Ground Works

Finelli Consulting Engineers News Quarterly

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Environmental, Economic, and Social Benefits of Green Infrastructure

Green infrastructure is a modern approach to sustainable stormwater management that combines natural processes with engineered systems to manage and treat rainfall at its source. It helps to reduce environmental and economic impacts and improve our quality of life.

Stormwater has traditionally been managed in the U.S. by gray infrastructure systems comprised of pipes, storm drains, tunnels, levees, swales, culverts, and retention ponds, just to name a few. But gray infrastructure has many drawbacks; by the time water has been carried to its ultimate destination – rivers, lakes, streams, wetlands, etc. – it has picked up various pollutants, heavy metals, trash, and bacteria that can contaminate our environment and drinking water supplies. To compound these problems, our existing gray infrastructure is aging and, in many cases, ill-equipped to handle increasing volumes of water where communities continue to grow.

Green infrastructure, as opposed to gray, incorporates manmade solutions that mimic the natural water cycle. Examples include rain gardens, permeable pavement, bio-swales, rain gardens, green roofs, bio-retention systems, and a variety of other techniques that naturally filter, store, or reuse stormwater and reduce its flow to waterways and sewer systems. Green infrastructure conserves and protects our water supply and has proven to be more cost-effective than traditional gray infrastructure systems.

Finelli Consulting Engineers is committed to helping build a sustainable environment and is expert in a wide range of stormwater management solutions and green infrastructure designs. Please contact us at (908) 835-9500 or visit us at www.finelliconsulting.com for more information.

Surveying in History: Rope Stretchers of Ancient Egypt

It should come as no surprise that ancient Egyptians were among the earliest known surveyors. Rope stretchers, or harpedonaptae, were highly-skilled specialists who used knotted ropes to measure distances and lay out foundation lines. Knots were tied at equal intervals along the length of a specially-treated rope, enabling rope stretchers to find perfect right angles using the 3-4-5 triangle. To find vertical lines, rope stretchers used plummets, which modern surveyors still use today.

Defining the foundation of an building was considered a sacred occasion in ancient Egypt, and pharaohs and other high-ranking officials would often take part in rope-stretching during these ceremonies. The above painting from the Tomb of Menna (1550 – 1069BC) depicts a rope being used to measure a field.

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Alternative Septic Systems

Options for When a Conventional System Won't Suffice

Septic systems are fairly common in rural Northern New Jersey and Eastern Pennsylvania in municipalities where sewage systems don't exist. When a new septic system design is required for new construction or for the replacement of a failed system on an existing improved property (known as an alteration), a conventional system consisting of a buried septic tank and a leach field can usually be used. Conventional septic systems aren't suitable for every property, however, in which case an alternative septic system design may be necessary.

There are various reasons why a plot of land might require an alternative septic system. Perhaps the soil didn't pass its perc test, or there's shallow bedrock, or the water table is too high. In other instances, the property may be in an environmentally-sensitive area, on a steep slope, or doesn't otherwise meet regulations. Here are some of the more commonly-used alternative septic systems used in our area.

Mound System

Mound septic systems are often used where the soil is too dense or shallow, groundwater is too high, or bedrock is too close to the surface. In a mound system, wastewater flows from the septic tank to a dosing chamber that pumps prescribed doses to a raised leach field constructed of sand and gravel and covered in topsoil.

Pressurized Dosing

Like the mound system, a pressurized dosing system uses a dosing chamber installed after the septic tank to pump wastewater to the leach field in controlled amounts. This helps prevent overloading and improves system performance. Pressurized dosing can be used in combination with various types of septic systems.

Aerobic Treatment Unit (ATU)

An ATU functions much like a small-scale municipal sewage plant in that oxygen is injected into the treatment tank to increase the growth of aerobic bacteria (as opposed to the anaerobic bacteria found in a conventional septic system) and help break down organic matter more quickly. Aerobic systems are often selected when a water table is too high, soil is of poor quality, on small lots, or when a sensitive body of water is nearby. ATUs can be fairly expensive and require substantial maintenance.

Drip Distribution System

Drip distribution systems employ a long, winding length of flexible tubing that disperses timed doses of wastewater over a large area. These systems require a large dosing chamber, a timer, and oftentimes a filtering device. Also known as drip irrigation, it can be used to water lawns and non-edible plants. They are a good selection for clay soil, shallow soil, and on steep slopes. Because drip distribution systems require electric and are susceptible to freezing, they require substantial monitoring and maintenance.

Alternative septic system design requires the services of a licensed professional engineer to perform a site evaluation determine system requirements, and to conduct all necessary site inspections, soil testing, system design, and handling of system certifications. **Finelli Consulting Engineers, Inc.** is expert in alternative septic system selection, design, inspection, and troubleshooting. For more information, please call (908) 835-9000.