SOMERSET RARITAN VALLEY SEWERAGE AUTHORITY
Bridgewater, New Jersey

Sewer Flow Monitoring System for Wet Weather Inflows

In June 1996, Accusonic provided a Model 7510 Compound Flowmeter System for wet weather sewer flow monitoring as part of a Phase 1 Demonstration Contract with the Somerset Raritan Valley Sewerage Authority (Bridgewater, NJ). The purpose of the Phase 1 Program was to demonstrate the capabilities of ultrasonic transit-time flowmeters for accurately monitoring highly variable sewer flowrates, particularly under wet weather flow conditions.

The Authority maintains seventeen meter chamber sites throughout the multi-community sewerage collection system, carrying inflows to their Polhemus Lane Wastewater Treatment Plant (WWTP). The meter chambers are equipped with Parshall flumes for gauging the flowrate contributions from various community-member trunk sewers connecting to the main interceptors influent to the WWTP. High flow conditions during wet weather periods cause surcharging in the collection system, frequently resulting in backwatering and flume submersion at the meter chambers. This has hindered the collection of accurate flowrate information used for allocation of wastewater treatment costs among the contributing communities.

A complete flow monitoring and data acquisition /telecommunications system was installed in early June 1996 at Meter Chamber No. 4 for the Phase 1 Demonstration Program. The system comprised an Accusonic Model 7510 Compound Flowmeter configured for 3-path transit-time flow measurement within the 27-in-diam trunk sewer influent to the flume meter chamber, ultrasonic level sensor mounted above the existing Parshall flume for dry weather (low flow) measurement, and a data logger/telemodem for the remote collection and transmittal of flow data to a PC computer system installed at the WWTP. The Model 7510 utilized a pressure gauge for tracking water level within the 27-in influent pipe. A tipping-bucket rain gauge was also installed on site to collect local rainfall data, which was logged and transmitted along with the flowrate and water level measurements.

The equipment installed in the sewer environment conformed with applicable National Electrical Code Class I, Division 1, Group D Hazardous Atmosphere requirements. A NEMA 4X equipment enclosure was installed on post mounts on the roof of the flume meter chamber to securely house the system electronic components. Voice-grade telephone line service was implemented at the equipment enclosure for automatic transmission of all collected data to the WWTP facility. A back-up power source comprising batteries, charger, and DC-AC inverter was installed in a separate NEMA 4X enclosure for supporting the flow monitoring system during temporary AC mains power outages.

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The flowmeter transducers were pre-mounted on a stainless steel sheet-metal sleeve and installed via manhole access to the 27-in sewer pipe. The sewer was flowing about 12-in deep during the installation activities, which required approximately 3-hours of *in situ* work for installing and securing the pipe insert sleeve and performing a final alignment of the transducers. The 3-path transducer configuration provides high-accuracy flow monitoring capability throughout the entire range of dry-to-wet weather flow conditions. The attached photographs show the pipe sleeve insert and installation activities.

The flowmeter system was in continuous operation during the Phase 1 program period running from early June through mid-September 1996, measuring and recording the complete set of data parameters at 5-minute intervals. Thanks to wetter-than-normal summer weather conditions, a number of surcharging flume events occurred at Meter Chamber No. 4 during this period, and the corresponding flowrates were continuously measured and documented by the Accusonic flowmeter system.

Several instances of AC mains power outages and disruption of telephone line service did not prevent data recovery, due to the robust system design configuration which provided reliable flow measurement and data recording under these abnormal conditions. On-site data logger capacity was greater than two weeks for the 5-minute sampling of all measured variables. The recorded data was automatically downloaded to the WWTP PC database via telemodem several times per day during normal operation. When transmission of the data was prevented by telephone service disruption, the recorded data was retained by the on-site data logger until communications were reestablished. The recorded data could also be downloaded via hand-carried notebook computer brought to the site.

As a result of this successful Phase 1 demonstration, a Phase 2 contract was awarded in June 1997 to install the full network of 17 flow monitoring stations with automated data collection and reporting for the Somerset Raritan Valley Sewerage Authority. The complete flow monitoring network was installed and operational by the end of December 1997. Accusonic multiple-path transit-time flowmeters were installed at all 17 flow monitoring sites, working in conjunction with the centralized automated computer data collection and archiving system. These flowmeters have been reliably providing the Sewerage Authority with high-quality flow data via the computerized network ever since that time.

ACCUSONIC SEWER FLOWMETER
Intrinsically Safe Installation
Somerset-Raritan Valley Sewerage Authority

27" Pipe