



City of Lawrence
UTILITIES

2015 UTILITIES FIELD OPERATIONS ANNUAL REPORT

The Lawrence Utilities Department Field Operations group maintains the City's water and wastewater mains, and related infrastructure, including the following:

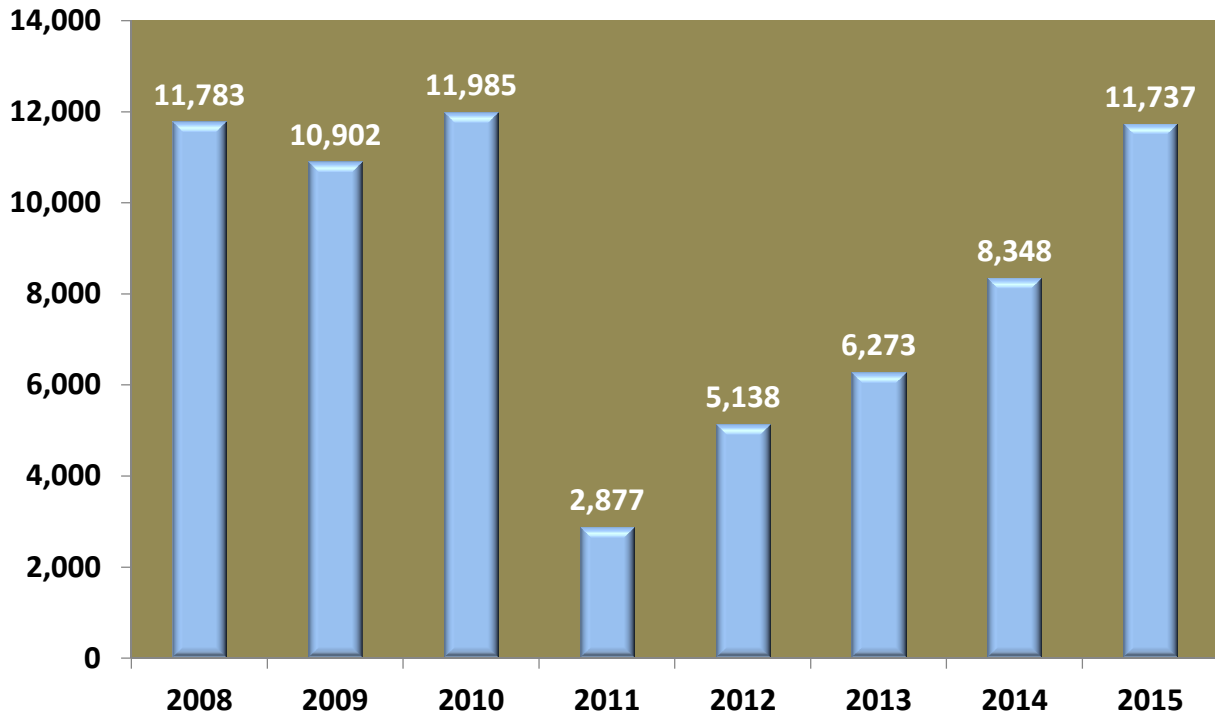
- 520 miles of water mains
- 13,534 valves
- 3,480 hydrants
- 33 miles of City-maintained sanitary sewer force main
- 419 miles of City-maintained gravity sewers
- 10,548 manholes

To maintain the reliability of the City's water and sanitary sewer transmission systems, Field Operations is responsible for the following:

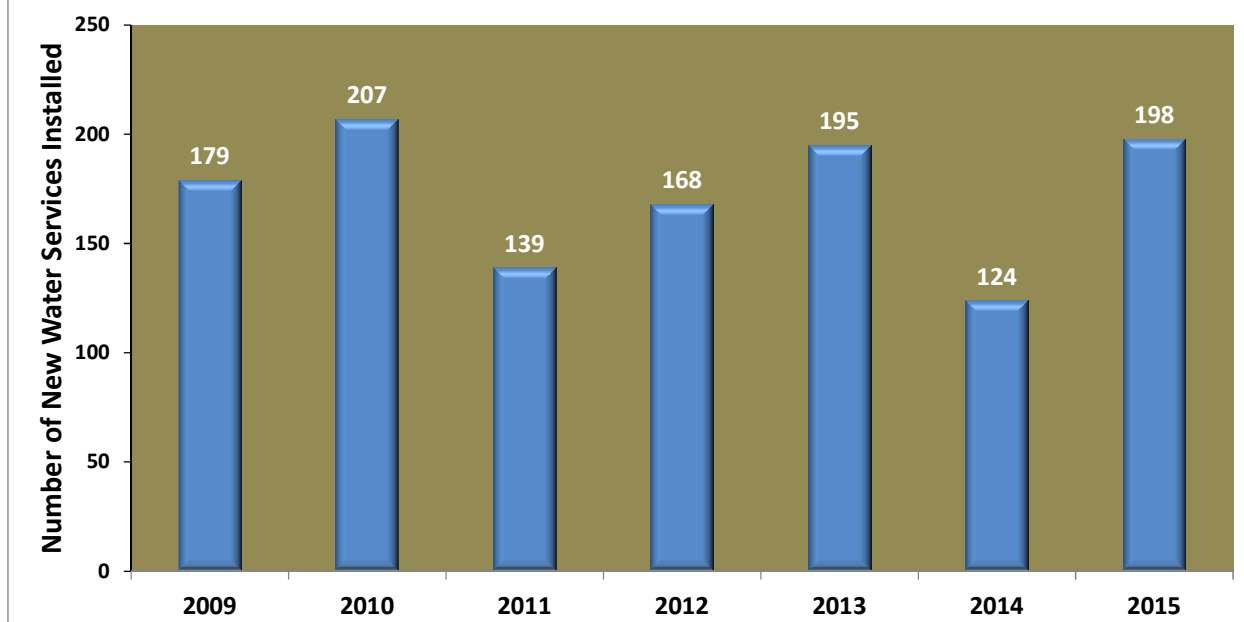
- Replace water mains, usually 8" and under. Water main replacements are based on main breaks, pipe material used, age, capacity, fire protection needs, the criticality of the water main within the system, and the number of services affected.
- Repair water main leaks as they occur, usually within 4 hours of identification.
- Exercise valves to keep them mobile to ensure that they will adequately isolate a leak to limit the number of customers without service during repair.
- Inspect and repair fire hydrants to ensure they are functioning and in good condition.
- Inspect sanitary sewer mains to identify cracks and breaks that may allow inflow and infiltration into the main and wastewater out of the main.
- Clean sanitary sewers to remove grease, rags, and other debris that may cause blockages and sanitary sewer overflows or basement backups.
- Locate and mark water and wastewater mains, as well as storm water and traffic signal buried infrastructure to avoid damage from contractors and residents excavating.
- Inspect construction of water and sanitary sewer mains to ensure they meet the specifications and criteria as required by the department.

