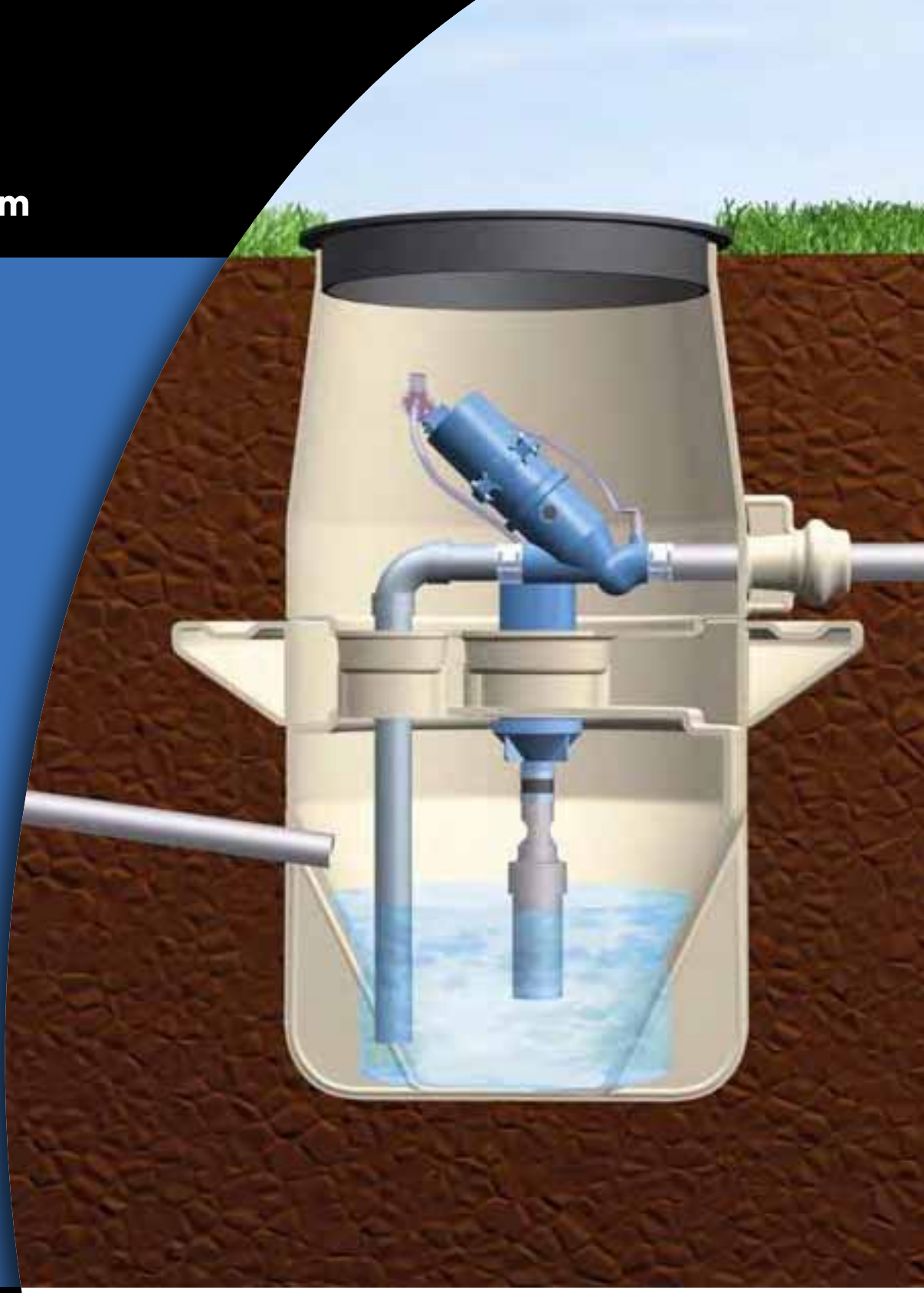
www.airvac.com



AIRVAC®

The World Leader in Vacuum Sewer Technology

AIRVAC sewer systems are reliable, dependable, and will save you money.

Reliable and Economical

Thirty years ago, vacuum sewers were regarded as new and only to be used as a system of last resort. Improvements in the technology later led to acceptance as "alternative" sewers, but still only to be used when significant savings would result.

Now regarded as the system of choice, AIRVAC systems are providing efficient and reliable sewer service to communities all around the world. And, as a bonus, the cost-saving potential is as great as ever.

Save Money

Hundreds of communities have enjoyed cost savings as high as 60% by using an AIRVAC vacuum system as compared to traditional gravity systems and low-pressure systems. And, there is no extra burden on the homeowner as the AIRVAC valve is pneumatically operated and requires no power from the house.

Reduce Construction Costs

Vacuum sewers use small diameter pipes and shallow burial depths. The resulting narrow, shallow trenches greatly reduce the excavation, dewatering effort, surface disruption and the danger associated with larger, deeper trenches.

Field changes can be easily made as unforeseen underground obstacles can be avoided by going over, under, or around them.

Further cost savings result when multiple lift stations are replaced by a single vacuum station. It is not unusual for 1 vacuum station to replace 6 or 7 lift stations.

Save on Operation & Maintenance Costs

The continuing improvement in vacuum technology has resulted in significantly decreased Operation & Maintenance costs compared to the earliest vacuum systems. O&M costs are now in line with, or even lower than traditional gravity systems.

Because vacuum is a sealed system, infiltration and inflow are eliminated, reducing maintenance costs as well as treatment costs.

Simple Design

Even though AIRVAC systems are very simple, we work closely with client engineers during the design phase of each installation. We offer assistance with piping profiles, vacuum station design, standard details, and sample specifications. We will also review all plans and specifications.

Simple Installation

Local contractors who have pipe laying and plumbing experience have no problem learning to install the AIRVAC system. AIRVAC field supervisors are available to oversee the installation. Through daily vacuum checks of all installed pipe and other techniques, you can be assured of a properly installed and leak-free system.

Operator Friendly

Since vacuum sewer systems are completely sealed, operating personnel are not exposed to raw sewage. Additionally, with no manholes, entry into a confined space is not an issue.

While extremely rare, leaks would not result in sewage spills, but rather air would enter the pipe and would be immediately detected. An auto-dialer, standard equipment in a vacuum station, would automatically notify operating personnel.

Backup Safety

The vacuum station has a standby generator to provide uninterrupted service during power outages. An alarm system will alert the operating personnel that this condition has occurred.

Longevity and Applicability

Over 700 AIRVAC systems and 80,000 vacuum valves have been installed since 1972. AIRVAC has operating systems in more than half the states in the U.S. and in nearly 30 countries around the world.

Typically, the more difficult the sub-surface conditions, the more likely vacuum sewers are the answer. Having completed projects in every imaginable environment, AIRVAC has been able to customize its product to fit virtually any customer need.

Municipalities

- Dependable and economical service for your customers
- Minimal surface disruption to existing community
- Low O&M costs and long life of components
- 24/7 system troubleshooting hotline
- Annual system check-up
- Operator friendly

Design-Build Teams

- Educational services designed to ease owner and customer concerns
- Master planning and system layout assistance
- Design assistance
- Construction inspection services
- System start-up support
- System operation (interim or full time)

Developers

- Service may be easily extended into future construction phases
- Sealed system protects environmentally sensitive areas
- Eliminate multiple lift stations- fewer lots needed for lift stations mean additional lots are available for sale
- Shallow main lines mean easier installation and expansion and less surface disruption

AIRVAC and vacuum sewers can help you with your project.

