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EXPO ISSUE

# WEATHERING THE STORM

Sweet Home  
stays the course  
and nets big  
results from its  
I&I abatement  
program

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Dominic Valloni  
Engineering Technician  
Sweet Home, Ore.

FOCUS: STORM/SEWER

# WEATHERING THE STORM

The City of Sweet Home uses modeling and inspection data to target I&I sources and reduce excess treatment demand by 60 percent

By Dan Heim

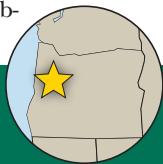


The Sweet Home team includes, from left, maintenance worker Rick Kopf, Crew Chief Doug Latham, maintenance worker Dean LeBret, engineering technician Dominic Valloni, Maintenance Superintendent Pat Wood, and Brown and Caldwell engineer Rob Lee. (Photography by Peter Krupp)



**S**wet Home, Ore., is nestled in central Willamette Valley, about 100 miles south of Portland, near the foothills of the Cascade Range. They get plenty of rain — some 45 inches per year on average. With an aging collection system, I&I had been a huge problem, often overwhelming their treatment plant during peak wet-weather events. Still, they've reduced I&I significantly with smart planning and coordinated rehabilitation efforts.

"We knew we had a real problem with I&I, so starting in 2001 we embarked on a four-phase plan to solve that prob-



**PROFILE:**  
City of  
Sweet Home (Ore.)  
Engineering Division

**SERVICE AREA:**  
8.5 square miles

**CUSTOMERS:**  
2,400 residential,  
800 commercial

**INFRASTRUCTURE:**  
64 miles of pipe (30 miles PVC or rehabbed, 34 miles original concrete dating to 1938); 1,020 manholes; one activated sludge treatment plant

**ANNUAL BUDGET:**  
\$1.8 million

**EMPLOYEES:**  
3 full-time workers plus  
1 engineering technician

**AVERAGE RAINFALL:**  
45 inches per year

**WEBSITE:**  
[www.ci.sweet-home.or.us](http://www.ci.sweet-home.or.us)



**Dale Jarvis from subcontractor K&R Plumbing performs an electro test on an Epoxytec manhole liner.**

PHOTO COURTESY OF DOMINIC VALLONI

lem," says engineering technician Dominic Valloni.

Under the leadership of Mike Adams, Sweet Home Public Works director, guided by Rob Lee, P.E., of Brown and Caldwell, the city formulated a plan to solve their wastewater issues. Lee says that led to their continuing relationship, and they've stayed on board to assist with all phases of the city's efforts to mitigate I&I.

Early results showed that flow to the treatment plant, which was sized for seven times average flow, could reach 22 times its design capacity during peak weather events. Brown and Caldwell recommended an aggressive approach to I&I reduction, and the city decided to implement the firm's recommendations for flow reduction.

Phase 1 of their plan involved the installation of flow monitors, smoke testing and video inspection of the pipes. The city also asked Brown and Caldwell to build a hydrologic model of their system so they could predict problems and focus their resources. The result was a multi-phase I&I abatement program. Flow monitoring after each phase drove analysis and helped fine-tune the program.

**The problem**

Sweet Home faced some huge issues with I&I, amounting to a treatment capacity 15 mgd over what their existing plant could handle.

"As of last year, we had reduced that to a few million gpd over our current treatment capacity of 7 million," notes Valloni, putting their progress into perspective.

Issues were compounded by very high groundwater levels and many springs in the area. This exacerbated I&I, especially in the winter, and made trenching or excavation difficult at best. There are also many trees in the Sweet Home environs, and root intrusion further contributed to I&I.

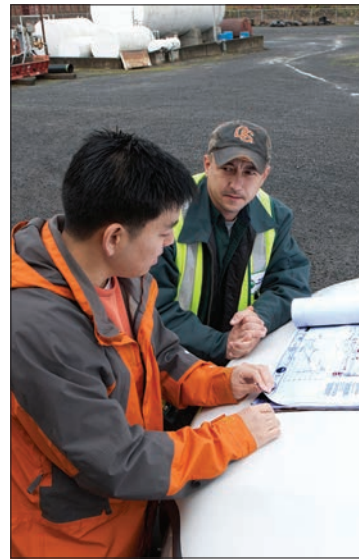
Finally, their aging collection system had pipes dating back to 1938, composed mostly of concrete. That pipe was rapidly deteriorating, and much of it had already reached the end of its serviceable life.

