alternative onsite wastewater treatment

By Dennis F. Hallahan

Septic chambers replace New York high school's aging lagoons

Project Description: Aging lagoon septic system at a New York high school replaced using chambers in six beds

Owner: Jordan Elbridge School District, Elbridge, N.Y.

Contractor: C.W. Gregory, Blue Heron Construction Co. LLC, Jordan, N.Y.

Engineer: Paul3McGarvey, P.E., Stearns & Wheler GHD, Amherst, N.Y.

Health Officer: Jeffrey A. Till, P.E., Bureau of Public Health Eng., Onondaga County Health Department, Div. of Environmental Health

Solutions Used: 5,700 ln ft of Infiltrator Quick4 Standard chambers, plus Orenco Controls pumps and distribution valves

When the Jordan Elbridge Central School District in New York state needed to replace an existing lagoon with a new septic system for a high school, it ran into the challenge of poor soils with varied permeability and percolation rates.

Engineers for the project needed to find a solution that could handle the wastewater flow efficiently and be installed within the maximum allowable bed width of 20 ft, per state health regulations. A stone and pipe system initially was proposed as part of the Draft Environmental Impact Statement, but the vast size of the bed required for such a system was larger than allowable by state standards.

This determination sent project engineers at Stearns and Wheeler back to the design phase to look for other absorption bed options. The team proposed a chamber system that would provide a high level of treatment even with poor soils on the site. Although chamber systems have been installed in similar large commercial applications in New York state and nationwide, they never had been used in this area of the state.

When originally proposed for this absorption bed project, the chamber system was met with some regulatory concerns. The Infiltrator Systems team worked closely with the Department of Health and the project team to work out a design to solve site and soil challenges with the goal of gaining system approval.

WHY CHOOSE ONSITE TREATMENT?

In current budget-constrained times, funding for major infrastructure projects—such as municipal sewage treatment plants and sewer line extensions—is hard to come by. Without federal funding, sewers have proven to be inadequate in terms of cost-effectiveness in many cases; onsite wastewater treatment has stepped in to fill this void with economically feasible options that provide the same level of treatment. With advances in products, onsite wastewater systems currently operate to handle in excess of 1 million gal per day.

NON-AGGREGATE NATURAL TREATMENT

For this system, which treats a design flow of 8,000 gal per day, an absorption field that specified 5,700 ln ft of Infiltrator Quick4 Standard chambers was designed and approved. To enhance treatment, the effluent is applied to a larger surface area than the original system design specified. The drainfield system is divided with two six-way automatic distributing splitter valves in 12 separate beds to accommodate the maximum bed width regulation of 20 ft. The chambers were installed along with a distribution valve system with time dosing.

A state-of-the-art quad-plex pump station from Orenco Systems, supplied by Wastewater Technologies Inc., feeds the chambers. The company also provided onsite support and startup services for the project. The pump station features Orenco's energy-efficient PF Series effluent pumps and a custom MVP control panel. The distribution valves allow the flow to be rotated through each bed. This is a benefit in that the whole system does not have to be pressurized at one time, thus allowing for smaller pumps to be specified. Splitting the system into zones also allows for improved operations and maintenance options, as certain beds can be rested if necessary and taken offline without having to shut the whole system down.

The Quick4 Standard chamber was selected because dimensionally it fits inside the parameters of the field size and offers significant benefits over a traditional aggregate system. The chamber

system provides increased storage volume in the bed and a larger unobstructed absorptive area than a traditional stone-and-pipe system. This increase in storage volume was a plus in this scenario due to the varied nature of the flows from the school—from high flow during school hours to very low-flow volumes when school was not in session.

Sensitive soils on the site presented another catalyst to selecting a non-aggregate system. If aggregate had been specified, it would have resulted in extensive damage to the permeability of the soil during construction. The dumping, hauling and placing of the aggregate also would have affected system performance negatively and resulted in a significant increase in overall system cost due to the labor required for handling, placement and cleanup.

Due to the sensitive soil conditions, a specified mound sand fill was imported to level the uneven slope for the shallow, keyed-in design. Each bed steps up in elevation to accommodate the natural slope of the site. The design had to account for equal distribution to beds of varying elevations; these variables were accounted for in the design of the pressure distribution system. The design team composed of Infiltrator, Wastewater Technologies and Orenco was available throughout the project to provide assistance with regulatory approval and with the various facets of design. The team also was on site for the system installation to assist with any concerns as they arose during construction.

CONCLUSION

Non-aggregate onsite wastewater treatment systems using chamber technology can provide a cost-effective and efficient alternative to municipal treatment plants and sewer line extensions at a time when funds for large infrastructure projects are difficult to obtain. Where large and variable flows and site constraints (e.g., poor soils) are an issue, systems using chamber technology in combination with pump stations and distribution valves allow for outstanding treatment and viable operations and maintenance options. Shallow systems also offer additional installation options for designers faced with sloping sites that require varied elevations.

In the case of the Jordan Elbridge High School septic system, this proved to be a valuable asset to gaining approval. Installation of the system was completed in the summer of 2010, and the system went online as planned in the fall. Operation has been effective, with the system functioning as planned. WWD

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The distributing valve allowed the chamber drainfield system to be split up into zones. The valve requires no power and rotates sequentially through each zone.

New tanks were installed: This one houses the pumps and has risers to grade for ease of access during operations and maintenance procedures.

The palletized chambers were delivered to the site, unloaded close to the beds and then installed quickly, thus saving time on installation and cleanup.

The system was designed to fit the site with each chamber bed stepping the natural slope. Each chamber bed is a different zone receiving effluent from the pump tank.

The smaller-diameter pressure lines distribute effluent to each zone. The system is designed to drain out upon completion of each dose to prevent the piping from freezing.