Lightweight valve pits, capable of bearing traffic loads, are easily installed and typically serve two or more homes.

To ensure system integrity, vacuum tightness tests are conducted daily during the construction period.

AIRVAC assembles and tests the mechanical and electrical equipment of the vacuum station at its factory. The skid-mounted equipment is delivered to the job site and placed into the vacuum station building.

The vacuum station building that houses the mechanical and electrical equipment is designed to fit the characteristics of the neighborhood.

Vacuum mains use small diameter pipes installed in shallow, narrow trenches. Because of these factors, the mains are typically installed adjacent to the pavement, minimizing road restoration.

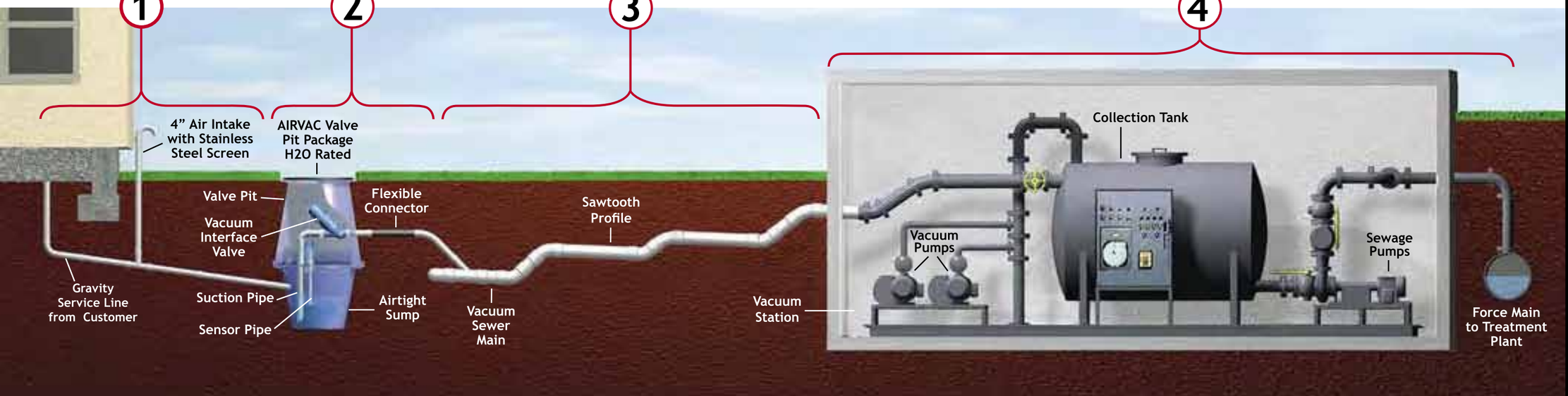
Disruption to the community during the construction period is kept to a minimum with vacuum sewers resulting in less surface restoration being required.

Vacuum stations provide a clean, safe environment for maintenance personnel as all sewage is completely contained within the collection tank.

AIRVAC technicians work hand in hand with the Owner to ensure optimum system operation.

How it Works:

1. A traditional gravity line carries wastewater from the customer to an AIRVAC valve pit package.
2. When 10 gallons of wastewater collects in the sump, the AIRVAC valve opens and differential pressure propels the contents into the vacuum main.
3. Wastewater travels at 15 to 18 fps in the vacuum main, which is laid in a sawtooth fashion to insure adequate vacuum levels at the end of each line.
4. Wastewater enters the collection tank. When the tank fills to a predetermined level, sewage pumps transfer the contents to the treatment plant via a force main. Vacuum pumps cycle on and off as needed to maintain a constant level of vacuum on the entire collection system.



AIRVAC provides excellent customer support and service.

What our clients say about AIRVAC Vacuum Sewer Systems and support:

Richard Foster
President
Baymark Construction
Cape Charles, VA

"I recommend developers take a look at the AIRVAC system. It can save you time and money and improve quality."

Phil Hubbard, P.E.
Engineer V
Public Utilities Operations
Virginia Beach, VA

"AIRVAC reviews all of our construction plans during design to make sure guidelines are being followed and to look out for our best interest. I would recommend this to everyone installing a vacuum system."

Donald Eckler, P.E.
President
Eckler Engineering, Inc.
Coral Springs, FL

"AIRVAC's involvement from preliminary design through system start-up was integral in making this 'difficult to sewer' area a success."

Joe Musgrave
Superintendent Field Operations
Kirk Brothers Company, Inc.
Alvada, Ohio

"Field conditions constantly change and AIRVAC's experience and advice allows my crews to make field adjustments in a matter of minutes."

Robert J. Paulette, P.E.
Environmental Engineering Dept. Head
Wilson & Company Inc.
Albuquerque, NM

"AIRVAC engineers and service technicians provide excellent assistance to both my clients and my staff for our vacuum systems."

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Are Gravity Sewer Systems Holding You Down?

Soar with a Barnes Pressure Sewer System and...

reduce your costs, increase your flexibilty, protect the environment

Old Technology Makes Way for New

Gravity sewer systems have been used since ancient times. They're…well, ancient technology that involves digging wide, downward sloping trenches. Okay for going downhill, but it's challenging when the terrain is uncooperative. The deeper you go, the more it costs to dig.

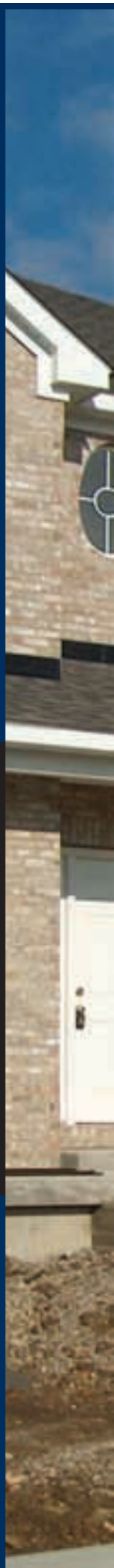
In addition, you have to periodically raise the sewage along the way with lift stations to keep the gravity flow going. So it's even harder if you're going uphill and takes more lift stations. It's also more costly when digging through rocky or sandy soil and traveling over long distances.

A Barnes Pressure Sewer System Reduces Costs

Rather than gravity, the pressure sewer system defies gravity using submersible grinder pumps that grind sewage particles into a slurry and moves it along. It uses smaller diameter pipes that are less expensive and easier to install. Plus they follow the terrain, requiring a depth just below the frost line, and move directionally to skirt obstructions.

The result is a significantly lower cost of installation compared to traditional gravity systems.

"We saved almost $2.2 million in our installation cost simply by using a pressure sewer system rather than gravity."



Developers must install water, sewer and utilities well in advance of any new home construction. It's a large capital expense with a long payback cycle. Time is money. It especially squeezes cash flow with a slow build-out rate. This is where a pressure sewer system gives you a financial boost.

The comparatively low up front cost of a pressure sewer system forcemain versus a traditional gravity main represents a true cost savings. This combined with the deferred installation and cost of the grinder pump station to just prior to closing reduces cash outlay. So the time between your expense and funds from the house sale closing is greatly reduced.

Not only does the pressure sewer system cost less to install, but the cost savings grow proportionately as the number and size of lots increases. Since it's built for durability, it performs efficiently and with very little maintenance for years.

