

Breaking the Record

Two brothers in west-central Wisconsin design and install the largest privately owned onsite system in the state

By **Scottie Dayton**

The Wisconsin Department of Transportation's Highway 29 bypass project rerouted traffic around Chippewa Falls and expanded the road to a four-lane highway. River Country Co-op owns a travel plaza east of the city and wanted to build a similar one on the west side to take advantage of the bypass.

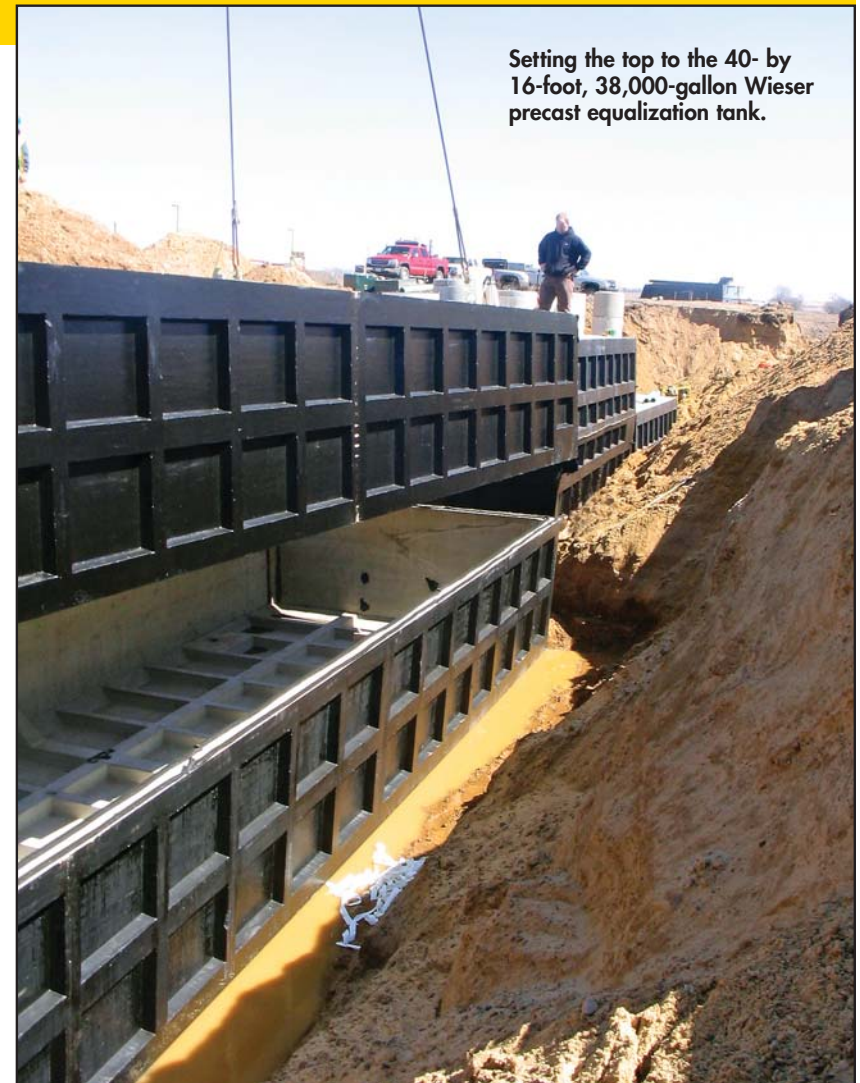
The co-op purchased 10 acres for a full-service truck stop with convenience store, mini-mall, restaurant, and 78-room hotel with banquet seating for 300 in an adjoining conference center. An onsite wastewater treatment system would service the complex.

Bruce Mlsna, the co-op's general manager, knew the reputation of Geo Tech Soil & Site Evaluation, a full-

service soil testing and septic system design company in Chippewa Falls. He asked owner Bill Bergh to design the system.

