



Costa Mesa Sanitary District

...an Independent Special District

Case Study

Privatizing vs In-House Services for Sewer Collection System Pump Station Maintenance

BACKGROUND

The Costa Mesa Sanitary District (CMSD) was formed in 1944 as an independent special district under the Sanitary District Act of 1923. Solid waste collection was the primary reason for the formation of CMSD, but in 1953 CMSD expanded its service to include owning and maintaining a sewer collection system. 1953 was also the year when Costa Mesa became a general law city and two years after the City's incorporation, the City and CMSD agreed to enter into a partnership where the City would provide the employees and equipment to operate and manage CMSD's sewer collection system. This arrangement lasted until 2006 when CMSD decided to go its separate ways by hiring its own employees and acquiring its own equipment and facilities to manage solid waste and sewer collection systems. This study will look at the different methods CMSD used to maintain sewer pump stations to prevent sanitary sewer overflows (SSO) and determine what method was the most effective to protecting the environment and the community's health at the least amount of cost to the ratepayers.

CMSD SEWER PUMP STATIONS

The Costa Mesa Sanitary District has twenty pump stations that range in flow from as low as 45 gallons per minute (Aviemore Terrace) to a high of 3,750 gallons per minute (Elden). All the stations have two submersible pumps that range in size from three inches (Corp Yard) to twelve inches (Elden). All the pumps in the wet wells are manufactured by Flygt, a premier manufacturer of submersible pumps. All the stations have a standard electrical and control panel from Essco Controls with a primary and secondary control mechanism that allows for stations to continue to operate when the primary control fails. All the stations have redundancy power that include three stations with permanent by-pass pumps on site and three stations with permanent generators on site. The remaining stations have dedicated mobile generators and by-pass pumps to ensure the stations are operational in the event of a power outage. All the stations have wireless supervisory control and data acquisition (SCADA) from Aquavx that sends text alarms to staff when there is a power outage or stations are experiencing



Protecting our community's health and the environment by providing solid waste and sewer collection services.

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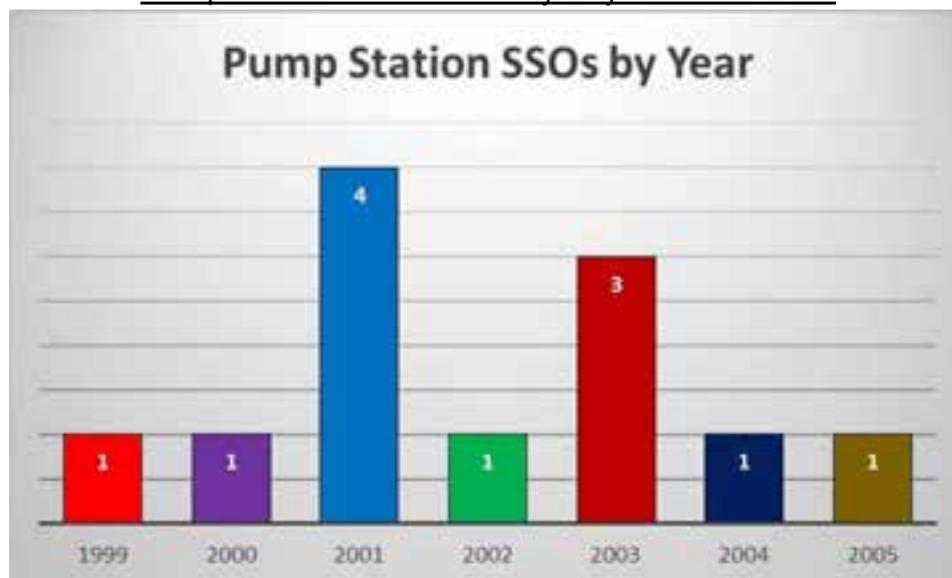
high water in the wet wells. The first pump station was constructed in 1956 (Elden) while the last lift station was constructed in 1991 (21st Street).

PUMP STATION MAINTENANCE

Because of the high volume of wastewater that flows through pump stations regular inspections and routine maintenance are necessary to preventing sanitary sewer overflows (SSO). Regular inspections, usually once a week, requires someone to visit each station and inspect the pump run times (if pumps are working too hard it could be the pumps are clogged with rags). Regular inspections also include checking valves, electrical wiring, motor starter, breaker and fuses, motor windings and exercising plug valves. Routine maintenance includes annual preventive maintenance (PM) that includes inspecting cord connections, circuit breakers, fuses, amps, volts, wet well coating, changing oil and coolant, clean and exercise all valves, replacing impellers, if needed, etc. Significant repairs may be needed after PMs are performed in which case the repairs are scheduled to be performed and completed.

