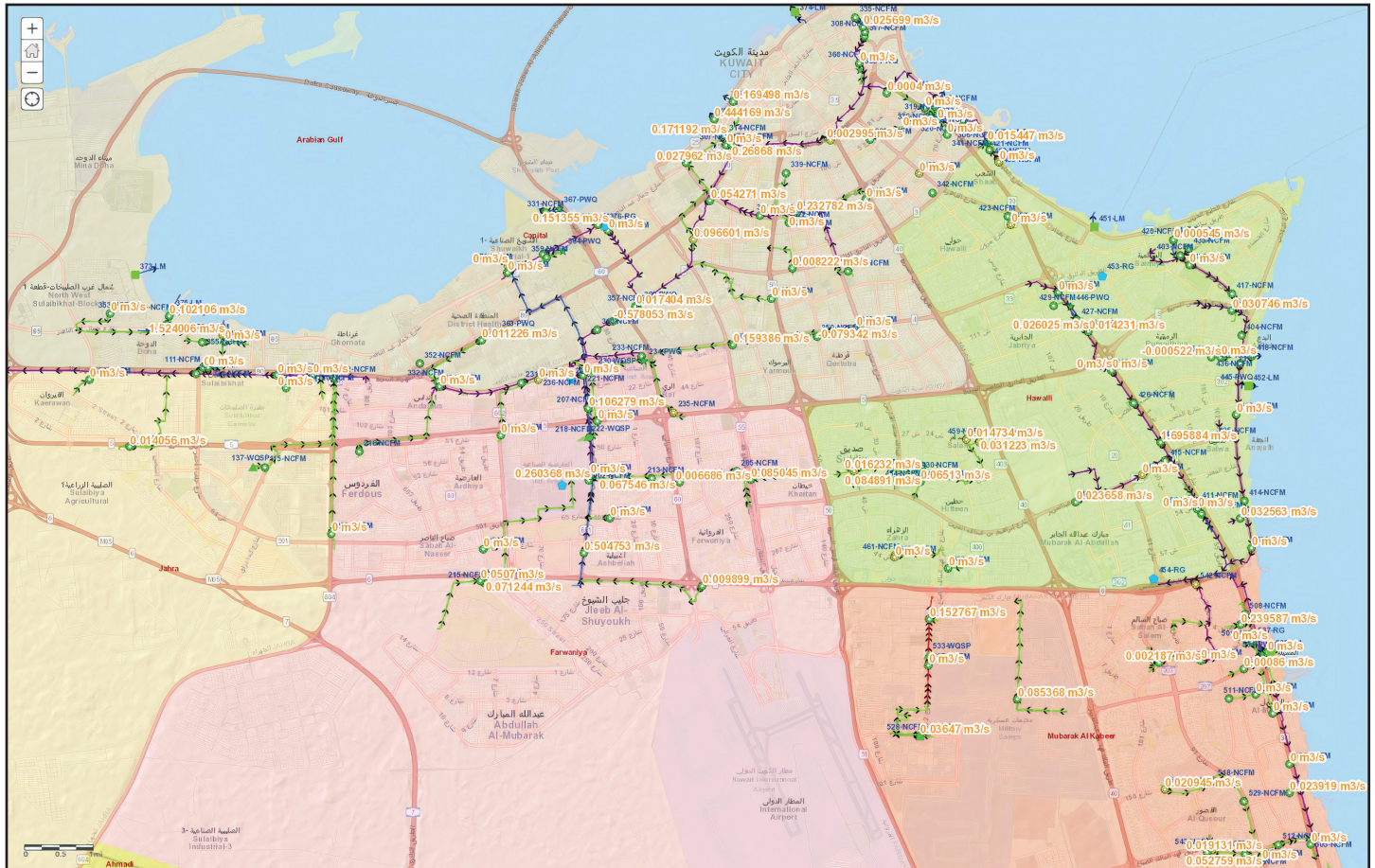


Advanced Flow Rate Monitoring of an Extensive Wastewater System in Kuwait City, Kuwait



Teledyne ISCO provided a complete flow monitoring solution that helped the Kuwaiti Ministry of Public Works manage their wastewater reclamation system from a data control center. More than 250 Teledyne ISCO non-contact LaserFlow® sensors and Signature® flowmeters were installed.