A preliminary soil test indicated that the site was marginally suitable for a mound system or holding tank. Bergh told Mlsna that unless they found a better area offsite for the system, the travel plaza probably could not be built. Bergh located the only two-acre parcel with acceptable soils across the road from the plaza, and the co-op bought it.

The first challenge Bergh faced was how to dose the system without overloading the absorption bed on peak days. The second was to design a system around that dose, and the third was to



Setting the top to the 40- by 16-foot, 38,000-gallon Wieser precast equalization tank.

System Profile

Location:	Eau Claire, Wis.
Facility served:	River Country Travel Plaza.
Designer:	Geo Tech Soil & Site Evaluation, Chippewa Falls, Wis.
Installer:	Bergh Contractors Inc., Eau Claire, Wis.
Site conditions:	Coarse sand mix with a loading rate for highly treated effluent of 1.6 gallons per square foot per day. The seasonal high-water table is within 17 feet of grade.
Type of system:	Fixed activated sludge treatment (FAST) units from Bio-Microbics; EZflow drainfield from Ring Industrial Group
Hydraulic capacity:	27,633 gpd

get the design approved. The solution involved a grease interceptor, lift station, septic tank, flow equalization tank, five fixed activated sludge treatment (FAST) units from Bio-Microbics, dose tank, and a four-zone drainfield.

Site conditions

River Country Travel Plaza is in a 40-acre commercial development in Eau Claire. Soils at the treatment unit site were glacial outwash (coarse sand mix) with a loading rate for highly

treated effluent of 1.6 gallons per square foot per day. The land slopes less than 2 percent, and the seasonal high water table is within 17 feet of grade.

System components

Bergh designed the system to handle 27,633 gpd. Its major components are:

- 8,000-gallon, four-compartment grease interceptor tank, next to the restaurant. (All tanks concrete; made by Wieser Concrete Products Inc., Maiden Rock, Wis.)
- 12,000-gallon lift station with two 3/4-hp sewage ejector pumps from ITT/Goulds Pumps, Seneca Falls, N.Y. (All pumps single phase and on current sensors.)
- 10,000-gallon, single-compartment septic tank.
- 38,000-gallon, single-compartment flow equalization tank with two 1/2-hp Goulds pumps.

“The biggest reason for the four zones was that it allowed us to keep our pump sizes down.”

— Bill Bergh

- Five 10,000-gallon tanks containing 9.0 HighStrength FAST aerobic treatment units from Bio-Microbics, Shawnee, Kan.
- 12,000-gallon, single-compartment dose tank with four 1/2-hp high-head pumps from Orenco Systems Inc., Sutherlin, Ore. (Each pump outlet has an STF-100 effluent filter from Sim/Tech Filters Inc., Boyne City, Mich.)
- 1,056 1203H-10 EZflow units from Ring Industrial Group, Oakland, Tenn.
- 10,560 feet of 1 1/4-inch Schedule 40 PVC distribution laterals inside the EZflow units.
- VeriComm telemetry control panel from Orenco.

System operation

A 6-inch, high-strength PVC line runs from the kitchen to the grease interceptor, which discharges into an



At left, the lid of the equalization tank in the foreground and the five 9,000-gallon treatment tanks, each with a 9.0 FAST unit, in the background. Below, Bill Bergh with the Orenco control panel.



8-inch, 11-foot-deep, 3034 PVC sanitary sewer. Six-inch PVC lines carry domestic-strength waste from the hotel and convenience store washrooms to the sewer. It drains to the lift station.

“We wanted to limit the amount of excavation required to set the large tanks,” says Bergh. “The lift station produced the required elevation to bring the discharge pipe level with the top of the septic tank.”

Effluent gravity-flows from the septic tank into the flow equalization tank, installed to handle surge flows. A five-way splitter valve distributes the effluent equally to each FAST unit. The pumps alternate and run for 5.7 minutes every 45 minutes, delivering 512.5 gallons (one percent of design flow to each FAST unit).

Currently, none of the effluent is recirculated to the equalization tank because nitrogen levels meet Department of Natural Resources standards. The system has a recirculation valve should the need arise.