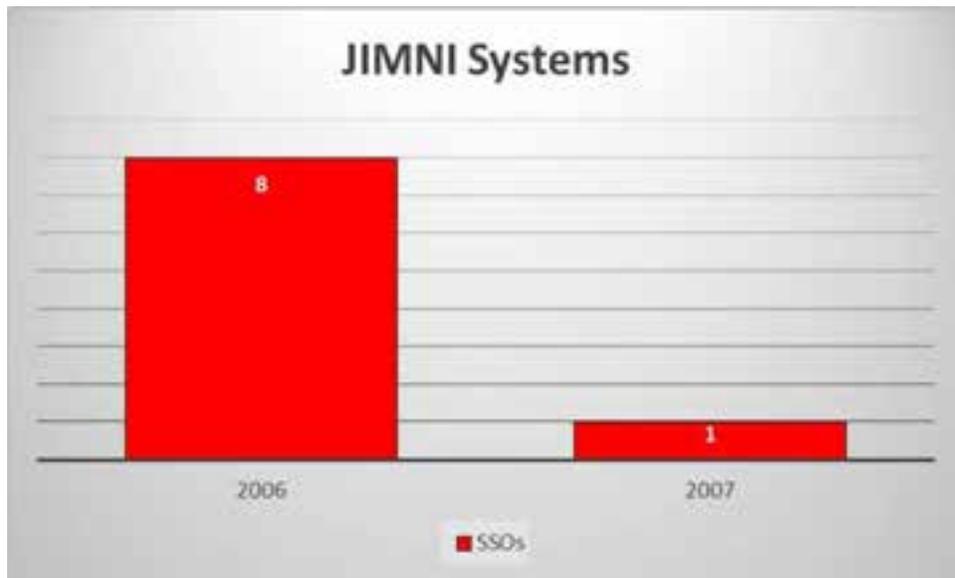
A good indicator that the pump station maintenance program is effective is by the number of SSOs. As mentioned earlier, in 1955 the City of Costa Mesa was maintaining CMSD's pump stations, but documenting and maintaining data about SSOs did not begin until 1999. In fact, public agencies were not required to report SSOs until the California Water Resources Control Board adopted the Statewide General Waste Discharge Requirements for Sanitary Sewer System in 2006 (Order No. 2006-0003-DWQ). As shown below, from 1999 through 2005 CMSD experienced a total of 12 SSOs at pump stations or an average of 1.7 SSOs per year.

Pump Stations Maintained by City of Costa Mesa



CMSD's cost to have City employees perform maintenance on pump stations is unknown because CMSD's financials were not transferred to the new financial system when CMSD discontinued the partnership with the City in 2006, two years after CMSD moved to a new facility.

In January 2006, JIMNI Systems began providing pump station maintenance for CMSD. JIMNI performed regular inspections and routine maintenance as well as providing after hours emergency services such as transporting and operating CMSD's mobile equipment (e.g. generators and by-pass pumps) during power outages. JIMNI's 2006 and 2007 hourly rate for one technician ranged from \$140.00 to \$157.87 an hour. For two technicians the hourly rate ranged from \$195.00 to \$216.17 an hour. In the first two years of service from JIMNI, CMSD experienced 9 SSOs from pump stations, as shown in the graph below.



From January through June 2006, CMSD paid JIMNI Systems \$60,618. In FY 2006/07 CMSD's payment to JIMNI doubled to \$128,224 and in FY 2007-08 CMSD spent \$136,703 on pump station maintenance.

HYBRID INSPECTIONS

In 2008, CMSD hired two wastewater maintenance workers to perform “hot spot” cleaning (sewer pipes that require high frequency cleaning) and pump station weekly inspections. CMSD also acquired a 2002 used utility truck with a crane. The purpose for hiring maintenance workers and equipment is to save money and enhance CMSD’s weekly inspections. The hourly rate for two maintenance workers and a utility truck was \$113.48 compared to JIMNI’s hourly rate of \$195.00 to \$216.17 an hour. JIMNI continued to perform preventive maintenance, repairs and emergency response services. Pump station SSOs continued from 2008 through 2013 as shown in the graph below. A total of seven SSOs occurred in the six year period averaging 1.2 pump station SSOs per year, which is a slight improvement when the City was maintaining the stations.



CMSD WMW inspecting electrical control panel



In FY 2012/13, JIMNI installed a new SCADA system for CMSD at a cost of \$63,000. On April 9, 2013, CMSD entered into an agreement with Xylem, Inc. to perform preventive maintenance and in FY 20103/14 Xylem performed service repairs to eleven stations. JIMNI continued to provide emergency response services, training of staff and minor repairs. The annual costs for pump station maintenance are described below.

