



VACUUM PLUMBING SYSTEMS



MORRIS GROUP  
INTERNATIONAL



## VACUUM PLUMBING SYSTEMS FOR JAILS, PRISONS AND CORRECTIONAL FACILITIES

Engineered Plumbing and Waste Solutions  
for a Secure Environment

## What is a Vacuum Plumbing System?

An AcornVac vacuum plumbing system is a simple and viable alternative to conventional gravity waste systems that uses the combined energies of vacuum pressure and gravity for the transport and disposal of waste from plumbing fixtures such as toilets, sinks and showers through a piping network that can be routed above ground.



## A Vacuum Plumbing System Offers an Alternative to Gravity Plumbing

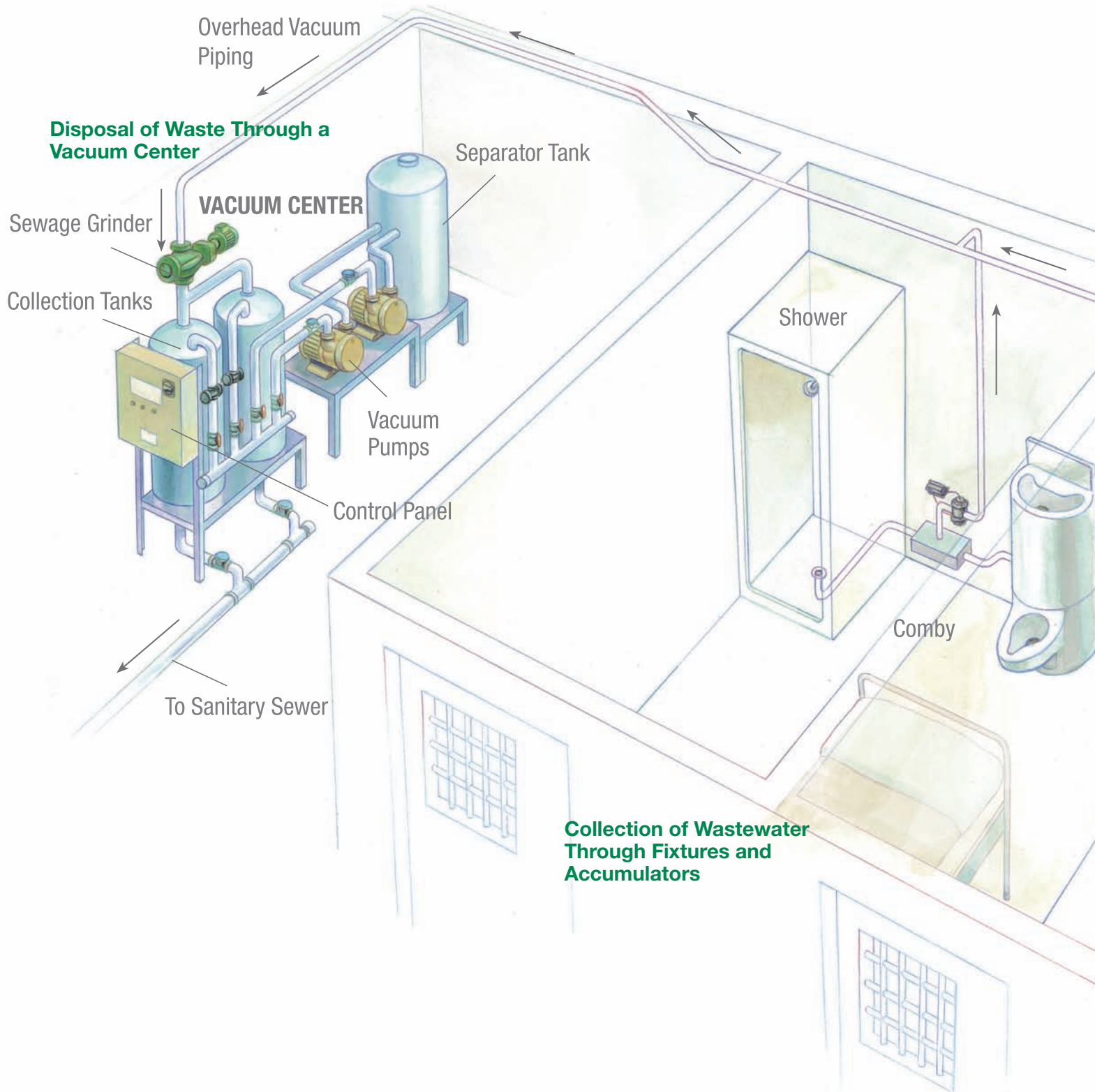
While a vacuum plumbing system can be used on virtually any project, certain features may make it the most beneficial solution available for correctional facilities. Here are some examples:



| FEATURES                             | BENEFITS  |
|--------------------------------------|---|
| <b>Reduced Water Usage</b>           | The AcornVac toilet uses ½ gallon (2 liters) of water per flush. Water supply and sewage disposal costs are dramatically reduced. Sewer connection fees may also be reduced.  |
| <b>Flexibility</b>                   | The Vacuum Plumbing System can be installed horizontally or vertically because it does not require continuous slope. This allows flexibility in layout and design for both new construction and remodeling projects.  |
| <b>Security and Control Benefits</b> | Sections or areas of the facility can be easily isolated and cross-connection between cells is eliminated.  |
| <b>Reduces Construction Costs</b>    | The vacuum piping network is typically installed with smaller diameter pipe and fittings that reduce material and labor costs. AcornVac can also eliminate: <ul style="list-style-type: none"> <li>• up to 70% of the materials and labor costs associated with vent stacks.</li> <li>• up to 60% of the cost of trenching.</li> <li>• 100% of costs associated with waste grinding/pump stations.</li> </ul> |
| <b>Maintenance Benefits</b>          | Vacuum plumbing results in less cluttered pipe chases, leading to ease of maintenance. The Vacuum Plumbing System is designed to use differential pressure to transport waste. This results in fewer main line blockages. When blockages do occur, they are easily located and the abusers can be identified.   |

**Did you know:** The estimated water and sewage savings for a 500 inmate correctional facility is 4,800,000 gallons per year.