Effluent gravity flows into the dose tank, where each pump is responsible for one of the four drainfield zones (total drainfield footprint is 240 by 880 feet). Each zone has six cells, dosed independently via a multi-zone valve. The pumps operate in sequence. It takes 25 doses before the system returns to a particular cell.

Installing the distribution cell containing EZflow gravelless pipe and pressure distribution piping.



“The biggest reason for the four zones was that it allowed us to keep our pump sizes down,” says Bergh. Every time a pump shuts off, effluent drains back from the absorption bed and flushes the effluent filter.

Each cell in a 60- by 200-foot zone has four EZflow units supplied through a center manifold. The system uses 10-foot lengths of 1.25-inch Schedule 40 perforated corrugated PVC pipe surrounded by 12 inches of lightweight geo-synthetic aggregate. Polyethylene netting holds everything together. Two pairs of laterals, 110-feet long, branch in opposite directions from the manifold and are stacked tightly side-by-side. Everything is installed level, and inverts are at the same elevation.

Each cell has four 2-inch Schedule 40 PVC laterals with 1/8-inch orifices drilled three feet on center. Orifices face up, but every fourth one discharges down to allow proper draining and prevent freezing. Three feet separates each lateral.

Installation

After River Country Co-op purchased the additional property in 2005, Bergh obtained an easement to run 900 feet of sewer under the plaza’s parking lot, across the road, and into the sewage lift tank. A local plumber installed the sewer because the co-op had not yet awarded the septic system contract.

“The sanitary sewer had to be



A riser with 6-outlet Multizone valve to sequentially dose the distribution cells.

installed and the first coat of asphalt applied to the parking lot before the ground froze,” says Bergh. “The contractors wanted to complete the hotel in spring, and not deal with frost issues or us getting in their way.”

In Wisconsin, the DNR and Department of Commerce must review any system designed for 12,000 gpd or more. Three months passed before those agencies granted approval. The DNR’s concern was that the effluent must not exceed 10 mg/l total nitrogen, while Commerce focused on whether the design would work. The project was the biggest Bergh ever designed and, at the time, the largest privately owned septic system in the state.

Ed Bergh of Bergh Contractors Inc. in Eau Claire won the bid, but winter was approaching. To prep the site for the next year, he covered the drainfield and tank areas with chopped straw to insulate the soil. When his men removed the straw in April, they encountered frost in a few locations, but its depth was insignificant. “It rained for the next three days and all the frost came out of the ground,” he says. “Our timing was perfect.”

This was Bergh’s first large commercial onsite installation, but the work went smoothly because the system was off the main construction site. Excavations for the tanks were 16 feet deep. Andy Winkler and crew used a 260-ton crane to set and assemble the tanks. (Half of the 38,000-gallon, 40- by 16-foot septic tank weighed 70 tons.) Joints were sealed with a tar-strip adhesive.

Eight days later, when the system

was installed, they poured 10,000 gallons of freshwater into the dose tank and pumped every lateral to blow out the shavings and filings left from drilling the orifices. They also did a distal pressure test at the end of each lateral to make sure the zones were working properly.

“During the startup, we measured all the drawdowns in the tanks to see what the pumps were pumping,” says Bill Bergh. “We entered those values into the control panel. Since we know what amperage each pump draws, we also set an upper and lower amperage level. If it moves five amps in either direction, an alarm goes off.”

Maintenance

Geo Tech holds the two-year maintenance contract. The grease interceptor receives a quarterly inspection until its baseline is established and protocol determined. For the first year on a quarterly basis, effluent is sampled from the dose tank and randomly sampled from the FAST units. The air intake on the FAST units is cleaned, and the alarms and current sensors checked.

One control panel regulates everything. Alarms come to Bill Bergh’s cell phone, then go to the office if he doesn’t respond. “We’ve seen significant flows already and the system performed flawlessly,” he says. “The conference center has hosted wedding receptions with the hotel at 90 percent capacity.” Assuming the drainfield receives quality effluent, it should last indefinitely. ■

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October 2006

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