



FLOW MEASUREMENT ON PRECAST CONCRETE PIPES



Water

"We put it on everything. We put it on ductile iron, HDPE, reinforced concrete, straight concrete pipe – and Flexim worked on all of it."

*Lee Inman,
E&I Superintendent at HRSD*



Measuring Task

The accurate measurement of raw sewage through large concrete pipes

The Hampton Roads Sanitation District (HRSD) in Hampton Virginia has a combined treatment capacity of 225 million gallons per day flowing through 16 wastewater treatment plants in south eastern Virginia. The collection system consists of a variety of pipe materials including concrete, reinforced concrete, ductile iron, HDPE, and PVC. Most major force main pipe sizes range from 30 to 60 inches.

HRSD was struggling with the failure of several insertion flowmeters and was seeking a more economical alternative. Replacing or repairing the insertion meters would be costly and require significant service interruptions, so Lee Inman, E&I superintendent at HRSD, decided to investigate the idea of non-invasive, clamp-on ultrasonic metering, as he was already familiar with this technology and had successfully used it on various pipe materials in the past. He also knew they were roughly half the cost of the insertion meters currently in use. However, he didn't know if they would work on concrete, which represented many of the pipes where he needed replacements.

Flow has traditionally been measured with full bore and insertion magnetic

point velocity flowmeters. And while that approach has serious downsides, especially with older pipes, it was once the only option for concrete pipes. Replacing old insertion meters is expensive and resource-intensive, involving service interruptions and possible harm to the pipe's structural stability during installation. In some locations, a building's roof has even had to be removed to allow a crane to remove the old meter and install the new one. Because the insertion meters are exposed to the flow of material in the pipe, there is substantial cost embedded in their design, and they require significant maintenance.



What insertion meters showed and what was actually measured coming out of the force main never aligned. Flexim meters more accurately reflect the expected flow.



"The installation process is more straightforward, and they are easier to work on. We don't get the spikes like we used to get with the insertion meters because they were more sensitive to air pockets. Best of all, our measurement data is far more consistent and reliable with the Flexim meters." Lee Inman, E&I Superintendent at HRSD



Meter installation with no interruption of flow and no downtime on this 48-inch concrete force main, flowing raw sewage. Straps went around the pipe securely, holding the PermaLok tracks and the transducers tightly with a maintenance-free coupling pad.



The finished measuring point with its single pair of CDK transducers was up and running in a few hours with no service interruption and no spilling of raw sewage.



Solution

Wanting to demonstrate the non-intrusive advantages of ultrasonic flowmeters, the local Flexim representative delivered an F601 portable clamp-on unit to try out. The meter worked like a charm. The readings were so accurate in fact, that HRSD rented one for a month to fully test its abilities. The meter was used to test multiple locations including HDPE, Ductile Iron Pipe and Precast Steel Reinforced Concrete Pipe PCCP with a 7 inch wall thickness.

The first opportunity Inman had to deploy a new Flexim ultrasonic meter for a permanent installation was in a new pump station in 2019 on a 42-inch prestressed concrete cylinder pipe. Results confirmed exactly what the tests had indicated and were so positive that since then, when an insertion flowmeter stops working on concrete pipes, HRSD simply replaces it with a Flexim ultrasonic clamp-on meter.

HRSD has already replaced around 12 devices on concrete, reinforced concrete and ductile iron, and have about 50 of the old insertion meters in the field awaiting replacement upon failure. They have also installed Flexim technology in other difficult applications where no other meter that was installed or tested provided such consistently accurate flow measurements.

Precast concrete pipe presents a challenge for any flow measurement technology. But thanks to powerful clamp-on transducers and sophisticated evaluation technology, Flexim's ultrasonic flowmeters are up to the task, delivering accurate and drift-free flow measurement data.

Measuring Points and Instrumentation

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|-------------------------|--|
| Pipeline | prestressed concrete pressure pipe (PCCP), various – from 12” to 48” diameter, and up to 7” wall thickness |
| Medium | wastewater |
| Measuring Device | FLUXUS® F721 portable clamp-on unit |

Advantages

- Installing a Flexim ultrasonic meter is a fraction of the cost of replacing full bore and insertion magnetic flowmeters. No service interruption. No harm to the pipe’s structural stability.
- Installation is completed in a few hours with no downtime, offering certainty that there will be no service interruption.
- Accurate flow measurement is assured. What the insertion meters were telling HRSD and what was actually measured coming out of the force main never aligned. With Flexim ultrasonic meters, the data more accurately reflects the expected flow.
- Reliable non-intrusive flow measurement using Flexim high energy signal generation allows the signal to penetrate the large, thick walls of old pipes where other ultrasonic meters are unable to measure.
- Connection to the SCADA system utilizing existing power and signal wire. The Flexim solution is truly plug and play.
- Flexim’s innovative solution has delivered tremendous parts and labour cost savings for HRSD, sparing the district from service interruption.

Customer



Hampton Roads Sanitation District (HRSD), Virginia Beach, USA

Established in 1940, HRSD is committed to treating wastewater effectively, serving 20 cities and counties of southeast Virginia and the northern shore – an area with a population of more than 1.9 million people. HRSD operates eight major treatment plants alongside eight smaller treatment plants and has a combined treatment capacity of 225 million gallons per day. The collection system comprises more than 500 miles of pipes, with these being between 6 and 60 inches in diameter, and they also operate more than 100 pump stations.

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