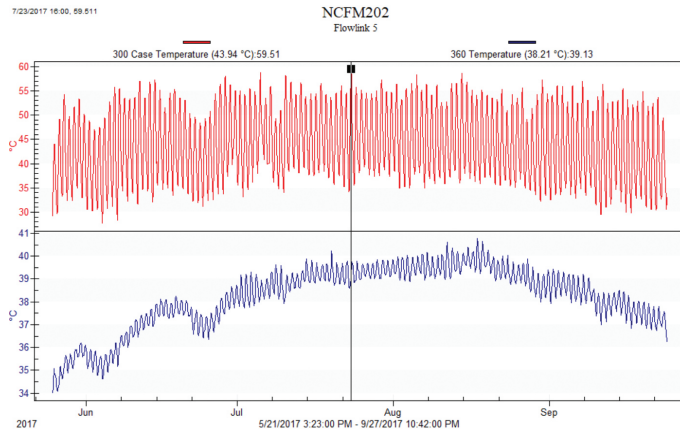
Project Overview

The project, named SE157, included the supply, installation, operation, and maintenance of permanent flow monitors, permanent water quality monitors, and associated equipment at 250 sites in the sanitary network of the state of Kuwait, with the majority of sites located within the Kuwait Metropolitan Area. It also included the supply of all supervision, labor, construction facilities, detailed design and logistic support necessary to provide a complete operating system and its maintenance for two years.

The preliminary stage of the project was an in-depth evaluation of available flow techniques that could be used in the existing difficult conditions, plus site surveys to identify suitable manholes and other installation locations. One LaserFlow sensor and Signature flow logger were installed first in 2017 for demonstration purposes. After six months of continuous operation and in-depth data analysis, Hydrotek Engineering Company, the contractor for Kuwait MPW, demonstrated that Teledyne ISCO technology was superior to other commercial solutions in terms of ease of installation, quality of data recorded, and resistance to harsh environmental conditions, such as extreme temperatures.

Site Challenges

The typical ambient temperatures for the region can exceed 50 °C, which must be considered when evaluating any hardware solution. The Signature and LaserFlow sensors were successfully tested during summer months while recorded temperatures inside the kiosk (red line on the graph below) reached nearly 60 °C and 40 °C inside the manhole (the blue line).



Graph 1: Extreme temperatures registered inside the kiosk (red line) and manhole (blue line).

Demo installation was powered from a solar panel to ensure 24/7 autonomy. LaserFlow readings were pushed remotely into Flowlink Global software, a Teledyne ISCO web user interface that allows continuous monitoring of flow data and site conditions.

Another challenge was to install and maintain sensors inside very deep manholes. Installation and measurements inside sewer manholes are never easy, especially at a depth of 30 meters!

Teledyne ISCO therefore offered an adjustable mounting system with a street level sensor retrieval tool that helps the service personnel during maintenance. This solution made the safety and PPE requirements less strict and less expensive as no personnel are required to enter the manhole. With this adjustment tool the sensor can be removed simply by releasing the lock and then pulling it up to ground level.

Outside the installation, the primary requirement was to offer an accurate and reliable flow measurement system that would be able to handle various flow condition such as: low levels, near zero and high velocities, large and small channels, urban and industrial wastewater,



Figure 1: Teledyne ISCO LaserFlow demo installation in Kuwait City.

surcharge conditions, and Ex zones, all of which had to be considered when evaluating the best solution.

“We sought a solution that could accurately measure the flow, even in harsh conditions, with ease of installation. Teledyne ISCO had the expertise and equipment that allowed us to achieve this,” said Prem Kumar, Automation Division Manager for Hydrotek Engineering Company.

Flow monitoring results in costs savings

The installation of flow monitoring covering the entire Kuwait Metropolitan Area is designed as an early detection system to better control the impact of rainfall as well as the capacity of the entire collection system, which, if not sufficient, would result in backflow and flooding of households. Flow rate monitoring in the industrial areas further allows effective control of contamination and other environmental impacts.

The system was able to save money by more effectively managing certain resources that should be used only when absolutely necessary. This was made possible by real-time analysis of the information continuously being collected remotely from key measurement points.



