

Really Kwik

A team mobilizes to beat winter weather and other challenges and finish an onsite system in time for a travel center grand opening

By Scottie Dayton

Kwik Trip of La Crosse, Wis., wanted to build a travel center at the former site of a truck stop along Interstate 90 north of Nodine, Minn. Plans called for a restaurant seating 56 people, a coffee bar serving hot food and showers for truck drivers.

The two onsite systems on the property were undersized for the new project. Kwik Trip hired Kim O'Laughlin of O'Laughlin Plumbing and Heating in Winona, Minn., to design a system that could handle high-strength waste and fit on half an acre.

The solution involved a grease interceptor, two septic tanks, a flow equalization tank, sampling manholes, two fixed-film activated sludge treatment units, a dose tank and two drainfields. The company had enough men and machinery to

install the system quickly. Despite bad weather, site constraints and an early, brutal winter, the crews met the deadline for the center's grand opening.

Site conditions

Soils are clay loam with a loading rate for highly treated effluent of 2.2 gallons per square foot per day. The seasonal high water table is 84 inches below grade. The site is surrounded by a freeway and agricultural fields.

System components

O'Laughlin sized the system to handle 4,000 gpd at a waste strength of 1,200 mg/l BOD. Its major components are:

- 3,500-gallon grease interceptor. All tanks, made by Crest Precast Inc., LaCrescent, Minn.,



Gary Thill, operator for Modern Crane of La Crosse, Wis., prepares to lift the bottom half of a 10,000-gallon tank with the HighStrengthFAST unit inside. (Photos courtesy of O'Laughlin Plumbing and Heating)



Corey O'Laughlin (foreground) and Kyle McNallan install 6-inch insulated Insul-Seal PVC pipe from the building to the septic tank.

- have traffic-rated lids and cast-iron risers.
- 3,200-gallon septic tank.
- Recycled 6,000-gallon, dual-compartment septic tank with PL-525 effluent filter from Polylok Inc.
- 48-inch sampling manhole.
- 6,000-gallon flow equalization surge tank with two 1/2 hp EP0538 Red Jacket Water Products - IIT effluent pumps supplied by Petersen Supply LLC., Fredonia, Wis.

System Profile

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| Location: | Nodine, Minn. |
| Facility served: | Kwik Trip travel center |
| Designer/installer: | Kim O'Laughlin, O'Laughlin Plumbing and Heating, Winona, Minn. |
| Site conditions: | Clay loam soils; seasonal water table 84 inches below grade |
| Type of system: | FAST units from Bio-Microbics Inc.; Smart-Rock media from Infiltrator Systems Inc. |
| Hydraulic capacity: | 4,000 gpd |



In the background, Wayne Hornberg (left) and Corey O'Laughlin set grades for the manhole covers. Steve Mader (bending over) disconnects the crane from the 6,000-gallon surge tank.

- Control panels from American Manufacturing Co. Inc., Elkwood, Va.

System operation

Most plumbing is 6-inch Schedule 40 PVC pipe insulated with two inches of sprayed-on foam protected by plastic wrap. Effluent from the grease interceptor and septic tank enters the 6,000-gallon septic tank, passes through the first sampling manhole, and feeds by gravity into the equalization tank, installed to handle surge flows.

Pumps in the surge tank alternate, running for two minutes every half hour and delivering 83 gallons to each aerobic treatment unit through 2-inch pipes. O'Laughlin chose the FAST system because it requires little maintenance and reduces BOD and TSS to less than 30 mg/l with 65 percent nitrogen reduction. Effluent gravity-flows

solid; the top bundle has the laterals. The tubes are stacked tightly side by side.

The system uses 10-foot lengths of 4-inch Schedule 40 perforated corrugated PVC pipe surrounded by 12 inches of lightweight geosynthetic aggregate. Polyethylene netting holds everything together. "Using four zones was another way we kept down the pump sizes," says O'Laughlin.