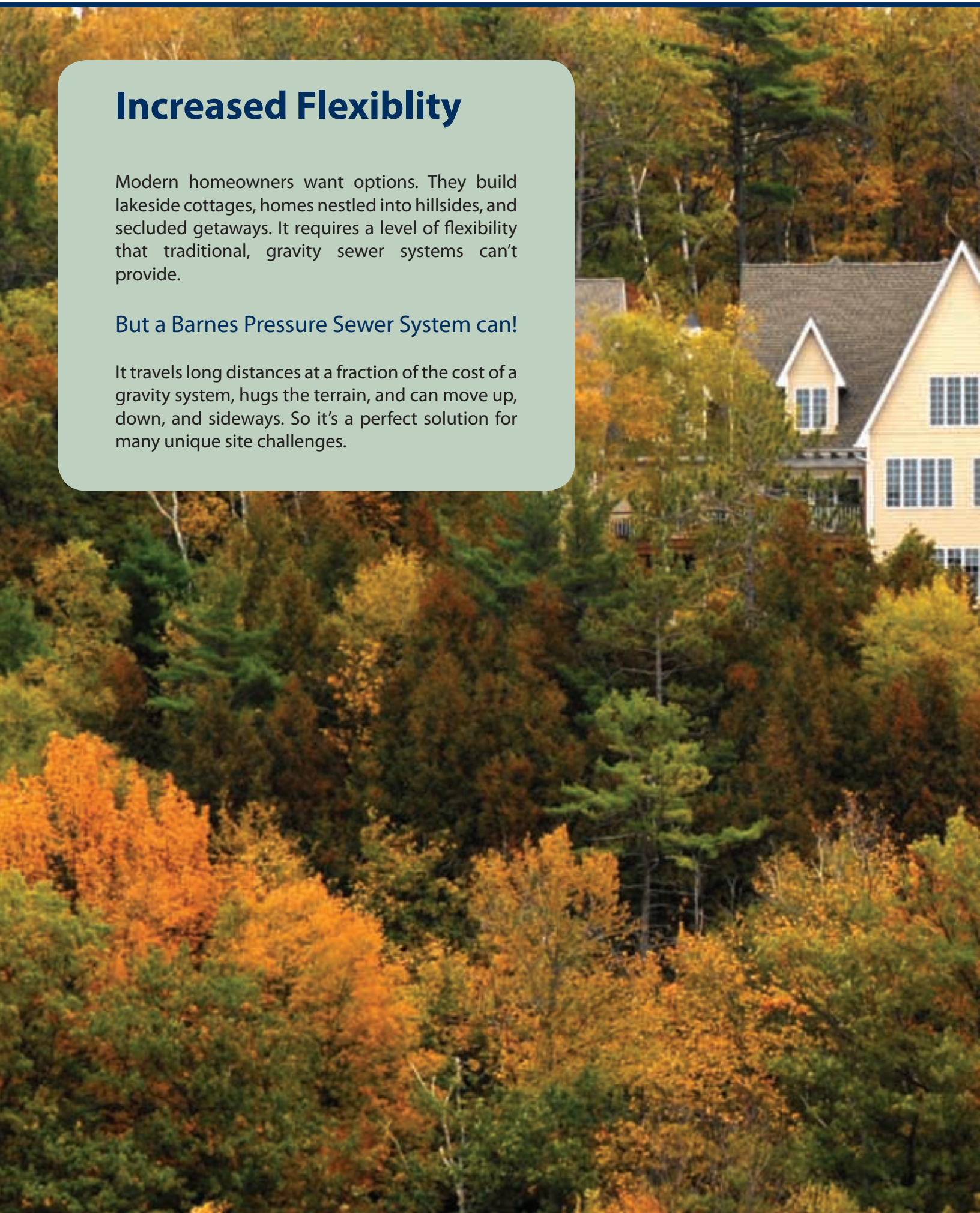
"We just don't have any problems! It costs us more to service two emergency stand-by power generators than156 grinder pumps."

Increased Flexiblity

Modern homeowners want options. They build lakeside cottages, homes nestled into hillsides, and secluded getaways. It requires a level of flexibility that traditional, gravity sewer systems can't provide.

But a Barnes Pressure Sewer System can!

It travels long distances at a fraction of the cost of a gravity system, hugs the terrain, and can move up, down, and sideways. So it's a perfect solution for many unique site challenges.



Replacing septic systems: When a worn out septic system is at the end its useful life, a pressure sewer system will provide a cost effective method to connect to a municipal system.

High Ground Water: Both the construction and operation of a gravity sewer system are more costly under this condition. Furthermore, the potential infiltration of ground water into the system is a contamination rish. The extra burden can overload treatment plants.

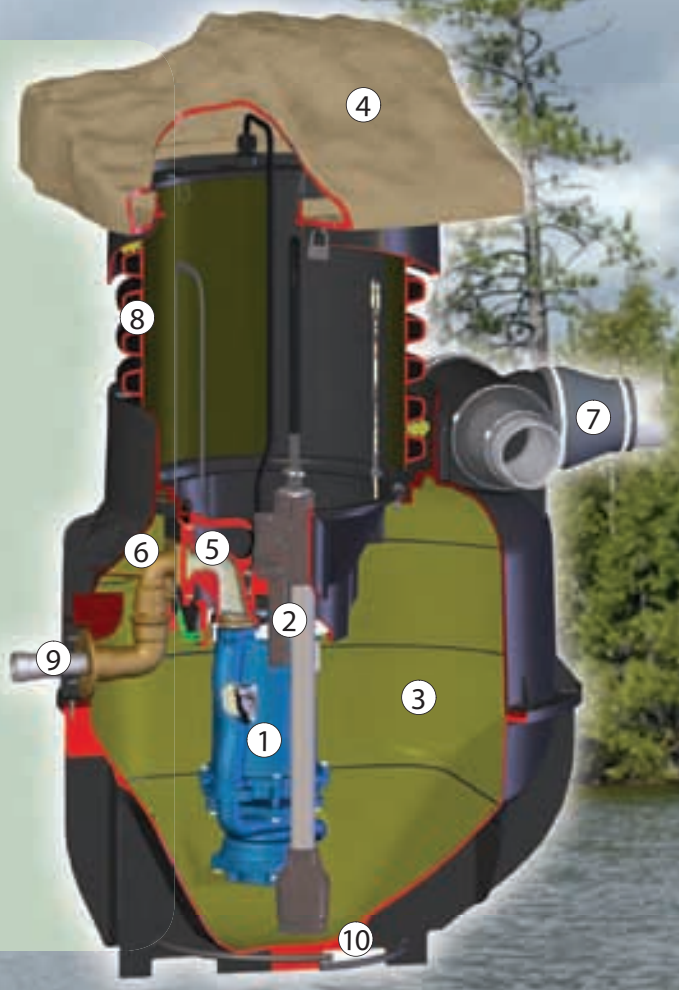
Lakeside or Ocean Front: A residence next to water is a prime location, but the sandy, downward sloping terrain makes trenching for gravity systems difficult and expensive. Septic systems are a popular second choice, but they pose an environmental and health threat. A pressure sewer system offers a safe, secure alternative.

Surmounting Barriers: Roads and streams that separate lots from an existing sewer system are no problem for the Barnes pressure sewer system. Directional boring of the small diameter piping can greatly reduce the need for road repairs and traffic disruptions.

Homes and Gravity Systems that don't Match: When new homes added to a development are too low for basement sewer connections, a grinder pump and pressure sewer line is a simple solution for connecting to the nearest gravity main.

