



Comprehensive, Pro-Active Grouting Program Produces Dramatic Reduction of Wastewater Volume and Treatment Costs

Sewer system management in Newtown, PA credits use of a new, comprehensive, pro-active chemical grouting program rehabilitation by minimizing infiltration from pipe and joint failure. The new program, replacing on-demand grouting, keyed dramatic reductions in wastewater volume and consequent treatment costs, in spite of significant, ongoing system expansion.

The volume reduction, helping management to continue to provide the lowest user rates in its area, is also aided by a pro-active program which allows homeowners to reduce excess inflow to the system. Newtown's sewer management and engineer estimated that about 85% of the wastewater volume reduction is due to the new grouting program.

"Before the new grouting program, we were metering a total of 80 to 96 million gallons per month (gpm) through six sites, and are now seeing only 55 to 60 million gpm from nine metering sites," said Warren Gormley, authority manager for the Newtown, Bucks County, Joint Municipal Authority. "We've taken almost 50 million gallons per month out of the system so far, saving on treatment costs that are steadily rising."

"In the meantime, we have also reached out to homeowners to minimize inflow from missing or broken traps and cleanouts, sump pumps, gutters, and downspouts. Our user rates are \$27 per quarter for the first 10,000 gallons. Everyone else around us is on the order of \$110, \$116, and \$120."

Grout Mix

The grout, a mixture of three or more water soluble chemicals, is provided by Avanti International of Webster, TX.

"We congratulate the Authority on their accomplishment," said David Magill, CEO of Avanti International. "It demonstrates the very significant savings that pro-active grouting can provide 24 hours a day, 7 days a week, all year long---savings that go on long after the grouting work has been performed."

The Authority maintains 110 miles of sewer piping that serves about 8,000 customers, an increase from about 2,800 in 1984. According to Kenneth F. Finger, P.E., project manager for the Authority's consulting engineering firm, Gannett Fleming Inc. of Valley Forge, PA, vitrified clay pipe (VCP) was used from 1964 to 1980s, when all piping was changed to PVC. Then it was changed to ductile iron

(DIP) Class 52 about 10 years ago. The firm remains responsible for field inspection, piping replacement, and new pipe installation, among other duties.



Complete grouting inspection and delivery capability is transported by truck, which carries 500' of delivery hose. When further accessibility by truck becomes prohibitive, an additional 500' of hose is provided via remote grouter unit.

Four pump stations move sewage from residential, commercial, industrial, school, and multiple-type customers. The bell-and-spigot-type joints are periodically air-tested, and sealed with the chemical grout upon discovery of failure.

The new pro-active grouting program, used for mains, laterals, and manholes, started around 1998, replacing on-demand grouting. According to John Hess of Infratech Industries Inc. of Mechanicsburg, PA, the Authority's contractor for air testing and trenchless repairs, payback from the new program was almost immediate.

"They started paying a lot less for treatment pretty much right away," he said, "even though their customer base was continuing to grow rapidly."

"Before, grouting inspection would be called for only when routine checks for blockages revealed excessive flow, or too-clear streams at a particular spot. With the new program, we divided the system into drainage areas, started at the top of each one, and made comprehensive checks of all manholes, mains, and laterals, making repairs as needed."



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Air Testing

Hess said air testing is performed at 8-10 psi. When failure is discovered, the grout is pumped from a tank in a truck, and mixed in the area formed by the inside wall of the pipe and the end elements of a grout packer that is connected to a closed-circuit television camera. Continued pumping pushes the grout mixture through the defect, impregnating the soil around the pipe and the joint, and subjecting it to 20-40 seconds of set time.

The repaired joint is then re-tested at 10 psi before the packer moves on to the next joint. The packer has air hoses for the air test and for isolating the joint with its air-filled end elements, and two more hoses for the grout chemicals. Complete control for the operation is housed in a truck that allows for performance of both inspection and grouting.

For manholes, grouting is performed to fix leaks between 4' pre-cast sections, as well as at their connections to mains, and sometimes to laterals. A hole is drilled through the structure, and the packer method is substituted by a "Y" injection point connection that provides for mixing the contents of the two delivery hoses.

In a new procedure, latex is added to the grout tank in the truck in order to reduce shrinkage and increase the compressive strength of the cured grout.

Avanti's chemical grout is a mixture of three or more water soluble chemicals that produce stiff gels from properly catalyzed solutions. The base chemical in the mixture is a blend of acrylamide monomer (AM) and methylenebisacrylamide (MBA).

The other two ingredients are catalysts that contribute to the cross-linking of the grout, thereby causing it to change from a monomer to a polymer. The two catalysts are triethanolamine and ammonium persulfate, with the quantities used for each having a direct effect on the cure time of the grout.

The mixture is commonly applied to stop leaks in mainline sewers, laterals, and manholes. It is also used in concrete structures to stop water leaks, and in soil grouting to prevent erosion and hazardous waste migration. Since 1978, the company's product line has grown from acrylamide gel and urethane foam to over fifteen chemical grouts.

"The company's strategy for supplying the highest quality chemical grouts focuses on their correct application."

The company's strategy for supplying the highest quality chemical grouts focuses on their correct application. Avanti invests in the promotion of proper use of chemical grouting through industry and trade organizations, and in providing the highest level of customer assistance through its inside technical support staff and outside sales team. They also offer application guidelines, safety information and training, and product selection advice.

Avanti also provides marketing materials to help grouting contractors sell their services, and partners with an online provider of bid opportunities and information related to construction and government procurement, to provide a database of work opportunities for contractors.

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