



ACORN ENGINEERING COMPANY

How Correctional Institutions Stem Crime With **MODERN ARCHITECTURAL PLUMBING**

An Environmental Profile of the
Western Virginia Regional Jail Authority



PROJECT: Western Virginia Regional Jail
LOCATION: Salem, VA
OPENING DATE: March 2009

- **Conserve Water**
- **Reduce Utility Costs**
- **Stay on Budget**
- **Simplify Maintenance**
- **Solve One Problem with Contraband**



Vacuum flush ADA Comby



Vandal-resistant stainless steel fixtures

LOCATION

The Shenandoah Valley rests peacefully between the Blue Ridge and Allegheny mountains of Virginia. Postcard-worthy farms frame the landscape while historic towns roll across scenic back roads. Nestled within this serenity is the Western Virginia Regional Jail in Salem, Virginia.

This impressive 264,000 square-foot, 605-bed correctional facility opened its doors March 9, 2009. Already, it is considered one of the most modern, safe and cost-effective jails of its kind. But no achievement on this scale is without challenges.

When word about the planned facility first spread, the local population was quite concerned, asking themselves: Would environmental pollution from a facility of this size harm this pristine Valley?

The City of Salem, along with Franklin, Montgomery and Roanoke counties formed an Authority to build the facility. Need was great; space was available. From the outset, however, Authority leadership was determined to accommodate its community by building an environmentally sensitive facility in harmony with the pastoral surroundings.

CONTRABAND ARSENALS

Of all the project challenges, contraband was an issue of great concern because its presence compromises the safety of staff and inmates. Here's how: Inmates regularly stuff toilets full of sheets, their own clothes, wads of paper, torn mattresses, candy, books or other unwelcomed objects brought in by families. One former jailer (not associated with WVRJA) said that stopping up toilets is a weekly occurrence in most facilities.

Once pipes are clogged, flooding begins, and guards must move inmates away from unsanitary conditions while repairs are made. Turns out, this is perfect time to divert guards and create a little havoc and control over the day. The cost in water waste, manpower and aggravation is inestimable.

The Authority faced a number of daunting challenges in the \$80 million construction project. What's more, all work had to result in a highly controlled and secure environment. The facility was slated to house special needs inmates, escape risks, high profile inmates in mixed settings from minimum to maximum security.



Vandal-resistant stainless steel fixture



Vandal-resistant ADA shower

STRATEGIC APPROACH

Acorn Engineering, and subsidiary AcornVac, came into the project early on as a consultative supplier. With a 20-year track record in providing vacuum plumbing systems to correctional facilities, and other commercial and institutional markets, AcornVac made a considerable upfront investment in the project to provide the education the owners needed to identify full requirements, conduct a cost/benefit analysis, and compare competitive and/or alternative options.

Ultimately, AcornVac was specified as sole source for the project, working closely with Hayes, Seay, Mattern and Mattern, now part of the global, award-winning architectural and engineering firm, AECOM. As is its signature style, HSMM/AECOM sought the maximum in environmental benefits for the project. That is a primary reason for focus on the modern vacuum plumbing system. In fact, the HSMM/AECOM team invested considerable time to pre-qualify AcornVac's success at other facilities to learn precisely how to incorporate that technology into the Western Virginia Regional Jail project to achieve added control, security and water savings.

Ease of maintenance is a major dividend of an AcornVac installation. Its new, smaller diameter piping opens space and expands service room. Where once a technician had to work in very confined spaces, he now has the room needed to make repairs quickly and efficiently.

SOLUTION BLUEPRINT

To lock down one aspect of WVRJA's green-plus challenge, the HSMM team identified vacuum plumbing as a viable alternative plumbing system. AcornVac solves a complex range of issues from construction and renovation to environmental and cost control.

The AcornVac vacuum plumbing system offers an advanced alternative to underslab gravity drainage system by way of a meticulously engineered drainage piping network. AcornVac outperforms gravity drainage systems, especially in the correctional setting where systems failure is more likely and more damaging under heavy usage of toilets, showers, urinals, drinking fountains, mop sinks, and hand wash basins.

TESTIMONIALS

"AcornVac is a powerful money saver. For starters, we cut the Authority's waste cost by \$200,000 a year. We saved \$400,000 upfront in domestic water connect fees because AcornVac's smaller piping network simplifies everything, and we drastically reduced how the inmates control the jail by eliminating clogged pipes."

John Chaney
AECOM's Project Manager for WVRJA



Vacuum drainage system chase



Vacuum center pumps

HALF-GALLON FLUSH

The AcornVac system reduces potable water consumption 68 percent for toilets alone by using a highly efficient vacuum flush toilet that needs only a one-half gallon per flush, compared to 1.6 gallons in a conventional toilet. WVRJA expects to save four million gallons of water every year with AcornVac vacuum flush toilets. But they are going to be pleasantly surprised.

