special section
METERSOURCE

Managing storm water and the related problems of runoff is everyone's problem. All levels of government from local school districts to the Federal Highway Administration are grappling with the increasing problem of monitoring and managing storm water runoff.

go with the *flow*

By James Panek

Flowmeter technology helps storm water management professionals accurately measure notoriously variable flows

Storm water management is a priority due to the related problems runoff generates. Storm water that does not soak into the ground becomes surface runoff. Surface runoff becomes a problem when it flows into surface waterways or channels itself into storm sewers.

In the private sector, facility and infrastructure engineers charged with pollution and flood control are continually seeking new and improved technologies to manage storm water in a cost-effective manner.

Runoff Concerns

Facility managers and engineers tasked with storm water management must deal with two primary issues, among others, created by runoff.

Monitoring and measuring. Due to the unpredictable nature of the volume and timing of storm water runoff, measuring is a key challenge.

Environmental concerns. The water pollution caused by contaminants carried in the storm water adds to already-large pollution problems.

Because urban runoff usually contains pollutants that impact the water quality of the streams and other water sources receiving it, engineers typically apply best management practices to remove pollutants from the runoff. Additionally, a key priority is to monitor the hydraulic performance of the storm water management practices.

Another major problem associated with urban runoff is monitoring and managing the total volume and flow rate of the water that is discharged to the storm sewer system or the receiving stream. Flow monitoring technologies for successful storm water management applications require flowmeters that can perform well and provide accurate measurement even in the most challenging flow conditions.

On-the-Mark Measurements

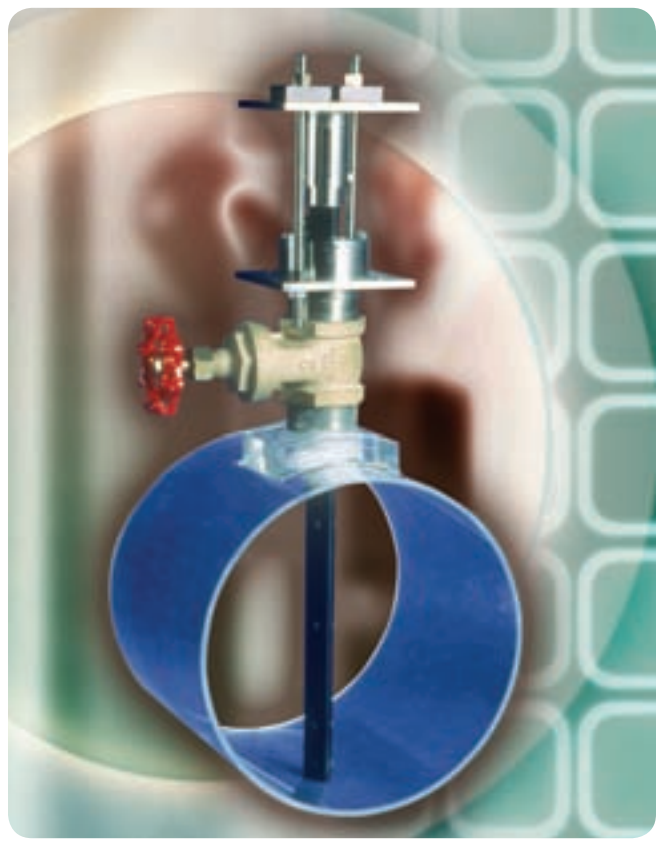
Successful advanced storm water management practices include using the optimal technologies to manage storm water after it has been treated and is being returned to the system. Specifying field-proven technologies that provide accurate, low lifecycle cost solutions should be a key goal.

Flow parameters such as reduction in peak discharge rate, reduction in total volume discharged and the time effects of discharges are frequently measured. To do this, accurate measurement of flow rates and water volumes into and out of a system is mandatory.

Accurate storm water flow measurement challenges include a short time of concentration and difficult flow conditions, including flows with wide fluctuations. Monitoring sites where large changes in flow rate occur in a relatively short period of time requires particular attention during flow measurement equipment selection, installation and use.

Rapidly changing flow conditions like those found in storm water can cause flow-measuring equipment with poor data-density recording capabilities to miss brief periods of significant flow. Engineers research available flow solutions and specify technologies that reduce errors in flow measurement due to unsteady conditions or flows below the minimum.

Flowmeter Solutions



One example of flow measurement technology that can provide accuracy in unpredictable, widely varying full-pipe storm water flows is McCrometer's Marsh Multi-Mag flow-meter. Electromagnetic sensing flowmeters such as this one can handle wide ranges with no moving parts for low maintenance.

The Marsh Multi-Mag is an advanced multipoint measurement solution that provides accuracy in the most difficult flow conditions. Its electromagnetic flow-sensing technology is field-proven in low flows, wide flow ranges and flows containing sand and grit—the types of flows typically found in storm water management applications. It also can maintain accurate flow measurement in elbows and bends, also common in storm water applications.

The flowmeter measures liquid volumetric flow rates in pipes sized from 4 to 120 in. (100 to 3,000 mm) with a streamlined multipoint technology that creates only negligible pressure loss. It can be hot-tapped in a pipe that is full and pressurized, which eliminates the need to shut down the process and interrupt service for flowmeter installation.

Using an insertable electromagnetic averaging design, the Multi-Mag measures volumetric flow with accuracy up to ±1% of reading, zero stability from 0.5 to 20 ft per second and repeatability at 0.2% of the flow range. It constantly profiles the flow, ensuring accuracy, and features a high turndown ratio, automatic sensing, correction for shifting profiles and reduced operating costs due to its lower energy requirements compared to most flowmeters.

The Multi-Mag features a 4-20 mA analog output that is galvanically isolated and fully programmable for zero and full scale. Dual alarms—two separate outputs—are provided and fully programmable for high and low flow rates, percent of range, empty pipe, forward and reverse polarity (normally opened/closed) and more.

Facility and municipal water system engineers find the unit installs in minutes without shutting down the system and removes easily through standard valves. Additional features that optimize storm water treatment facility operations include availability of a rugged transmitter enclosure that is NEMA 4X/IP65-approved for harsh operating environments; separate termination and electronics compartments provided for reliability and safety; and a clear window for local field readings and inspection.

Overall, facility operators responsible for storm water management should seek a flow monitoring and measuring technology that is dependable and excels at providing accurate flow measurement in the widely variable, unpredictable flows typical of storm water applications. WWD

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