Installation

Once the general contractor prepared the site, bad weather arrived. "Every moment it wasn't raining and the site was dry enough, I had one crew setting tanks and another working on the drainfield," says superintendent Corey O'Laughlin. "We had eight weeks to install the system before the ground froze. It rained 30 percent of the time, and an early winter was closing in fast."

Steve Mader of Crest Precast Inc. delivered the tanks. The 6,000-gallon septic tank was recycled from another Kwik Trip location after Mader tested its structural integrity. Tanks closest to the building — grease interceptor, septic and surge — were installed first, enabling contractors to pour the concrete parking lot over them.

After installing the tanks with their tops 3 feet below grade, O'Laughlin's men insulated them with 2-inch-thick foam to further protect them from freezing. The men set the manholes, ATU tanks and dose tank the same way. "Our biggest challenge was keeping the equipment from sliding off the greasy soil into the ravine," says O'Laughlin.

Tony Birrittieri and Bob Zwiefelhofer of Petersen Supply helped install the FAST units, pumps on guide rails, blowers and controls, then programmed the dosing schedule. The FAST units, containing media to which bacteria cling, are box-like containers standing on legs inside the concrete tank. The blowers sit at-grade in enclosures.

After O'Laughlin's men mowed the tall grass on the drainfield site, the excavator dug 3- by 2.5-foot-deep trenches on 5-foot centers. "Every time it rained, we had to wait



Corey O'Laughlin glues 4-inch Schedule 40 perforated corrugated PVC pipe together for the pressure distribution system. The pipe is inside the Smart-Rock geosynthetic aggregate drainage tubes.

"We had eight weeks to install the system before the ground froze. It rained 30 percent of the time, and an early winter was closing in fast."

Corey O'Laughlin

- Two 10,000-gallon tanks with Bio-Microbics Inc. 9.0 High-StrengthFAST aerobic treatment systems set side by side, supplied by Petersen Supply.
- 48-inch sampling manhole.
- 2,000-gallon dose tank with four dedicated 1/2 hp Red Jacket Water Products - ITT 2WS1038B submersible sewage pumps.
- 300 feet of pre-insulated 6-inch Schedule 40 PVC pipe from Insul-Seal, Racine, Minn.
- 5,280 feet of 1203-SEP Smart-Rock (formerly EZflow) geosynthetic aggregate drainage tubes from Infiltrator Systems Inc.
- 2,060 feet of 2-inch Schedule 40 PVC distribution laterals inside the drainage units.

through a 6-inch pipe through the second sampling manhole to the dose tank.

The dose tank is at the bottom of an 8-foot-deep ravine 300 feet behind the building. "Using four pumps instead of two allowed us to reduce their size and the gallons per minute requirements," says O'Laughlin. "We also avoided splitter valves, because they can freeze in Minnesota." An 8-foot backfall drains liquid to the dose tank when the pumps stop.

Each pump sends 625 gallons every four hours to a dedicated zone in the drainfields. Drainfield A has two 200- by 60-foot zones with six trenches each, and drainfield B has two 130- by 60-foot zones with eight trenches each. The bottom bundle of three aggregate tubes is

two or three days before the equipment wouldn't slide off the greasy soil and the footing was safer for the crew," says O'Laughlin.

The men drilled 1/4-inch holes 3 feet apart in the supply lines, then inserted them into the 10-foot-long bundles. They covered the top row with filter fabric extending halfway down both sides. After backfilling with 6 inches of native soil, they planted grass. "The drainfield is on the other side of the ravine and 450 feet from the back of the building," says O'Laughlin. "Customers won't even know it's there, let alone what it is." The center opened on time, creating 25 new jobs.

Maintenance

Petersen Management Co. in Fredonia has the service contract. Once a week, a technician checks the system. Twice a year, the technician draws effluent samples and submits them to the Winona County Health Department, checks the blowers, adjusts the flows as necessary and monitors the sludge level.

Kimo's Septic Tank Pumping in Winona has the pumping contract.

Grease tanks must be pumped when they are one-quarter full. The aerobic treatment tanks are scheduled for pumping every three years. ■

MORE INFO:

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Insul-Seal

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Red Jacket Water Products - ITT

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