When you consider only three percent of the entire world's water is fresh, and only one-third of one percent of that can be used by people, four million gallons is a blessing. All the rest is salt water or permanently frozen. We cannot drink it, wash with it, or use it to water plants.

ADDITIONAL BENEFITS

Even more, AcornVac 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. AcornVac's smaller diameter waste piping permits the system to route either overhead or below grade in shallow spaces. This vertical/horizontal flexibility, combined with self-venting, helps to provide smaller, more accessible plumbing chase areas, and more room in the rest of the facility. For sites with high water table, sand, and rock or structural issues (post-tension slab construction or asbestos abatement requirements), the versatility of AcornVac opens up even more possibilities.

LEED LEADERSHIP



Environmental integrity was paramount to everyone on the WVRJA project. And this commitment paid off. The Jail is one of the first correctional facilities to achieve the Leadership in Energy and Environmental Design (LEED) Green Building Rating System for environmentally sustainable construction. And, one of the first correctional facilities to specify the AcornVac Vacuum Plumbing and Drainage System, as part of its quest for a LEED rating.

Although LEED ratings require a multitude of green systems and materials, AcornVac is unique in its ability to impact construction at many junctures beyond water conservation. For instance, when HSMM/AECOM engineers needed to accommodate fire sprinkler flow rates of 100 gallons per minute through the vacuum drainage system, AcornVac systems engineers custom designed an integrated approach with specialized hardware and software exclusive to this facility to accommodate the large flow rates.

"Every inch of the new facility had to showcase the latest and best thinking in plumbing technologies. Acorn Engineering and AcornVac have built a worldwide reputation of high quality plumbing fixtures and valves for prison facilities. And, our extensive product line positions us to provide standard and custom solutions across the entire facility—even the water coolers."

Laura Marshall
Vice President of AcornVac, Inc.



Overhead vacuum drainage system piping



Vacuum system motor control center

10 VS. 20 FLUSHES

The AcornVac System also features the Master-Trol electronic water management systems. These system components give administrators complete control over facility water resources, bringing added strength to conservation and security efforts. Master-trol's electronic valve control system is easily programmable by both maintenance and security staffs because the interface is simple to learn and extremely user-friendly, enabling greater control and visibility over the complete facility plumbing system operation at all times.

John Chaney, AECOM's project manager for WVRJA, points out that the typical inmate flushes his cell toilet 20 times per day. The Master-Trol system permits administrators to program in restriction on flushes to a maximum number per day, for example 10 per day per cell, potentially saving another four million gallons a year.

ROI PAYOFF

The Authority, AECOM and AcornVac envision that the new facility will payoff its investment in less than one year. Water conservation alone could amount to 8 million gallons. Add to this, all the savings from connection fees, waste reduction, reduced maintenance and a more secure environment. LEED credits long-term benefits are equally cost effective. AcornVac engineers estimate facility operational cost for the new system at only one cent per day per inmate, based on its experience with other correctional facilities.

About ACORN ENGINEERING CO.

Acorn Engineering is a market leader in environmentally sensitive plumbing products and systems, with a specialty in systems development and vandal-resistant products for the correctional field. The complete Acorn line is manufactured from durable stainless steel with high recyclable content and performance longevity.

Acorn and its family of companies are committed to environmental sustainability and social responsibility in our manufacturing processes to benefit the environment and reduce landfills. By conserving earth's resources, we can proudly deliver the highest standard products under the latest code requirements.

For more information on AcornVac and the full range of Acorn Engineering products and services please log onto www.acorneng.com



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ACORN PRODUCTS:

- Zenith Standard and ADA Showers
- Penal-Pak Standard and ADA Showers
- Terrazzo Standard and Modified Shower Bases
- Terrazzo Mop Sinks
- Penal-Ware Modified Rear Mounted Service Sinks
- Penal-Ware Rear Mounted & Front Mounted Lavatories
- Meridian One, Two, and Three Station Sensor Operated Washbasins with Chromomite Heaters
- Vacuum Flush Combies
- Vacuum Flush ADA Combies
- Vacuum Flush Penal Rear Mounted Toilets
- Vacuum Flush Front Mounted Toilets
- Vacuum Flush Detox In-Floor Toilets
- Modified Gravity Flush Front Mounted Toilet
- Meridian Urinals
- Acorn Master-Trol Electronic Valve System

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- AcornAqua Vandal Resistant Single & Bi-Level Water Coolers

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CHROMOMITE PRODUCTS:

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ACORNVAC PRODUCTS:

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