

# Alternate Collection Systems, Case Studies

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# Overview

- ▶ Alternate Collection Systems in Greene County
  - Small Diameter Gravity System
  - Vacuum System
  - Pressure Sewer System

# Overview

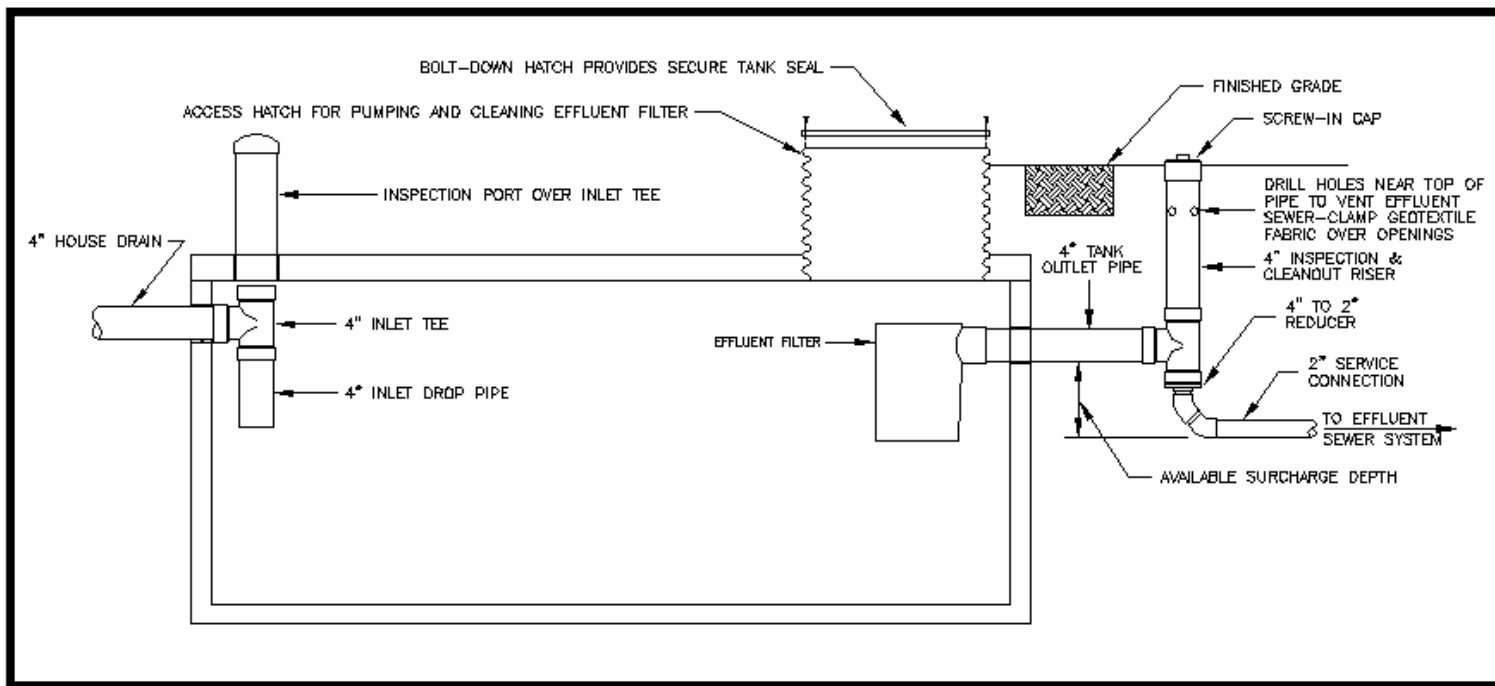
## ▶ Small Diameter Gravity System

- Grease and solid materials are separated out at each connection in a septic tank
- Works well in very flat terrain because settleable solids are not conveyed through collection lines
- Less hydraulic gradient and velocity are required to transport the wastewater than with conventional sewers allowing lines to be laid at shallower depths
- Utilize fewer manholes and can use smaller diameter lines

Source [www.nesc.wvu.edu/nsfc/Articles/SFQ/sfqsp01/SFQsp01\\_diametergravity.html](http://www.nesc.wvu.edu/nsfc/Articles/SFQ/sfqsp01/SFQsp01_diametergravity.html)

# Overview

## Small Diameter Gravity System



### Typical Septic Tank Layout

Source [www.epa.gov/nrmrl/pubs/625191024/625191024ch3.pdf](http://www.epa.gov/nrmrl/pubs/625191024/625191024ch3.pdf)

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# Overview

## ▶ Vacuum System

- Uses differential air pressure to move sewage
- Requires a central source of power to run vacuum pumps which maintains vacuum on the collection system
- Requires a normally closed vacuum/gravity interface valve at each entry point to seal the lines so that vacuum is maintained
- Valves are located in a pit, and open when a predetermined amount of wastewater accumulates in the collecting sump resulting differential pressure between atmosphere and vacuum

