

SYSTEM PROFILE



A Huge Layout and Sketchy Weather Made an RV Campground a Logistical Challenge

This North Carolina park project was the largest installation ever for Creech's Plumbing

By Scottie Dayton

Expanding Raven Rock State Park in Lillington, North Carolina, included building nine campsites, each with five or six RV hookups, and a bathhouse with showers and restrooms.

Park officials hired Allen Grading Co. with Taylor Carr, the general contractor's project manager; Robert Graham, P.E., principal engineer at George Finch/Boney and Associates; and Stacy Creech, proprietor of Creech's Plumbing in Wilson, North Carolina.

To stay within funding limits, park officials requested a conventional system with stone-and-pipe drainfields. "We avoided pretreatment and nitrification due to the level of maintenance, operator training and licensing required," Grahams says.

The size and complexity of the project intimidated local installers. "Even I wasn't interested at first, but the challenge of the logistics was intriguing," Creech says. "Although the installation was straightforward, it was our largest system to date."

SITE CONDITIONS

Soils are sandy loam to gravelly sandy loam with a loading rate of 0.30 gpd per square foot.

➤ Stacy Creech (right) explains to Hunter Creech, his son, what he is reading with the Topcon GPS tool, while performing an as-built. The system designer, Robert Graham, P.E., observes.

✚ While teammates prepare the trench using a Bobcat tracked excavator, a worker off-loads Infiltrator chambers from a Ditch Witch SK 1550 mini skid-steer transport.



SYSTEM COMPONENTS

Graham sized the system to handle 2,655 gpd. Major components are:

- 6,000-gallon dual-compartment septic tank with a 6-inch PL-625 effluent filter (Polylok). Tanks from Shoaf Precast
- 8,000-gallon dose tank with dual dedicated 2 hp Hydromatic SKHS-150 sewage pumps (Pentair)
- 840 Quick4 Plus Standard chambers (Infiltrator Water Technologies)
- DPC-4F control panel with Panel Link controller (SJE Rhombus)

SYSTEM OPERATION

All piping is Schedule 40 PVC unless indicated otherwise.

Wastewater from the camper hookups connects to a 6-inch sewer pipe running 693 feet downgradient to the septic tank. Water from the bath-house gravity-flows 799 feet through a 4-inch pipe to the septic tank, then effluent flows to the dose tank.

When activated, alternating on-demand 110 gpm pumps in the dose tank send 690 gallons in 6.25 minutes through a valve vault, then to a dedicated 14-tap manifold. If one pump fails, the five 3-inch gate valves in the vault allow the second pump to service either field.

To balance output to the fields, the 3-inch SDR-21 piping at the dose tank changes to 4-inch before reaching the manifolds. The distance to the manifold for Drainfield 1 is 1,292 feet; the line to Field 2 is 1,250 feet. Fields are 100 yards apart and both are dosed twice daily at full campground capacity. A 3% slope on the fields enables effluent to gravity-flow to the chambers. Both fields have 14 trenches 120 feet long on 9-foot centers and a reserved repair area.



System Profile

Location:	Lillington, North Carolina
Facility served:	Raven Rock State Park
Designer:	Robert Graham, P.E., George Finch/Boney and Associates
Installer:	Stacy Creech, Creech's Plumbing
Type of system:	Conventional
Site conditions:	Sandy loam to gravelly sandy loam, loading rate 0.30 gpd per square foot
Hydraulic capacity:	2,655 gpd

INSTALLATION

The park was a one-hour and 45-minute drive from Creech's shop, so he chartered a helicopter and was on-site in 30 minutes for his first visit. He saw a road of volcanic rock, soil and clay leading to the park entrance, but only a park ranger road wound through a forest of pines and hardwoods to the job sites.

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▲ Workers apply butyl rubber sealant tape to the bottom half of the 6,000-gallon septic tank.

▼ Hunter Creech checks the level of the PL-625 effluent filter (Polylok).



“After importing a DWG file of the drainfields into the data collection, we laid out 28 precise lines — or both drainfields — in one day. It was phenomenal.”

Stacy Creech

“One park entrance was fine, but the other didn’t have a bridge over a creek and it had a huge rock in the middle,” Creech says. “Allen Grading had cleared the trees and flagged the drainfield perimeters. Everything beyond them was off limits. The logistics of where to stockpile the massive amount of stone, then truck it to the fields without penetrating the perimeter was daunting.”

Creech requested substituting Infiltrator chambers and the change was accepted. However, Graham and the park officials rejected the 25% footprint reduction allowed for chambers over gravel, preferring to err on the side of caution.

The chambers arrived on one truck and the pipes on a second vehicle. Materials were stacked in a condensed, deforested area, then carried by hand or moved with Ditch Witch SK 1550 mini skid-steer transports.

Since as-builts were part of the contract, Creech purchased the Hybrid Positioning System with FC5000 data collector, LN100 laser, and Sokkia GPS antenna (Topcon Positioning Systems) from Benchmark Tool & Supply. Thomas Ethridge, company representative, arrived the first day to train everyone: the GC and Creech’s crews, the state inspector, Graham, Carr and Jonathan Godfrey, Infiltrator sales representative.

Creech’s team, which included laborers and equipment from his brother’s company, Travis Creech Plumbing and Septic, began measuring with the laser and laying the trenches on contour. Before long, the measurements extended 35 feet beyond the perimeter. “After importing a DWG file of the drainfields into the data collector, we laid out 28 precise lines — or both drainfields — in one day. It was phenomenal.”

EYE ON THE SKY

Weather was a constant concern. Work began in early September 2019 as the state entered the rainy season and its potential for hurricanes. By agreement with the inspector and Graham, work was done in stages, inspected, and covered before the GPS equipment recorded the daily as-builts.

“I don’t know what a survey company would have charged for 8 to 10 days of work, or even if one would have been available for what was considered a small job,” Creech says. “By eliminating another contractor, the as-built tool brought us closer to being a turnkey service and increased our productivity.”

Creech pushed the crews hard to complete a day’s work. Each stage — the drainfield, the supply lines from the manifold to the trenches, and the force main — took two days to install, then they returned home to catch up on local projects.

Temperatures hit 100 degrees while installing Field 1. As Bobcat E42, E63, and E85 compact excavators dug trenches simultaneously, Godfrey offered supervision and helped install chambers. After the trenches were

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▲ A 14-tap manifold with supply lines.

inspected, they were covered and marked with the as-built tool. Installing Field 2 followed the same sequence.

Allen Grading's work on the campsites and rain stretched Creech's total of 14 workdays over three months. By late December, the crew had vacuum-tested the tanks and were ready to pressure-test the system using a generator for power.

"We filled the tanks, turned on the system, and left with everything on automatic," Creech says. "Sometime later, I received an alert at home that a pump had activated three times." An investigation revealed that someone

thought the tanks were leaking because they weren't filling, so he let the hose run. The episode proved to park officials why the system needed remote monitoring.

The day after the install concluded, rain fell for the next four weeks. "Had I not pushed everyone, we wouldn't have finished until the middle of next spring," Creech says.

MAINTENANCE

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