HIGH SECURITY WITH LOW IMPACT

How AcornVac boosts security and reduces water use at the
Salinas Valley State Prison Silver LEED Project

Image courtesy of CDCR, Salinas Valley State Prison

PROJECT: Mental Health Facility/ Treatment Center at the Salinas Valley State Prison

LOCATION: Soledad, CA

COMPLETED: July, 2009

OBJECTIVES:

Minimize water consumption in new construction's arid location
Minimize impact on location's local wastewater collection system
Reduce cost of both potable water and waste water treatment
Achieve Silver LEED certification status
Boost security and minimize contraband
Reduce Maintenance cost and effort

The project team included stake-holders from CDCR, Program Manager Kitchell CEM, Nacht & Lewis Architects, mechanical engineers from Capital Engineering, electrical engineers from CB Engineering and the general contractor, Roebbelen Contracting Incorporated. Green Building Services assisted the project team with establishing the sustainability objectives and the LEED certification process.

AcornVac Vacuum Center features dual 100-gallon stainless steel tanks, and duplex 10-HP vacuum pumps

PROJECT GOALS

In a prison, the plumbing gets a lot of attention. After all, something as simple as a clogged toilet often ends up being an inmate's intentional act to create a disturbance and compromise safety. Hidden contraband, blockages, and maintenance issues tax a facility's manpower and budget. For these reasons, correctional facilities must take careful steps in a plumbing system's planning and design.

Today, there is yet another challenge prisons are taking on, especially in states such as California. Under the Governor's Executive Order #S-20-04, the design, construction and operation of all new state-owned facilities shall be certified under the Leadership in Energy and Environmental Design (LEED) beginning January 2011. This means that not only will facilities be built to function at the highest levels of service and security, but they will now have the lowest impact on the environment as possible.

It was with this goal that the Salinas Valley State Prison underwent construction on a new 64-bed, 36,400 sq-ft mental health housing/treatment facility in Soledad, CA. The facility would house male inmates requiring inpatient mental health care at level IV security (the most violent). At the same time, the project aimed to achieve the first LEED certification for the State's prison system, ahead of the 2011 mandate. And to accomplish this, the new addition to SVSP specified the AcornVac Vacuum Plumbing System. AcornVac reduces impact on all of the facility's resources time, cost, maintenance, and precious water—and ultimately contributed to a Silver LEED certification.

LEEDING THE WAY

A toilet in a prison cell is used and abused in multiple ways; it can be used to dispose of trash, to hide contraband, or to create distractions. A single inmate may flush his or her toilet more than an average household flushes in an entire day. A correctional facility operating at full occupancy uses a lot of water, but what's more, it generates a lot of waste.