System Features

1. *Grinder pump*
2. *Level control*
3. *High strength corrosion-resistant polypropylene copolymer tank*
4. *Lockable rock-shaped cover rotates to locked position. Vented to atmosphere or configured for flood plain.*
5. *Serviceable flap style check valve*
6. *Shut-off valve*
7. *Zero leak inlet connection*
8. *Day of installation depth adjustment*
9. *Stainless steel flexible discharge*
10. *Fiberglass rebar for simple concrete anti-flotation ballast*



A Barnes Pressure Sewer System provides higher cost-savings, flexibility and environmental protection. So defy gravity and soar with the advanced technology of a Barnes Pressure Sewer System.

Protects the Environment

Gravity sewers are open systems. So after heavy storms, an excess inflow of water increases the risk of spillage contaminating the environment, and can also overwork treatment plants.

Pressurized systems are sealed so they prevent infiltration and excess plant inflow. Since treatment plants don't have to deal with excess water, they can be built smaller for improved economy.

Septic systems are another potential hazard to the environment. Especially as they age, these systems leak and contaminate ground water, streams and lakes. In fact, according to the EPA, around 10% of the current septic systems fail each year. Considering the US Public Health Service estimates that over 50% of available land in the US is unsuitable for septic tanks, a pressure sewer system is a safe, reliable and cost-effective alternative.

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SEWER SYSTEMS

E/ONE SEWER™ SYSTEMS GIVE YOU THE FREEDOM TO SEWER ANYWHERE –

E/ONE SEWER™ SYSTEMS ARE COST-EFFECTIVE, highly reliable central sewering systems that can be installed in any terrain flat, wet, rocky, even on sites with dramatic elevation changes. Plus, they are much more affordable than conventional gravity sewers, which require major excavation, and much safer for communities than septic systems, which can eventually fail, polluting ground and recreational water and endangering public health.

Front cover: E/One Sewer Systems installations (from top): Paradise Valley AZ, Wilder, KY, Kitsap Peninsula, WA
This page: Oak Grove, MN
Page 3: Canton, GA

AT A FRACTION OF THE COST OF GRAVITY SEWERS.

With E/One, you can set your sites higher – or lower. In fact, you can site new homes in formerly infeasible locations – rugged hills, isolated flatlands, coastal areas, below grade, or sites with high water tables.

For the developer or prospective homebuilder, E/One frees you to utilize the best sightlines on any plot – regardless of the location of the sewer main or septic field. This means better sightlines, aesthetics, and views, as well as the possibility of utilizing "difficult" or orphan lots, and maximizing the density of any development.

E/One Sewer systems also feature a lighter "footprint." That's because they follow the contour of the land, so they can go anywhere without destroying the landscape. Even around existing features like mature trees, streams, and rock formations.

They're easier to install than conventional gravity sewers, so they greatly reduce the high cost of sewering. And they're highly reliable. So they lower operating costs.

Environmentally sensitive. Economically sensible. Plus the freedom to build anywhere.

Break the restrictions of gravity – and enjoy true freedom.

THE E/ONE SEWER SYSTEM.

HERE'S HOW THE E/ONE SEWER SYSTEM WORKS:

The E/One system stores, grinds and pumps wastewater under pressure to a treatment site or central sewer, depending on the location. Because the output is pressurized, the wastewater can be transported horizontally up to a mile, or uphill some 185 feet vertically. Because the system does not rely on gravity to carry the waste, it provides more options for siting and building, as well as system renovations.

WHY THE E/ONE SYSTEM IS BETTER THAN GRAVITY:

Both the gravity sewer and the E/One Sewer system are known as central sewer systems. Most cities and villages use central sewering, which simply means that waste is transferred, usually by pipe or a main, to a central treatment plant.

Gravity sewers are the "original" central sewers, with origins in the Roman aqueducts. Unfortunately, the technology behind gravity sewers is also centuries old: they're bulky systems using a large main and usually require major excavation to install. They must be accurately placed and bedded along a continuous downward grade and often involve large, costly lift stations. Plus they're expensive and not entirely efficient in transporting waste because they can tend to leak, and can be compromised by storm water infiltration.

ENGINEERED TO DO ONE JOB PERFECTLY.

The Extreme series grinder pump, the heart of the E/One Sewer, is the industry leader in ruggedness, watertight design, serviceability and reliability. It provides wastewater storage, grinding, and pumping in a single unit. Translation: it lowers operating costs, the cost of waste collection, and reduces maintenance.

The E/One grinder pump is engineered to do one thing perfectly and in the process, provides the best value for homeowners, builders, developers and municipalities.

THE LEADER IN RELIABILITY.

The technically superior E/One Sewer system employs highly sophisticated technology that results in a 10 year average mean time between service calls, and requires no preventive maintenance. Plus, low upfront costs, reduced operating expenses, and the ability to be installed at any site, regardless of the challenges of topography.

DEFY GRAVITY WITH E/ONE.

The beauty of the E/One Sewer system is that, unlike conventional central sewers, it defies gravity. Because installation follows the natural contour of the land, it is ideal for all terrain, including land that is flat, wet, rocky, or hilly. It gives the freedom to sewer anywhere including sites where old septic systems have contaminated water and posed severe public health issues.

HOW DOES IT WORK? WHY IS IT BETTER?

HOW WILL IT LOOK?

Aesthetics are a major consideration for homeowners. The E/One Sewer system is virtually out of sight — the only visible part is a low-profile cover that blends seamlessly into the environment but provides easy access for servicing operations.

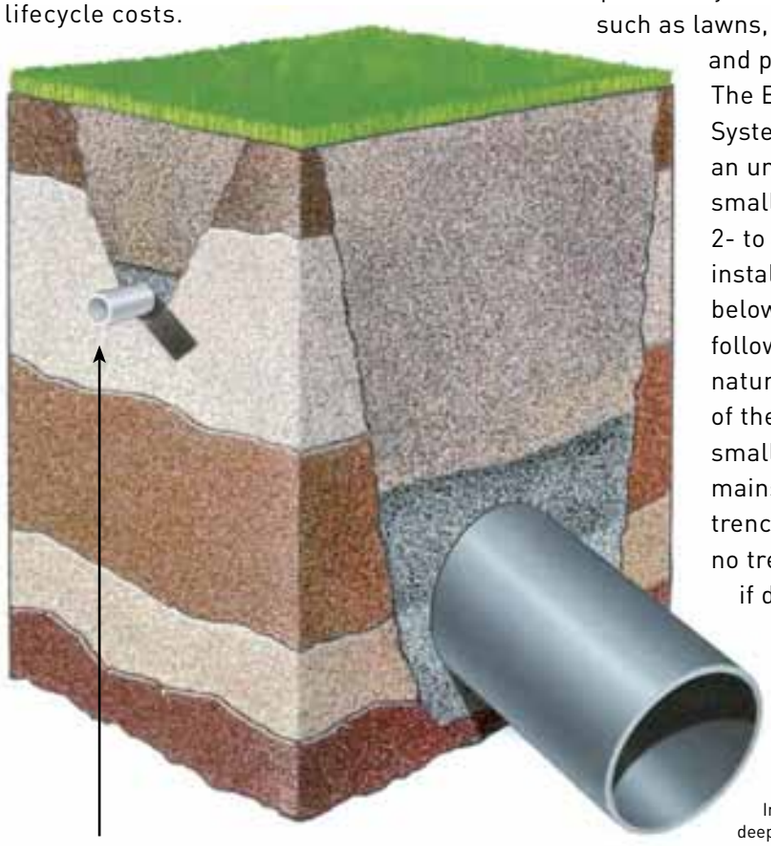
The E/One Extreme series indoor unit was specifically designed for installation in a basement mechanical room or in the slab foundation. Its clean look fits unobtrusively into any environment.