# Components of a Typical Vacuum System in



# a Correctional Facility

## How it Works: An Introduction to Vacuum Drainage Systems for Institutional Facilities

**A Vacuum System consists of simple components that work as a system:**

### Toilets

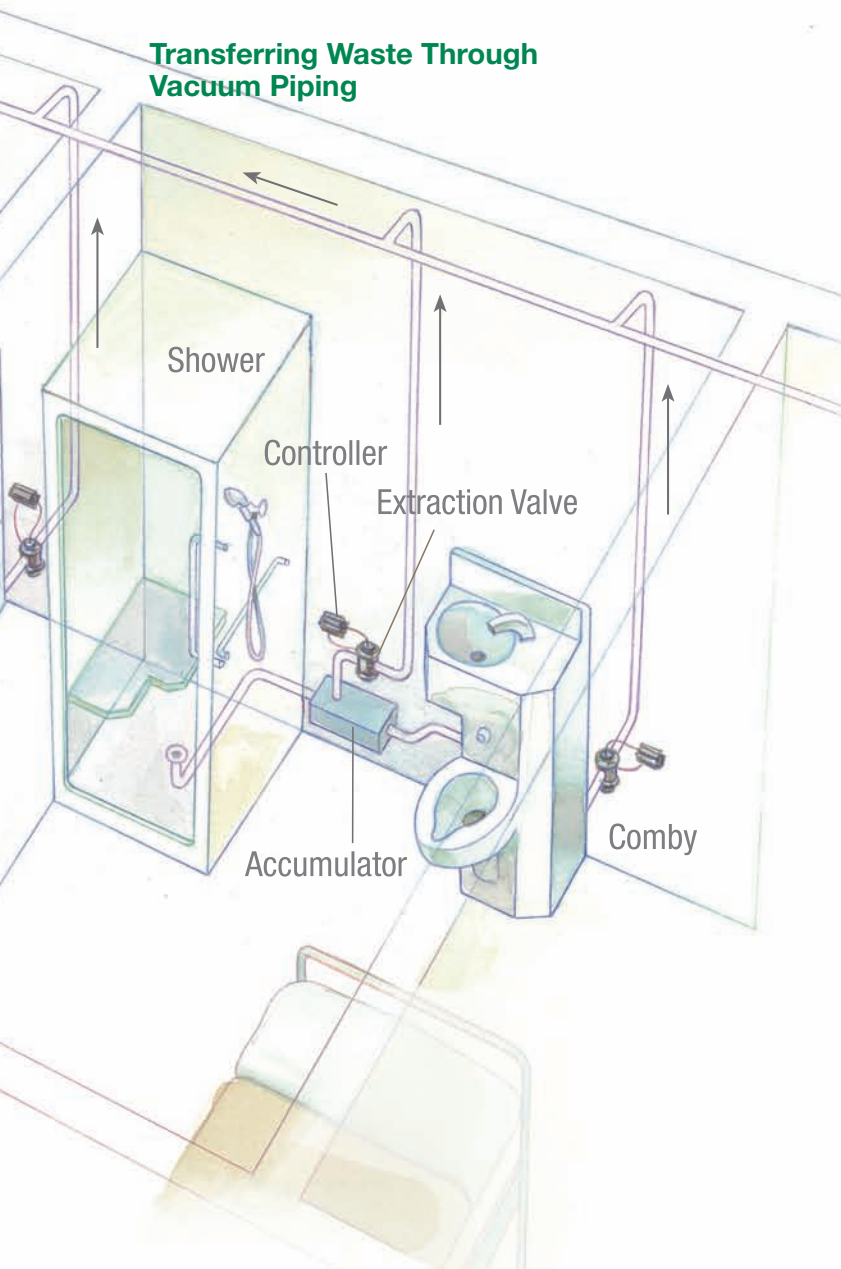
The interface of atmospheric pressure at the toilet bowl and a constant vacuum pressure in the waste piping network provides a highly efficient flush, using only 1/2 gallon of water. When the push button is activated, the extraction valve opens, allowing atmospheric pressure to push waste into the vacuum piping and toward the vacuum center. A water valve is simultaneously activated, allowing the toilet to be rinsed and refilled.

### Sinks, Lavatories and Showers

Wastewater from plumbing fixtures flows via gravity into an Accumulator (collection point), typically located behind or below the equipment. When the waste reaches a pre-determined level in the Accumulator, the controller automatically opens the normally closed extraction valve, allowing the vacuum to evacuate the collected waste into the vacuum piping network for delivery to the Vacuum Center. Overhead piping can be routed where convenient in the ceiling space or across an entire campus in shallow trenching.

### Vacuum Center

The Vacuum Center includes vacuum pumps, waste collection tanks and controls that automate the operation of the system. Waste is delivered from fixtures and equipment to the Vacuum Center waste collection tanks via the vacuum piping network. Waste is temporarily held at the vacuum center before being discharged to sanitary sewer mains or treatment facilities. The vacuum system may also include sewage grinders and discharge pumps to transfer waste from the collection tanks into the sewer.



Transferring Waste Through Vacuum Piping

For illustration purposes only



## Our Services

### PLANNING

AcornVac offers comprehensive coordination with the project design team and owner during the design phase to assist in system sizing, piping layout and specification development. This includes a review of the scope of the project and drainage requirements, the creation of installation details and recommendations for piping layout.

### INSTALLATION TRAINING

AcornVac provides comprehensive training for the installing contractor, covering system dynamics and proper installation requirements, supplemented by periodic inspection of the installation with detailed reporting regarding completion and correction of any installation deficiencies.

