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Pressure Sewer Systems

Application, Design, Installation and Maintenance

Pressure Sewer Systems application, Design, Installation and Maintenance

Presented by:

Bob Jordan, Covalen

V.P. Sales

317-789-8888 office

317-319-6077 mobile

bjordan@covalen.com

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Agenda

- The Myths
- The Real Story
- System Components
- Applications of the Technology
- Design Considerations
- Installation Guidelines
- Maintenance Requirements
- Wrap-Up

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The Myths

- A system can't work with such small pipe and with so many pumps!
- Low pressure sewer systems are "experimental"
- Low pressure sewer systems are only a "stop-gap" measure, and only used after all other methods have been ruled out
- Low pressure sewer systems are only for rural areas
- Low pressure sewer systems will not work in flat, highly populated areas

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The Myths…continued

- Low pressure sewer systems are a dismal failure and they should be outlawed!!
- Low pressure sewer systems are a source of constant maintenance and they will cause a municipality to go broke!!
- Low pressure sewer systems will grind up dogs, cats and anything else that gets close to the system!!

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The Myths…cleared up

- Hydraulic studies and practical experience indicate that systems with 1,000's of pumps and pipe no larger than 6" – 8" will function very well
- Systems usually consist of 1 ¼" pressure laterals and 2"-4" sub-main pipe sizes
- Low pressure sewer systems are proven and have been in operation for over 40 years
- Low pressure sewer systems are at the forefront of leading engineers' solutions for corrective sewer measures

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The Myths…cleared up

- Low pressure sewer systems are being effectively utilized in all sorts of settings: rural, urban, suburban, etc.
- Low pressure sewer systems are being used in as many areas with flat topography as they are in wet, rocky or hilly locales

The Myths…cleared up

- Low pressure sewer systems have had the greatest success rate of any technology produced during the great “Water Act” movement. The industry has evolved and continues to perfect the system and its multiple technologies.

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The Myths…cleared up

- Low pressure sewer systems, when properly designed and installed, are no more of a maintenance concern than conventional gravity systems with manholes, lift stations, and deep piping systems. Most owners find that with proper operation of the systems, they have fewer service calls than with their conventional systems.

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One Last Myth…cleared up

- Low pressure sewer systems, and specifically the grinder pump stations, DO NOT grind up dogs, cats, the neighbor's kids or anything other than normal residential sewage!!!

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The Real Story

- A properly applied, designed and installed low pressure sewer system will provide the owner with years of trouble-free operation and a long-term solution to difficult sewer applications.

Follow along for the rest of the story…

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The Real Story

- Who
- What
- When
- Where
- Why
- And How…

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Who?

- Cities, Towns, Municipalities
- Sewer Districts, Conservancy Districts
- Commercial and Industrial facilities
- Developers and Builders
- Engineers
- Funding Agencies
- Corps of Engineers

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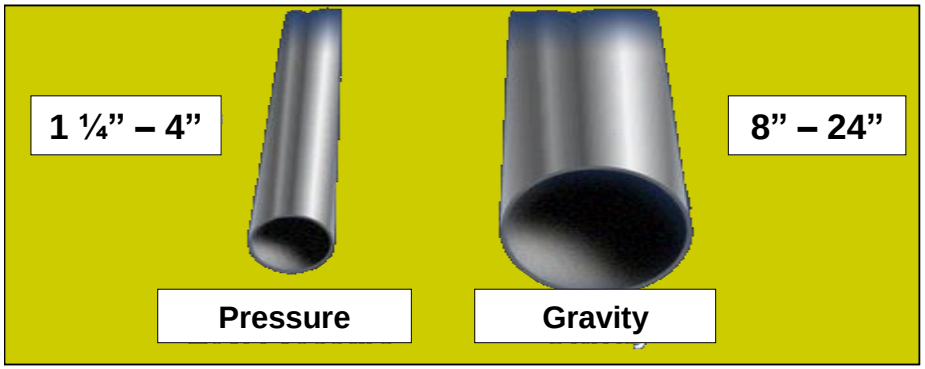
What?

A series of small diameter sewer lines installed with the terrain, below the frost line, by means of both trenchless construction and conventional open trench methods.



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When?

- Wet, flat rocky or hilly conditions.
- Close lot lines
- Interference from other infrastructure
- Mature trees and lots
- New home construction
- Replacing failed or failing septic systems
- CSO corrective measures

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Where?

- Rural settings
- Urban neighborhoods
- In conjunction with gravity collection systems
- New developments
- Infill sewer systems

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Why???

- Virtually no restoration when trenchless is used
- Reduced impact on surrounding infrastructure
- Minimal pavement, roadway or driveway issues
- Lower first cost means more facilities served per project
- Lower operating costs when comparing electrical, maintenance, life-cycle factors
- Ability to add to system with no first cost expenditures

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And How…

- Identify the proposed area to sewer
- Determine the location for the new infrastructure with regards to existing
- Locate the grinder pump stations
- Determine the electrical connection method
- Proceed as follows:

It's a tool for fixing things!

