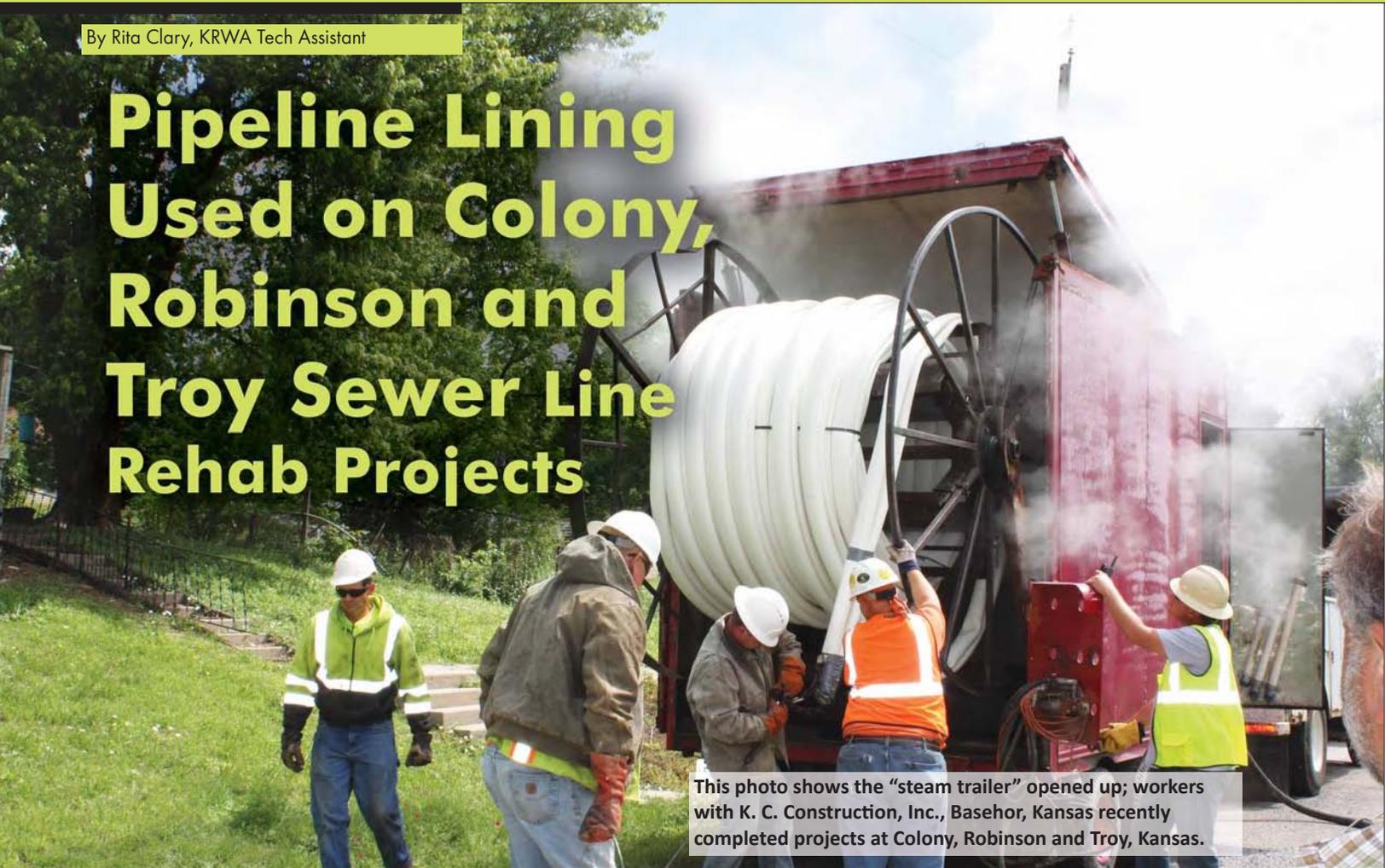


# Pipeline Lining Used on Colony, Robinson and Troy Sewer Line Rehab Projects



This photo shows the “steam trailer” opened up; workers with K. C. Construction, Inc., Basehor, Kansas recently completed projects at Colony, Robinson and Troy, Kansas.

**P**rior to 2012 the cities of Colony, Robinson and Troy all realized they had problems with their sewer systems, that age-old problem, inflow and infiltration (I & I). Infiltration occurs when groundwater seeps into sewer pipes through cracks, leaky pipe joints and/or deteriorated manholes. Inflow is storm water that enters the wastewater system through rain leaders, basement sump pumps or foundation drains illegally connected directly to a sanitary sewer pipe. I & I causes dilution in sanitary sewers. Dilution of sewage decreases the efficiency of treatment, and may cause sewage volumes to exceed design capacity. Although inflow is technically different from infiltration, it may be difficult to determine which is causing dilution problems in inaccessible sewers.