### CONSTRUCTION AND COMMISSIONING

AcornVac assists with the commissioning of all areas of the system, along with diagnostic evaluation and recommendations for resolution of any areas of concern to ensure a functional and efficient installation.

### TRAINING, SUPPORT AND FOLLOW-UP

AcornVac provides on-site training for facility maintenance staff, including a complete overview of the dynamics of the vacuum system and comprehensive training in basic maintenance and troubleshooting.

### SERVICE

AcornVac offers technical support through our Sales Engineering and Technical Services Departments. AcornVac factory staff and representatives are available to facility maintenance personnel for telephone consultation.

*“AcornVac was very helpful throughout the design process, providing the necessary design and specification input. The installation of the system went very smoothly.”*

Anthony Colacchia,  
M.E. Principal,  
Capital Engineering Consultants Inc.



## Security, Control and Operational Benefits for Institutional Facilities

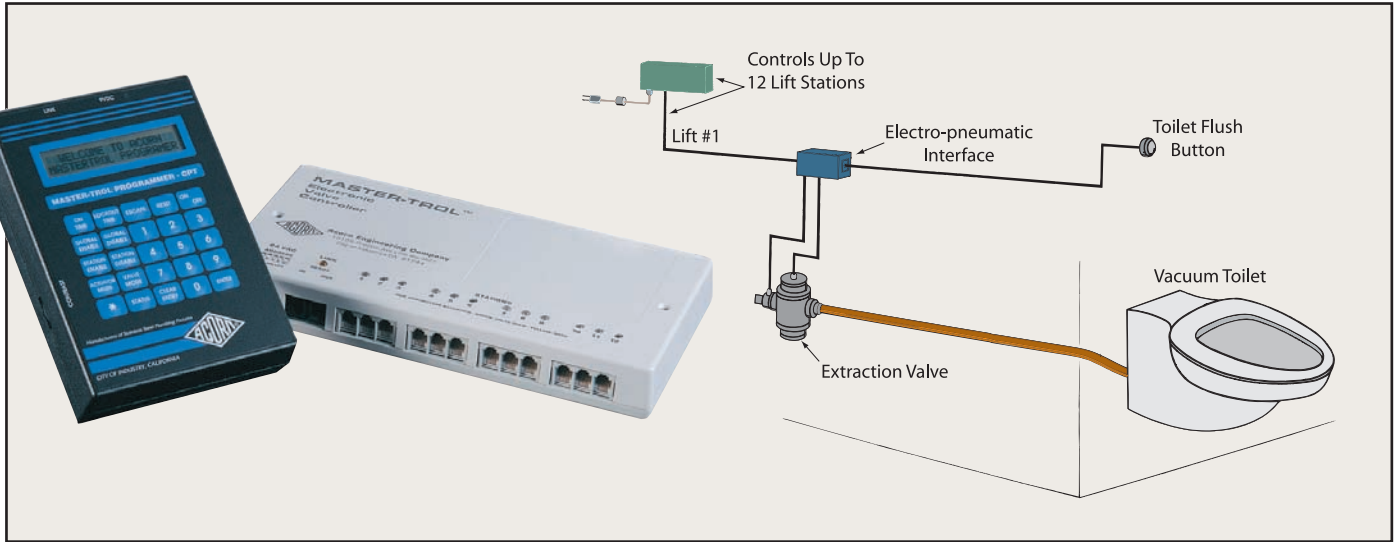
- Direct connection of multiple toilets into the same waste stack is eliminated, thereby preventing inmates from passing contraband between cells.
- Vacuum toilets eliminate cell-to-cell communication that inmates often use to create “planned plumbing chaos” by organizing large “group flushes” that are typical for gravity drainage systems.
- The operational dynamics of a vacuum plumbing system virtually eliminate main line blockages, reducing maintenance costs and disruption. When toilet blockages do occur, they are easily located at the fixture, rather than within the waste line. This feature allows staff to easily identify inmates who routinely try to vandalize the plumbing system, promoting significantly improved security and control.
- Individual cells or groups of cells can be “turned off” prior to a security sweep to prevent contraband or other incriminating evidence from being flushed away.
- Vacuum flush toilets do not splash during the flush cycle, significantly reducing the spread of bacteria within the facility and promoting a healthier environment for staff and prison populations.



