

Installers Gather for Installation of a New Treatment Technology

By Scottie Dayton [April 2017](#) Appeared in print as "Learn by Doing"

A New Hampshire onsite designer's own system fails, so he plans an industry event around its replacement using new technology.



Corrosion and age collapsed the nearly 2000L metal septic tank with dry well serving a four-bedroom home in Littleton, New Hampshire. The timing was perfect.

A month earlier, Presby Environmental had released its EnviroFin passive onsite wastewater treatment and dispersal system. "Here was an opportunity to install one of the first units in the state and in my backyard where I could monitor it," says Mike Carbonneau, the homeowner and proprietor of Connecticut Valley Design. He also used the installation as a Field Day.

The event, approved for CEUs by the New Hampshire Department of Environmental Services, was also sanctioned by Granite State Designers and Installers. It attracted 90 participants, mainly installers and designers from New Hampshire and Vermont, with some from Maine and Massachusetts.

"Typically, most people fly out of the door the minute a training session is over," says Carbonneau. "This event was to finish at 2 o'clock, but we were inundated with questions and interest in the product. Two hours later, we were still talking to 15 to 20 participants, and were contemplating ordering takeout dinners."

System Components:

Carbonneau designed the system to handle 2555 Lpd. Major components are:

4700-litre single-compartment concrete septic tank

Three x 852 lpd EnviroFin modules

54 tonnes of ASTM C-33 washed concrete sand with no more than 2 percent fines passing a No. 200 sieve

System Operation:

Wastewater flows by gravity 6.7 metres through a 100mm Schedule 40 PVC lateral to the septic tank, then runs 9.75m through a 100mm supply line to the fin distribution unit in the centre of the first module. The 60 cm diameter by 60 cm -deep FDU has four parallel treatment fins on either side, creating a 3.2m-diameter footprint. Two 100mm pipes passing through the FDU connect multiple units. The upper pipe transfers oxygen and the lower pipe distributes effluent.

Effluent enters through a sanitary tee near the top of the FDU, then passes through skimmer tabs that capture grease and suspended solids as the liquid drops to the bottom. More solids settle out as the cooled effluent seeps through perforations in the FDU and into the eight 1.37m-long by 150mm-diameter fins.

The bottom 200mm of the fins have a thick layer of coarse fibres with a thin layer of geotextile fabric below it. This combination provides large surfaces for bacteria to colonize and digest nutrients. A 100mm perforated corrugated pipe within the fin and above the layers functions as an air duct, supplying oxygen to the system and enabling waste gases to escape. The basal sand area beneath the geotextile fabric wicks away liquid and transfers air to the bacteria on the fabrics. The system exceeds **NSF/ANSI Standard 40 treatment***.

Installation:



Mike Carbonneau, owner of Connecticut Valley Design in Littleton, New Hampshire, demonstrates where to screw together the two halves of the EnviroFin distribution unit. (Courtesy of Presby Environmental)

The state Department of Environmental Services and other sources publicized the June 2016 Field Day, with presenters Carbonneau, Presby general manager Lee Rashkin, and technical representatives Don Prince and Mark Vander-Heyden. Ken Wood of Calco Precast provided the septic tank. Presby Environmental supplied the modules and an OrnaVent — a miniature New England Patriots helmet — for the lower air vent. George Papadamos of Blue Lodge Spray Foam donated the Bayer spray insulation.

“Our property is on top of a hill with minimal tree cover, making strong winds and deep frost an occasional concern,” says Carbonneau. “As a precaution, George insulated the lateral and supply line with Bayer spray foam.”

Using a Hyundai Robex 140 LCD-7 excavator, Connecticut Valley Design employee Justin Marvin decommissioned the wet well and septic tank, then dug the new tank hole. Rashkin delivered and set the tank before the Field Day, and Carbonneau plumbed the lateral. “We wanted the tank in place for a visual reference,” he says. “We also installed a 10cm sanitary tee instead of an effluent filter. David Presby is concerned that filters restrict airflow and he is conducting a formal study on that theory.”

