

# ANGLE and LINE

A Quarterly Newsletter by COWAN ASSOCIATES, INC.  
Engineers • Geologists • Surveyors • Landscape Architects  
Serving Business, Municipalities, and Industry since 1958



## A New Way to Look at Detention Basins

By: Jeffrey L. Schroy, SET, CPESC

Municipalities today are looking at alternative ways to handle stormwater. EPA Phase II Regulations require that municipalities take a "best management practice" approach to control stormwater. Best management practices can improve water quality and/or maintenance of groundwater levels and base flow for streams. This provides municipalities with the flexibility to decide what practices should be used. Minimum control measures include public education and outreach, public involvement and participation, illicit discharge detection and elimination, construction site stormwater runoff control, post-construction stormwater management, and pollution prevention. PA Act 167 Stormwater Management Control Plans also stipulate stormwater design criteria for each watershed area.

Stormwater is created when it rains or snows. Uncontrolled or insufficiently controlled stormwater results in significantly increased peak flows to streams during storms. Stormwater that runs off streets, parking lots, and construction sites may wash sediment, oil, grease, toxins, pathogens, and other pollutants into nearby stormwater management systems. As the stormwater runoff enters existing sewer and stormwater management systems, it may be discharged as untreated runoff into local streams and waterways. The EPA considers this type of untreated stormwater runoff as a leading threat to public health and local environments. Additionally, the volume of the suddenly increased stormwater runoff can create flooding hazards when it flows across surfaces that are impervious to infiltration. Increased stormwater flow and reduced groundwater infiltration alters natural stream hydrology and increases stream erosion, often with detrimental effects.

Years ago detention basins were simply used to detain stormwater for a certain amount of time. Basins are now being designed to encourage water to infiltrate into the ground and to settle out silt and other pollutants in the water. Controlling stormwater runoff has become a more important issue as environmentalists are discovering what kind of impact the pollutants running off streets and roadways may have on marine life further down the watershed.

By using filtration systems naturally available in a number of soil types, detention basins can be created that are attractive. At the time of construction, carefully crafted basins can minimize disturbance of natural resources such as delicate permeable soils or natural swamp settings. When these ponds can double as well-sized or well-crafted detention ponds, the property owners may have both an aesthetically pleasing basin as well as one that serves environmental needs.



How to protect the plant life, birds, and animals that naturally inhabit small ponds or wetlands is becoming more of a community priority as we collectively worry about extinction of different species because of changes to the environment, changes in land usage and, perhaps because of land development, decreasing the amount of naturally

accruing wetlands in a municipality. Consideration of the type of flowers and foliage vegetation can create an added benefit of beauty as well as providing filtration of pollutants as stormwater is absorbed by their root systems.

There are three main types of basins that are being designed to control stormwater and also function as a basin for infiltration and settling of silt, sand, etc. The three types of basins are standard detention basin, infiltration basin and wet pond. These types of basins are further discussed as follows:

### Standard Detention Basin

A standard detention basin is a basin that temporarily stores a part of the stormwater runoff following a storm. It may also be referred to as an extended detention dry pond. Water is stored by means of a hydraulic control structure to restrict outlet discharge. A benefit of this type of pond is that pollutants carried by the stormwater flow have some opportunity to settle. If the basin is designed to control stormwater for any extended period, considerable material can accumulate on the basin bottom. This material will need to be removed by periodic dredging or excavation.

A secondary benefit of a standard detention basin is that it may significantly reduce the frequency of occurrence of erosive floods

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## EMPLOYEE SPOTLIGHT



Cowan Associates, Inc. is honoring Jennifer L. Egner in this spotlight for her tireless efforts as our Administrative Assistant. She has been associated with CAI for over 23 years, spanning three corporate presidencies including Richard S. Cowan, James R. Leister, and William D. Kee.

Jen's responsibilities include managing the secretarial personnel; interviewing potential staff; reviewing typing, faxes, and emails; as well as typing, assembling and proofing specifications and engineering reports; and developing bid tabulations. This is no easy task for a staff of 30 engineers, project managers, surveyors, lab technicians, and inspectors.

Co-workers greatly appreciate the speed and accuracy with which Jen and her administrative staff produce final products seen and used by our clients, often under difficult time constraints. Jen is an important part of Cowan Associates, Inc., and we appreciate her efforts and dedication to excellence.

## DETENTION BASINS

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downstream. This is accomplished by determining how much stormwater is detained and how long it will be held before being released from the pond. These types of basins can usually be used in new development situations as well as being a feasible option for retrofitting an existing dry or wet pond.