Water Distribution Systems

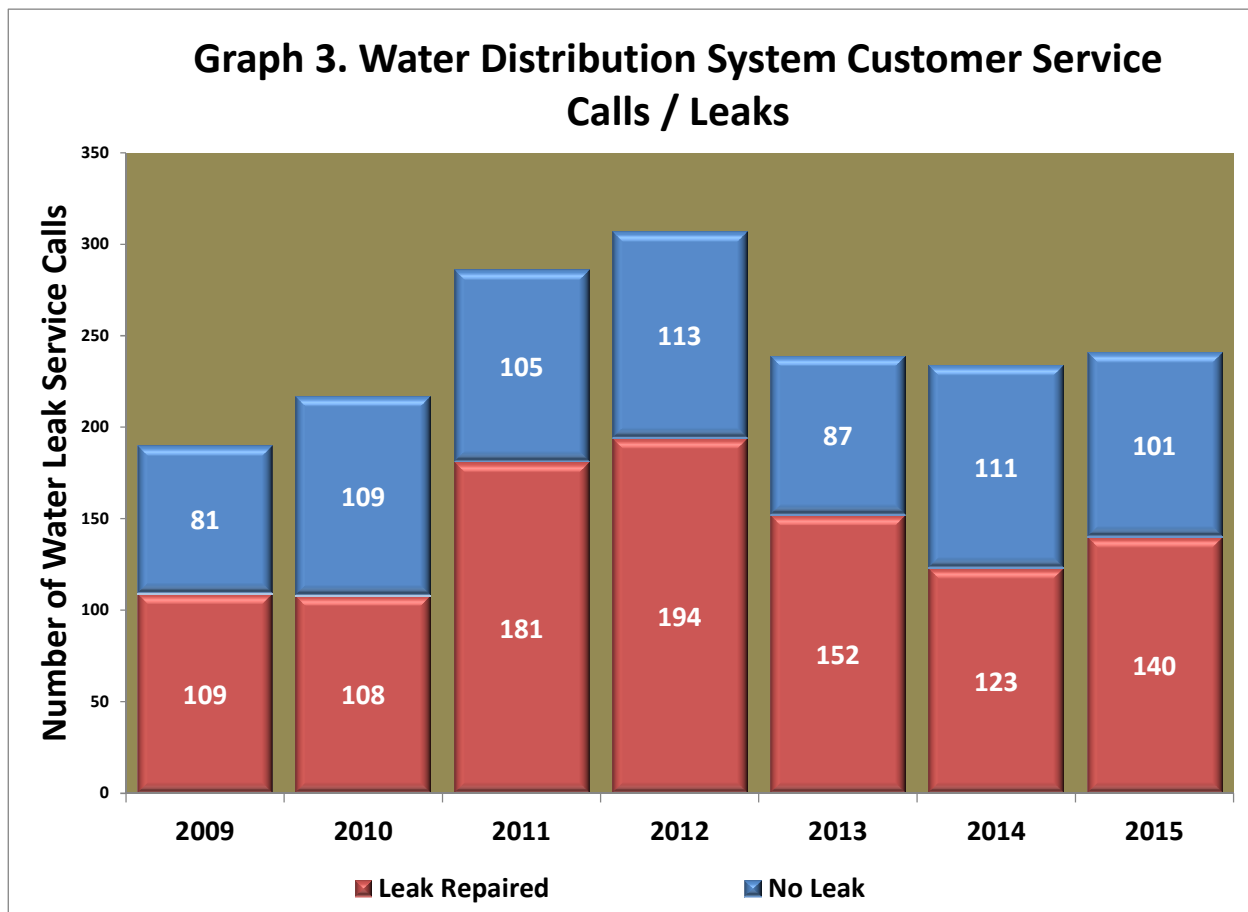
In conjunction with the water main replacement program, Field Operations staff typically replaces water main on the replacement list that are 8 inches and smaller and located in low traffic areas in neighborhoods. The ability of in-house crews to replace water main provides flexibility of the program to move quickly to address changing conditions. For example, the in-house crews were able to replace water main for a new development at 9th and New Hampshire ahead of planned building construction. In 2015, Utilities Field Operations crews installed 11,737 feet of water main with in-house resources. The water main installation replaced existing water main due to excessive leaks, critical location, or meeting specific criteria and based on available resources. The amount of water main replaced with in-house resources has increased over the past 3 years due to an increase in available funding and personnel availability. In-house water main replacement occurred at increased levels from 2008-2010, because two crews were assigned to these projects. In 2011, consistent rainfall early in the year, which persisted into the summer, resulted in suspension of the program, due to decreased revenue and funding concerns. In 2011, only one crew was used. Two crews have been used since 2012 and productivity has improved as new staff gained experience and increased efficiency. (See Graph 1.)

