

Unique Situation Complicates City of Concordia Water Improvement Project

Concordia, Kansas boasts being home to the Thunderbirds of Cloud County Community College on the city's west water storage tank.

The city of Concordia has been making many system improvements and additions to its infrastructure to meet new demands and growth. Concordia is located in Cloud County on US Hwy 81 in north-central Kansas. In the process, some unique issues surfaced that I would like to share in this article.

The Cloud County Community College built a new three-story dorm building that would require the city to make some changes to be able to supply water to the third floor of the building. The City contracted with BG Consultants for review and design; Thaniel Monaco of the Manhattan office is the project manager. The challenge was to design a booster station that would be installed to isolate and increase pressure in the southern portion of the city's newer development and to the college. The city installed most of the

pipework and valves for the new system and isolation themselves. The booster station was put on line in August 2010. Everything seemed to be operating satisfactorily. But soon, it was apparent there were complications.

In February 2011, Operator Jeremy Arnold climbed the city's west water storage tank to replace the warning light; while there, he opened the lid to look inside. The tank was empty! But the pressure gauge on the control system indicated there was 42 psi available at the tank which should indicate the tank to be approximately one-third full. Operators were perplexed.

Looking for a tie-in

Troubleshooting the problem led the city operators to believe that the new booster pump station had somehow increased the pressure on the entire system by about two

pounds. This in turn resulted in a false reading at the tower. It was assumed by everyone that because this is an "open system", there was no way the situation could develop with the line pressure showing 42 psi outside a tank, yet the tank was empty.

Several factors were determined to be combining to create this situation. The main issue is that there is a bypass between the new section of the system where pressure was increased and the remainder of the city that actually supplies the booster station. This allows water to continually circulate through the pump station. The other main reason this issue was not detected was that city has one well that runs continuously while the other wells maintain storage levels in the towers. The one well with the booster station was acting similar to a variable frequency drive (VFD) when a storage tank is taken out of service. However, the production from the one

well was not adequate to keep up with the usage at all times. I suggested that the well would be able to make up a little ground at night but the usage would gradually exceed the production from the one well.

The city has been operating by changing the set points on the well pumps and storage tanks while city operators and I have been working to find the bypass. An initial survey of the valves found one valve that was leaking by, but that was not enough to be causing the problem. For several days the crew read the meters in the southern portion of the system where pressure had been increased and compared those readings to the flow through the booster station. The calculations indicate that about 50 gallons per minute were bypassing and recirculating. With additional focused work by isolating sections of the system, the bypass has been narrowed to an area on Highway 81. As of January 26, 2012,

that bypass problem has not been located. It may be where two lines run parallel to each other for a distance. One is from a well that is feeding the lower pressure side of the town and the other supplying the boosted area. My hunch is that the pipelines are linked or looped in some location. Or there is also the possibility that a fire feed line to one of the larger businesses is being supplied from both lines for better protection and that situation was not noted on the city's water system maps. Because the line with the increased pressure was an existing pipeline and not a new installation, the city is in a real quandary because of not having adequate maps of prior work on



Concordia opted to install a 10-inch fusible PVC pipeline for the extension north of the city. The pipeline crosses the Republican River. A unique feature was the addition of a 4-inch PVC line was also installed as a return to recirculate the water in the system.

services and extensions. This makes pinpointing the problem an extremely difficult challenge.

This situation in Concordia is unique. It's imperative that the city be able to resolve the problem. It reminds everyone how essential it is for systems to document the installation of services, and improvements. It's not only essential to correct the problem for today but also to help with line repairs or future improvements. The project consultant might have been able to detect a problem had system information provided to him, been accurate and complete. This problem was not a fault of the engineer; it was due to a lack of accurate mapping and

This new booster pump station houses five main pumps and one small jockey pump that operates continuously.

It is extremely fortunate for the city that this problem was detected and corrected only days before a major fire occurred in Concordia.

system information. KRWA encounters similar problems nearly every day as KRWA staff try to conduct leak detection in cities and RWDs across Kansas. The problem can be reduced when water system pipelines can be located; accurate mapping is a start.

It was fortunate that at no time did the city lose pressure – but it was only a matter of time before such a scenario would develop. It is extremely fortunate for the city that this problem was detected and corrected only days before a major fire occurred in Concordia.

