

Major Annual Cleaning, Rehabilitation Plan Started In 2004

Houston's Aggressive Rehab Program Already Paying Off

by Jeff Griffin ■ Senior Editor

Most large cities in the United States face problems with aging sanitary sewer systems. Houston, TX is no different.

America's fourth largest city, Houston's population of 2.2 million is spread across a broad geographic area.

"Many factors contribute to problems with Houston's sewer system," said Joseph Majdalani, P.E., assistant director of the wastewater operations branch of Public Works and Engineering. "They include heavy annual rainfall averaging 49 inches, high temperatures that speed corrosion of sewer pipes, unstable soils which contribute to leaks and growth of the city, much of it by annexation, creating a complex system pieced together of many parts with challenging legacies. These conditions chal-

lenge the cash-strapped utility in providing safe, reliable service at a reasonable cost."

Like many other cities, "our sewer system is aging," said Majdalani.

"Over the years," he continued, "billions of dollars have been invested in infrastructure. Houston is very aggressive in restoring sewer infrastructure to improve customer service and reliability, support future growth and protect the environment. Simply repairing existing systems to sustain service can be a costly and ultimately futile task. Replacing or rehabilitating failing infrastructure takes time and money, and in addition to addressing deteriorating pipes and accommodating increased population growth, capacities of systems often

must be increased and services extended to new areas."

How each city addresses these issues varies with circumstances, but Houston has initiated an aggressive, 10-year sewer improvement program that in only two years has produced striking results. Indeed, it would be difficult to find another metropolitan sewer system that has seen so many significant improvements in so short a period of time.

Goals

Under the 10-year plan initiated in 2004, 9.5 million linear feet of pipe are to be renewed and 20 million feet of pipe cleaned – translating to annual renewal of 950,000 feet of pipe and cleaning of 2 million feet of pipe.

In the first two years of the program's operation, both these annual figures were significantly exceeded while cleaning progress more than doubled the plan's goal.

Community sewers of the 1940s were constructed of clay pipes; the decade of the '70s saw introduction of concrete pipe and constructed overflows; in the '80s, the city's tunnel program was initiated and construction and maintenance were influenced by regulatory requirements and new technologies, including plastic pipe; and the 1990s saw continued regulatory issues, construction of relief sewers and the impact of trenchless rehabilitation methods.

When implementation of the 10-year plan began, the city's sewer system included:

- 40 wastewater treatment plants;
- Three major sludge facilities;
- Three wet-weather facilities;
- 419 lift stations;
- 33.5 million linear feet of collection lines;
- 1.5 million linear feet of force mains;
- 130,000 manholes; and
- Total average daily flow was 563-mgd permitted, 268-mgd actual.

Houston's current sewer improvement programs date from 2004 with the preparation and submission of a new Wastewater Collection System Overflow Plan and Schedule requested by the Texas Commission on Environmental Quality (TCEQ). With the plan prepared and submitted, the city proceeded with its implementation, even before its approval to show good faith and commitment to addressing issues in the system.

Perhaps most attention focused on the amount of pipe renewed and cleaned under the 10-year plan.

In fiscal year 2005, renewal of 1,307,881 million linear feet of pipe was completed and in fiscal year 2006 the total was 1,004,883

FY 2005

Renewal method	Percent of linear footage	Dollar percentage
Pipebursting	72 percent	45 percent
Sliplining	23 percent	15 percent
CIPP	3 percent	20 percent
Remove and Replace	2 percent	20 percent

FY 2006

Renewal method	Percent of linear footage	Dollar percentage
Pipebursting	80 percent	50 percent
Sliplining	15 percent	10 percent
CIPP	3 percent	20 percent
Remove and Replace	2 percent	20 percent

(the yearly goal under the plan is 950,000 feet per year).

Pipe cleaning totals surpassed the 2 million linear feet goal by even more impressive margins: 4,013,700 linear feet in fiscal year 2005 and 5,425,600 in fiscal year 2006.

Results

"We are seeing immediate results of our efforts," said Majdalani. "After the first year, overflows dropped from 400 to 300 per month, and now they are down to 200 per month. We are receiving fewer complaints, and water quality is improving because sewage is being contained in the sewer system."

Without trenchless construction technology, Majdalani continued, it would be impossible to meet the plan's goals.

Statistics from the first two years of implementation document the role trenchless construction has played with pipebursting accounting for the largest portion of collection system renewal.

"There is a place for every construction method, but we are leaning toward trenchless because it is very efficient and cost effective," said Majdalani. "The time frame for completing our 10-year plan is critical, and trenchless allows us to move quickly with the least disturbance to our customers, to traffic and to surface improvements, and pipebursting allows upsizing of existing pipes to provide additional capacity when necessary. What we are doing now simply could not be accomplished with open-cut construction."

Cleaning is accomplished by high-pressure water to remove grease, soil, sand, silt, solids, rags and debris from each sewer segment and associated manholes. Loosened material is removed downstream by vacuum equipment.

Closed-circuit television inspections are made of pipes to determine condition, to plan rehabilitation and cleaning, and for confirming rehabilitation and cleaning and to evaluate completed work.

Majdalani said the availability of experienced and reliable trenchless contractors contributes to the success of the city's trenchless programs.

More to the plan

Of course, pipe rehabilitation and cleaning are only part of the plan. Lift stations are critical to the operation of the collection system.

"Failure at any lift station could impact the collection system," Majdalani said. "We are improving reliability by adding SCADA (supervisory control and data acquisition) to lift stations to gather and analyze real time data."

Master planning is essential. "The city has 40 service areas and by reducing the number of plants through consolidation, we have fewer plants to manage, giving us flexibility to better manage the entire system," explained Majdalani. "We are capturing lost capacity of the collection system, improving service to our customers, protecting the environment and the investment in our sewer system, all to support a growing economy."

The opening years of the 21st century reflect a significant shift from a reactive to proactive approach to sanitary sewer system management, said Majdalani.

He pointed out that future initiatives include:

- Emphasis on master planning;
- Plant consolidation;
- Flow diversion;
- Sewer rehabilitation and cleaning programs;
- Lift station maintenance; and
- Regulatory compliance.

"Ten years ago," he said, "we fixed what failed. Five years ago, we fixed what was failing. Today, we are fixing everything and, in the future, cleaning will dominate."

FOR MORE INFORMATION:

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