High Velocity Flow Monitoring in a Sanitary Sewer using LaserFlow™

Application Note

TELEDYNE ISCO
Everywhereyoulook™

Expertise in Flow

LaserFlow™ Velocity Sensor

Standard Features

- Non-contact velocity and level measurement
- Single or Multiple Point measurement below liquid surface
- Rugged, submersible enclosure with IP68 ingress protection
- Zero deadband from measurement point in non-contact level and velocity measurements
- Quality readings without manual profiling
- Bidirectional velocity measurement

Applications

- Permanent and portable flow measurement for CSO, SSO, I&I, SSEs, CMOM, and other sewer monitoring programs
- Shallow flow measurement in varying pipe sizes
- Wastewater treatment plant influent, process, and effluent flow measurement
- Industrial process and discharge flow measurement
- Stormwater conveyance and outfall
- Irrigation canals and channels

The LaserFlow™ velocity sensor, which remotely measures flow with non-contact Laser Doppler Velocity technology, was used in this application because of the uncertainty of the flow velocity and levels.

This site, in a sanitary sewer, had two options for flow monitoring applications. The first application was in front of an overflow bypass gate where standard area velocity flow monitoring technologies were installed and working, but only intermittently. When the gate closed, the water surcharged the pipe until it overflowed into the bypass weir. The AV sensor was no longer able to read the bypass flow because the water at the bottom of the channel was no longer flowing. Another challenge was with the pipe joints creating turbulence.

View of flow inside the pipe

The alternate flow monitoring location was upstream, in a 42 inch pipe, and on the side of a hill. The level, which is 1-3 inches deep with velocity of 4.5 ft/s, was an additional challenge. Standard in-pipe area velocity sensors are not able to operate in conditions where high velocity effects the depth of the water accelerating over the top of the sensor (Bernoulli Effect) resulting in lower recorded levels.

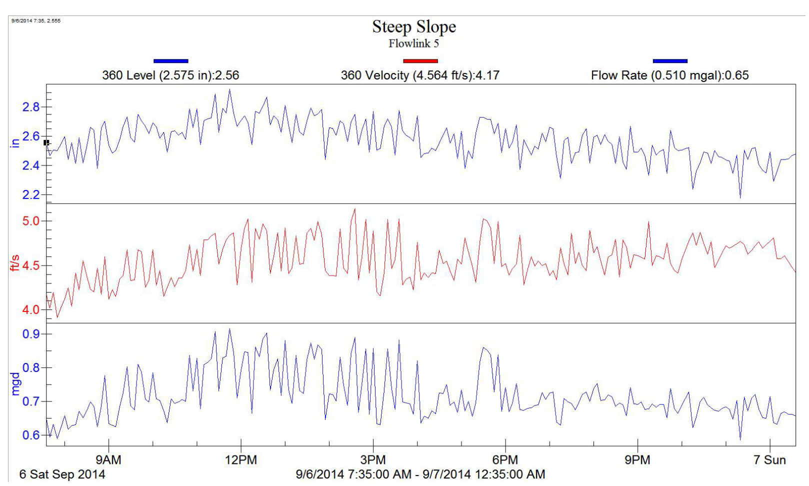

Chart of the sensors output

The solution in this application was LaserFlow. LaserFlow uses a non-contact sensor that utilizes a non-contact ultrasonic level sensor and a laser to read the velocity below the surface. In this application the LaserFlow allowed for accurate readings to be taken even in the most turbulent of flows.

After the initial setup the LaserFlow sensor worked well for several hours. When the level decreased, the laser started to focus on the bottom of the channel due to the steep slope of the pipe. There were two options to correct this issue:

- Send a technician back into the confined space to position the LaserFlow sensor parallel with the flow stream.
- Change the slope programming setting to match the slope of the pipe without having to enter into the confined space.

Flow Meter technician in the pipe adjusting the LaserFlow

It was decided the slope setting would be changed. After determining the slope of the pipe from a 12 foot rise over a 150 foot run = 8% slope. After a few program adjustments, the sensor worked flawlessly.

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