

CALM, COLLECTED AND I&I COMPLIANT

Wastewater district embraces digital technology as a means of making infrastructure and operational improvements

By Mary Shafer

Taylor's Fire and Sewer District in Taylors, South Carolina, is party to an intergovernmental agreement with Renewable Water Resources, which owns and operates several wastewater treatment facilities in their five-county service area. About 10 years ago, Taylors learned this agreement required them to eliminate inflow and infiltration into their wastewater collections system within 15 years, giving them a completion deadline of 2021.

This municipal subdistrict serves about 10,000 parcels in central Greenville County. It is responsible only for the wastewater collections system, including nearly 130 miles of gravity line and 3,602

manholes. It connects to treatment lines and a treatment plant owned by Renewable Water Resources, and Taylors can access flow data from ReWa's inline monitors.

Bad, but how bad?

Taylor's service territory is divided into 10 mini-districts, bordered by the Metropolitan Sewer Subdistrict to the northwest and southeast, and the Wade Hampton Fire and Sewer District to the southwest. Nine of the mini-districts contain sewer collections systems, while the 10th comprises a small area of mostly septic systems.

One of those mini-districts, called Mill Hill,

was the main problem area, says Samantha Bartow, director of sewer services. Her department was aware that the Mill Hill infrastructure dated from the 1920s, and was seriously past its design life — a likely culprit in the tremendous flow rise during heavy rain.

"Everything at that point was just guessing," she recalls. Taylors has nine required flow monitors at various points in their lines, and some spotty legacy inspection records still on VHS tape and in hard copy reports. Apart from this, Bartow's staff realized they had no substantial empirical data about specific problem locations in their

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Taylor's Fire and Sewer District technicians Chris Stamey and Teven Henry lift a manhole cover and set up to clean a sewer line in Taylors, South Carolina. (Photography by Ken Osburn)



Administrative assistant Alicia Jenkins, Director of Sewer Services Samantha E. Bartow, construction crew leader Chris Powell, and GIS analyst Kristien King discuss the day's schedule at Taylors Fire and Sewer District.

system. "Until we do post-work monitoring, we won't know the percentage of I&I Mill Hill was responsible for, but we know from the instant jumps on the flow monitors during rain events that it's substantial."

Bartow's team knew that to comply with the agreement, "just guessing" wouldn't cut it. They would need to inspect their entire system and identify problem areas, then plan, schedule and budget for specific repairs and rehabilitation. So they began monitoring the system with flowmeters in 2006 when the I&I reduction order came down. They quickly estimated how long initial CCTV inspections would take, and started those immediately.

Going digital

While Taylors can pull flow data to determine what percentage of I&I originates in bordering subdistricts — Wade Hampton Fire & Sewer District, Metropolitan Sewer and the City of Greer — Mill Hill is all theirs, so ReWa wouldn't pay for the repairs.

Taylors is funded through millage or tax notices and user fees, and this was an extensive project. They were able to get a \$2 million loan from the state revolving fund to subcontract actual CIPP repairs and new pipes for the Mill Hill mini-system, but all the in-house cleaning, inspection and preparatory work was going to be labor intensive and costly.

They had to keep costs as low as possible, and realized one way would be to switch over to all-digital CCTV inspection systems. Up until this point, issues were written on random sheets of

Construction crew leader Chris Powell (front) and sewer technician Jesse Evett prepare to seal a manhole ring.

paper, and finding any asset information required hunting through folders by line and segment numbers for notes and still photos. Naturally, accuracy suffered.

Upgrades and outcomes

In 2008, they made their first move toward digital, replacing an old inspection truck with a Ford F450 Gas Cab 4x4, outfitted with a CUES K2 Base Station saved from the old truck. The existing TV reels were also moved into the new unit, along with all software: PipeLogix Inc's Flexidata and its Digital Video Survey module, their GIS package and the Windows 7 OS. In 2010, Flexidata was rebranded as PipeLogix, and Taylors bought their ESRI GIS software module.

Onboard inspection software now includes PipeLogix with the lateral module. They also switched from MS Access database-generated paperwork orders to CityWorks/ArcGIS CMMS integrated digital utilities management software in July 2014.

"Our crew uses CityWorks to locate assets, manage their workflow and prioritize repairs," Bartow says. "The bulk of the work is done on desktop computers, but out in the field they use tablets for quick reference."

Following an introductory period to familiarize themselves with CityWorks, the Taylors crew realized it would be beneficial to port the PipeLogix information to CityWorks, for users like

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PROFILE:

Taylors Fire and Sewer District, Greenville County, South Carolina

FOUNDED:
1958

POPULATION SERVED:
10,000 customers

AREA SERVED:
16 square miles of the City of Taylors in central Greenville County

STAFF:
16; 11 in operations and 5 in administration

INFRASTRUCTURE:
About 130 miles of 6- to 15-inch sewer main collection pipes within 10 mini-districts, comprising 3,602 manholes and one pump station. Connected to 17.14 miles of trunk line, 1.6 miles of force main and one pump station operated and maintained by Renewable Water Resources.

