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Fairfield uses the Flex-Seal system to seal manholes as part of its rehabilitation program. After sandblasting of the surface, a primer is applied, followed by a topcoat. Maintenance worker Johnny Morgan applies the topcoat. (Photography by Mark Young)

BUYING BACK CAPACITY

Aggressive manhole rehabilitation and a larger I&I control effort help Fairfield, Ohio, prevent overflow and keep sewer user rates down

By Erik Gunn

Fairfield, Ohio, just might be a poster child for the power of thinking ahead — and thinking long-term. The city, a Cincinnati suburb, has a program of manhole inspection and rehabilitation that has been going strong for a quarter-century. It's a key to the city's strategy for combating inflow and infiltration.

To control I&I, Fairfield uses a variety of tactics: regular televising of sewer lines, a five-year repair cycle, and close cooperation with other city departments. The work has paid off, says Drew Young, public utility sewer superintendent. Since the mid-1980s when the program started, the city's population has grown by nearly one-third, while average daily

wastewater flow has declined by 200,000 gallons.

"Our flows are lower today than they were 25 years ago," Young says. "And we've added more than 15,000 population. Not many communities can say that."

Suburban system

A bedroom community of 42,300 people with a mostly light commercial business base, Fairfield may have it easier than many cities. "If you can have an ideal flow, we are pretty textbook," Young says. "We don't have a high BOD — it's about 250 mg/l — and our total suspended solids are around 200 mg/l. We don't have slug loads from a lot of businesses. We have a very moderate stream coming into the treatment plant."

The system also is relatively new. The collection system was built starting in 1965, before which sewage treatment was handled by private septic systems and a couple of small neighborhood treatment systems (package plants). By 1986, though, the city was seeing storm-related sewage overflows caused by I&I. So the Fairfield staff took action.

Regular inspections and scheduled repairs followed, focusing on manholes. "We started videotaping all of our sewer lines," says Young. "By 1992, we had televised every public sewer line in the city. We were way ahead of most cities by that time."

Making repairs

In 1986, the city began a campaign of spot sewer line repairs,



PROFILE:
Fairfield, Ohio,
Public Utility
Wastewater Division

POPULATION SERVED:
42,300

AREA SERVED:
29 square miles

INFRASTRUCTURE:
180 miles of sewer mains;
4,500 manholes

WASTEWATER FLOW:
5 mgd (average)

ANNUAL BUDGET:
\$5 million (2009, sewer only)

STAFF:
21

WEBSITE:
www.fairfield-city.org

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Left, a torch is used to dry the surface before priming of the manhole in preparation for sealing. Right, the manhole surface with the topcoat in place.

using Insituform cured-in-place pipe lining. At the same time, the city began a program of regular manhole rehabilitation. Inspections of the 4,500 manholes take place mainly in December and January, when the weather prevents crews from doing other work. The city is divided into 30 sewer basins. “We take a basin at a time, starting with older neighborhoods,” Young says. The sewer cleaning program targets one-fifth of the city every year.

When the manhole rehabilitation program began, risers were an early target. In the past, brick riser sections — the top of the manhole chimney immediately below the frame — might be as high as 30 to 36 inches. “The higher the riser section, the greater potential for the mortar to fail, allowing additional inflow into the system,” Young explains. “We redefined our ordinance to allow only 18 inches of riser.”

Riser bricks were regouted, but increasingly precast risers became the preferred style. After floods, crews would check the flooded areas; where manholes were submerged, the city replaced the vented lids with gasketed, solid models.

Varied solutions

Initially repairs to deteriorating manhole seals used non-shrink grout. Then the city experimented with chimney seals. For the last

decade, crews have used mainly Flex-Seal aromatic urethane rubber seal from Sealing Systems.

“With grout we found the freezing and thawing at that level would sometimes cause pieces to break off,” Young says. “It wasn’t what we would call a permanent repair such as we’re seeing with the Flex-Seal.”

City crews learned how to do the job in a factory-provided training program that took one day. The repair process begins with

the mid-winter inspection, which highlights the manholes in need of repairs (typically 60 to 75 per year) and the types of repairs needed.