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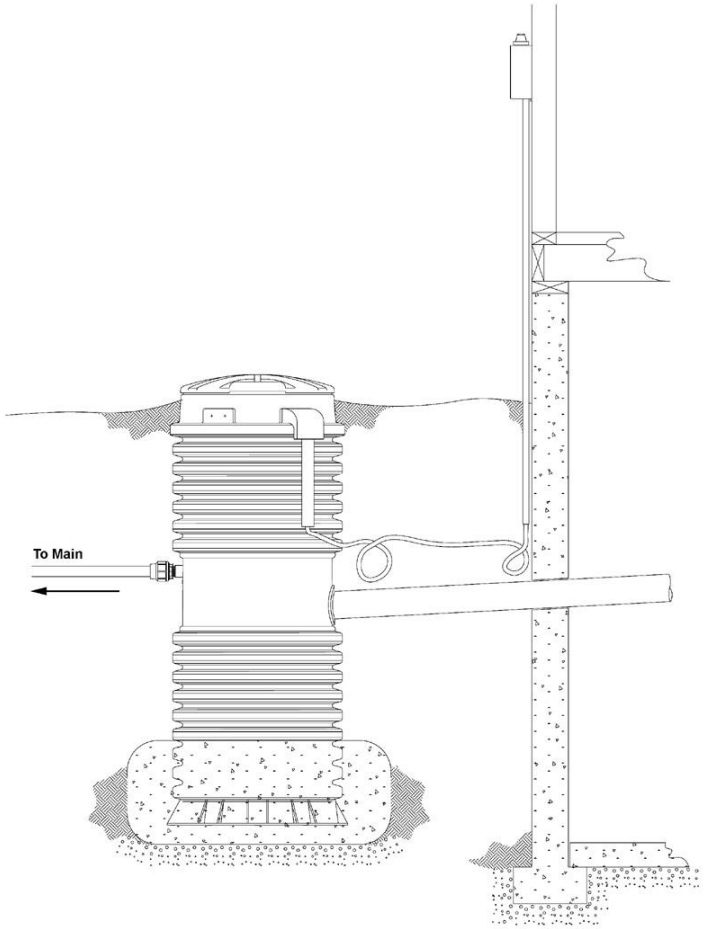
System Components

- Low pressure sewer systems consist of:
  - Grinder pump stations
  - Small diameter pipe system
  - Air/vacuum release valves
  - System isolation valves

The System Components



- A grinder pump station is located in the yard or basement of each home.
- Sewage flows into the station from the building's sewer line (typically 4-inch).
- The basin contains a specially-designed grinder pump with integral level controls.

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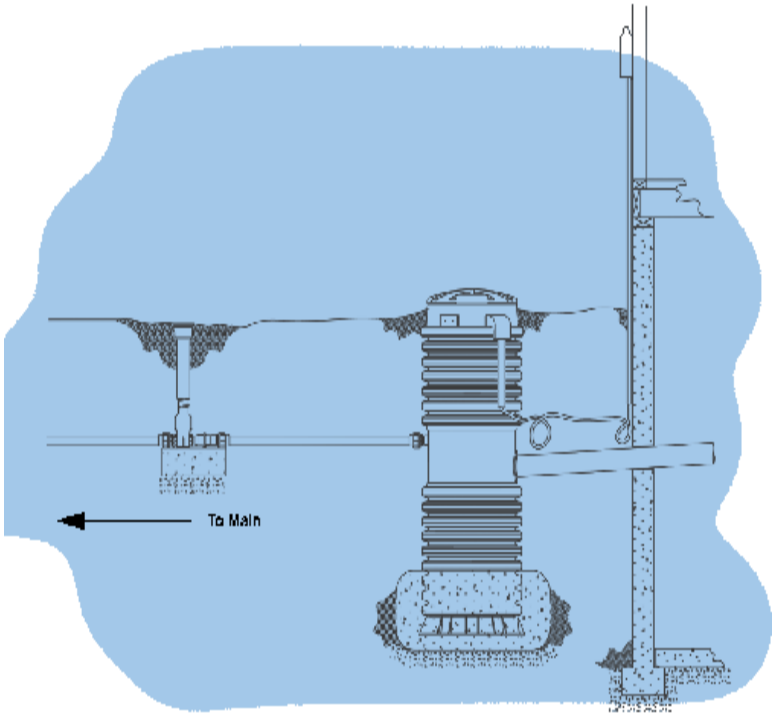
The System Components

- The grinder pumps are connected to a small-diameter, low pressure main laid along the edge of the roadway, following the contour of the land.
- The low pressure main delivers the wastewater to a central treatment system, lift station, manhole, or force main.
- Transporting sewage several thousand feet to a discharge point at a higher elevation is commonly accomplished with low pressure sewers.