Figure 2: Sensor installation in the manhole.

The LaserFlow sensor diagnostics data quickly alerts management to critical events, for example a manhole surcharge, allowing remedial actions to be taken by a network supervisor with no delay.

Data collection systems and GIS software are integral parts of our monitoring instruments, allowing historical

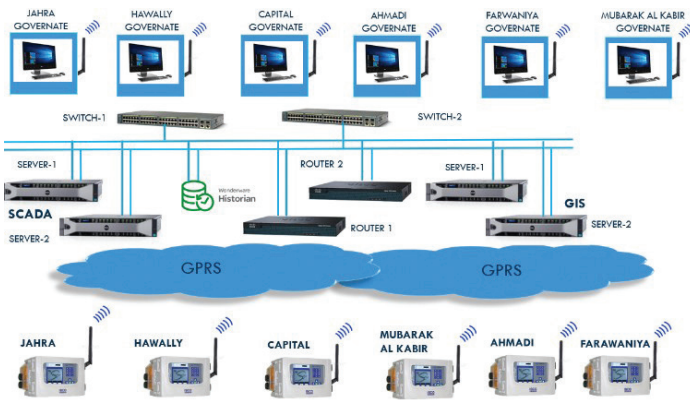


Figure 3: Data collection and visualization system scheme.

and real time data to be transmitted regularly to each of the Governorates in the State of Kuwait.

Consistent flow monitoring throughout the entire sewerage network provides the information needed for sustainable city development, helping to determine the level of investments required to maintain the existing wastewater infrastructure efficiently and plan properly for expansion.

Customer feedback

Teledyne ISCO non-contact laser technology was recognized by the customer as a key to successfully completing the project. “The Teledyne ISCO LaserFlow sensors and Signature flowmeters have been providing an accurate, reliable, and continuous measurement solution since 2019”, said Engineer Jaber Mohammed Hassan Barwiz, Project Engineer at Kuwait Ministry of Public Works.



Figure 4: A complete solar-powered measurement station.



TIENet® 360 LaserFlow® Sensor

The TIENet 360 LaserFlow sensor is an area-velocity flow and water-level measurement device that remotely senses flows in open channels using non-contact Laser Doppler Velocity Sensing and non-contact Ultrasonic Level Sensing technologies. The sensor uses advanced technology to measure velocity with a laser beam directed at single or multiple points below the surface of the wastewater stream. Therefore, unlike radar technology, it does not require the creation of ripples on the surface of the stream.

- Zero deadband from measurement point in non-contact level and velocity measurements Continuous measurements in submerged conditions
- Advanced velocity diagnostics for data quality evaluation and analysis
- Bidirectional velocity measurement
- Low level velocity measurement
- Certified MCERTS Class 2
- The LaserFlow Ex is certified for hazardous areas classified as Class 1, Div 1, Zone 0 and ATEX category 1G.



Signature® Flowmeter

The Signature flowmeter from Teledyne ISCO, designed for open channel flow monitoring, supports flow measurement methods including bubbler, non-contact laser area velocity, ultrasonic, and submerged Doppler ultrasonic area velocity.

With the ability to connect up to 9 sensors*, the Signature flowmeter provides a broad range of I/O and communications options:

- pH and temperature
- 4–20 mA output
- SDI-12
- Ethernet
- RS485
- GSM/GPRS modem

The Signature flowmeter is rugged (IP 66) even if the cover of the lid is open. It performs data logging with variable rate data storage and data integrity verification, and has the ability to connect a USB drive for data/report retrieval and programming.

** Performance, response and speed will vary depending on type and number of TIENet devices connected to a Signature flowmeter. Check with your sales representative to ensure the best configuration for your application.*

About Teledyne ISCO

Teledyne ISCO is a leading manufacturer of a wide range of innovative products designed to increase productivity while improving the quality of life on our planet. Our standard and customized products are used across multiple sectors including water and wastewater, pharmaceutical, academia, oil exploration, and reactant feed. Teledyne ISCO is continually improving its products and reserves the right to change product specifications, replacement parts, schematics, and instructions without notice.

For further information contact your local Teledyne ISCO representative.