PRICED RIGHT FOR INSTALLATION. AND FOR THE LONG TERM.

E/One can solve sewering problems and replace failing septic systems at a fraction of the cost of conventional gravity sewers. E/One Sewer systems sharply reduce both front-end installation costs and overall lifecycle costs.

WHEN IT COMES TO SEWER SYSTEM TECHNOLOGY, BIGGER ISN'T BETTER.

Conventional gravity sewers can use up to a 24-inch large-diameter pipe, or main, which requires major excavation and severely disrupts the landscape and any built structures such as lawns, driveways, and plantings. The E/One Sewer System uses an unobtrusive, small-diameter 2- to 4-inch main installed right below the frostline, following the natural topography of the land. The small-diameter mains mean small trenches — or, no trenches at all if directional boring is used.

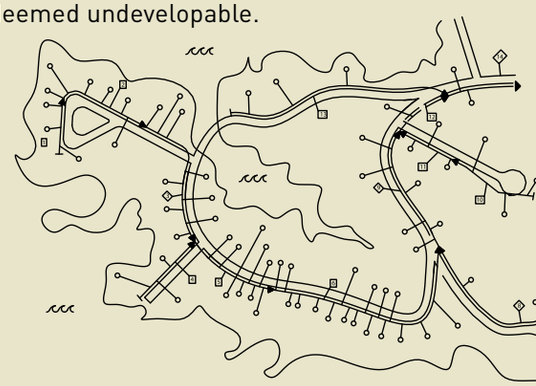


E/One Sewer System: 2-4" main, installed to follow the contour of the land.

Gravity system: large 24" main. Installation requires deep excavation.

SET YOUR SITES ANYWHERE

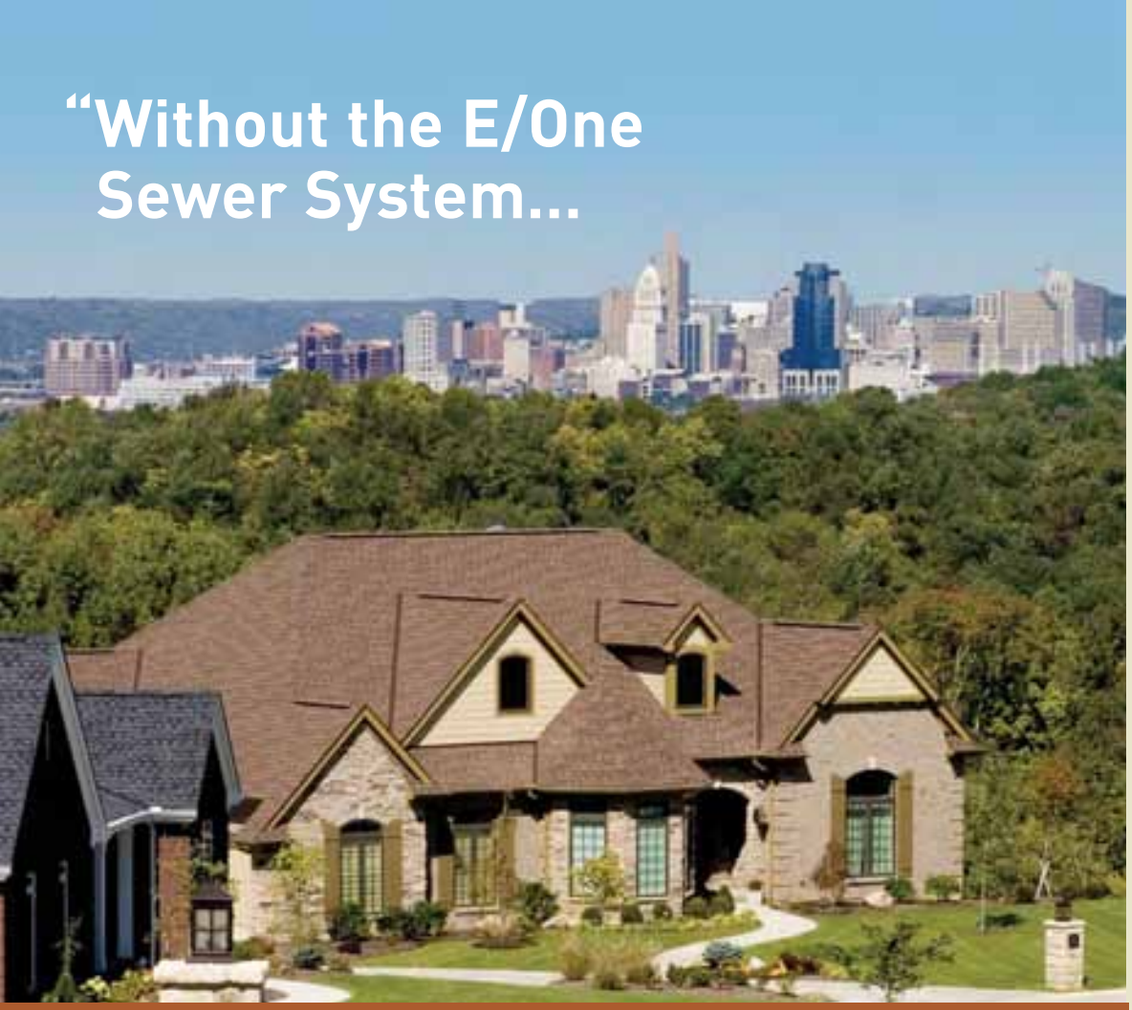
Multi-branch E/One Sewer systems serve the entire community and give engineers, developers, community planners, and homeowners the freedom to sewer anywhere, on any kind of site. Even sites that – to date – have been deemed undevelopable.



SEPTIC SYSTEMS – POTENTIAL TIME BOMBS IN OUR MIDST

While septic systems may be a common way of disposing of residential sanitary waste, they are, at best, a temporary solution and come at a high cost to public health. Around the world, septic systems have degraded ground and recreational water, creating serious

safety problems. Because of failing septic systems, water is not safe to drink. In addition, failing septic systems decrease real estate values. E/One Sewer systems can go wherever septic systems were initially used, reclaiming water quality and quality of life while providing an efficient, cost-effective solution to wastewater disposal and treatment.



"Without the E/One Sewer System...

...we wouldn't be standing here today."

Situated on a steep Kentucky hillside overlooking the Ohio River and Cincinnati beyond is a breathtaking piece of real estate. But difficult terrain, uncertain easements, and expensive gravity sewering solutions made it unattractive to prospective developers. Until recently.

The developer chose the E/One Sewer system to provide a simple, effective, and inexpensive solution for this problematic parcel. Only shallow, contour-hugging, small-diameter lines are needed to carry wastewater, which is critically important due to the extensive bedrock at this site. Best of all, the E/One system cost a fraction of the other alternatives.

"Compared to gravity systems, we saved 50% on Operation & Maintenance with E/One Sewers

...and 75% on installation."