Graph 1. In-House Water Main Installed (in feet)

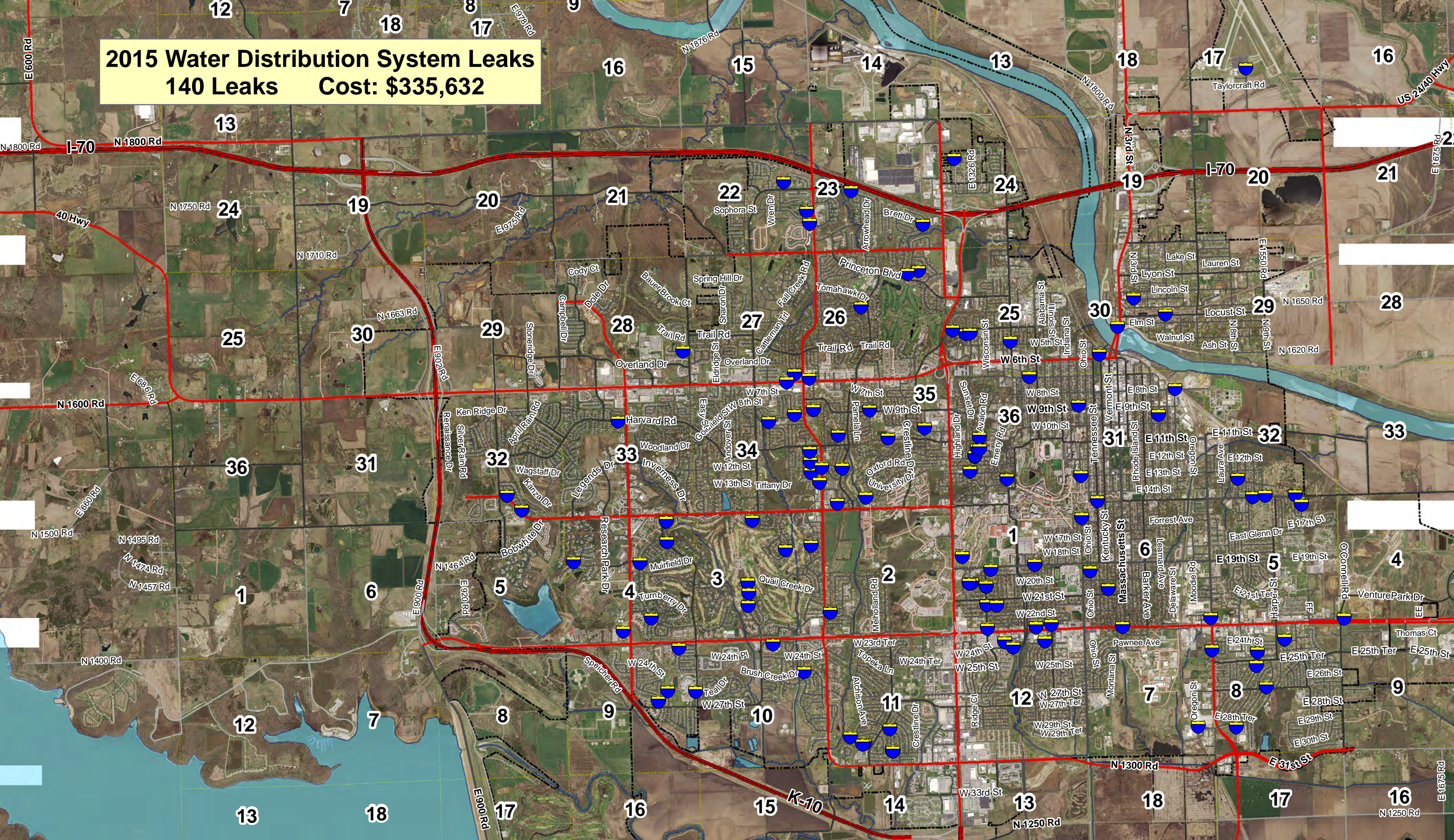
Utilities Field Operations crews currently install new 1" or smaller water services. One inch or smaller services are generally residential. The number of new service installations completed by staff is based on the number of requests received, due to residential construction. (See Graph 2.)

