

Get Creative in the Fight Against Inflow and Infiltration

A retiring I&I veteran from Florida passes the baton and shares mitigation strategies



When I&I isn't mitigated, it leads to situations like this, where a faulty manhole boot allowed infiltration to pull sand into the manhole and caused a depression in the road. The Hillsborough County Field Maintenance Services Division often uses dewatering headers at excavation sites to speed up repairs due to the area's high groundwater table.

Rich Cummings is one of the industry's most passionate advocates for inflow and infiltration (I&I) mitigation. Slated to retire this fall in Florida from his position as director of Hillsborough County Field Maintenance Services Division, one of his goals is to help ensure the county remains positioned to fight leaks.

After two decades of leadership, he'll pass the baton to Chris Jones, the current pump station operations section manager at Hillsborough. Both Cummings and Jones say Hillsborough is moving toward a One Water system — a system that “envision[s] managing all water in an integrated, inclusive and sustainable manner,” according to the US Water Alliance. Currently, Cummings' department, water resources, is responsible for water, wastewater and reclaimed water. The public works department is in charge of stormwater. However, Cummings says he wouldn't be surprised to see stormwater conveyance fall under the purview of water resources at some point, as it currently manages the maintenance for the pump stations. A One Water system makes a lot of sense for many reasons, but especially when dealing with I&I.

Cummings and Jones both agree that I&I is a major problem for Hillsborough, and their colleagues at the wastewater treatment plants are concerned as well. Part of the problem is that Hillsborough experiences aggressive weather systems that many areas in the country do not. A tropical depression can sit on top of the area, dumping several inches of rain for hours, and will often wreak havoc on the power grid as well. Cummings says it's similar to pouring five gallons of water into a one-gallon bucket. A major storm can cause flows at the treatment plants three times the normal rate for several weeks. Then it can take another month to get the biologicals back under control. When the flows are at their worst, plants will experience foam and odor problems in addition to sanitary sewer overflows (SSOs) because they cannot handle the capacity.

So, when those storms let loose, Cummings has to get creative. For instance, when Hurricane Irma blew through Hillsborough, his department pulled together its mobile high heads and deputized its renovation and rehabilitation contractors to work alongside the county crews on a pump-around. The teams went from lift station to lift station trying to keep ahead of the storm. Once they cycled through all the stations, they started over again at the beginning until the stations could manage on their own.

"We learned some hard lessons, and necessity is the mother of invention," Cummings says.

Hillsborough is not under a consent decree, but that doesn't stop Cummings from worrying about SSOs. This constant attention might be why the county's SSOs are decreasing despite the fact that Hillsborough is seeing tremendous growth with 650 to 850 new homes coming online each month. Cummings knows because he is counting every one of them.



Outgoing director Rich Cummings (left) and incoming director Chris Jones discuss water/wastewater strategies for Hillsborough County's future.

One of the best ways to eliminate SSOs is by reducing I&I, and Cummings, like many utility leaders experienced with I&I, sees its mitigation as a job that is never finished. Hillsborough has funded a systematic I&I program to go through every one of its basins on a continual cyclical process. Each basin can take up to a couple of years to perform groundwater level monitoring, flood level management, manhole inspections, smoke testing and flow monitoring — and it's worth repeating.

"If given the opportunity, the situation will revert back, so you have to go back to areas that you already inspected continually," Cummings says.

He admits, however, that funding a comprehensive program like that is not easy when there is only so much money in the budget. "We have been lucky compared to some communities. We had plenty of room in our wastewater treatment plants for many years, so we didn't necessarily have to do anything. But now we have a couple of plants that are on the upper edge of what they can handle, so we have to transfer flows around to try to meet those capacities."

For his part, Jones will be seeking capital improvement plan funding for a low-pressure sewer SCADA system. And while there's never enough money, Cummings says their leadership understands how critical the situation is, and he thinks Jones will be successful.

Veteran advice

Municipalities often get themselves into trouble ignoring I&I. As long as the plant has the capacity, there's no incentive to investigate the root cause of I&I and how much it contributes to the flow. The lack of incentive leads to a lack of funding, and then nothing gets accomplished. Cummings says part of that is because I&I isn't a particularly sexy news item.

"Ragging reductions and floatable reductions get news coverage, but you hardly ever read anything about I&I," he says.

It's a critical issue for Hillsborough because its highest elevation is about 160 feet, and it goes all the way down to sea level. During the wet season, the groundwater table is so high that it sits above the pipes. That water is going to find its way into any crack, break or imperfection.

Public sentiment is something that many utilities struggle with when it comes to funding. However, as a result of several water-related environmental disasters, Florida's infrastructure problems made national news last year. Therefore, Hillsborough citizens are well aware of the value provided by their water/wastewater utilities.

Cummings thinks that if he were to ask Joe Public what was worth spending money on, it would be keeping water clean. "The bottom line is everybody has to have water to drink."

Still, you can't expect customers to be happy about paying for everything that hasn't been taken care of in the past 25 years or more in one fell swoop. That's why Jones warns against getting into a situation where SSOs and consent orders trigger a huge rate increase.

“We’ve witnessed this happening throughout the country. Smaller, systematic and continual rate increases will get you where you need to be versus a huge hike. We must be good stewards of our communities,” he says.

And then there are times you try to do everything right, but instead the fix causes more problems. For Cummings, that lesson came in the form of pipe liners.