### Infiltration Basin

An excavated area that collects stormwater flow and allows it to gradually infiltrate the stormwater through the basin floor is an infiltration basin. Stormwater runoff is detained in an infiltration basin so that the opportunity would be created for the runoff to infiltrate into the permeable soils in the sides and bottom of the basin and, with plants and soil, will serve to filter pollutants from the runoff entering the basin. Soils are the most important factor in determining if these types of basins will work in a certain area. Another important consideration in the placement of this type of basin is the location of the seasonally high water table or depth to bedrock. A buffer is necessary between the bottom of the basin and either the seasonally high water table or bedrock for an infiltration basin. Enough soil must exist below the bottom of the basin so that the water can infiltrate into the ground without carrying pollutants.

Infiltration basins of this type do, however, offer higher failure rates. This occurs when the permeable soils become plugged and proper infiltration flows cannot naturally occur. There is also the concern that aquifer contamination can occur in rapid permeability soils. Because of the dependence of the basin on the natural infiltration properties of the soil, proper maintenance of the bed and side slopes is imperative to ensure functioning of the facility.

### Wet Pond

A wet pond is a permanent body of water that helps control the stormwater runoff as well as assisting in removal of pollutant

materials. Gravity, settling, and biological factors will filter out these pollutants. Wet ponds, if designed properly, will give significant water quality control. Wet ponds may be an attractive Best Management Practice alternative since the permanent pond may have aesthetic value and can be used for recreational purposes as well as an emergency water supply. When properly sized and maintained, wet ponds can be successful in removing a high amount of sediment, organic nutrients, and other pollutants. Naturally occurring biological processes within a pond can also remove other pollutants such as soluble nutrients. A wet pond is normally planted with the types of plants that do well in a wet situation. Plants that can thrive in a wet location can also, to some extent, help to treat and filter pollutants in the runoff from streets and parking lots.

The wet pond can be expected to trap a great deal of sediment throughout the lifespan of the facility. It can be anticipated, and should be accounted for in development of maintenance schedules, that the pond will be dredged at some future period in time.

As communities today become more urbanized, the amount of land covered by impervious surfaces continues to increase. The stormwater runoff created by these surfaces can alter the natural hydraulics of streams and naturally occurring wetlands. By designing and maintaining proper stormwater basins as well as other stormwater management systems, the impact on surrounding areas can be controlled, leading to proper runoff and groundwater replenishment. The goal of good stormwater management design is to control site planning, create stream buffers and control the impact of impervious surfaces. A good design that includes these elements helps to protect the environment. Cowan Associates has recently designed a number of detention basins which meet these regulations. Two examples would be a site near Telford Borough in Hilltown Township where a best management practice basin was designed with wetland pockets and plantings; and a site in Carbon County that involved regrading to create a wetlands area.

Cowan Associates can assist its clients in investigating what types of impervious soils are encountered during construction and then design a basin that best suits the available conditions.

## HUMOR

*A tourist is picked up by a cabbie in New York on a dark night. The passenger taps the driver on the shoulder to ask him something. The driver screams, loses control of the car, nearly hits a bus, drives up on the sidewalk, and stops inches from a shop window. For a second everything went quiet in the cab, then the driver said, "Look friend, don't EVER do that again. You scared the daylights out of me!" The passenger apologizes and says he didn't realize that a "little tap" could scare him so much. The driver, after gathering himself together replied, "Sorry, it's not really your fault. Today is my first day as a cab driver - I've been driving hearses for the last 25 years!"*

## SLIPS, TRIPS & FALLS

Slips, Trips & Falls - a demystification seminar - will be presented by Johann F. Szautner P.E., Forensic Engineer and Executive Vice President of Cowan Associates, Inc. to the Nevada State Bar. The seminar is designed to be helpful to both the defense and plaintiff attorneys. Demystification of why and how we fall will help seminar attendants to quickly realize that accidental falls are rarely single cause events, but complex system failures whose components must be carefully analyzed to identify tort-feasors and to assess their culpability.

The seminar will be given at the Bally in Las Vegas on 11/21 and at the Atlantis in Reno on 11/22. Costs are \$ 119 and reservations can be made through the Nevada State Bar. Tel (800) 254 2797, Fax (800) 660 0060.

This Seminar may also be of interest to risk managers and claims adjusters. It can be given in a three-hour or one and a half-hour time frame. For further information contact Johann Szautner.

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## SEWERAGE - THEN AND NOW

*by William D. Kee, P.E.*

Ever wonder when civilization moved from chamber pots and dumping sewage in the streets to sewage collection systems? Or for that matter, who were the first to use chamber pots? Or when was it recorded that proper disposal of excrement was important and a written law passed to enforce it was important? Are port-a-potties new? Or when were indoor bathrooms first used? Questions pile one upon another as one considers evolution of sanitary facilities.

Starting with the chamber pot, Heathen Sybanite warriors of ancient Italy are credited with inventing chamber pots. It seems it was easier to have servants to carry wastes away than to leave feasts and orgies for nature calls.

