On-Site Septic
FOR PROBLEM SOILS

Plastic leach chambers are lightweight and easy to place, and require less space than conventional trenches

by Gary Bellavance

Northern New England would appear to have plenty of space for new homes. But as in most areas of the country, recent development has made building lots in desirable areas increasingly scarce. Many of the remaining house lots are smaller or have soils that perc slowly, both of which present a problem for traditional pipe-and-stone leach fields. The usual solution is a pressurized septic system instead of a gravity one, but pressure systems are twice as expensive and have other drawbacks, as well. Pressure systems rely on an electric pump to carry the effluent, usually to the top of a sand mound. But even the best pumps have a limited lifespan and inevitably fail at the worst possible time. In addition, most homeowners would rather not look at a 5-foot mound of sand in the backyard. Fortunately, there are technologies that make it possible to install a conventional gravity-supplied septic system on many lots where pipe and stone are unsuitable.

Although I've been installing septic systems in northern Vermont for more than 20 years, I recently installed my first chamber leaching system to replace a failing pipe-and-gravel system. While chambers are quite popular in some states, they haven't been widely accepted in Vermont until recently, when state regulations changed to allow designers to reduce the size of the leach field when a chamber system is used. As a result, chambers are now more cost competitive with conventional systems.

Figure 1. Plastic leach chambers are lightweight and stackable, so they can be delivered to the job in a pickup, making them a good option for sites with poor access. Size vary: These chambers are about 6 feet long and weigh about 40 pounds each. The author places a couple of inches of sand in the trench (right) to make leveling the chambers easier.

Advantages of On-Site Septic

Contrary to popular belief, on-site septic systems are an efficient, safe, and economical way to deal with household wastewater. Instead of a huge wastewater plant and the associated pipe and infrastructure, on-site treatment uses aerobic and anaerobic bacteria in the soil to purify the effluent. In a typical gravity system, a concrete, fiberglass, or plastic septic tank is used to settle out large waste solids, while the clarified effluent flows by gravity to the leach field. In a pipe-and-stone system, the water flows through perforated pipes into a gravel bed where bacteria in the soil digest the solid particles, purifying the effluent. The systems work, but they have one problem — the stone: It takes up a lot of space that could be used by the waste-digesting bacteria, and even washed stone has fine particles that slow (or even stop) leaching, so you end up with a larger leach field.

Chamber leaching systems work similarly to a pipe-and-stone system, except that the wastewater leaving the septic tank is piped to a gravel-less trench covered by a dome-shaped plastic chamber. The gravel-free trench provides more space for the effluent-purifying bacteria, and in about a year a "bio mat," which does the majority of the

Figure 2. Chamber sections are designed to lock together easily. End caps are installed before placing the sections in the trench. They're molded with the pipe locations, so they can be used at either end of the trench. A couple of galvanized screws hold the end cap in place (right).

purifying, will cover the trench bottom. Without the gravel, leach fields can be smaller, and the chamber's air space gives the aerobic bacteria, which need oxygen, plenty of breathing room. Chambers also have more storage capacity, so when the homeowner is hosting a 100-guest party, the chambers can temporarily store the excess water that might otherwise back up into the house or surface on the lawn.

Replacing a Failed System

It doesn't take an expert to know when a septic system has failed — the telltale odor and surfacing effluent are dead giveaways. That's how one of my replacement customers realized that his old system was malfunctioning. His system had been in place for about ten years, and while the soil wasn't the worst I'd seen, it had a lot of clay, preventing good drainage. Because this customer's concrete tank was still in good shape, we cut the pipe leading to the leach field and started the new system from that point. The design called for three trenches, each about 40 feet long. After digging the trenches with an excavator, we began placing the chambers.

Installing the chambers. The high-capacity Sidewinder chambers I used on this job (Infiltrator, Old Saybrook, Conn., 800/718-2754, www.infiltratorsystems.com) can hold about 110 gallons of effluent, about 25% more than most chambers. The increased capacity results from making the sides taller. The design is great for soils that perc slowly. The Sidewinders also have louvered sides for additional drainage. The 6-foot chambers are placed in the trench end to end. They're only about 40 pounds each, so they're easy to carry and place (see Figure 1, previous page). They go in fast; installing the 21 chambers on this job took only about an hour. Matching end caps are installed before the first and last chambers go into the trench (Figure 2).

Backfilling. Once all of the chambers are in place, I start backfilling, first with sand and then with soil. Although it's technically unnecessary, a bucket or two of sand placed directly over the chamber is cheap insurance. It keeps the chambers in place while they're backfilled and assures good drainage. Once they're covered with sand, I walk the trenches to compact the sand around the sides (Figure 3). While you

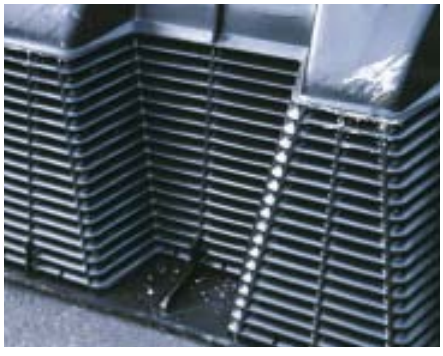

Figure 3. After covering the chambers with sand, the author walks the trenches to makes sure nothing has been dislocated and to compact the sand (left). The chamber louvers are sloped so as not to get clogged with fine particles of soil or sand (above).

Figure 4. The concrete distribution box divides the effluent equally among the three trenches, so it has to be level. Self-sealing plastic knockouts are used to bring the pipes in and out. Once the connections are made, the cover will be installed and the box carefully backfilled.

Figure 5. Starting at the box, we work back to the connections on the chambers. The opening in the end cap is drilled with a 4-inch hole. Fittings are attached using PVC cement, and the pipe is cut with a hand saw. Careful backfilling with sand prevents the connections from loosening.

could backfill everything at the same time, I usually backfill the trenches as soon as possible and leave the inlet end open to make the plumbing connections. Backfilling the trenches right away makes it easier to get around the site and prevents the trenches from filling with water if it rains.

Making the connections. Plumbing the leach field starts at the distribution box. I connect the box to the line leaving the septic tank, then run the pipes to the individual trenches (Figure 4). Once the box is leveled, I use gasketed SDR pipe and glue-on fittings to make the connections (Figure 5).

I was surprised at how easily the system went in. Although it may take a while for chambers to catch on here, they make a lot of sense for problem soils and small lots. Because stone is cheap and plentiful in this area, the chambers end up costing more than pipe and stone. But they're still less than a mound system, and there's no effluent pump to maintain.

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