

## **Houston Leading the Nation in Wastewater System Renewal and Initiatives**

**Joseph Majdalani, P.E.**

Assistant Director, City of Houston  
Houston, TX.

E-mail: ravi.kaleyatodi@cityofhouston.net

The City of Houston (City) evaluated its Sanitary Sewer Overflow (SSO) history for the 2000 to 2003 calendar years. The location, timing and cause of the SSOs vary widely. The analysis of the SSO history indicated the following trends:

- 98 percent occur in dry weather,
- 97 percent occur in pipes smaller than 24-inch in diameter,
- 86 percent of manholes do not experience a repeat overflow,
- Temporary blockage and structural failure are the predominant causes,
- Lift station and force main problems are seldom the cause, and
- No significant correlation exists between pipe age, material, structural rating, or land use and SSO location.

To address the SSOs, the City submitted a Wastewater Collection System Sanitary Sewer Overflow Plan and Schedule (Plan) to the Texas Commission on Environmental Quality (TCEQ), in May 2004.

Under the structural based response approach, the City commits to:

- Providing Pipe Renewal for 7,000,000 linear feet of small diameter collection system pipe in locations with established patterns of SSOs (as defined in subsequent sections of this Plan as First and Second Tier meter basins),
- Providing Unscheduled Pipe Renewal for 2,500,000 linear feet of small diameter collection system pipe in locations where future repeat SSOs occur, and
- Providing Lift Station and Force Main Renewal for facilities with identified patterns of causing SSOs.

In April 2005, the City and the TCEQ entered into a Compliance Agreement based on the Plan. The Plan is also a component of an Agreed Order (AO) executed by the City on August 19, 2005. The AO was signed by TCEQ on November 21, 2005, with an effective date of November 24, 2005.

The Plan is based on a two-pronged approach to correct SSO causes. The first prong is a structural-based response to replace or rehabilitate, collectively termed “renew,” the City’s wastewater collection system. The second prong is a non-structural response to

clean the City's collection system, increase preventive maintenance activities for lift stations and force mains, and improve management information systems.

The City proposed to undertake the renewal over a 10-year period from FY 2005 to FY 2014. Upon completion, the City would have renewed the collection system in those areas that account for 80 percent of all SSOs and will have renewed over 30 percent of the City's 33.5 million feet of gravity sewer lines. This will bring the total amount of renewed gravity sewers within the City since 1990, to nearly 60 percent of the total collection system. From FY 2005 to FY 2014, the City will renew 9,500,000 million linear feet of pipe.

Under the non-structural based response approach, the City commits to:

- Providing 2,000,000 linear feet per year (a rate of 7.6 percent per year of the 24-inch and smaller lines and 6.5 percent per year of the total gravity sewer system) of hydraulic sewer line cleaning to remove blockage-forming debris,
- Improving preventive maintenance procedures for lift stations and force mains,
- Improving management information systems to more accurately track cause and locations of SSOs and to respond to their occurrence,
- Strengthening our grease control efforts for regulated customers discharging fats, oils, and grease, and
- Providing the staffing, the management tools, and the equipment resources necessary to accomplish our commitments as described in this Plan.

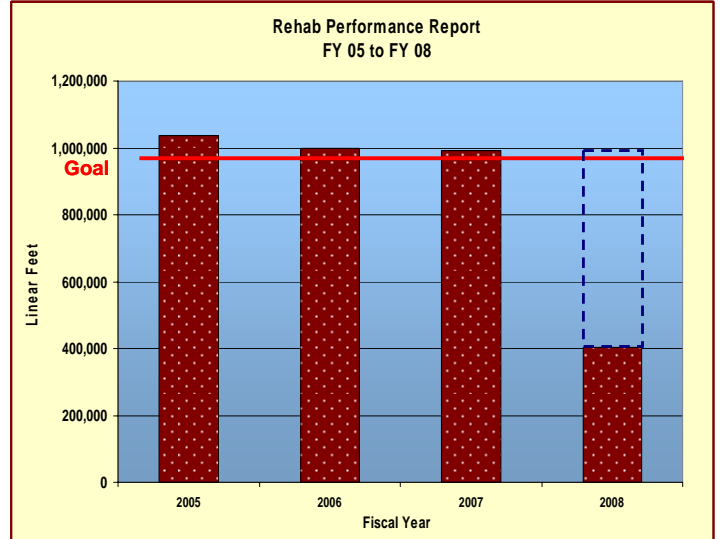
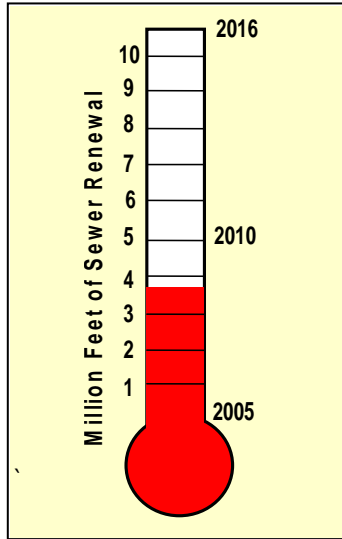
From FY 2005 to FY 2014, the City will clean 20,000,000 linear feet of pipe.

To indicate its good faith, the City began to implement the Plan in the City's 2005 fiscal year (July 1, 2004 through June 30, 2005). During this first year, the City transitioned from a process driven by customer complaints to a proactive program that targeted areas with dry weather SSOs.

