RACE TO ZERO

St. Petersburg overcomes wet weather and nearly eliminates overflows with an award-winning collections system maintenance program

By Jim Force

When it rains in St. Petersburg, it pours. But the sewer system no longer overflows the way it used to, and manhole geysers are a thing of the past.

That's the result of an award-winning collections system maintenance program implemented over the last few years by Lane Longley, manager of the Wastewater Collection System Maintenance Division, and his staff in this Florida city of 300,000.

"The results have been dramatic," says Longley. "We've had no major overflows in the last few years, and our treatment plants are operating well within their maximum capacities, even after heavy rains."

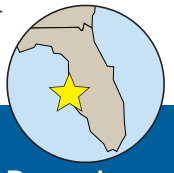
The city has progressed from overflows totaling millions of gallons a year in the late 1990s to less than 5,000 gallons a year today in overflows, spills and other discharges reaching the surface. "We're operating at a good comfort level now," Longley reports.

Such significant strides caught the attention of the Florida Water Environment Association, which honored the St. Petersburg collections system maintenance program in 2007, naming it the best in the state for systems with more than 50,000 customers.

Zero discharge

St. Petersburg operates four wastewater treatment plants, with a total design capacity of 68 mgd. All perform to "zero discharge" levels, meaning all effluent is pumped into the city's reclaimed water distribution system for landscape irrigation, or injected deep underground during rainy periods. None is discharged into Tampa Bay or the Gulf of Mexico, which essentially surround the city.

That requires the city to keep its sewers clean and tight — no small challenge for a system that includes 920 miles of gravity mains, 450 miles of laterals, 56 miles of force mains, 83 lift stations, 96,000 lateral connections, and 19,500 manholes.



A St. Petersburg crew uses an Aquatech combination truck from Hi-Vac Corp. to clean the sewer system as part of the city's ongoing maintenance program. (Photos by Graham Photography)

PROFILE:
City of St. Petersburg, Fla., Water Resources Department, Wastewater Collections Division

POPULATION SERVED:
300,000

SERVICE AREA:
St. Petersburg and surrounding communities in Pinellas County

STAFF:
52

INFRASTRUCTURE:
1,400 miles of sewers; 83 lift stations; 96,000 lateral connections

ANNUAL BUDGET:
$6.8 million (operations)

WEB SITE:
www.stpete.org

Before Longley and his team tightened their focus on collections system maintenance, wastewater overflows had become a major issue. The problem began during heavy rains in 1995 and became chronic during prolonged El Niño rains of 1998.

With enforcement action by the U.S. EPA and the Florida Department of Environmental Protection (FDEP), the city entered a consent order with the state in 2000. "That was a strong mandate that we had to do something," says Longley, who arrived in 1998 after working 17 years for the City of Tampa Sanitary Sewer Department.

Further impetus came from participation in the EPA Region IV CMOM program. In 2005, St. Petersburg became one of the first two utilities in the state to complete a CMOM program.

"The results have been dramatic. We've had no major overflows in the last few years, and our treatment plants are operating well within their maximum capacities, even after heavy rains."

Lane Longley

Above, the Quick Television crew from the city's Preventive Maintenance Section uses a pole camera to inspect sewers. Operating the camera is wastewater technician DiMario McKenzie. Right, wastewater technician John Martin cleans a line as wastewater collections system maintenance division manager Lane Longley observes.

No more scrambling

Longley remembers that the division's approach to maintenance had been primarily reactive, crews often scrambling like emergency medical technicians. So one of his first measures was to reorganize the maintenance staff into three sections:

- Preventive, coordinated by John Stanton, and responsible for cleaning and inspecting lines.
- Corrective, supervised by John Turner, whose four construction crews repair sewers in each of the treatment plant's operating collections areas.
- Emergency response, coordinated by Paulette Wright, responsible for citywide response to service interruptions, manhole overflows, and broken lines. The target response time is two hours or less.

St. Petersburg's is not a typical collections system. It's an old and very flat network of pipes, some dating from the late 1800s, others from the 1930s, 1950s and 1960s. The system was designed to store wastewater during wet weather, in addition to transporting it to the treatment facilities.

"There wasn't much grade in the large trunk lines, and we had a lot of debris collecting in those pipes," Longley explains. "The soil throughout the area is mainly sand, which easily infiltrates into the system and settles out, reducing pipeline capacity. Further, with a number of beach communities feeding into the network, the problems with sand are augmented by saltwater intrusion and high-chloride levels, which create issues in the treatment processes."

