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BIG PROBLEM, TIGHT DEADLINE

Manhole rehab helps an Ohio County meet a mandate to cut I&I

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Manhole rehabilitation plays a big part as Allen County, Ohio, strives to reduce I&I and stop sewer overflows to meet a state agency deadline

By Angus W. Stocking, L.S.

Galen Troyer (foreground) of Mr. Manhole removes the clamp from a freed sewer collar, while Anthony Crites clears debris from the sewer chimney with the aid of Nick Crites (in excavator). The next stages of the process is cleaning and rebuilding. (Photos by Aaron Piper)

The Allen County (Ohio) Sanitary Engineering Department is facing a serious challenge, and a short timeline.

In May 2006, the Ohio Environmental Protection Agency (OEPA) mandated the closure of six sanitary sewer overflows (SSOs) by 2015. "These overflows flow by gravity to the Ottawa River," says Bill Horvath, department superintendent. "We monitor them, and we know what the flow is. We're not supposed to have them, of course, but they were put in years ago to deal with backups during storm events. I could dig them up and just shut them down, but then we'd have customer issues."

To comply with the EPA order, the department expects to spend about $25 million on an ambitious inflow and infiltration reduction program. It includes a variety of innovative technologies to monitor flows and close leaks in sewer pipes and manholes.

Totally sewer

Horvath's department deals exclusively with the sanitary sewer — townships handle the storm sewer. There is plenty of work to keep Horvath's staff of 35 busy. The customer base totals 9,000 connections, serving about 30,000 residents. The department maintains three treatment plants and 46 lift stations, along with more than 200 miles of line. "We've got everything from vitrified clay to Armco Truss Pipe," says Horvath.

The department monitors flows carefully and is well aware of significant increases during storm events. To reduce I&I, the department has already lined about five miles of sewer. "We specify fold-and-form PVC or in-situ lining," says Horvath. "They're both good techniques, so we leave it up to the contractor. We've used a lot of Miller Pipeline formed-in-place EX liner, a PVC resin product."

But it's not just pipes that leak: The system includes nearly 6,000 manholes, and they are responsible for substantial I&I. "We have some brick manholes, some precast with bottoms poured in place, and some newer precast," Horvath says. "They leak at joints due to O-ring wear; you get leakage in the bottom of precasts, seams between barrel sections leak, and you

PROFILE:
Allen County (Ohio) Sanitary Engineering Department

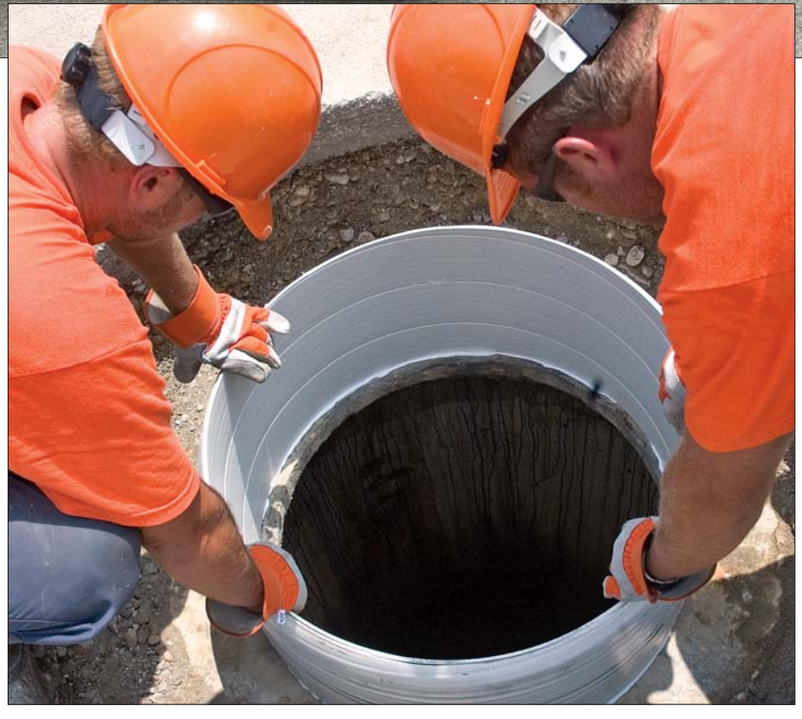
CUSTOMERS:
9,000 connections (30,000 residents)

INFRASTRUCTURE:
200 miles of pipe, 6,000 manholes, 46 lift stations

STAFF:
35

ANNUAL BUDGET:
$5 million

WEB SITE:
www.allencountyohio.com



Above, a bore fitted to the front arms of a Bobcat excavator drills through the blacktop and frees the sewer collar, which can be reused. At left, Nick Crites (left) and Anthony Crites of Mr. Manhole apply pressure to the plastic piping, seating it in the caulking, The extension raises the manhole collar flush with the pavement.

"We have some brick manholes, some precast with bottoms poured in place, and some newer precast. They leak at joints due to O-ring wear; you get leakage in the bottom of precasts, seams between barrel sections leak, and you definitely get leaks in chimney sections."

Bill Horvath

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The department started rehabilitation by simply lining some manholes with a cementitious product. Similar lining is now done with epoxies from Raven Lining Systems, with good results so far.

The top few inches of manholes posed a more difficult problem. "Like everyone else in the country, we get a lot of leaking where the chimney brings the cone section up to desired grade," says Horvath. "The adjusting rings are 2 to 4 inches thick, and heavy. It's hard to get them exactly flush with the road surface, and then, how do we seal these things?"