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Pressure Sewer System Components

- Pressure laterals from the grinder pump to the street connection are typically 1 ¼”-2” pipe
- They should always be connected to the main via the use of a curb stop valve/check valve combination for the protection of this pressure line
- A combination valve similar to the one below is highly recommended
- Stainless steel serviceable unit

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Pressure Sewer Applications

- Protect existing infrastructure
- Protect environmentally sensitive areas
- Enhance or limit community growth
- Replace failing septic tanks with central sewage collection

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Pressure Sewer Advantages

Eliminates:

- Road closings
- Expensive dewatering
- Utility replacement
- Detours
- Large, deep and costly trenches

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Pressure Sewer Advantages

- Directional boring can be used
- Large, deep trenches are eliminated
- Little disruption to existing landscaping, roads and driveways

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Pressure Sewer Advantages

Immediate and easy restoration

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Pressure Sewer Advantages

- Minimizes the number of costly, unsightly and maintenance-intensive lift stations and manholes
- Small-diameter pipe does not require maintenance or flushing of lines
- Low system maintenance costs
- Eliminates infiltration and inflow, minimizing the size of the treatment plant and eliminating plant overflows

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Pressure Sewer Advantages

Flexibility

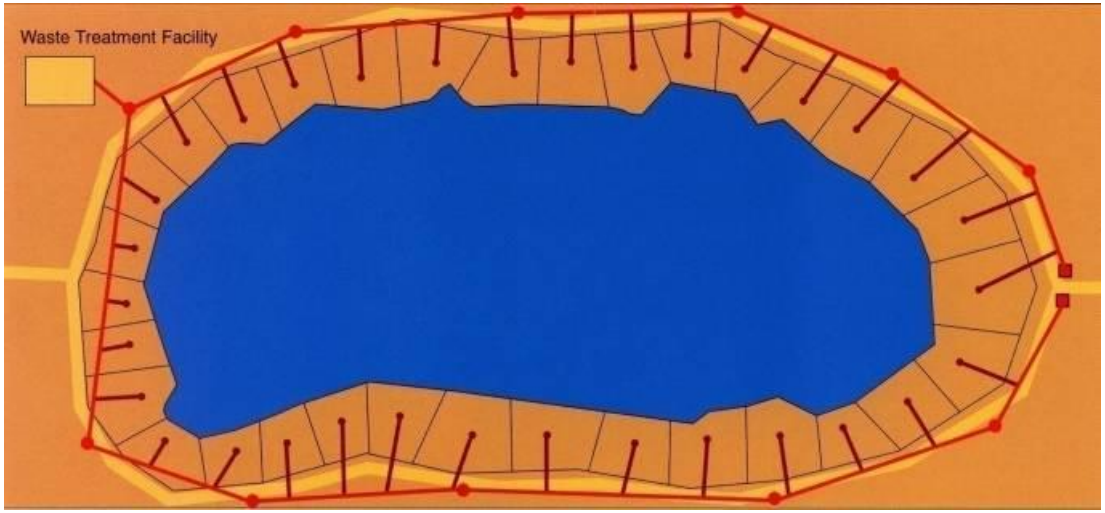
- Pump directly to a municipal or on-site treatment plant — no need to pre-treat
- Pump into an existing gravity manhole, lift station wetwell, gravity main or force main
- Pump to a community septic tank

Design Considerations

- Small diameter piping system with standard ASTM design minimums
- Multiple pump system design with calculated flows/heads
- Growth designed into system with no major additions
- Ability to manipulate changes into system with little design impact
- Manufacturers such as Environment One offer full design assistance for new or replacement systems contact your local representative for further details

Design Considerations

- A sanitary sewer system that utilizes a network of grinder pumps to transport wastewater through small diameter pipes to a collection and treatment system.
- A grinder pump is a submersible pump designed to reduce wastewater particulate to a slurry through the use of a grinding mechanism



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Installation Guidelines

- Piping methods
  - Open trench
  - Directional boring
- Piping materials
  - High density polyethylene or PVC
  - Cleanouts, air/vacuum release valves, curb stops, check valves
- Pump station installation specs tightly adhered to

Installation Guidelines

- Electrical connections standardized
- Start-up and commissioning of system should include complete system testing, operation of all components verified by the individual manufacturer, the contractor, and the owner's representative
- Pre-installation contractor training is a necessity
- Training of post-project contractors recommended

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Maintenance Requirements

- Develop mapping of system to enable easy identification of system components
- Institute “Homeowner Education Program” to inform them of the “Do’s and Don’ts” of using a grinder pump station
- Environment One offers a full online manual for the homeowner to access
- Hand-outs are available from your local representative