Methodical approach

So, besides reorganizing, St. Petersburg has taken a number of steps to make its system more functional and reliable, and keep it out of trouble during wet weather.

To clean the system, the utility employs a fleet of five Aquatech high-velocity jetter-vacuum combi-

TRAINING FOR PERFECTION

Lane Longley

There are no "walk-ons" on the St. Petersburg collections system maintenance team. All new staff members take part in a four-year apprenticeship program that leads to certification by the Florida Water and Pollution Control Operators Association.

The apprenticeship involves classroom study and some 8,000 hours of on-the-job training before an apprentice can be promoted to technician. "We're at about 70 percent certified right now, and our goal is to make it to 100 percent," says Lane Longley, manager of the Wastewater Collections System Maintenance Division.

Each apprentice must complete field training in construction, inspection, line cleaning, and a miscellaneous category that includes such areas as force mains, plug-ups, and root control. Testing is coordinated with the Florida Department of Education.

"It's nationally recognized, and one of the most complete programs I've seen for municipal agencies," he says. One of the biggest benefits to the students is that they graduate as union-recognized wastewater pipe fitters, and that's a certification they can take with them anywhere in the country.

nation units (Hi-Vac Corp.). To increase flow across the system and eliminate quiescent zones, the department made changes to the headworks at its treatment plants. These projects were to improve the hydraulics of the trunk lines by lowering the wet wells and pumping to elevated headworks, enabling the treatment facilities to take advantage of gravity flow.

A two-man team uses an arsenal of pigs and swabs to clean the force mains and perform scheduled valve exercising and inspections, greatly reducing problems with those lines. Another team uses a modified Aquatech jetter truck (Hi-Vac Corp., modifications by Municipal Sales Inc.) to treat gravity lines with Vaporooter foaming root-control chemicals (Douglas Products).

The treated roots are later removed by the Aquatech trucks equipped with root-cutting heads: Lumberjack cutters from NozzTeq for most applications and Root Rat cutters from ChemPure Products Corp. in smaller lines. NozzTeq also provides most of the general

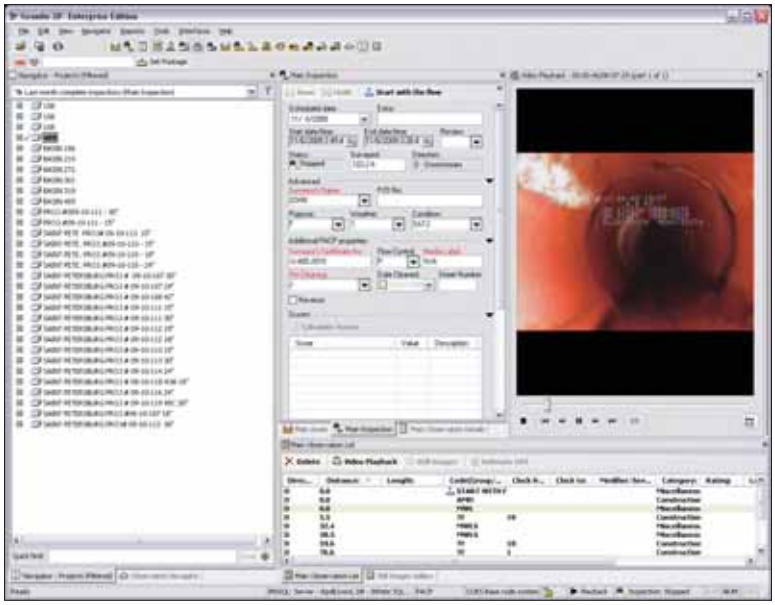
"I can't say enough about our field staff. When we started out, the task here seemed daunting, and we wondered if we'd ever get there. It's taken awhile, but now we have a really good feeling about our accomplishments.

Lane Longley

cleaning heads used by the division's pipe-cleaning crews.

Working with the city's Engineering Department, the Collection Division has conducted extensive infiltration and inflow (I&I) investigations throughout the system. That includes smoke-testing shallow pipes and manholes. Manholes have been fitted with gasketed covers and inflow dishes. Longley credits the Engineering Department's David Abbaspour and Scott Murray along with Water Resources engineer Matt Wilson, with helping to coordinate these strategies.

Oil and grease had been another major issue. The city's tourist-attracting beach areas are filled with restaurants, and the city has a flourishing food-processing industry. Still, the collections system maintenance program has reversed the trend of grease accumulation in sewer lines.