That's a tough nut to crack: Some experts believe that manhole chimney leaks are the single largest source of sewer system inflow. Allen County installed a number of rubber and stainless-steel interior chimney seals from Cretex Specialty Products. "They're good products; we still use a lot of them," says Horvath. "But especially in roadways, water gets in, and the freeze and thaw cycle shifts them a little bit. You have to do a real good job getting them in."

Opting for innovation

In 2006, the department encountered a chimney rehabilitation system invented right in Allen County — and became one of the first sewer departments in the country to give it a try.

Horvath contracted with Mike Crites of Mr. Manhole to rehabilitate the city's manholes. "I knew Mike, and my first interest was the cutter-extractor, which is essentially just a big hole saw," says Horvath. "I let him do a couple of demonstrations for us, and he cut and removed a big plug around the manhole rim in about five minutes. The same job takes us a couple of hours and a lot of labor. He just cut it and pulled it out. Everyone was impressed."

Two more innovations complete the system. An insert made of vylon replaces the chimney and raises the manhole to the level of the road. "And then he uses a ring saw to cut it off at the exact angle of the road," says Horvath. "I've had customers call after we've replaced a manhole chimney. They don't notice that we've reduced inflow, but they're happy we've removed a bump in the road. You don't get a lot of thanks in this business."

Horvath observes that the sealants attaching the vylon chimney to other components work well, and the con-

HIGH-TECH IN LOW PLACES

The Flo-Dar flow measuring system from Marsh-McBirney Inc. uses two advanced technologies — radar-based velocity measurement and ultrasonic-based pulse echo depth measurement — to measure flow through pipes.

The information from these sensors is combined with site-specific information like pipe shape and velocity profile to calculate flow volume and velocity. Optional electromagnetic surcharge velocity sensors and pressure transducer sensors are added to the Flo-Dar unit when surges bring flow levels to within 4 inches of the radar sensor.

Accuracy of the calculated average velocity has been shown to be within 2 to 5 percent. In addition to accuracy, advantages include low maintenance, data recovery rates between 98 and 100 percent, and wireless transmission of data. A white paper on the system is at www.marshmcbirney.com/Articles/flo-dar-accuracy-white-paper.htm.

crete that is poured around the new chimney is dyed black to match the roadway. "These can be done in an hour, with almost no manual labor, and we've done six to eight in a day," Horvath says. "We used to do two to three a day. This way is safer and cost-effective."

Monitoring the system

The county's I&I reduction program also relies on measurement of flows before and during storm events

A technician operates the circular saw, while another uses tongs to hold down the opposite side of the plastic piping.

A technician applies texture to the wet cement with a brush. He then dyes the cement to match the surrounding pavement.

and before and after rehabilitation projects. "We've done extensive monitoring of lined pipe," says Horvath. "We have got 35 flowmeters to get an idea of flow reduction."

The county uses Flo-Dar flowmeters from Marsh-McBirney Inc., which use radar and ultrasound to measure flow remotely, eliminating the need for sensor ring maintenance. So far, the flowmeters are giving Horvath good news. "We're reducing I&I by 10 to 30 percent, and by up to 50 percent in some areas," he says.

The county also uses CCTV inspection extensively. "We use one of

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Pearpoint's explosion-proof crawlers, operated from a panel truck, and we record all the data digitally," says Horvath. "The truck even has its own bathroom."

The county is working on bringing the digital inspection data into its ESRI-based GIS. A survey firm was hired to use GPS to locate significant features of the sanitary sewer system. Eventually, GIS users will be able to click on a section of pipe and get up-to-date camera footage onscreen.

The county also uses a Pearpoint push camera to inspect laterals. There is no charge to customers for inspecting the laterals, or for repairs: "We just solve the problems," says Horvath.

More efforts needed

Horvath does not believe that I&I reduction alone will reduce storm surges enough to eliminate backups without the six SSOs slated for 2015 removal.

The county worked with the Columbus office of URS Corporation to study the effects of I&I reduction. After extensive flow modeling and system evaluation, Horvath says, "We're shifting gears now; formerly, we were convinced that sewer lining, manhole rehabilitation, sump pump removal and similar approaches would be enough. URS has convinced us otherwise, so we need to change our thought process. We'll continue with the reduction program, but we'll also be putting more money into larger sewers.

"Flow metering let us know that we were still getting significant peaks during storm events, even in sections where we had lined pipe and done extensive rehab. We could reduce inflow, but not enough to eliminate backups — we still had a problem."

So in some respects, Allen County is going back to the drawing board. The department is working with URS

Dyllan Burkheimer operates the vacuum truck and pressure washer controls, while Gary Carter monitors the hoses.

to craft a new approach to eliminating backups and prioritizing system upgrades.

Bouncing back

The public is very interested in how the backup problems are being resolved. The department's web site has a section that monitors project progress. Information about projects is distributed in a newsletter sent with bills. Neighborhood meetings are held, and six large public forums have been conducted — two of them in school gymnasiums, to capacity crowds.

Despite the change of direction, the Sanitary Engineering Department is determined to meet the Ohio EPA mandate and to keep customers happy. One thing that will help is a new, $3.1 million facility that now houses the department. "Before, we were all spread out," says Horvath. "Now, all the divisions are under one roof, and we have a huge new training room."

Sometimes the first approach, however well planned, doesn't work out as intended. Allen County has proven flexible enough, and realistic enough, to be willing to try something different. ✦

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