ANNUAL EXPENSE BUDGET:
\$2,357,500

WEBSITE:
www.taylorsdistrict.org



Technician Mike Jones (left) and TV crew leader Gary Cantrell run a sewer line inspection from the control room of the CCTV van.

She cites, for example, the ability to see the work order requests and any related comments, and compare them to the actual TV inspection details collected from the field with PipeLogix.

Playing nice and unexpected benefits

Technicians are now inputting data from the field via iPhone and iPad. Reports can be generated anywhere via screen or print.

“We installed a CCTV interface module and are now working with PipeLogix to get their software and Cityworks to work together, importing videos and linking to work orders,” Bartow says.

“We use Cityworks every day for the SC811 program, which is handled by our TV crew. PipeLogix and Cityworks combined have helped us locate areas of inflow and infiltration, where we would need to place a flow monitor, or have our construction crew make a repair. This has been a tremendous help, especially when the wastewater treatment facility our collections system dumps into required us to submit an inflow and infiltration reduction plan for a new subdivision flow request.”

Cityworks has also helped Taylors’ customer service staff keep better records of recurring incidents and complaint calls. It has helped improve their response time, since customer service staff can now answer questions that, in the past, had to be handled by field personnel. This has also

freed up the field crews to be more productive.

The Taylors team is finding that the PipeLogix software also helps enable compliance with their new 811 safety hotline program, which requires people to call in before they dig on their property to be sure they won’t strike underground utilities. The subdistrict processes more than 200 of these work tickets per month.

Now, technicians can just get a number off a PipeLogix report, go out into the field, measure off footage between two manhole points and mark where the service lateral taps into the mainline. Then the crew paints a line on the ground and/or places flags to indicate to the property owner where they should avoid digging.

That saves significant time and labor, says Bartow. “Without the PipeLogix reports, we’d have to do everything from the surface. That would mean we’d have to have a crew dedicated just to that work, which would be tremendously expensive. One subdistrict quoted a minimum of \$100,000 to do this.”

Related equipment changes

Along with the software upgrades, they’ve since added an Insight/Vision push camera on a fiberglass rod, a CUES K2 portable system, a self-propelled lateral inspection system with color pan-and-rotate camera for 6- to 30-inch mains and



Mike Jones (left) and Gary Cantrell lower a CUES camera into a manhole for a sewer line inspection.

the subdistrict’s director — who doesn’t have hands-on daily experience with PipeLogix — to review work orders and work to date, and to analyze completed work.

“Being able to see that data in one software program is very beneficial for upper-level management, to be able to make decisions on priorities,” Bartow says. “It also allows us to have all the information about our CCTV inspections in one place.”

3- to 8-inch laterals, and a mini pan-and-tilt lateral launch system. In 2012, they brought on a CUES locator sonde to find their existing OZIII camera in the line, should it get hung up. They also purchased a CUES WTR crawler with 6-inch rubber wheels, plus an auxiliary set of 8-inch steel wheels.

This modern technology allows Taylors to focus CCTV inspection and reporting efforts where most effective for I&I reduction. The efficiency has paid off. "We've exceeded our goal of inspecting at least 8 miles of line annually since 2005," Bartow says.

Lean and effective

By 2012, Taylors had made enough progress that the project moved to a fiscal year basis. They now have just two mini-districts left to complete for inspection. Bartow credits the software upgrades with a significant part of the speed of the process on the administrative end, as well.

The intensive inspection program has also provided an unexpected bonus: It's helping identify illicit storm drain connections, creating opportunities for more I&I removal without generating extra costs to the subdistrict, since property owners are responsible for those remedies. While on site, technicians perform smoke tests to find unauthorized connections from basement sump pumps, truck washes, dog kennels and veterinarian washdown areas, whose clean-outs dump directly into the sewer instead of to authorized storm drains.

Taylors is shooting to start actual pipe rehabilitation by year's end, Bartow says, "but there are lots of variables. It should take about a year to complete, barring any issues with weather or hitting rock." They're televising old clay pipes that run underneath residences, with the goal to relocate all lines from beneath houses into the public right-of-way. Old lines will be abandoned and filled with flowable fill, so nothing can be run through them again. More than 5,900 linear feet of new mainline will be installed.

Now in its tenth year, the project is ahead of schedule. Ables says they're on track to complete

by 2020, a year earlier than anticipated. That happy outcome didn't originally look like a possibility, but the investment in digital, integrated technology has proven itself a greater boon than expected.

"This is a huge project, but even when it's done, inspection and rehabilitation will always be an ongoing effort," Bartow says. She acknowledges that they won't know just how effective the I&I reduction campaign is until they're all finished and do another round of flow monitoring. The agreement specifically states that compliance is based on the collections system maintaining

an acceptable level of I&I measured after three consecutive rain events of 1 inch or more.

"Once in a while, you'll hit a home run ... but until we have all the figures, we won't know. We also won't know what new requirements will be thrown our way," she says.

Regardless, it's clear that Taylors is rapidly developing into a lean, cost-effective wastewater collections system that now has the tools it needs to set higher goals, with every confidence of being able to reach them. ♦

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