

## FOCUS: SEWER

# MAINS IN MOTION

Stege Sanitary District keeps a tight and efficient sanitary sewer system despite frequent seismic activity that can crack pipes, loosen joints, or worse

By Suzan Marie Chin

**I**t's hard enough maintaining an aging sewer system under the best of conditions. It's harder still when the terrain is challenging and the earth itself regularly moves.

Stege Sanitary District, in California's San Francisco Bay area, must cope with a geologically active area over a part of the San Andreas Fault, source of several major earthquakes and frequent

tremors. The terrain is also hilly, and access to lines for cleaning and inspection is not always easy.

Still, the district has steadily reduced stoppages and overflows on its 150 miles of mains and has created a system that can withstand seismic punishment. In 1991, the district initiated an aggressive, long-range Sewer System Management Plan (SSMP).

With that plan in place, the district was well prepared when the

San Francisco Bay Region Water Board passed a resolution to address sanitary sewer overflows (SSOs) in 2003. The SSMP includes aggressive cleaning with mechanical rodding and flushing, a continuous cycle of CCTV inspection, chemical root control, and annual line rehabilitation.

An essential part of the program is a commitment to pipe bursting, a technology that lets the district make repairs without dis-



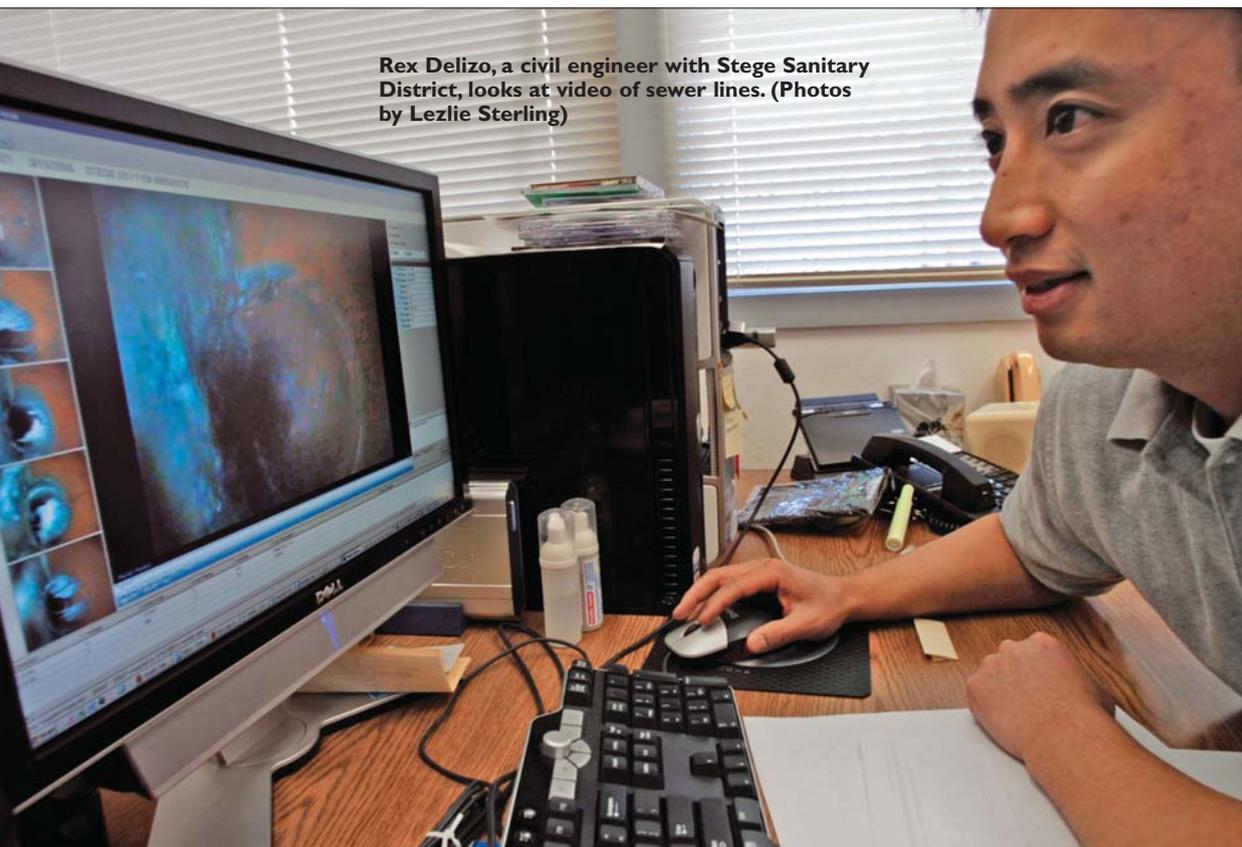
Stege Sanitary District uses a SRECO-Flexible root cutter to clean sewer lines in El Cerrito, Calif.

ruption on the surface and leaves behind a leak-free, structurally sound pipe.