## System history and project description

- **Colony** is located approximately 90 miles southeast of the city of Topeka; in south-central Anderson County. The city of Colony has an approximate population of 410 per the 2010 Census; Colony is a third class city. The project for the City of Colony included upgrading the lines that had collapsed sections and major offsets in joints, as well as rehabilitating manholes that have been identified as having critical defects. The estimated cost of the project is \$2 million.

- **Robinson** is located approximately 75 miles northeast of the city of Topeka in Brown County. The city of Robinson is a third class city with an approximate population of 280 per the 2010 Census. The project consisted of service-point repairs, rehabilitation of 9,050 feet of sanitary sewer collection system and rehabilitation of manholes. Estimated cost of the project was \$1.1 million.
- **Troy** is located approximately 75 miles northeast of the city of Topeka in northeastern Doniphan County. The city of Troy is a third class city and has an approximate population of 1005 according to the 2010 Census. The project rehabilitated approximately 40,000 feet of wastewater collection system, and also replaced approximately 2,000 feet of 8-inch and 10-inch sewer main with PVC pipe. The project made approximately 150 point repairs prior to mainline rehab. It included approximately 100 brick manholes with cementitious liner. The estimated cost of the project was \$3.5 million.

All three projects were completed in phases. Phase I consisted of TV inspections. TV inspections were used to determine the scope of work and design of project. Phase II was the construction and rehabilitation of the systems.

## Fold and form

“Fold and Form” PVC pipe liner, supplied by American Pipe and Plastics (AM LINER II), was the method/material used for all three systems in rehabilitating their sanitary sewer mains. The low bidder on these three projects, K. C. Construction, Inc., Basehor, KS, is a licensed installer of the AM LINER II material. The company has 38 years’ experience in the excavation and underground utility field. A Fold and Form PVC pipe liner is one of several trenchless rehabilitation methods used to repair existing pipelines. Fold and Form pipe liner has been used in the United States since the early 1990s. Lining is less expensive and more efficient than traditional open-cut replacement methods; the process normally requires little or no surface disruption. Trenchless lining processes can be used to rehabilitate virtually any type of pipe including clay, cast iron, Orangeburg, PVC, ABS, HDPE, concrete or corrugated metal pipe.

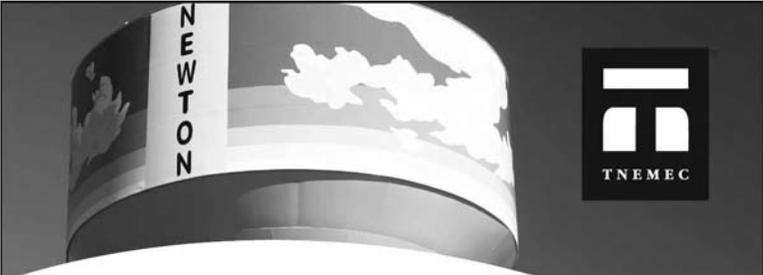
Mainline and service-point repairs are the first step of all projects. This is when repairs are needed in various places in the sewer main with PVC pipe to prepare for the liner.

The liner is delivered to the jobsite folded and coiled on a spool ordered exactly to length for each run. The liner is heated with steam to approximately 210 degrees for nearly an hour in a box type steam trailer. While the liner is heating K. C. Construction, Inc. employees clean the sewer main with a high pressure water jetter. Once the jetting is completed a self-propelled camera is inserted and travels through the sewer main looking for active sewer laterals while logging the exact location of laterals. The location of the laterals is recorded both digitally and manually for backup purposes. The heated liner is then pulled through the sewer main with a winch cable from manhole to manhole. PVC liner is then processed using steam and air pressure to tightly form the previously folded PVC liner pipe to the existing sewer main. Once the PVC liner is tightly formed or expanded to the existing pipe, ends are trimmed at the manhole wall and the remote service reinstatement begins. This process is completed using a self-propelled robotic cutting device. Using the exact location measurements from the cleaning and inspecting prior to lining, the robotic cutter can be sent to the exact location to cut the opening for the service lateral. Prior to cutting service openings, all service lines are deemed active or inactive



This “steam trailer” contains equipment to heat rolls of material to reline pipelines. Steam hose attached and steaming coil of pipe inside steam trailer.

with a dye, if needed. Only active lines are reinstalled. Connecting only active services should reduce I & I which was the purpose of the project. This process is then repeated from one block to another until all sewer mains have been lined and service taps reopened. Depending on the scope of work after the liner is installed the manhole rehabilitation can be performed. Manhole rehabilitation can consist of cementitious liner, bench and invert repairs, etc.



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This self-propelled robotic cutting device is used to cut the service taps back into the sewer pipeline after relining, making the project something akin to a non-invasive surgery.