**Phases 1 and 2**

Phases 1 and 2 of the city's program began in the early 2000s. Smoke testing revealed a number of cross-connections between storm sewers and private roof drains. These were disconnected early on by in-house staff.



Dominic Valloni, left, and Doug Latham lower a CUES camera into a manhole for an inspection.



Rob Lee of Brown and Caldwell, left, and Dominic Valloni review sewer plans.

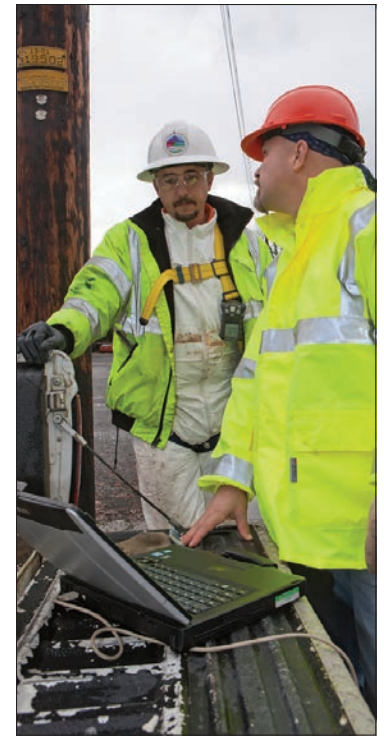
**“The success of the city’s program was their willingness to address the private side laterals. Without that commitment, reduction in I&I would have been much less, and several times more expensive, to get the same results.”**

**Rob Lee**

Rehabilitation utilized a number of technologies including open-cut replacement, cured-in-place pipe and pipe bursting. Additionally, the type of work varied by sewer basin. In some basins, only mainline sewers were rehabilitated. In others, mainlines and laterals to the property line were rehabilitated, while in others private-side laterals were addressed.

At this point, Brown and Caldwell conducted another round of flow monitoring and modeling. This allowed the city to determine which methodology was most effective, and how much of the collection system required attention.

Modeling results were conclusive: Addressing only sewer mains and manholes would result in a 10 percent decrease in I&I during peak weather events, while addressing manholes, sewer mains, and laterals to property lines would yield a 30 percent decrease. If private laterals were included, a 60-80 percent



Valloni, left, and Dean LeBret get the software ready to download flow rate data once Valloni is lowered into the manhole.

reduction in peak I&I was expected.

“The success of the city’s program was their willingness to address the private-side laterals,” says Lee. “Without that commitment, reduction in I&I would have been much less, and several times more expensive, to get the same results.”

These predictions convinced the city to move forward by rehabilitating mains, manholes and laterals as far as possible. Given the limited number of rehabilitation contractors, the city followed Brown and Caldwell’s recommendation to allow various rehabilitation techniques to be bid against each other. Pipe bursting was bid against CIPP, and various manhole products were tested in numerous phases. The result was greater competition and lower bid prices, with contract documents emphasizing quality.

### Phases 3 and 4

During the first three phases of work, Sweet Home experimented with the gamut of products for manholes from various manufacturers: polyurea, several spray-on products, fiber-reinforced cementitious compounds, and cured-in-place manhole liners. By Phase 4 they had settled on an epoxy product manufactured by Epoxytec.

## PROTECTING THE RIVER

The Santiam River is ultimately where excess effluent goes. It’s a tributary of the Willamette River, which is a tributary of the Colombia River. The North Pacific is its final destination. Proper stewardship is essential, and Sweet Home takes this responsibility seriously. The Santiam is a popular whitewater rafting route and also provides salmon fishing opportunities. It’s one of the major tourist draws for Sweet Home.

Settlers first arrived in the Willamette Valley in the early 1850s. In 1893, the City of Sweet Home was incorporated. The Santiam Wagon Road, a toll road connecting the Willamette Valley with central Oregon, was opened in 1865. The road supplied goods from western Oregon to central Oregon, but competition from railroads and the newly opened McKenzie Pass Highway made it obsolete by 1940. That road is now U.S. Route 20, also known as the Santiam Highway.

Sweet Home enjoyed significant growth during the 1940s, fueled by demand for timber from local forests. Further growth occurred when construction began on nearby Green Peter Dam in 1962 and continued as construction began on Foster Dam in 1966.

At an elevation of 537 feet, and a location on the windward side of the Cascade Range, Sweet Home enjoys a temperate, near rainforest climate. That portends greater-than-average rainfall, but a pleasant environment.