### Tough terrain

The district's collection system is bisected by the Hayward Arm of the San Andreas Fault and traverses a significant active area known as the Blakemont Slide.

Over time, continuous land move-



Rex Delizo, a civil engineer with Stege Sanitary District, looks at video of sewer lines. (Photos by Lezlie Sterling)

### PROFILE:

Stege Sanitary District, El Cerrito, Calif.

**FOUNDED:**  
1913

**SERVICE AREA:**  
6 square miles (cities of El Cerrito, Kensington and Richmond Annex)

**CUSTOMERS:**  
40,000

**EMPLOYEES:**  
10

**INFRASTRUCTURE:**  
150 miles of sanitary sewers

**BUDGET:**  
\$2.2 million annual (minimum \$750,000 for rehabilitation)

**WEB SITE:**  
[www.stegesd.dst.ca.us](http://www.stegesd.dst.ca.us)

**“If information is over five years old, we don’t use it for decision making. It is just historical data, and we have to collect new information on that asset. If we don’t have up-to-the-minute information, we are not going to start digging.”**

Walter Lunn

Stege Sanitary District technician Adam Clark puts a rodder to work on a problem line.



**A pipe bursting head emerges from a manhole after a 350-foot run. Stege Sanitary makes pipe bursting a major part of its pipe rehabilitation program. (Photo courtesy Stege Sanitary District)**

ment in the area has cracked lines, loosened joints and, in the case of severe earthquakes, sheared pipes or severely offset joints.

The cracks caused by ground movement also create a perfect environment for root intrusion, which had been a common cause of SSOs. The district was incorporated in 1913. The pipes average about 55 years, but some are as old as 90, reaching the end of their lifespan. The area is densely built, primarily on hillsides, and is full of easements.

All these factors made the field of solutions narrow when the Stege team developed the SSMP. To meet aggressive cleaning goals, the Stege team uses a SRECO-Flexible 80-gpm flushing truck with Myers pump and various noz-

zles. In many cases, the hillsides and easement access restrictions make flushing impossible, and the crews rely on two OK Champion S660 continuous hydraulic rodders built on Freightliner C50 chassis, a slim design that gives the crews easier access in neighborhoods than traditional truck- or trailer-mounted units.

Between flushing and rodding, the crew cleans and clears 6,000 to 8,000 feet of line per day. “We work our crews pretty hard,” says Walter Lunn, superintendent of collection systems. “You don’t find our crews parked underneath a tree. But when you are an older district like we are, you don’t have a choice. You have to work hard, otherwise you find yourself in trouble.”

Grease abatement is also a top priority. The district’s fats, oils and grease (FOG) control program consists of permitting, inspections and outreach to food service facilities. The program requires grease interceptors, maintenance of grease removal devices, and record-keeping.

A key element of the program’s success is a targeted response to hotspots. It includes camera inspection of mainlines and laterals upstream of problem areas,

## SMALL BUT MIGHTY

Maintaining a 150-mile system that serves a customer base of 40,000 over a three-city area is no small feat for the Stege Sanitary District’s 10 employees. A lean team, they keep operating and administrative costs low while maintaining the system in peak order, relying on a structure of education, support, and financial rewards for the staff.

Continuing education is a key element: All crew members must be certified and complete at least 12 hours of classes each year. Employees are encouraged to do more than the minimum and, on average, crew members complete nearly 60 hours of continuing education annually.

The district engineers rely heavily on feedback from maintenance crews. Management keeps an open-door policy and uses the field input in making maintenance decisions that help the agency consistently save time and money.

These factors have created an environment of employee buy-in, says Walter Lunn, superintendent of collection systems. “We are able to keep our costs down and keep our system clean and running optimally because our staff buys into it,” he says. “We keep them informed, involved and, most important, compensated through an annual incentive award.”

The award is based on the amount of money the district saves by reducing overflows, limiting accidents and employee injury, and keeping overtime low. The savings are shared equally with all staff members, regardless of their position or seniority. “It is an all-or-none approach,” Lunn says. “Everybody has buy-in, which gives it validity and makes it work. That is why we’re able to accomplish so much with so few.”

The district freely shares information about its SSMP programs. Readers who would like to know more may contact Rex Delizo, senior engineer, at [rex@stegesd.dst.ca.us](mailto:rex@stegesd.dst.ca.us), or Doug Humphrey, district manager, at [doug@stegesd.dst.ca.us](mailto:doug@stegesd.dst.ca.us).



grease interceptor inspections, measurement of grease, water and solids, corrective actions such as more frequent cleanings, and community education.