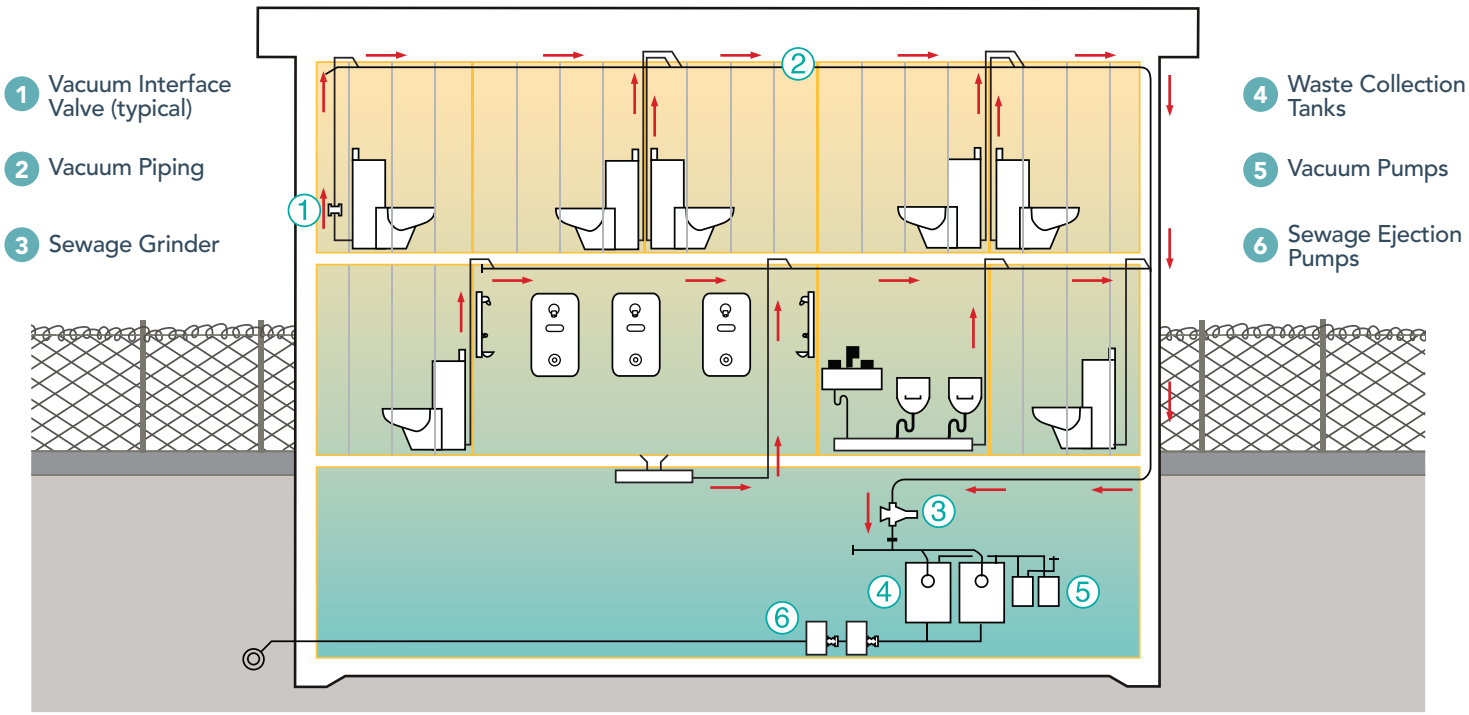
In arid climates such as Soledad, California, water consumption is important, but so is the volume of wastewater generated. Treatment costs for both are high. Although the performance specification for the Vacuum Plumbing System did not specify a manufacturer, Dean Barchacky, Correctional Business Manager II and Plant Manager at the time of construction, together with plant operations and project stakeholders, felt that AcornVac best met the requirements in addition to obtaining the LEED points potential.

AcornVac uses the combined energies of atmosphere and vacuum pressure to move waste through a small-diameter piping network. **As a result, it only requires 0.5 gallon of water per flush to effectively remove waste, as opposed to the 1.6 gallons typically required with a traditional gravity plumbing system.**

Overall water consumption is thus reduced by as much as 68 percent, far exceeding the 20 percent required under the Executive

BENEFITS OF THE ACORNVAC VACUUM PLUMBING SYSTEM:

- **No Digging Required**
- **Design and Construction Flexibility**
- **Health Safety and Security**
- **Fewer Line Blockages**
- **Lower Maintenance and Operational Costs**



Order for LEED credits on this project. Additionally, all buildings at the SVSP employ electronic valve metering (Master-Trol) from Acorn Engineering to control the number or duration between flushes, and how long a shower can run, for instance. When combined with AcornVac's 0.5-gallon flush, this system further reduces water consumption.

Barchacky says the fixtures were calibrated and confirmed at startup testing to use only the required 0.5-gallons per flush, and though the proof of water use reduction hasn't been precisely metered, the incredible reduction of water use and waste water was immediately evident in the lowered cost of water treatment. The CDCR pays the city of Soledad to treat its waste water, and the new Mental Health Facility would have sent a lot more waste to a treatment plant already operating at full capacity. In addition, for potable water, it's necessary to pump it from the ground to a reverse osmosis treatment plant; an expensive task in itself. "Pumping costs are down, wastewater is down. The initial installation cost might be a little more, but we feel the benefits will outweigh this with its payback," Barchacky says.