“Initially, we thought it was going to mitigate our I&I, but we didn’t see a major reduction,” he says.

It turned out in their case that the existing host pipes and host laterals could be damaged during the lining work, particularly with lateral reinstatements, so the crew had to remedy that.

Laterals are the bane of many municipalities’ I&I existence, and high on Jones’ wish list for future funding are lateral repairs. He is currently investigating different lateral lining techniques and says the fact that so many vendors are calling on him these days is a sign of a lateral repair trend. It seems to both Jones and Cummings that towns have done all the work they can do on the main lines, but with the I&I problem remaining, they’re now considering the laterals.

Cummings says 50% of Hillsborough’s I&I comes from those laterals, but it’s a tough nut to crack because most of them are on private property. It’s not a problem if the leak is at the point of connection, but if it’s farther up the line, you have to talk to the property owner. Knowing that it’s a problem that needs to be addressed, he is looking toward other utilities that have figured out creative ways to get onto the private property to make the needed repairs.

Tools of the trade

Everything from labor-intensive, creative, no-cost techniques to the latest in gadgetry and materials can help you solve your I&I problems. While Cummings loves technology, he’s happy to keep some of the tried-and-true, old-school methods around as long as they’re working.

For example, “Operation Pop-Top” is a trick Cummings learned from an old friend who ran the Jacksonville, Florida, collections system. Cummings was able to narrow down the source area for SSOs — one to three manholes out from the pump stations — using the GIS “Previous SSO” layer. The only problem was that Hillsborough has over 840 pump stations.

Over the course of the week, Cummings sent crews out to pop the tops on the targeted manholes and look inside. They were checking for problems like liquid levels over the bench or excessive debris on the bench.

While some counties are lucky to have the money to invest in smart sewers that alert them when there is a problem with liquid levels, Cummings has around 38,000 manholes. He says a technical solution is expensive, but it’s still worth exploring the advantages of technology. For now, “Operation Pop-Top” is a low-budget quick fix, and it’s one way Hillsborough is reducing SSOs.

On the high-tech side of things, Cummings and Jones are both big fans of InfoSense’s Sewer Line Rapid Assessment Tool (SL-RAT). The SL-RAT is two components, a transmitter and a receiver. The

transmitter sends active acoustic transmission through the pipe. The receiver listens and interprets the signal to tell you whether there is an obstruction and just how bad the situation is.

Cummings says the decision to adopt technology like the SL-RAT is a pretty simple one as the pair of units were just around \$25,000 and could process 70,000 linear feet of pipe a week.

“This could tell me in less than one and a half minutes whether or not that system was good to go or wasn’t,” he says. “There’s nothing else out there that is even close to that.”

Currently, Cummings and Jones have their eyes on the horizon with artificial intelligence as they try to get their heads around the benefits machine learning and AI can provide for the utility.

But while everyone loves to talk about cool new technology, Cummings reminds us that equally as exciting are the new materials being developed. Everything from new piping materials and joining materials to thicker, better tracer wires. “Anything that gives you a competitive advantage is something worth investigating,” Cummings says.

He recently started working with Romac Industries couplings and likes them for many reasons, including the fact they’re restrained couplings and are American-made. They also cost less than traditional couplings, and the Romac couplings have just two bolts, which means it takes one-fifth the amount of time to join two pieces of pipe, according to Cummings.

For Jones, technology has other added benefits. “Technology is also allowing us to use our personnel to benefit us in other areas of need,” he says.

Cummings adds that it’s the most exciting time he’s experienced in his career with regards to new technology. “More things are coming at us — new equipment, new methodologies that are smarter, faster and better. We are better prepared for the future than we’ve ever been.”

Ready for the new guard

As passionate as Cummings is about this industry, he’s not worried about getting bored once he retires. He is an avid surfer, motorcyclist, martial artist and gardener. He also knows Hillsborough is in good hands when Jones takes over. “He’ll keep some of the things that are worth keeping and get rid of some of the things that need to go.”

One initiative that Jones aims to keep is the basin project. He will continue to cycle through all the basins and do a comprehensive I&I study on all of them. He admits it’s an expensive proposition, but that is his goal.

He also wants to focus on employee development because, as he puts it, the employees are the future of the utility. Jones started in the industry by working his way from the ground up with much support from his leaders, and he wants to pay that forward.

“We’re making great strides in many areas, whether it’s the new technology, or the potential for rate resolutions that will fund all the programs that we have to have and are currently planning for. But at the same time, we must continue to prioritize employee development to ensure a high performing workforce. The employee is the backbone of the utility,” says Jones.

Cummings likes Jones' focus on the rank-and-file employee. "First-line supervisor is the hardest job. You've got the people above you going at you, and the people below you going at you, and you're catching it from the guys that you're supervising. It's just a lot of work."

Jones is grateful to Cummings and others for laying a great foundation, and he likes the direction that future planning is going for Hillsborough.

"It's just continuing to carry that torch and making sure that we continue to make great strides in advancing our utility into the future," he says. "We have a real bright future that will show telling signs in the next few years. We've got this One Water project with a new water and wastewater treatment facility, booster pump stations, pipelines, and we're getting ready to move into that phase where some of the items are actually under construction.

"But 10 years down the road, everything's going to look a lot different. And that's because of the work that's being done now."