Some manholes need to be raised. “You’re looking at casting conditions — whether the manhole is subject to ponding or surface inflow,” says Young. If a manhole has sunk to create an area that ponds in a storm, it is tagged to be raised to grade level. If a lid lets in water, it can be des-

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Drew Young



The Fairfield manhole rehabilitation crew includes, from left, maintenance operator Kim Campbell, and maintenance workers Tony Stephens, Chris Croucher and Johnny Morgan (shown with a Mary A manhole cover extractor made by Doug Meadows Company).

CAMERAS AND MAPS

In Fairfield, Ohio, sewer maintenance doesn’t stop with systematic manhole rehabilitation or the city’s five-year sewer cleaning cycle. Sewer lines get televised on a 10-year cycle, using one of four cameras, all from CUES.

“We have a pretty good arsenal of TV equipment,” says Drew Young, public utility sewer superintendent. Three of the mainline cameras are pan-and-tilt models, and the city also owns two SeeSnake push cameras from RIDGID for lateral inspection. Sewer crews also conduct regular inspections of the storm sewer system, which are under the public

works department.

Over time, the city has been mapping all manholes, sewer lines and laterals to its GIS database. “That’s always being updated,” says Young. “One of the most critical things in our operation is to have good maps.”

It’s a far cry from “the good old boy days” when veteran crewmembers carried the details in their heads and shared them via sketches on the back of an envelope or napkin. “When we started this, trying to determine what we had in the ground was difficult,” Young recalls.

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igned for replacement.

Roughly three-fourths of the manholes designated for repairs are likely candidates for Flex-Seal. The recommendation is up to the inspection crew's judgment. "Any manhole in a street that's got bricks on it gets Flex-Sealed, unless the mortar looks really, really good," Young says. "Clearly, if you see signs of leaking, that's pretty straightforward."

Young's department orders the material in May. Since Fairfield started using Flex-Seal in the late 1990s, about \$25,000 per year has been set aside to buy the product. At about two sealing kits per manhole, sealing costs about \$300 per manhole, plus labor. The annual order is more than enough to meet a yearly demand of 45 to 60 manholes needing the treatment.

The sealing process

Work crews use a custom-made trailer to store the tools and materials for the sealing process. Step one is to sandblast and pressure-wash the inside of the manhole chimney to make sure it is completely clean for the sealant.

Maintenance worker Tony Stephens sandblasts the area near the top of the manhole.

While the surface dries, the crew moves on to a second manhole. "They come back when it's dry and put the primer on it," Young says. "Then they come back the next day and seal it."

A dry surface is important. "If it's not good and dry, you get little bubbles behind it," Young says. Then the seal can fail. To date, that has happened only to one liner the city has installed. "The guys really take time with the prep work," says Young. "That's critical to longevity."

Crews usually complete two manholes a day. Young contends that the procedures Fairfield uses are more painstaking than he's seen outside contractors use, but he believes the result is a more durable seal. "We've found that ours holds up better," he says.

The product's elasticity allows it to expand and contract as the weather changes from cold to hot. "And it's impervious to hydrogen sulfide and salts that may get on



it," Young says. "The high durability of it is probably its best feature."

Cooperation and results

Sewer and manhole repairs are coordinated with the city's street department to avoid duplication of effort. When a street is desig-

field's success, but there isn't anything magic about it. "You don't let yourself get behind the 8-ball," says Young. "A lot of communities have become reactive instead of proactive."

But when it comes to making repairs, he concludes, "It's always

"We're not under any findings and orders. We're in an enviable position. But we've been at it a long time. Through aggressive manhole rehab and I&I reduction, we've bought back 15,000 people's worth of capacity that we didn't have."

Drew Young

nated for repair or resurfacing, sewer department crewmembers inspect any manholes to see if they need to be fixed or replaced. Before roadwork starts, the sewer work comes first, including replacing castings or installing a seal.

Young points proudly to the rewards of I&I abatement. "Today, we really don't have an inflow and infiltration problem," he says. "We're not under any findings and orders. We're in an enviable position. But we've been at it a long time. Through aggressive manhole rehab and I&I reduction, we've bought back 15,000 people's worth of capacity that we didn't have."

Savings like that have helped contribute to Fairfield's ranking as the city with the second lowest combined sewer and water rates among 68 communities in the region, he says.

And that's where thinking ahead comes in. There's a secret to Fair-

cheaper to do it on your timetable than it is on an emergency timetable." ♦

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