AcornVac, in combination with other conservation efforts throughout the new facility, contributes to a reduction **in potable water use by a remarkable 56 percent from this building, as reported by the California Department of Corrections "and lowered sewage conveyance by nearly 70 percent through a state-of-the-art vacuum plumbing system."**

CUSTOMER SERVICE

The building at Salinas is one of few prison facilities in the United States to use vacuum plumbing, and the first in CDCR's system. Two crews of supervisors and maintenance staff assigned to the facility met with the experts at AcornVac at the company's headquarters in Chino, California for live training and hands-on experience. As sometimes happens, a few errors occurred during construction at installation. "A couple of issues came up, but they were resolved," says Barchacky, "We called AcornVac and they came down. There were a lot of times when they came out within a few days, or even the following day." AcornVac coordinated with the manufacturer of a particular system component to ensure correct installation that was required in the specifics of the SVSP project. They provided the SVSP's maintenance staff with all the necessary operations documentation, to troubleshoot any problems they may encounter with the system's maintenance. So far, they haven't needed it. "You expect to have bugs to work out on the start-up of a system like that. Other than that, there really haven't been any problems," says Barchacky.

LOW-MAINTENANCE

The AcornVac system not only saves water, but also proves to be very low maintenance, due in large part to its design. The system efficiently isolates every cell from the waste piping network by means of a normally-closed valve separating the toilet in the cell from the rest of the toilets in the facility. Leaks and mainline clogs are virtually eliminated. Sam Ochoa, who assumed the role

as Plant Manager after Barchacky, says he's pleased with fewer maintenance calls. "There have hardly been any problems raised to my level of attention. I have no main-line blockages to report, and I haven't had to order any replacement parts so far," he says. "It's been a big benefit having this type of system at our facility." Barchacky reports the same, and says, "We haven't hardly had any costs in maintenance. If something plugs up, it's right there at the fixture, making it easy to isolate and fix." A big asset in a correctional environment, which experiences intentional vandalism and misuse.

ENHANCED SECURITY

A combination toilet and lavatory, or "comby," is often one of the few items in a cell, and an inmate spends a lot of time with it. They flush anything they can use to clog a fixture and create a flood and a dangerous distraction.

Gravity plumbing is an open network of pipes leading down to a central waste pipe which drains to the sewer system. With traditional toilets in a correctional facility, communication is possible between all toilets sharing the same line, for example, to speak or pass contraband. Inmates may tie a string to an item and flush it, so it can be hidden and retrieved later. When vacuum plumbing is used, communication through the plumbing fixtures or waste network is eliminated, as the system's valves are only open during a flush cycle. In comparison to valve metering alone, "The vac system is even better because everything must pass a valve, and once it does, it can't be retrieved at the fixture," Barchacky points out– an added bonus in efforts to eliminate the passing or hiding of contraband.

At SVSP, all water waste, including grey water from lavatories and mop sinks, is transported to a collection center where it is macerated before leaving the facility. Outside the new mental health facility, where they do not use AcornVac, they must use bar screens to catch debris that has been flushed, and must employ inmates at the prison to clean those screens. Barchacky points to this as a problem because those inmates will collect any flushed contraband and keep it for themselves. With the vacuum plumbing system, he says this problem is resolved. Says Ochoa: "With gravity plumbing, we've seen t-shirts, plastic bags, blankets, all come through the plumbing. With AcornVac, there's no debris going to the main sewer line."

A LONG-TERM SOLUTION

Both Barchacky and Ochoa are optimistic about the longevity of the vacuum plumbing system, and point to the fact that there are very little movable parts in the system that would need replacing. Ochoa has worked at the California Department of corrections for 20 years and says, "I've been involved in implementing water-saving technology in my past, and some of it risks getting antiquated. As long as the AcornVac system's parts and components keep working as well as they have, I think it will perform well for a long time." As for the CDCR's plans to save water in the future? Ochoa says, "As far as what I've observed so far at the Salinas Valley mental health facility, I would recommend AcornVac for new constructions built under the Governor's Executive Order."

Plumbing fixtures available from Acorn Engineering Co.
www.acorneng.com