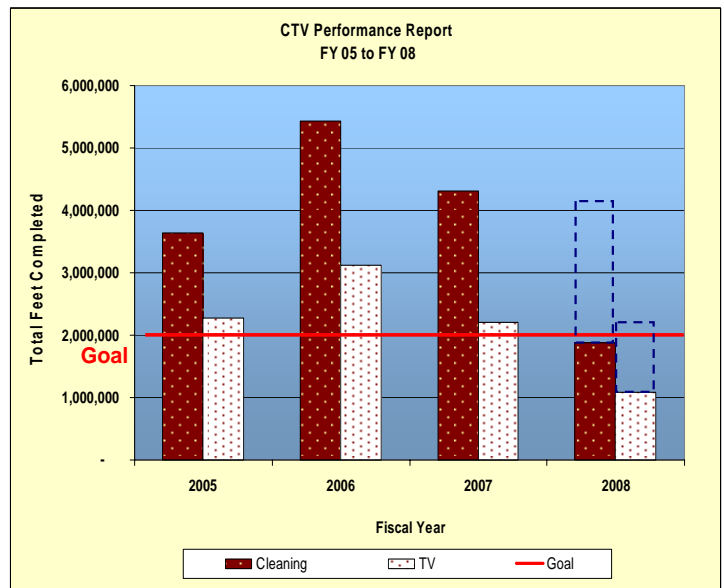
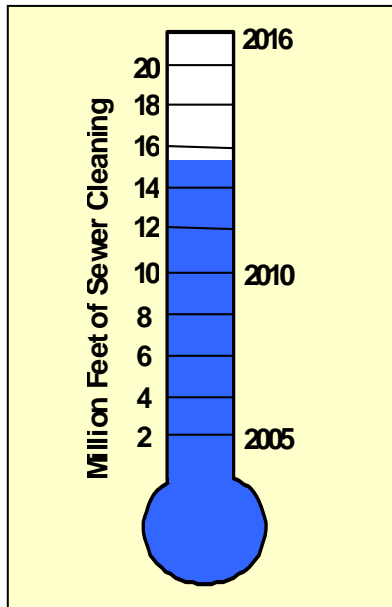
The City has transitioned its organization, procedures, systems, and tools to accomplish the Plan. An SSO Plan Implementation Team meets quarterly to review progress on the Plan's performance commitments, as well as the institutional and organizational changes required to accomplish the long-term commitments of the Plan. The Assistant Director continues to manage the operation, maintenance, and renewal of the sanitary sewer system. Additional key managing and supervisory engineering positions were created and filled. The City continues with the reorganization and staffing plans to develop a significant number of new positions into FY 2008.

Following are the accomplishments:

1. **Pipe Renewal** – The City renewed over 1,307,881 linear feet of pipe in its collection system in FY 2005, 1,044,883 linear ft in FY 2006 and 1,102,998 linear ft in FY 2007, through both scheduled and unscheduled activities. Total to date the City has renewed 4,007,108 million linear feet through mid-FY 2008.

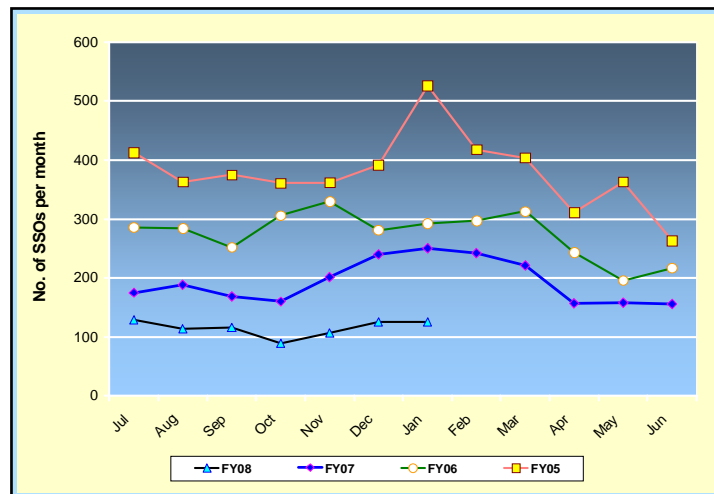


2. **Maintenance** – The City cleaned over 4,013,700 linear feet of sewer in FY 2005, 5,425,582 linear feet in FY 2006 and in FY 2007 4,302,164. Total to date the City has renewed 13,999,292 linear feet to date.



**Lift Station and Force Main Maintenance** – The City completed detailed inspection of all its 419 lift stations by May 2006. The City continues to perform routine preventive maintenance on all of the lift stations.

3. **Fats, Oils, and Grease (FOG)** – The City continues to target FOG-related blockages for action by the City's Department of Health and Human Services and has modified its code of ordinances. On May 2, 2007, the new FOG Ordinance was passed by City Council. To reduce the impact of FOG on the system, the City has modified Chapter 47 of its Code of Ordinance to be consistent with Texas Water Code §§ 26.049 and 26.0491. The City has also developed a public education project, entitled “Corral the Grease,” targeted to residential households and multi-family housing complexes.
4. **Supplemental Environmental Project (SEP)** – As part of the AO, TCEQ approved a SEP developed by the City, that replaced defective private lateral lines to homes in low-income areas where laterals have caused sanitary sewer overflows (SSO). The SEP has been completed and the final report was submitted to TCEQ on May 15, 2007.
5. **Management Commitments** – The City has focused on the organizational plan and business processes required to meet the long-term commitments of the Plan.



**Conclusion:** The SSOs have been reduced by more than 60 percent. The City was averaging around 400 SSOs in FY 2005. Currently the City averages 125 SSOs per month. The program is effective in reducing the number of SSOs.