Nestled between the Cascade and the Olympic Mountain ranges, the Kitsap Peninsula boasts 300 miles of scenic coastline in the Puget Sound. So when failing septic threatened that pristine coast, municipal engineers found a cost-effective solution – and an ally – in E/One Sewer systems.

They compared the construction and O&M costs of four distinct sewer collection systems, and E/One's pressure system came out on top - in both categories. Compared to a gravity system, the E/One system was less than a quarter of the cost to install, and less than half projected O&M.

Nearly 350 E/One grinder pumps and six miles of high-density polyethylene pressure main were installed along the waterfront. A careful analysis of the operating and maintenance costs revealed that after seven years, only 16 service calls per year were required – less than half the number projected. And the mean time between service calls was 22 years – more than double the pre-project estimate of 10 years. The cost of those repairs came in at 68 percent less than projected.

"People pay a premium for this natural setting.

E/One showed us how to preserve it... and our capital."

This 2,200 site development is nestled in the rugged, hilly north Georgia terrain. A dramatic setting that offers fresh air, pristine forests, and breathtaking views. Plus considerable sewering challenges.

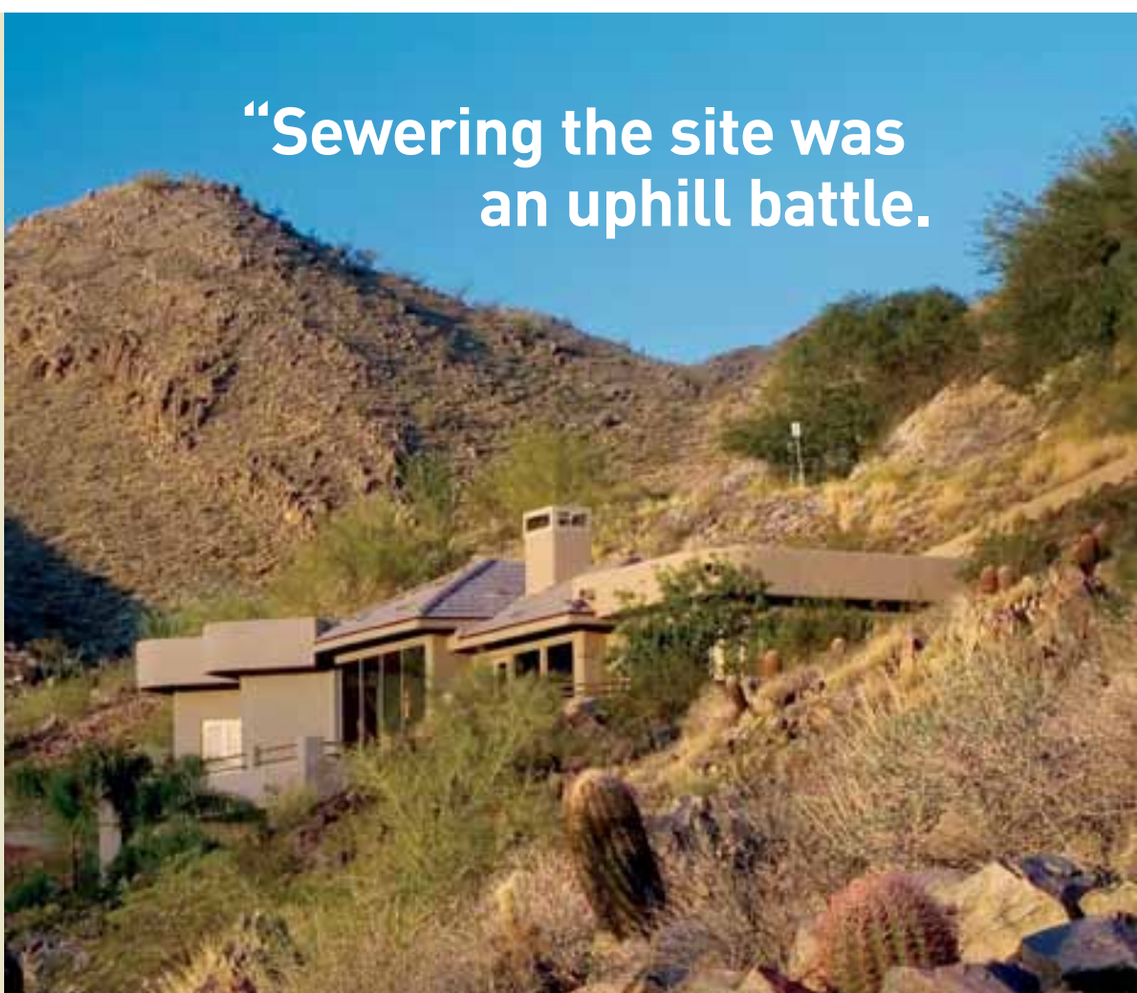
That's why the developer turned to E/One, a trusted resource, to help him engineer an elegant, simple solution. By using pressure sewering, only shallow, contour-hugging small-diameter lines were needed to carry wastewater – even uphill. Powered by E/One's reliable grinder pumps, the system carries waste offsite, and away from the community reservoir. And, at a fraction of the cost of gravity sewers. This solution minimized the number of unsightly and expensive lift stations from 20 – to just three!

The developer says it best: "The E/One system allows us to offer the best environmental quality of life in a most attractive new community."

Arizona's Paradise Valley is no picnic for builders. These exclusive home lots present daunting challenges with steep grade, rocky terrain and restrictive land use covenants. No wonder other builders walked away from this challenging infill lot – except one.

This builder turned adversity into profit with E/One's proven pressure sewage system. Instead of the expensive and disruptive lift station system proposed, he saved lots of money – and got an elegantly simple, cost-effective solution. He preserved the environment as well as his budget, with pumps mounted at grade and low impact, small diameter piping installed just below the surface.

The bottom line: E/One defied both gravity and conventional wisdom and rescued an "unbuildable" lot – for a lot less.



"Sewering the site was an uphill battle.

With E/One I found gold in these hills"

THE ADVANTAGES OF THE E/ONE SEWER SYSTEM

HOMEOWNERS

- Safe – protects water quality and enhances quality of life
- Reduces costs of housing – both initial and ongoing
- Visually pleasing – only evidence is a low-profile cover that is easily camouflaged
- Does not disrupt the beauty of the landscape or damage built structures
- Virtually no preventive maintenance required of homeowner
- Central sewer increases value of home

CONTRACTORS/CONSTRUCTION MANAGERS

- Installation follows contour of the land – does not require major excavation
- Needs only shallow trenches – increases ease and safety of installation procedures
- Labor and material costs are much less than gravity sewer systems

MUNICIPALITIES/DEVELOPERS

- Permits freedom to sewer anywhere in any kind of terrain
- Low initial costs make central sewers economically feasible
- Low initial costs make development economically feasible
- Central sewer increases value of development units
- High reliability – no preventive maintenance
- Reduces operating costs
- Protective of public health
- Permits regulatory compliance
- Closed system – not compromised by stormwater infiltration – plus zero exfiltration

ENGINEERS/OPERATORS

- Proven engineering and design
- Ideal for every terrain and building environment
- Cost-effective central sewering solution for new construction or retrofits
- Engineering and technical support during design, construction, installation, and operation
- Reliable performance means reduced O&M costs – up to 50% or more savings over gravity
- When needed, E/One pumps are easy and safe to access and service
- Designed to keep maintenance to absolute minimum

Environmentally Sensitive

Economically Sensible

eone.com

E/ONE SEWER SYSTEMS ARE MAKING BETTER COMMUNITIES ALL OVER THE WORLD

Many communities have been made possible because of E/One Sewer System technology and hundreds more have been made safe once again after failing septic systems created serious public health problems by contaminating ground and recreational water.