Year	JIMNI	CMSD	Xylem	Total
2008/09	\$ 66,929	\$88,514	\$0	\$155,443
2009/10	\$ 34,881	\$89,942	\$0	\$124,823
2010/11	\$ 54,852	*\$113,250	\$0	\$168,102
2011/12	\$ 68,003	*\$150,480	\$0	\$218,483
2012/13	\$ 95,460	*\$147,317	\$35,000	\$277,777
2013/14	\$ 90,247	*\$127,575	\$176,000	\$393,822

*Includes labor, equipment and parts

From 2006 through 2010 pump station parts were acquired and delivered to pump stations by JIMNI. In 2011 CMSD began acquiring and storing parts at CMSD’s Corporate Yard, which finished construction in October 2010.

From 2008 through 2010 CMSD estimates approximately 780 hours a year was spent inspecting 20 pump stations by two full-time CMSD employees. In 2011, an additional wastewater maintenance worker was hired to assist with cleaning the system and one wastewater maintenance worker was dedicated full-time to inspecting pump stations. Staff estimates the dedicated pump station maintenance worker spends approximately 1,500 hours a year inspecting and performing minor repairs of pump stations. Parts costs are included in CMSD’s costs.

IN-HOUSE MAINTENANCE PROGRAM

On August 31, 2013, CMSD experienced its largest volume SSO since the organization began tracking SSOs in 1999. An electrical surge at the Irvine Pump Station caused the station’s uninterrupted power supply (UPS) to fail and because the UPS was on the same breaker as SCADA, when the UPS failed so did SCADA, which caused a delay in detecting the SSO. As a result, 77,000 gallons of wastewater was lost in the Delhi Channel and eventually in the Upper Back Bay. The Upper Back Bay and Newport Dunes was closed to the public for three days.

After this SSO CMSD reevaluated its pump station maintenance program and determined the best method to preventing pump station SSOs is to hire in-house staff that is knowledgeable, experienced and trained to maintain sewer pump stations. CMSD would also acquire the necessary equipment for maintaining pump stations. CMSD believes having in-house staff and equipment dedicated to maintaining



CMSD Ford F-750 Utility Truck with Crane

pump stations will enable the stations to receive maintenance on a full time basis and having staff in the community will help improve response times when stations lose power, experience high water or malfunctioning. By the end of 2013, a new Ford F-750 Super Cab XLT utility truck was put into service at CMSD. The new utility truck came with a crane that has a lift capacity of 11,000 pounds. The crane enables CMSD staff to remove the largest pumps in the system (12" pumps at Elden Pump Station). Before acquiring the Ford F-750 CMSD would have rent a utility truck from JIMNI to pull large pumps at a cost of \$1,900 per visit. The utility truck also has an emergency generator, a trailer hitch (for towing mobile generators), pressure washer, and a welding unit.

In July 2014, CMSD hired a new employee titled SCADA Technician/Industrial Electrician. This person is well trained, experienced and knowledgeable about CMSD pump stations because he was the lead technician for JIMNI. The new employee is responsible for monitoring SCADA data and addresses SCADA alarms. He will also troubleshoot the electrical control panel and routinely exercise valves, generators, and by-pass pumps. Together with a Wastewater Maintenance Worker II employee CMSD has two employees dedicated to inspecting and maintaining pump stations. The crew performs the following PM functions:

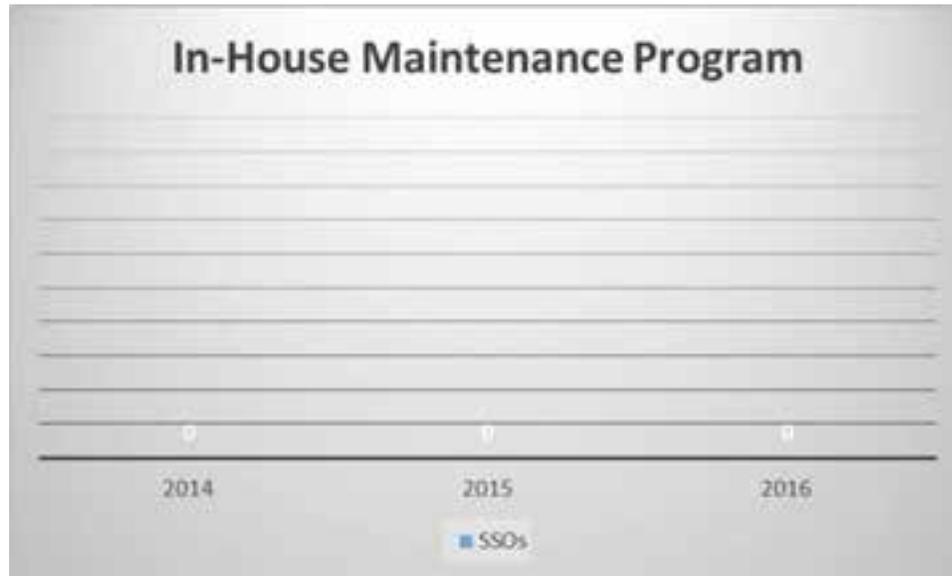
- Remove the motors to examine the impellers for wear and torque;
- Change the oil;
- Check the motor windings for resistance;
- Test and check the general condition of the pumps;
- Re-install the pumps and test the system.