Expanding north

Concordia recently completed a line extension north of town for a new development. The north development extension consisted of a 10-inch main line with a 4-inch return line to create a



The contractor on the project, J and K Contracting, Junction City, KS, fused the new pipe using this McElroy Tractstar fusion machine.

loop for circulation of the flow. The project also involved installation of a 6-inch forced sewer main, all which had to cross the Republican River. C 900 slip joint gasket PVC pipe was used for the water project. A fusible PVC pipe was used on the river crossing. The fusible PVC is basically C 900 pipe with a different resin to allow for fusion of the pipe. This fused pipe allowed installation without the need of an encasement. The process of fusing PVC is similar to that used for fusing polyethylene (PE) pipe. The new extension will be serving a new 200,000-square foot sales and service center for Concordia Tractor (CTI) and a new state area KDOT office and shop that is planned. Future business growth in that area is also anticipated. The project contractor was J and K Contracting, Junction City, KS.

The city also completed a sewer replacement project in the summer of 2011; it involved two blocks of sewer main on Broadway Street. The project was possible thanks to a CDBG Grant through the Kansas Department of Commerce and a \$71,000 contribution by the city. The cost was \$460,000. The project replaced the oldest sewer line in town; it was installed in 1901. Accomplishing this upgrade involved forming a sewer district.

New AMR system

Another project with a positive impact benefiting Concordia's water utility is the replacement of the water meters. The city is installing a new automated meter reading (AMR) system.

Concordia serves more than 2,500 services; the city crew had manually read meters each month. The system was divided into four areas and the city would read and do billing in quarters.

As of January 23, 2012, the city has installed nearly 1,400 of the auto-read meters. As a result, the city has been able to reduce billing from four billing cycles to two billing cycles per month. When all the new meters are installed, the city will bill all customers in one cycle. The city has already seen an increase in revenue and a reduction in water loss. Utilities Director Chad Buckley commented that typically the city doesn't realize the anticipated annual revenue from the water utility until the last billing cycle. However in 2011, because the city has more accurate billing and timely usage reports, the city was on track to have a revenue increase of nearly \$63,000. That increase is with just more than 50 percent of the new metering installed.

The AMR drive-by read system reduces the amount of time it takes to

read the meters, freeing up operators to complete other tasks. The rechecking of meter readings and the flagging of problems with a service can be a great tool when customers dispute billings. Automated reading systems usually integrate with the billing software, reducing office staff time as well. While the changeover requires a significant investment and time to install, Concordia is already realizing benefits that exceeded expectations.

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Attend the conference

I want to encourage cities and rural water districts and other water and wastewater system personnel to attend the upcoming KRWA conference. As superintendent at the city of Washington prior to joining KRWA as an employee several years ago, the KRWA conference was the one event that I looked forward to attending. The conference continues to be the premier event for water and wastewater systems in Kansas. What I like most is the variety of training sessions offered, the largest display of products and services available and the down-home atmosphere that the conference creates. KRWA's conference offers an outstanding return for the time and investment it takes to attend. I hope to see everyone there.

Greg Metz joined KRWA as a Technical Assistant in July 2009. He previously worked at the city of Washington for 13 years where he was involved in city utilities including the power plant, streets, water and wastewater. He also served as purchasing agent for those utilities.





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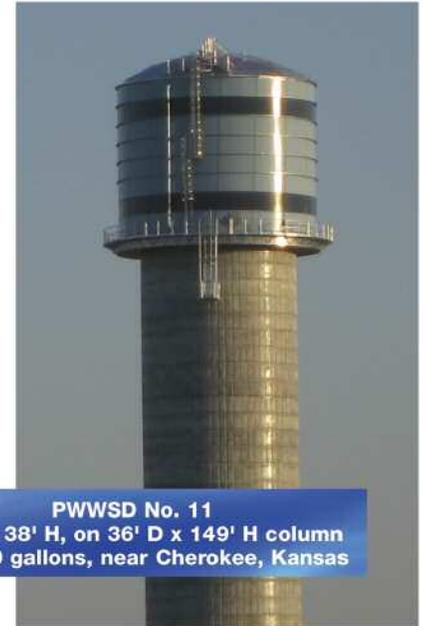
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