Working on a 12 percent grade, Marvin removed numerous fieldstones as he excavated a 975m- by 1.38m- by 0.60m-deep trench for the drainfield, then he scarified the fine sandy loam with gravelly attributes. Meanwhile, Carbonneau used a self-built Mack dump truck with 10.7-cubic-metre Bibeau box to haul in three loads of sand. Marvin built up the grade with 15cm of sand, and extended the fill 90cms along the toe of the drainfield.

A morning classroom session and PowerPoint presentation at a nearby donated Masonic Lodge launched the Field Day. During lunch at Carbonneau's home, presenters explained more about how the product worked. Afterward, they divided attendees into three groups, enabling everyone to become involved.

Presby ships the 23 kg system in a 60cm- by 60cm- by 120-cm cardboard box, Carbonneau says. Inside the box are the FDU's two halves, two sets of four treatment fins sewed together, four plastic zip ties, 18 self-tapping screws, a cover for the FDU, and silicone caulk.

After lunch, each group opened a box and removed the pieces. "We made sure everybody was hands-on because doing it yourself is the best way to understand something," says Carbonneau. "We demonstrated how to click and screw the FDU halves together, then disassembled it and let someone else try."



Two homemade plywood spacers hold the fins in position during backfilling and maintain the required 15cm separation between them. (Courtesy of Connecticut Valley Design)

Presenters used the same approach when teaching how to attach the top and bottom of fins to the FDU with zip ties. "We brought extra ties," says Carbonneau. "Two or three people would attach a fin, then we'd cut the ties and let the next group try. We wanted everyone to feel comfortable with how to align the fins with the perforations in the FDUs to ensure proper transfer of effluent."

After participants carried the components to the drainfield, Carbonneau dug a 60cm-diameter by 5cm-deep hole in the sand with a shovel and countersunk the first FDU. "This ensures the fins are level with the sanitary tee," he says. Attendees dug the two remaining holes.

Working on the slope gave everyone an appreciation for why the EnviroFin is suited to steep terrains. "The fins can be arrayed like wheel spokes or laid straight following a contour," says Carbonneau. "For the steepest terrain or on sites with setback restrictions, the fins can be separated to fit in the limited receiving areas."

Looking at the grade, installers wondered if it would cause effluent to blow out at the toe. "No," says Carbonneau, "because concrete sand — a mixture of coarse and fine particles — works like a time-release agent. The sand also transfers oxygen to the pores of the soil, which is critical for an aerobic system."

A 15cm separation between fins creates a dry transfer area for water to escape and to reduce biomat buildup. To ensure the exact distance is maintained during backfilling, Carbonneau fabricated two 1.2m by 0.38m-high plywood spacers with four 15cm-wide slots for the fins. "Everything good comes with care," he says. "We set the spacers over the fins, sprinkle in a little sand, compact it with our boots, then shovel in some more.



Some of the 90 attendees observe how multiple Presby EnviroFin distribution units are connected by two 100 mm PVC pipes. The upper one transfers oxygen and the lower pipe distributes effluent. (Courtesy of Presby Environmental)

"The spacers are 7.5cm taller than the top of the fins, giving us the proper cover fill height. After backfilling with sand to the top of the plywood, we walk around making certain it's compacted and smooth, then we pull up the spacers." An additional 7.5cm of loam completes the installation, which normally takes one day. Homeowners find the lower profile less intrusive.

Maintenance

Carbonneau recommends pumping the septic tank every three years, and looking for leaks or root intrusion. The screw-down lids on FDUs enable service providers to monitor the system's performance.

* NSF/ANSI 40 is a standard for residential wastewater treatment systems with rated capacities between 1,514 and 5,678 litres per day. We can evaluate any kind of system, regardless of treatment technology, in test facilities in the U.S., Canada and Europe.

To achieve certification, treatment systems must produce an acceptable quality of effluent during a six-month (26-week) test. Class I systems must achieve a 30-day average effluent quality of 25 mg/L CBOD5 and 30 mg/L TSS or less, and pH 6.0-9.0 spanning six months of testing. System service and maintenance are prohibited during the test period.

For more information on NSF/ANSI 40, call +1 734.827.5668 or email wastewater@nsf.org.