The E/One Sewer system delivers safe, cost-effective, reliable performance and enables controlled growth, permitting communities to maintain their quality of life at a cost they can afford.

e one
SEWER SYSTEMS

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Niskayuna, NY USA 12309-1090
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Fax 518.346.6188
www.eone.com

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Any site conditions: flat, hilly, shallow bedrock, high groundwater

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Choose the Superior Wastewater Solution: Orenco Effluent Sewers

Communities and developers throughout the world are struggling with wastewater collection and treatment issues. For many areas, conventional gravity sewer systems are too costly. Moreover, conventional sewers are not watertight, so their overflows contaminate our rivers, bays, and oceans.

"Given the diversity of the new technology that is now being developed, it is reasonable to speculate that, in the future, the continued use of conventional gravity flow systems will be a thing of the past."

Dr. George Tchobanoglous, UC Davis, Author of *Wastewater Engineering: Treatment, Disposal, Reuse* and *Small and Decentralized Wastewater Management Systems*

"Managed decentralized wastewater systems . . . merit serious consideration in any evaluation of wastewater management options for small and mid-sized communities and new development."

EPA, *Response to Congress on Use of Decentralized Wastewater Systems,* April 1997

Watertight effluent sewer systems are becoming recognized as one of the best solutions for collecting waste and transporting it to a treatment facility.

Orenco has helped hundreds of communities throughout the world to design, build, and maintain low-cost, watertight, reliable effluent sewers. Depending on terrain, effluent sewers are often half the cost of conventional sewers, or less.

Orenco effluent sewers are compatible with existing wastewater infrastructure. They take the burden off maxed-out municipal systems and allow sustainable service area expansion. For monitoring and control, Orenco offers telemetry panels that provide the power of SCADA at an affordable price.

There are other alternative sewer technologies – grinder systems, for example. However, because the effluent from an Orenco Effluent Sewer is relatively free of grease, oil, and solids, the pumps and collection lines require less maintenance. And the high-quality filtered effluent from an Orenco Effluent Sewer requires less costly treatment.

For all these reasons, communities that purchase our effluent sewers enjoy system-wide, long-term savings.

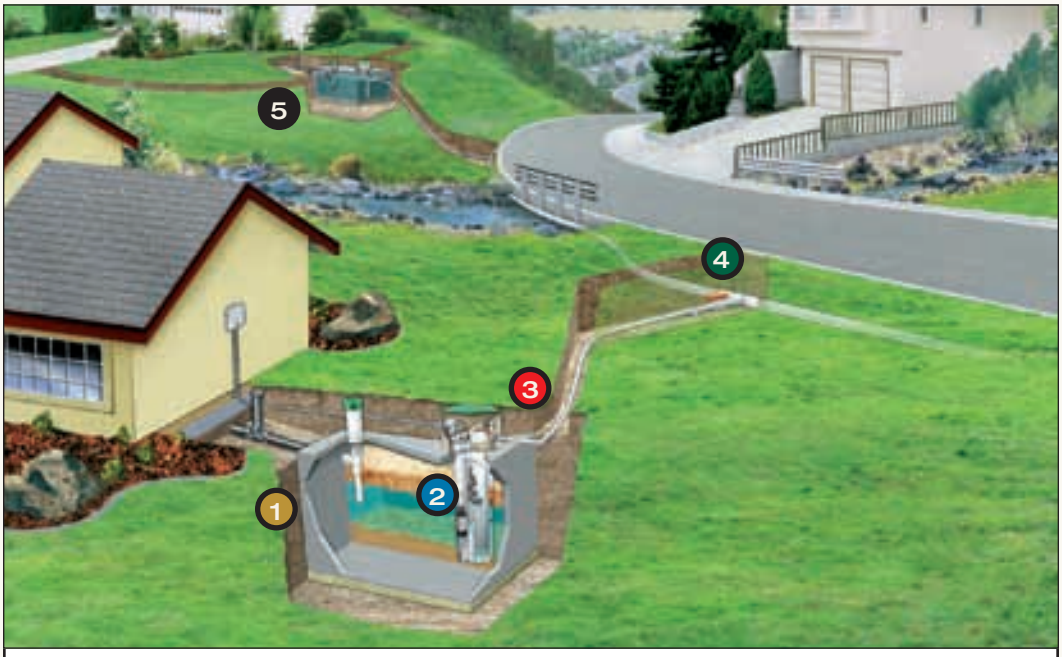
system-wide
long-term savings

Orenco EffluentSewers

How an Orenco Effluent Sewer Works

With an Orenco Effluent Sewer, raw sewage flows from the house or business to a watertight underground tank, where it is pretreated. Only the filtered liquid is discharged (by either pump or gravity) through the service lines, to shallow, small-diameter collection lines that follow the contour of the land. Solids remain in the underground tank, for passive, natural treatment. Tanks typically need pumping only once every 10–12 years.

Orenco Effluent Sewers are designed as a totally integrated package, and system components are compatible and preassembled. Each item is fully warrantied, and components are corrosion-resistant, durable, and lightweight.



1. *Watertight tanks provide primary treatment, so only liquids are conveyed to the treatment plant.*
2. *Our patented Biotube® Pump Vault filters out solids, and our lightweight, non-corroding pumps last more than 25 years.*
3. *One-inch (25-mm) diameter service lines can be easily installed with a trencher.*
4. *Small-diameter main lines follow the contour of the ground, saving excavation costs. No expensive manholes or lift stations are required.*
5. *Filtered effluent is conveyed by gravity from homes at higher elevations, so no pump is typically required.*

From Sewer to Treatment

The high-quality, filtered effluent from an effluent sewer is ideal for use with a low-cost, low-maintenance treatment system, such as Orenco's AdvanTex® AX100 textile filter. From there, it can be reused for irrigation or other kinds of beneficial re-use. With no infiltration or solids to contend with, the treatment plant can be sized up to 90% smaller than with other collection technologies, saving money in equipment, installation, and operation.

This photo shows Phase 1 and 2 of Orenco's modular AdvanTex AX100 Wastewater Treatment System, located in Bethel Heights, Arkansas. Bethel Heights now has 45 AX100 filter modules that are designed to handle 225,000 gpd (850 m^3/day) of wastewater. Multiple Orenco telemetry panels control the small, low-energy pumps that move wastewater through the filters and out to the drip irrigation fields.

Orenco EffluentSewers

A Fraction of the Cost of Conventional Sewers

Orenco Effluent Sewers dramatically reduce short-term and long-term wastewater treatment costs for communities and developers. In fact, effluent sewers are often one-half the cost of conventional gravity sewers or less. Here are the many ways you save:

Save On Equipment And Labor

- Collection lines are shallowly buried, just below the frost line, reducing excavation costs.
- Inexpensive, small-diameter collection lines are used.
- Expensive manholes and lift stations are eliminated.
- Installation time is reduced by one-half or more, compared to conventional sewers.
- Ease of installation causes less disruption to communities, allowing businesses to operate normally during construction.
- Ease of installation makes system well-suited for community "self-help" programs.
- Most equipment isn't purchased until lots are developed, deferring costs.