The chamber pot as a principal means of waste disposal lasted in the cities of England until the late 1600's, in Spain until 1760, and in rural United States well into the 19th Century.

Not all of civilization was that slow of ridding themselves of chamber pots. Things were more sophisticated 2000 to 5000 years ago in certain civilizations; namely the Indus (located in modern-day Pakistan) in circa 2550 B.C., the Aegean civilization in circa 3400-1200 B.C., and the Romans.

The Indus had houses with baths with burned brick drainage systems. At Mohenjodaro site, almost every house had a bathroom placed on the street side of the building. Latrines were placed on the street area beside washing places. Wastewater disposal went into drains via vertical pipes with spigot joints set in the building wall. Roof drains, bath, kitchen, and latrine wastewater entered the street through pipes that drained into pits which had outlets to street drains above pit bottoms - sounds like a septic system without the drainfield.

The Minoan civilization, located around the Aegean Sea, built bathtubs similar to modern ones. From 1900-1700 B.C., they constructed stone drain systems that carried wastewater, roof water, and general drainage a considerable distance from the Palace of Minos near Knossus on Crete. Latrines were connected to vertical or horizontal drains which were flushed by emptying a container of water into the latrine. The latrine seat was the edge of a wood plank, set vertically into recessed slots in the side walls.

Although sewer systems were built by the Romans on a grand scale, they had few house connections. Rome's famous Cloaca Maxima (main drain) was a conduit for removal of stormwater and groundwater. Excrement and other wastes were thrown into the streets and flushed into the drain(s) in the process of street cleaning. The Roman water commissioner of approximately 100 A.D. complained that theft of water for irrigation outside Rome sometimes left insufficient water for cleaning the streets. Nonetheless, sanitation was important and the Roman Goddess of Beauty and Health also bore the name Venus Cloacina (Venus of the Sewers).

It was the Romans who brought "port-a-potties" to a grand act - huge vases lined the streets along the roadway at both ends of town. Caesar reportedly then sold the urea to local dye workers and leather tanners, a much more enterprising solution than carrying modern day port-a-potties to a wastewater treatment plant, treating it, and dumping it into the river.

Wealth moved from cities to castles, and sanitation engineering and construction seems to have died with the fall of Rome. Some examples are humorous. In 1671, a Berlin law required every peasant who came to town to remove a load of filth when returning home to reduce the refuse heap in front of St. Peter's Church. (Foil)

In 1183, at a meeting called by the Pope, the floor of the main hall broke. Lords and knights fell into the cesspool located beneath the floor. Seems to have been a common practice to build the cesspool beneath the house.

Stone castles built during the Middle Ages had interesting provisions for waste disposal. Bowmen and sentries on ramparts used tiny cubicles built slightly out over sheer stone walls. Interior arrangements for royalty consisted of wooden closet-like affairs built into bed chambers. Servants used whatever containers were available and twice daily dumped their ordure into the castle's moat, which became a giant open sewer and quite a formidable barrier to would-be invaders. (Barlow)

Madrid, in 1760, used only chamber pots and slop pots. At night, accumulated contents were tossed out of windows into open sidewalk sewers on the streets. No curfew was needed to keep people home at night. When the king decreed that each landowner build a privy for each dwelling or business, medical doctors advised against it saying "Fatal illness may result from not allowing a certain amount of filth to remain in the gutters to

## SEWERAGE

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**SEWERAGE**

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attract those putrescent particles of disease which are ever present in the air."(Barlow)

As the age of industrialization started and people moved back to the cities, this lack of concern for hygiene resulted in cholera outbreaks that brought back the Roman idea of flushing it away. Queen Victoria gave strong support to construction of a modern sewer system that was completed in 1853. The convenience of indoor water and indoor toilets with flushing capabilities resulted in water consumption in England of 24 gallons per person per day versus 5¼ gallons in Paris where night soil was still being tossed from windows.

Things moved rapidly after that with indoor potable water, indoor water closets, and public sewers that discharge to modern wastewater treatment plants. Now disease and epidemics caused by improper sewage disposal are again recognized - just as they were 3500 years ago as recorded in the Book of Deuteronomy:

"Thou shalt have a place without the camp whither thou shalt go forth abroad: And thou shalt have a paddle (shovel) upon thy weapon (spear) and it shall be, when thou wilt ease thyself abroad,

thou shalt dig therewith, and shalt turn back and cover that which cometh from thee."

"Collection System Past and Present," by James L. Foil, Joel A. Carwiche and James E. White, Water Environment Federation Opflow Magazine, December 1993, from Paddles to Pull Chain.

"The Vanishing American Outhouse," by Ronald S. Barlow.



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