K. C. Construction uses AM-LINER II; it is considered an environmentally friendly method to rehabilitate damaged wastewater pipelines. According to the company's Web site, the product is advertised to provide advantages because workers have no hazardous chemicals to handle, and be without noxious odors and other hazardous materials. AM-LINER II is installed using trenchless technology, which eliminates the need for costly and time-consuming excavation. Upon installation, the product is a structural,

seamless, and chemically resistant PVC pipe formed tightly to the interior of the existing host pipe.

### Funding for the projects

The project consultant for all three projects was BG Consultants, Lawrence, KS. Each entity received a Kansas Department of Commerce Community Development Block Grant for all phases. The cities of Robinson and Colony worked with Kansas Department of Health and Environment Kansas Water Pollution Control Revolving Loan for interim financing and all systems concluded with funding the projects with USDA Rural Development.

I was pleased to provide assistance to the projects with Environmental Reviews, the LMI surveys at Colony and Robinson and Colony's interim financing loan applications. I also

monitored project disbursements and coordinated with USDA Rural Development.

KRWA is available to discuss your project and potential funding sources. If your community has needs to improve infrastructure, there are programs available to help you solve the problem. Please give KRWA a call or contact me directly at 785-850-0192 if KRWA can provide additional information. Also, I encourage readers to attend the 2015 KRWA Conference & Exhibition, March 24 - 26 at Wichita.

Each of the funding agencies will be available in EXPO Hall. Stop by and visit with them; leave with information that you can put to good use as you contemplate your community's needs.

*Rita has extensive municipal experience with the city of Troy, KS for eleven years. She was a certified EMT and served as the Ambulance Director for two years and supervised the volunteer staff. Rita also worked on or completed most water and wastewater utility reporting requirements. Her focus at KRWA is to provide assistance with applications for funding for cities and rural water districts.*





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# PWWSD 26 Breaks Ground on Water Treatment Plant

**G**roundbreaking for Public Wholesale Water Supply District 26 (PWWSD 26) was held on Wednesday, December 3, 2014. The event occurred at the proposed water treatment plant site, adjacent to the city hall in Strong City.

PWWSD 26 began several years ago with the cities of Cottonwood Falls and Strong City and Chase RWD 1.

After coordinating and listening to the needs of each entity, a comprehensive, regional water study that addressed the water needs of each community was prepared. The report recommended Cottonwood Falls, Strong City and Chase RWD 1 form a public water wholesale supply district to supply water to the regional area.

Raw water from the existing Cottonwood Falls and Strong City wells will be treated by a new 0.5 MGD treatment plant located in Strong City.

The new treatment plant will include greensand plus pressure filtration followed by reverse osmosis filtration. Finished water will be diverted to a new 0.5 million gallon storage tank for adequate storage capacity and pressure to the regional distribution systems.

A waste stream summary was prepared and submitted to Kansas Department of Health and Environment to gain approval from several state agencies for the disposal of the treatment residual. Several options were evaluated with respect to environmental, capital costs, and operational impacts.

The recommended option is to direct discharge the RO concentrate to the Cottonwood River. The agencies concurred with the proposed option and a discharge location was selected that will provide minimal environmental impact and low construction and operational costs.

Iron and manganese sludge from pre-filtration backwash will be discharged to an existing lime sludge lagoon that is being repurposed as part of the project.

The design team elected to pre-purchase equipment, procuring equipment manufacturers based on qualifications and proposed cost of the anticipated final equipment. This process allowed the District to pilot only the equipment that will actually be installed and allowed the design team to design the plant specific to the final equipment being supplied. It promotes early identification of potential problems for mitigation before final design.

The pilot study utilizing the proposed treatment process was completed in July 2013,

verifying treatment results and anticipated operational costs.

Other portions of the design include a new 0.5 million gallon ground storage structure and new water transmission lines connecting the new and existing infrastructure. A unique aspect of this project is that the District will also own and operate the new storage structure, which will directly serve all three entities. This reduces operational costs of each entity maintaining smaller separate storage structures.

The supply to each system will be the responsibility of the PWWSD. The supply to Cottonwood Falls requires 10,000 feet of 16-inch water line from the new PWWSD 26 storage structure to the city's system. This supply line will have to cross the Cottonwood River via directional bore. A new 12-inch raw waterline under the Cottonwood River is also required to connect the existing wells to the new treatment plant.

Separate projects are currently being designed that will improve the aging infrastructure of each entity. These improvements will reduce water loss by replacing over 100,000 feet of existing distribution mains. Combined with the wholesale district, there will be approximately \$11 million in water system improvements constructed in the region. PWWSD 26 is a recipient of a \$1 million regional water system grant through the Kansas Department of Commerce.



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