The city uses Granite XP pipe survey software from CUES Inc. in recording pipe inspections and noting defects.

"The CMOM program mandated that we develop a sound oil and grease-reduction program, and we did just that," says Longley. Strong city ordinances now prohibit dumping of oil and grease, largely through the work of Dr. John Parnell (now retired) and current program supervisor Paul Zimmerman. The city's Web site contains an extensive list of tips on grease disposal. It advises residents not to dump grease down the drain, but solidify it in a can for reuse or disposal with garbage.

"Grease used to be one of our biggest challenges," says Longley. "The oil and grease-reduction program has been a huge help."

Lighting the way

To accomplish repairs, Longley's team establishes priorities, concentrating on the most troublesome spots within the system. While some utilities conduct cleaning and TV inspections of all lines on a sequential basis, his team uses a "Quick TV" approach to find the 10 or 15 percent of the lines that really need attention.

"Several years ago, and using our own shop, we mounted high-intensity lamps and cameras on telescoping poles, and then we began lamping sections of lines from one manhole to the next," Longley says. "This gives us a quick look. If we can see a clear path in the section we've lamped, we're pretty sure there are no issues there, and we move onto the next section. This allows us to focus on those pipes that need cleaning the most. We're currently on a five-year cycle to QTV all our lines."

The Corrective Maintenance Repair crew uses a mini-track hoe to excavate a problem line and install a new section of PVC pipe.

The lines that fail the QTV process get a thorough cleaning and a detailed CCTV inspection to identify problems. Longley says the approach has been "one of the biggest single benefits to us," and he credits Robert Simmons of the utility's radio shop for coming up with the apparatus. "We're seeing

CALL THE PLUMBER

The St. Petersburg Wastewater Collections Division considers the community's plumbers as part of the team.

"We work hard to maintain good communications and relationships with our plumbers," says Lane Longley, division manager. "We work hard to keep them up-to-date on rules and regulations. And we keep a database on the accuracy of their work and their overall performance."

The city's Web site contains advice and guidance homeowners can follow when hiring a plumber. It also lists operating rules for plumbers working in the community.

interest in this approach from other utilities around the country," he says.

Not that St. Pete rejects conventional CCTV. The collections maintenance team uses three CCTV vehicles from CUES Inc. to inspect manholes and to assess pipelines. Crew members find and rank pipe defects using NASSCO Pipeline Assessment and Certification Program (PACP) standards. The inspection program is coupled with data management based on an Oracle utility and asset management system and Granite XP software from CUES.

"This allows us to transfer data from our TV trucks into a digital database in the PACP format," Longley says. "We used to use videotapes and CDs and DVDs but we had problems going back through old stuff. Now we can view everything graphically and pull up the latest video of the line. It's been a huge help."

Longley acknowledges computer systems coordinator Robert Labrie, who pulled the various system components together.

Making fixes

The St. Petersburg strategy uses several methods to rehabilitate faulty sewers. "We have been using Insituform Technologies Inc. and Reynolds Inliner CIPP (cured-in-place pipe) to rehab a lot of our larger-diameter pipe," says Longley. "We also slip-line some sections, especially the larger trunk lines, using the HOBAS method of fiberglass push pipe." He notes that this technique has been especially helpful where "pump-arounds" are not possible and an active flow must be maintained on the line.

The city has also taken advantage of pipe bursting, horizontal directional boring, and even microtunneling in some situations.

"We're always open to new ideas," Longley says. The progress in St. Pete would not be possible without good people, a factor Longley points to time and again. "I can't say enough about our field staff," he says. "When we started out, the task here seemed daunting, and we wondered if we'd ever get there. It's taken awhile, but now we have a really good feeling about our accomplishments.

"To me, the reductions we've seen in overflows and incidents are really indicative of the job our people are doing every day." ✦

MORE INFO:

ChemPure Products Corp.
800/288-7873
www.chempure.com

CUES Inc.
800/327-7791
www.cuesinc.com

Hi-Vac Corp./Aquatech
800/800-1016
www.hi-vac.com

HOBAS Pipe USA
800/856-7473
www.hobaspipe.com

Insituform Technologies Inc.
800/234-2992
www.insituform.com

NozzTeq Inc.
866/620-5915
www.nozzteq.com

Reynolds Inliner
812/865-3232
www.reynoldsinliner.com

Vaporooter
800/841-1444
www.vaporooter.com