Save On Operation And Maintenance

- Low maintenance has been documented with Orenco Effluent Sewers.
- 24-hour back-up storage in on-lot tanks reduces emergency calls and overtime costs.
- Homeowners pay less than $1/mo. in energy costs for pumps.
- Residential tanks typically need pumping just once every 10–12 years.

Save On Treatment Costs

- Because of high effluent quality, low-cost treatment systems, such as packed bed filters and sub-surface disposal, are ideal.
- Less costly permitting and testing are required when not discharging into waterways.
- Treatment facilities can be sized economically, since the whole system is watertight. There's no need to allow for the infiltration and inflow from high stormwater flows or groundwater.

Orenco Effluent Sewer Systems are ideal for new subdivisions, whether on flat ground or on the most difficult terrain.

"In general, alternative collection systems should be considered for smaller rural communities with low population density and site specific environmental conditions . . . Shallow bedrock, high groundwater conditions, extremely flat or very hilly terrain and limited room for construction make alternative collection systems more cost-effective than conventional systems."

Illinois Community Action Association
Alternative Wastewater Systems in Illinois

Community Case Studies

Hundreds of communities throughout North America are successfully collecting and treating their wastewater with Orenco Effluent Sewer Systems. For more detailed case studies, go to www.orenco.com/systems and click on "Markets."

Diamond Lake, Washington

In 1986–87, an Orenco Effluent Sewer system serving 500 homes was installed in this Washington lakeside community. Half the properties are seasonally occupied, with sudden start-ups and prolonged shut-downs. And the winters are very cold. Even so, operator Larry Garwood said, "The systems are simple, dependable, and easy to maintain."

New Minden, Illinois

The small farming community of New Minden, Illinois (pop. 228) is attracting nationwide attention for its Orenco Effluent Sewer and recirculating gravel filter. Built for little more than $1 million — half the cost of the gravity sewer bid — the system produces such clean effluent (BOD and TSS below 3.0 mg/L) that it discharges to a stream. Cost per dwelling? Less than $8,000 for collection and treatment.

Elkton, Oregon

In 1989, an Orenco Effluent Sewer system was installed to serve more than 100 homes and businesses in Elkton, Oregon, at an average cost of less than $7,000 per home for both collection and treatment. Ten years after installation, maintenance on the entire collection system averaged less than one hour per month, and not a single residential septic tank needed pumping.

Steamboat, Oregon

In 1999, an Orenco Effluent Sewer, followed by an innovative textile filter treatment system, was installed in Steamboat, Oregon, to replace a leaking gravity system along a wild and scenic river. Annual operating costs have been reduced by a factor of 12!

Mobile, Alabama

In the 1990's, South Alabama Utilities realized they needed to provide wastewater services to new subdivisions or risk losing customer share. Since then, SAU has installed Orenco effluent sewer systems serving 47 subdivisions. When all the developments are built out, SAU's collection systems will handle more than 2,000 homes.

SW Barry County, Michigan

To preserve water quality, this Michigan lake county has had an effluent sewer system since 1993. The system includes more than 1200 Orenco units. Orenco's units have worked so dependably that hundreds more have since been ordered.

"Progressive AE has been designing and observing the installation of STEP systems for small Michigan communities for over 15 years. And we've used the Orenco Systems STEP unit exclusively for more than 10 years."

William J. Parker, P.E.
Progressive AE

Orenco EffluentSewers

Frequently Asked Questions

Effluent Sewer Systems have been in use for several decades. During that time, the technology has improved so dramatically that effluent sewers are highly recommended by the U.S. Environmental Protection Agency, as well as by engineers, academics, and public agencies.

Who takes care of the system?

The community or a utility will own the system and provide centralized maintenance. Orenco's VeriComm® Monitoring System can provide automated, round-the-clock, computerized supervision. Orenco provides training for system operators and engineers.

Will there be lots of service personnel on people's property?

No. Service time per home averages less than 1 hour every 5 years. Utility meter readers come by far more frequently.

Do pumps have to be repaired or replaced frequently?

No. With normal maintenance and cleaning, our pumps last more than 25 years. Plus the electricity to run them averages less than $1 per month.

Will the system smell?

No. Not if properly designed and installed. Any wastewater collection system will smell if not properly designed and installed.

I've heard stories about these systems failing. Are they true?

Orenco Effluent Sewers work well. Solid engineering, proper equipment, and attention to detail ensure that. With any type of sewer system, poor engineering, substandard equipment, or sloppy installation can cause problems. Orenco Effluent Sewers have a well-documented track record of success.

Is the underground tank hard to take care of?

No. We require watertight tanks, and most need pumping only once every 10–12 years. Otherwise, they're underground, out of sight and out of mind.

What happens to the solids that accumulate in the tank?

Accumulation of solids occurs slowly because of the digestion process that takes place in a watertight tank. In fact, the tank digests more than 80% of the biosolids. Remaining solids are easily managed through planned pumping schedules.

What if something goes wrong with my tank?

Each property has a control panel with an alarm function. Your system's operator will be automatically notified of any alarms. And the 24-hour reserve space in your tank gives the operator time to have a problem checked.

If I have more questions, whom can I call?

Call Orenco at 541-459-4449 or toll-free at 800-348-9843.

Rely on Orenco for System Support

Orenco's innovative solutions to wastewater problems have become state-of-the-art. Our designs appear regularly in engineering textbooks and professional journals, and our engineers are invited to speak around the world. We routinely offer our expertise in the following ways:

Project Delivery

On the front-end of a project, we offer design/build options for community systems. On the back-end, we provide a variety of asset management services, including O&M protocols and optimization of financial performance.

Engineering and Technical Support

We can provide referrals to engineers who have successfully designed effluent sewers. And we offer a wide range of engineering and technical support services, from permitting assistance, plan reviews, hydraulic analyses, and CD-ROMs to complete plan preparation, bid documents, material specifications, O&M support, and tech support for advanced controls, including telemetry and SCADA.

Training

We offer installation and operation trainings, and we sponsor forums that give operators the chance to share tips and information. We also host an Operator Forum that's online.

Because our team of civil, environmental, mechanical, and electrical engineers work exclusively in the onsite and effluent sewer industries, we're able to offer unmatched technical assistance. When you choose an Orenco system, you'll have the industry leader behind you.

We provide training at our Oregon headquarters and around the country.

Orenco maintains an environmental lab and invests heavily in research.

Our engineers offer unmatched technical assistance. Orenco's engineers and scientists have more than 500 years' experience in the water/wastewater industry.

Orenco EffluentSewers

Orenco Systems is owned and managed by engineers who develop wastewater systems that work — systems based on sound science. From left to right: Eric Ball, P.E., Jeff Ball, P.E., Hal Ball, P.E., (front) Terry Bounds, P.E.

Defining Sustainable Solutions Since 1981

Orenco Systems has been researching, designing, manufacturing, and selling leading-edge products for wastewater treatment systems since 1981. The company has grown to become an industry leader, with about 200 employees and with 150 distributors and dealers representing most of the United States, Canada, Australia, New Zealand, and parts of Europe. Our systems have been installed in more than 50 countries around the world.

Orenco is headquartered at a 26-acre (10.5 ha) site in Oregon, a state that's known for its environmentally sustainable practices.

Orenco maintains an environmental lab and employs dozens of engineers, scientists, and wastewater treatment operators. Orenco's systems are based on sound scientific principles of chemistry, biology, mechanical structure, and hydraulics. As a result, our research appears in numerous publications and our engineers are regularly asked to give workshops and offer trainings.

Distributed by:

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