Now that CMSD has two dedicated employees and a utility truck, the organization can perform the following service in-house:

- Install refurbished and/or new pumps
- Replace impeller and wear rings
- Replace seals and O-rings
- Replace volutes
- Replace stators, rotor units, and float level sensors
- Replace magnetic starter contact kits
- Upgrade conduit
- Replace wear plates and chain slings
- Replace starters

CMSD hourly rate for the two dedicated employees and utility truck is \$139.63, which is still less than JIMNI's hourly rate.

Since CMSD began its in-house maintenance program, the SSO occurrence at pump stations dramatically decreased. In fact, CMSD has had zero SSOs at pump stations since its last SSO on August 31, 2013. See chart below



2016 Represents 6 months (Jan-Jun)

The hourly rate in FY 2014-15 for one Wastewater Maintenance Worker II and one SCADA Technician/Industrial Electrician and one utility truck is \$139.63, which is still less than contractor's hourly rate. It is estimated that approximately 3,000 hours a year was spent on pump station maintenance in FY 2014-15 at a cost of \$418,890. In FY 2015-16 the cost is projected to be \$417,642.

CMSD's hourly rate for two employees and equipment is less than contractors, but CMSD's annual costs are higher because more hours are dedicated to inspecting and maintaining pump stations, which has resulted in the desired outcome of zero SSOs for nearly three years.

CONCLUSION

This study has found that when more hours are dedicated to maintaining sewer pump stations the less likely an SSO will occur. However, the challenge is finding a low and competitive hourly rate to ensure costs do not get exorbitant. CMSD hourly rate is \$136.58 (FY 2015-16), which is substantially less than private contractors (JIMNI hourly rate is between \$195.00 to \$216.17 and Xylem's hourly rate is \$291.66). Therefore, an in-house maintenance program is effective and cost efficient, but annual costs will be higher than private contractors because of the additional hours being performed at pump stations by CMSD employees.

In addition, CMSD has learned from other agencies such as Orange County Sanitation District, City of Newport Beach and Irvine Ranch Water District that when they develop a staff of well trained and experienced workers and retain them as a team, the results are much more favorable.

Other benefits for having an in-house maintenance program for sewer pump stations are described below.

- *Faster response time to emergencies* – Having equipment stored at CMSD's Corporate Yard improves response time because the equipment is already in the community. In contrast, JIMNI's yard is located in Irvine and Xylem is located in Mira Loma. In fact JIMNI's contract allowed for a grace period of two hours to respond to emergencies. The faster CMSD can respond to emergencies the better chance of avoiding contamination of waterways.
- *Knowledge and ownership of system* – Contractors will use different technicians to service pump stations and therefore may not be familiar with CMSD stations. For instance, CMSD staff knows when peak flow occurs and where storm drain channels are located so that wastewater recovery is feasible during an SSO. CMSD can be proactive rather than reactive to replacing pumps and valves because the maintenance crew knows the life expectancy of pump station parts. Because the maintenance crew spends many hours inspecting and maintaining pump stations every day they have a sense of pride for keeping the stations performing at optimal level.
- *Confined space entry* – Entering pump station wet wells requires CMSD to conform to confined space entry regulations as per CalOSHA. Confined space entry requires three personnel, which will increase CMSD's cost with private contractors. JIMNI charges \$384.28 an hour for confined space entry. CMSD has additional personnel to perform confined space entry and comply with state regulations while at the same time keeping cost to a minimum.
- *Odor control* – The rotten egg smell, or hydrogen sulfide (H₂S), is prevalent in pump stations. When wastewater becomes stagnant, H₂S is generated in the anaerobic conditions. H₂S can start forming sulfuric acid that will corrode steel structures and emit the rotten egg smell in pump stations. CMSD staff knows which stations are prone to H₂S and will take immediate action to mitigate H₂S, thus eliminating odor complaints from the public and protecting the safety of CMSD workers.