The city calls itself the “Gateway to the Santiam Playground.” Sweet Home Public Works employees are dedicated to protecting their idyllic setting, and keeping the water clean is just one facet of those efforts.

“This is a trowel-on product, with great capabilities for bonding to the existing substrate, and it had excellent test data backing up its performance,” Lee explains. And since Epoxytec has a distributor in Portland, Sweet Home was able to get small quantities and test kits to do a lot of the initial trials, as well as repairs and touchups, using only in-house staff.

The city uses PVC for open-cut replacement of mains and laterals, but pipe bursting with HDPE is their preferred method for rehabilitation. “We found that if you can burst a pipe with HDPE, it is the best way to go,” Valloni says.

### Ongoing maintenance

Sweet Home is not a large city, with around 3,200 customers, 8.5 square miles of service area, 64 miles of pipe, and 1,020 manholes. They’re currently on a two-year maintenance cycle, and proactively clean and flush their system. Dealing with roots and other blockages is an as-needed priority. FOG is not a huge issue, as Sweet Home has few commercial sources. Valloni describes Sweet Home as “more of a bedroom community.”

Ongoing training of employees is also a given. Oregon State Wastewater and Stormwater Collection Certification, confined-space training, and other health and safety programs are required for all city employees. That’s an investment in quality the city has been willing to make, and the city’s support is a large part of this success story.

### Phase 5?

Sweet Home is just now wrapping up Phase 4 of their grand plan. Valloni says there’s nothing official on the books yet, but they’ve already gotten most of the low-hanging fruit. So if there is a Phase 5, future work might best focus on continuing improvements to the treatment plant.

Lee says the city has been monitoring flows during all phases of their program and will continue that process to see what really works. “We’ll also be entering into an extensive round of hydrological modeling where we investigate how our system will respond to peak weather events,” he says. “That will tell us whether it’s better to throw our resources at treatment plant capacity upgrades

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**Rob Lee**

or collection system upgrades. We really need to look at the balance there to get the most bang for our buck.

“In addition, we’ll continue looking for other I&I sources. That means continuing camera inspections and staying involved with controlling inflow sources. We’ve done some rain gardens and green

streets improvements, but our focus continues to be our deteriorating collection system.”

### Lessons learned

Significant I&I reductions are proof of the value of Sweet Home’s approach to system improvement.

“Starting 10 years ago, the city’s Public Works director recognized the need to address this whole I&I issue,” says Lee. “Adams has been creative in obtaining funds for this effort, and the City Council has been extremely supportive. They realize this is a process ... you can’t do it all in one fell swoop. Dominic and the Engineering and Maintenance Division have been in continuous communication with Sweet Home city managers, and that communication has been invaluable.

“And the city is funding this work the right way. Instead of slapping customers with a 40 percent rate increase in one shot, gradual and consis-



**Dominic Valloni, left, is lowered into a manhole as Doug Latham and Dean LeBret adjust an ultrasonic flow device (Teledyne Isco) and calibrate area velocity.**

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**“Instead of slapping customers with a 40 percent rate increase in one shot, gradual and consistent rate increases compatible with future planning went a long way toward preventing customer backlash.”**

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**Rob Lee**

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Valloni notes that the city has spent close to \$17 million over the last decade, which is a huge amount of money for a city its size. “Much of our funding has come through DEQ, and a few federal grants. The rest of it is just good planning and overall support from the city. We need to maintain the mentality that ‘we’re not done,’ and the city has supported us in that respect.”

Lee says five years from now, he’d like to see Sweet Home in total compliance with permits, and doing minor tweaks to keep the system in spec. He says the city has already done the bulk of the necessary work, and should be proud of the progress to date.

“One final thing I’d like to emphasize is the importance of knowing your system, whether by monitoring, modeling or inspection,” Valloni concludes. “Utilizing that information when planning projects has been critical to our success.” ♦

#### **MORE INFO:**

**Brown and Caldwell**  
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[www.browncaldwell.com](http://www.browncaldwell.com)

**CUES**  
800/327-7791  
[www.cuesinc.com](http://www.cuesinc.com)  
(See ad page 43)

**Epoxytec**  
877/463-7699  
[www.epoxytec.com](http://www.epoxytec.com)  
(See ad page 20)

**Teledyne Isco, Inc.**  
800/228-4373  
[www.isco.com](http://www.isco.com)