Because root intrusion is a major contributor to blockages, the district is expanding the program to that issue and FOG collectively. Eventually, the initiative will be known as FROG: the Fats, Roots, Oils and Grease Control Program. At present, the district chemically treats 60,000 feet of lines annually to control roots in critical areas. SSOs have been reduced significantly in treated areas.

### Look before digging

Pipe inspection is another key element of the management plan. Until 2005, the district had contracted for CCTV inspection, but the SSMP studies found that it would be more efficient and cost-effective to bring that in-house. The goal is to inspect and document the condition of the entire system every five years.

A mainline inspection rig from RS Technical Services Inc. and a custom-designed Microsoft Access database enable Stege engineers and its management team to review and assess the system and make vital rehabilitation decisions. The district uses its own system of pipeline defect scoring — the Damage Severity Index (DSI).

As crews inspect each line, they rate it using the DSI and log the information into the district's maintenance management system (MMS). This program interfaces with a digitized mapping system. "All this information creates a living, breathing document and allows us to come up with a list every year of the most important things to get done," Lunn says.

Keeping data current is also critical. "If information is over five years old, we don't use it for decision making," Lunn says. "It is just historical data, and we have to collect new information on that asset. If we don't have up-to-the-minute information, we are not going to start digging. Information is king, but how and when you use that data is even more important."

### Rehab solution

Using all of its available information, Stege began the rehabilita-

tion portion of its SSMP in 1997, after upgrades to some of its major mains in response to an inflow and infiltration (I&I) study. The district now replaces about 1.5 percent of its mainlines annually, allocating at least \$750,000 each year. To date, 90,000 feet of mains have been replaced.

The primary rehabilitation method is pipe bursting. "With a terrain and seismic activity like we



From left, John Gerletti, Adam Clark, Enrique Reyes and Walter Lunn with the Stege Sanitary District use the rodder on a cleaning job.

have, any rehabilitation solution we choose has to be able to take a direct load in the event of a cave-in or other structural failure," Lunn says. "We can't rely on the existing pipeline for support as in the case of CIPP. It has to be thick and strong enough to stand on its own."

The majority of lines rehabilitated by bursting are 6- and 8-inch mains comprised of VCP. Stege specifies a minimum of 17 SDR HDPE pipe as the replacement material in all bursting projects. The advantage of this material is the ability to fuse 1,000-foot sections without seams and so limiting future root intrusion. When the service laterals are connected to the new main, a slurry mix is placed on top to stop roots coming in from the connection points.

"The whole process is pretty non-intrusive," Lunn says. "Now we only have to dig a small pothole, and in some cases we can perform the rehab directly from a manhole as the bursting equipment has become more and more compact

over the past few years."

All pipe bursting work is performed by local contractors, who have used equipment from various vendors, including TRIC Tools Inc., Ditch Witch, and HammerHead, an Earth Tool Company. To get the best pricing, ensure quality standards, and limit change orders and overruns, the district has created base standards for installation, rehabilitation and repair.

For pipe bursting, the district specifies in detail how each section will be installed. For example, a specification might state that each section to be replaced will be 200 feet in length, set 6 feet deep, and have four lateral connections.

The contractor submits a bid based on the base specification. But if a section ends up being 280 feet long, the price of the extra distance is added using the base cost per foot, and additional per-connection costs are added if required.

"By detailing the specifications this way, we enable contractors to be more competitive, and we get a better price," Lunn says. "At present, our bursting costs are running \$56 per foot, and that is a significant savings over previous open-cut costs of \$115 per foot on average. No change orders, little to no disruption to the neighborhood, no restoration, less street repairs — it's a win-win for everybody."

Pipe bursting is also a main component of the district's plan to improve lateral connections to the

mains and reduce I&I. Before a home in the district is sold, its lateral must be tested and inspected. If defective, it must be replaced or rehabilitated.

An independent contractor conducts the pre-sale inspections using a CCTV camera. A district engineer reviews the video footage and issues a compliance certificate or recommends corrective action. Corrective options are limited to open-cut replacement and pipe bursting. In the case of bursting, the contractor must install SDR 17 HDPE. In open-cut replacement, only cast iron and VCP pipe are acceptable.

### 20-year fix

The SSMP plan has been many years in the making. The district has consistently monitored and refined it, being open to new practices, technologies and procedures on a selective basis. Selecting the right long-term solutions and retaining the good will of residents is the No. 1 priority.

"We have a joke here that everything has to be a 20-year fix," Lunn says. "Contractors and technologies come and go, but the district is never going away. We have to deal with everything forever. We have to choose the best fit for our system. If we can stop our problems in their tracks and do it properly, it is one less thing we have to deal with on another day." ♦

### MORE INFO:

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