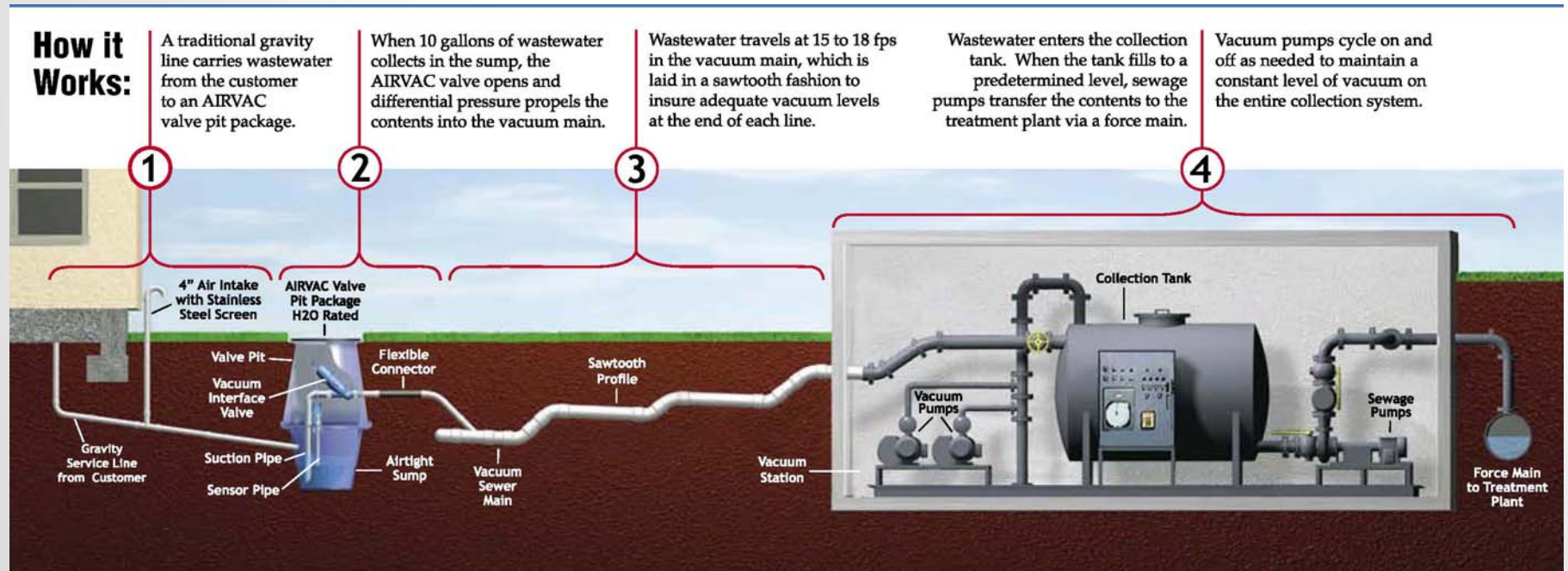
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# Overview

## Vacuum System



## Typical Vacuum System Layout

Source [www.airvac.com](http://www.airvac.com)

# Overview

## ▶ Pressure Sewer System

- Consists of a network of pressure pipes and grinder pumps
- The grinder pumps collect all of the wastewater from the home and grind it into slurry
- The sewage is then pumped to a larger sewer main or directly to a wastewater treatment plant
- Effective where flat terrain is combined with high ground water or bedrock, making deep cuts and/or multiple lift stations excessively expensive or where the terrain will not accommodate gravity sewers
- Requires electrical service at each pit location

Source <http://www.epa.gov/owm/mtb/presewer.pdf>

# Overview



Schematic of a pressure sewer system and  
cut away of a grinder pump

Source [http://www.eone.com/sewer\\_systems](http://www.eone.com/sewer_systems)

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# Greene County Systems and Experiences

## Spring Valley

- ▶ Small Diameter Gravity System
  - Constructed and placed in operation ~1988
  - Currently has 228 connections to the system, including one mobile home park with ~40 units

Pros	Cons
Small diameter pipe	Have to clean septic tanks
Fewer manholes to maintain	More odor complaints
Collection system virtually self cleaning due to zero solids	Heavy concentration of H <sub>2</sub> S is corrosive to lift station wet wells
Very few service calls for stoppages	Grease buildup at the tank effluent causes problems

# Greene County Systems and Experiences

## Clifton

### ▶ Vacuum System

- Constructed and placed in operation ~1995
- Currently has 103 connections to the system
- Manufactured by Airvac

Pros	Cons
Shallow collection system mains allow for safer excavations	One faulty valve or controller can take the whole system down
Sewer mains are virtually stop free	Difficulty in isolating trouble
No manholes to maintain	Originally design use plug valves in system , since replaced with gate valves
No scheduled sewer line cleaning	Difficulty in locating controller and valve pits in winter

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# Greene County Systems and Experiences

## Shawnee Hills

- ▶ Pressure Sewer System
  - Constructed and placed in operation ~2005
  - Currently has 877 connections to the system
  - Manufactured by E-One

Pros	Cons
Trouble calls are isolated to one residence	Pumps have a short life span
Easy troubleshoot grinder pump failures	Single source supplier of repair parts
Improved the quality of Shawnee Lake water	Heavy grease concentration in air release valves
No scheduled sewer line cleaning	The loss of electricity has resulted in overflowing pits
	Extreme odor at lift station

# Greene County's Advice

- ▶ Keys to successful operations and maintenance of alternate sewer systems
  - Learn as much about these systems before you select one for your community
  - Select an engineer who has previous experience designing alternate sewer systems
  - Good specifications + good inspection = less to fix when turned over for maintenance
  - Invest the time and money to train your staff
    - Both Airvac and E-One provides training for their systems. Failures reduced substantially in the Clifton system once employees took their training, and Greene county staff can repair Airvac valves and E-One pumps.

# Questions?