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Low Flow Sewer Applications

- Today's designers and operators of sewer systems are often faced with low flow conditions that challenge conventional lift station operation
- A pressure sewer alternative using a unique "Multi-Plex" design provides controlled flows, smaller force mains and reduced costs for overall installation and operation

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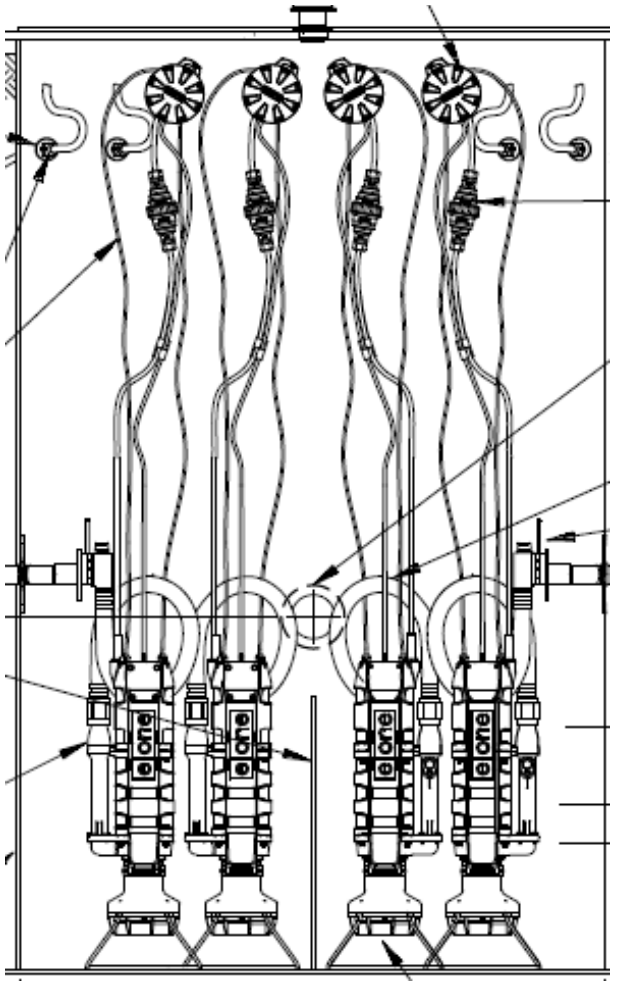
Low Flow Applications

Utilizing multiple pumps,
alternating controls,
and smaller more effective
basin the unique
“Multi-Plex” design can meet
many of these challenges



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Wrap-Up – Case Study

Pressure Sewer System Case Study

- Twin Lakes Regional Sewer District, Monticello Indiana (North Central Indiana)
- Construction began in 2000 (7 phases completed)
- 220+ miles of directionally drilled HDPE pipe
- 1 ¼” through 8” pipe size
- Traversed two lakes (Shaffer & Freeman) eight times
- Traversed Tippecanoe River 3 times
- 5,950 Grinder Pump Stations serving over 9,000 residences
- Two Sewage Booster packages (invented by Covalen)
- Five self-priming lift stations/Two other above ground lift stations
- 4 Wastewater Treatment Plants
- Entire system operated by 6 staff members and one chief operator
- It is the the largest individual Pressure Sewer System in North America

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Summary

- Pressure sewer technology, when combined with trenchless technology, sound engineering criteria, proper installation techniques, proper installation supervision and most importantly good homeowner education will provide today's wastewater treatment professionals with another tool in their tool belt to solve the many issues they face.

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Remember…

- Ignore the myths, get the real story, then follow this easy path to success with your next low pressure sewer system
  - Application
  - Design
  - Installation
  - Maintenance

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Thank You!

Bob Jordan, V. P. Sales
bjordan@covalen.com
317-789-8888 office
317-789-8960 direct
317-319-6077 mobile

Bob Hyatt, Territory Manager, Northwest Ohio, North Central Indiana
bhyatt@covalen.com
877-770-8277 office
317-789-8960 direct
574-870-8467 mobile

Nick Jacobi, Northeast, Central and Southern Ohio Territory Manager
njacobi@covalen.com
877-770-8277 office
317-789-8951 direct
317-716-6181 mobile

Covalen Heartland Division
Office & Distribution Center
6929 Brookville Road
Indianapolis, IN 46239
317-789-8888

Covalen Carolina Division
Office & Distribution Center
3981 Walnut Street
Loris, SC 29569
877-770-8277

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Certificate of Completion

To: *Employee Name*

*Location of Training*_____

Pressure Sewer Application, Design, Installation and Maintenance

One (1) hour PDH/CEU

Presenter Name and Title

August 3, 2017

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