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Sand, Surf and Septage

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Onsite systems at 16 beaches on Santa Monica Bay, Calif., had exceeded their useful lives. Most were at risk of overflows and required pumping every two weeks, as sand blowing in through corroded cast-iron lids filled them three-quarters full.

Monthly water samples taken by the Los Angeles County Department of Environmental Health confirmed intermittent high bacteria counts. Concern for the health of swimmers and surfers led the U.S. EPA to issue new total maximum daily loads for bacteria.

The Los Angeles County capital fund enabled the Public Works Water Resources Division to replace the onsite systems with advanced treatment units. Because ammonia in effluent could affect marine life, the board issued additional waste discharge limits for nitrogen and bacteria.

Public Works project manager Alex Villarama, P.E., selected AdvanTex AX-MAX modules for their ability to meet stringent regulatory requirements. Zach Adams of JS Innovative Systems in Malibu won the bid. The installations were the first of their kind in southern California.



Juan Ramirez of JS Innovative Systems helps a crane operator from United Rentals maneuvering a 6,500-pound AdvanTex AX-MAX module from the delivery truck. (Photos courtesy of BioSolutions Inc.)



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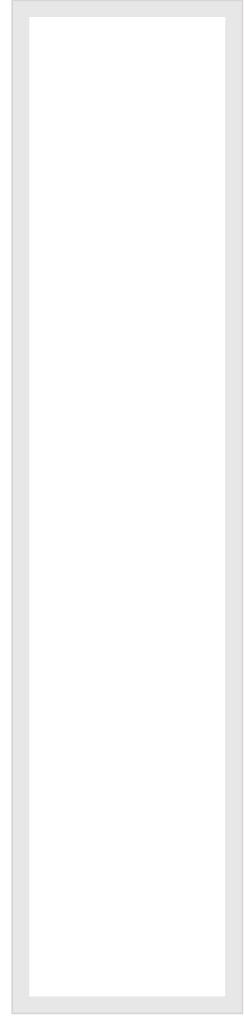
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Site conditions

Sand soil with the water table eight to 14 feet below grade, depending on the tides.

System components

Villarama designed identical systems to handle 1,500 gpd each. Major components are:

3,000-gallon Xerxes fiberglass septic tank with duplex single-phase, 50 gpm, 1/2 hp, 2-inch effluent pumps from Orenco Systems Inc. Most components supplied by BioSolutions Inc., Agoura Hills, Calif.

4,500-gallon AdvanTex AX-MAX packed bed filter module, Orenco

60-gallon buffering basin, Orenco

BK2000CD chlorination-dechlorination unit with tablets, Norweco Inc.

3G ultraviolet disinfection chamber, Salcor Inc.

Ozone disinfection unit, O3H2O4U

1,000-gallon concrete dosing tank with Orenco duplex single-phase, 10 gpm, 1/2 hp, 1 1/4-inch effluent pumps, Jensen Precast

Siemens magmeter/flowmeter integrated into custom TCOM control panel with telemetry, Orenco

360 feet of Geoflow drip tubing with headworks

2,500-gallon concrete sand trap, Jensen Precast

Rain switch system with butterfly valve from Jensen Instrument Co. of Southern California, supplied by JS Innovative Systems

System operation

Wastewater flows 25 feet through a 4-inch drain-waste-vent (DWV) pipe to the septic tank. Every hour, the pumps send 100 gallons to the three-compartment AX-MAX module. As influent enters the 3,000-gallon recirculation-blending chamber, it blends with filtrate dripping from the hanging textile media.

A pump in a walled-off area sends 100 gallons per hour through a one-way transfer line to a manifold above the media, which distributes the effluent for further treatment. As it percolates through the media, microorganisms remove impurities. A portion of each dose drips into the 1,500-gallon recirculation-filtrate chamber before flowing to the buffering basin.

A baffle divides the flow between the recirculation-blending and recirculation-filtrate chambers, and a recirculation return valve controls the liquid levels. No wastewater passes into the second chamber without first flowing through the media. In the buffering basin, a peristaltic pump injects soda ash to increase alkalinity for ammonia reduction and enhanced nitrogen removal.

After buffering, effluent gravity-flows through 4-inch DWV pipe to the chlorination-dechlorination unit, followed by UV and ozone chambers for additional disinfection. It continues to the dosing tank, in which pumps pressurize a magmeter for flow monitoring before sending the liquid to the drainfield. The headworks equally doses six 60-foot laterals on 12-inch centers with 1 gpm emitters spaced 12 inches apart.

The telemetry control panel allows the operator to monitor system performance. Effluent quality measures 6.4 mg/l BOD5, 5.9 mg/l TSS, 90 percent nitrogen reduction, and no E. coli colonies.

Installation

Adams' crew removed the old tanks and distribution boxes but could find no trace of the drainfields at Point Dume State Preserve. "Restroom One was the most challenging installation because the drainfield was on the beach 60 feet from the building," he says. "Excavations required shore boxes from Trench Shoring Company and a 23-ton Terex crane to set them and the tanks." Adams used a Caterpillar 320 excavator.

The lateral from the restroom was four feet below grade, necessitating a 10- by 20-foot shore box and 12-foot-deep hole for the septic tank on a 12-inch gravel bed. "That was a lot more material to remove than anticipated, and it concerned me," says Adams. "I also had only 12 inches on either side of the tank to set the 21-foot-long concrete deadmen, then secure the tank to them with straps and turnbuckles."

All except the concrete tanks needed antibuoyancy measures, as the occasional high tides of winter would push four feet of water into the holes. The 21- by 8-foot-high treatment module, weighing 6,500 pounds, required an 11- by 25-foot shore box and 9-foot-deep hole. Orenco designed a custom antilotation device using six steel tubes on 4-foot centers bolted across the bottom of the tank and protruding 18 inches on either side. They raised the tank six inches.

"The last half of the protrusions had two grooves for running rebar parallel to the module," says Adams. "We tied them in place while the tank was still on the delivery truck. They installed very easily." After setting the unit, the crew filled it with water, and a cement truck dumped two-sack slurry into the hole, covering the rebar by two feet.

The disinfection train required an 8-foot-long, 8-foot-deep hole. "The UV or ozone unit would have sufficed, but people here don't understand wastewater treatment," says Adams. "Alex believed the system would be an easier sell if it had redundancy."

Because of the system's location and the other two under parking lots, Villarama specified EBW H-20 traffic-rated lids from Franklin Fueling Systems. They were set in 12-inch-thick concrete slabs that covered the fiberglass tank lids and risers. Since the slabs were visible from the canyon homes above, Orenco matched their colors to beach sand and aging asphalt for camouflage. The lids are 12 inches apart.

Adams' crew installed a 4-inch channel drain to catch the water from four outdoor showers. Fines settle out in the sand trap before the water discharges into the septic tank. "We installed a butterfly valve in the pipe just before the sand trap," says Adams. "A gauge on the restroom roof closes the valve if it detects one-tenth of an inch of rain. That way, we don't process runoff."

Installing the drip tubing was straightforward. The drainfield, on the high side of the parking lot, is in an overgrown area. "We planted similar vegetation to camouflage it,"

says Adams. The crew also sank bollards every four feet around the treatment module, then welded chain to them to discourage foot traffic.

Maintenance

BioSolutions holds the maintenance contract. Every two weeks in summer, a technician checks the chlorine tablet supply and UV lamp. Twice a year, he opens the septic tanks to check the scum, sludge, and water levels, runs a cycle on the pumps and checks the control panel. Public Works samples the effluent monthly.

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