*“AcornVac in combination with other conservation efforts throughout the new facility contributes to a reduction in potable water use by a remarkable 56% and lowered sewage conveyance by nearly 70% through a state of the art vacuum plumbing system.”*

California Department of Corrections  
on the AcornVac System installed at  
Salinas Valley State Prison Medical  
Treatment Center

## AcornVac Master-Trol® Electronic Valve Control System



### Master-Trol

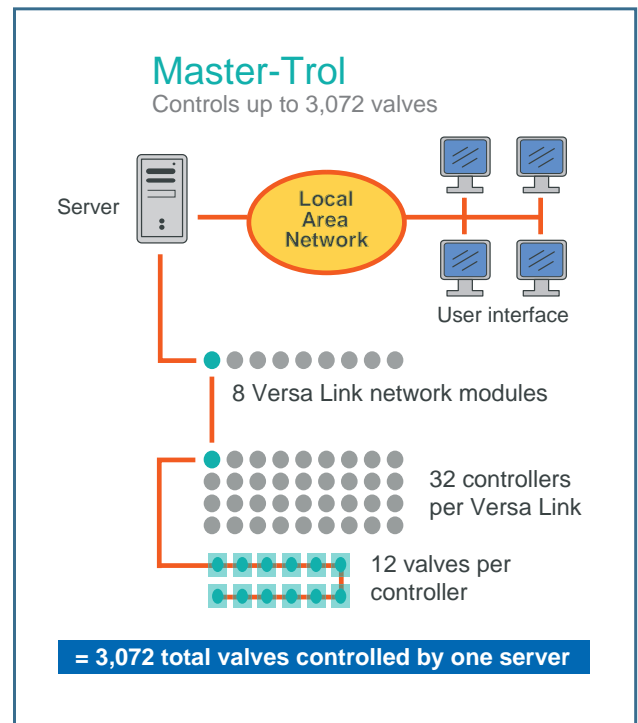
Master-Trol is an electronic valve management system that allows control and monitoring of water supply and vacuum waste valve activity through a dedicated server and software. Master-Trol can also be tied to a local area network for remote monitoring and control.

### How It Works:

When the pushbutton on a fixture is pressed, a signal is sent to the Controller, where a microprocessor identifies the valve and scans for pre-programmed options such as lockout settings and timing restrictions. The controller returns an activation signal to the branch box, signaling the solenoid operations valve, allowing valve operation.

### Features include:

- Customizable and adjustable limitations on water usage or activations. Limitations can be set on the number of activations per day or length of activation over a 24-hour period. Users can also elect to activate valves only during certain times of the day in up to three separate time windows.
- Ability to enable/disable single or multiple valves.
- Ability to make global changes by valve group or valve type.
- Ability to prevent simultaneous activations by assigning valves to queued activation or random activation.
- Remote operation that allows a user to activate a valve with the click of a button.
- Password protected with ability to limit access to functions or areas of the facility for lower level users. Passwords can be tracked in order to see what changes have been made and who has made them.
- Updated and secure interface makes it easy to use and prevents unauthorized access to the system by intruders.





*“AcornVac is a powerful money saver. For starters, we cut the Authority’s waste cost by \$200,000 a year. We saved \$400,000 up front 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 HSMM Project Manager  
 Western Virginia Regional Jail  
 Salem, Virginia

The Master-Trol Water Management System is a proven tool in reducing inmate water usage; it limits use of plumbing fixtures and improves the sustainability of a facility. Master-Trol limits the number of flushes and monitors water usage by reports, graphs and charts, allowing for calculated water savings. This ultimately leads to a reduction in overall water usage in correctional facilities and savings in utility costs.

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