easy installation on this bridge. Traditional butt fusion techniques would have been difficult, especially for the span of suspended pressure pipe, that needed to be installed beneath a busy roadway bridge.

But what IPEX wanted to find out, after almost 20 years in use, was whether TerraBrute® was still as strong and robust as the day it was installed and whether it could still claim to have one of the highest pull strengths of any pipe on the market.

In 2019, the Ridout Street bridge reached the end of its service life and needed to be decommissioned, a process which involved the removal of the TerraBrute® product as well.

Our team took this opportunity to test the pipe and confirm it has retained its properties, and continued to meet the original manufacturer's standards after 19 years in service. Because the installation of TerraBrute® at the Ridout Street Bridge was the first installation of this product, it provides the most comprehensive data about the performance of the product over its lifetime.



Non-Metallic Ring-and-Pin Joint Design

THE SOLUTION

Following the dismantling of the Ridout Street bridge and the removal of the TerraBrute® pipe, a 12-inch sample of the pipe was sent to the IPEX Technologies laboratory in Ontario.

According to IPEX technicians, the first impressions of the pipe were impressive. Visually, the pipe appeared to have maintained a vibrant colour and a smooth surface, and the cross-sectional area showed no signs of degradation.

The laboratory team conducted seven rigorous tests on the pipe to measure conformance to 12454 PVC pressure pipe cell class as well as dimension requirements.

These tests included:

1. Tensile Test	Determines the tensile strength, elongation and elasticity of the pipe in accordance with ASTM D638 standards.
2. IZOD Impact Test	Determines the impact resistance of the material using an Izod-type cantilever beam in accordance with ASTM D256 standards
3. Heat Deflection Temperature (HDT) Test	Determines the temperature at which the material deflects when subjected to a load of 1.82 MPa and is conducted according to ASTM D648.
4. Fourier-Transform Infrared Spectroscopy (FTIR)	A spectroscopic technique used to evaluate and identify the "chemical family" of a substance.
5. Gas Chromatography-Mass Spectrometry (GC-MS)	Separates chemical mixtures (the GC component) and identifies the components at a molecular level (the MS component), and it's considered one of the most accurate tools for analyzing environmental samples.
6. Dimension Test	Determines the pipe's outer diameter and wall thickness to ensure it continues to meet the required dimensions for pressure piping systems.
7. Colour Test	Quantifies the colour of the pipe material using a CM-700D Spectrometer to determine L*, a*, and b* colour values and identify any changes to the material's colour over time.

THE RESULTS

The team documented their findings in an internal IPEX report titled: "Analysis of 12-inch TerraBrute® PVC Pipe Made in 2003". The results of the study were overwhelmingly positive and helped to reinforce the long-lasting durability of the TerraBrute® line of products.

1. Tensile Test	A maximum elongation of 106% in the radial direction, which is outstanding for a nearly 20-year-old pipe.
2. IZOD Impact Test	Higher than average impact resistance, with tests passing all cell class requirements.
3. Heat Deflection Temperature (HDT) Test	All heat deflection temperatures measured above the cell class limit of 70°C.
4. Fourier-Transform Infrared Spectroscopy (FTIR)	Pipe's outer, middle and inner surfaces showed no significant differences in their spectra.
5. Dimension Test	The sample met the required criteria for the wall thickness of DR-18 pipes, at 18.62mm (for Blue Brute pipes, which are virtually the same as TerraBrute® pipes).
6. Colour Test	Pipe colour has not degraded at all after 19 years of use.

The report's overall conclusion determined that the properties of the TerraBrute® pipe were not affected after 19 years since it was first manufactured and installed.

This assessment of the quality of the IPEX TerraBrute® pipe system proves the product's longevity and resilience and that it continues to retain its properties and meet the original manufacturer's standards almost 20 years after installation.