Graph 2. New Service Installations

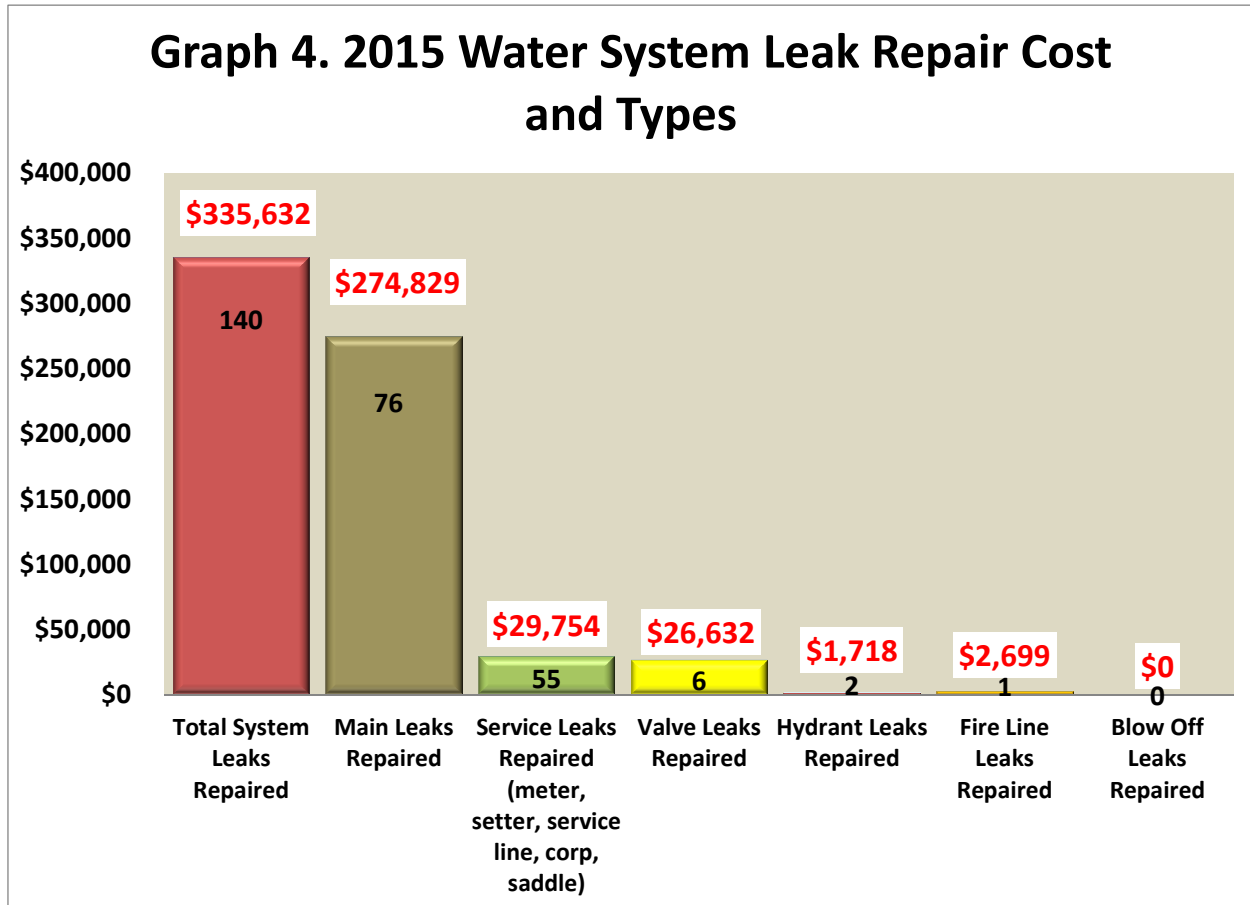
In 2015, the Utilities Field crews responded to 241 customer service calls for the water distribution system. Of these calls, 140 resulted in an identified leak, which was repaired and the main put back in service. Crews verified that the other 101 calls did not fall under City responsibility. The water distribution system leaks were located in all parts of the City with the greatest concentration of leaks on the older mains and the ductile mains where corrosive soils are present. (See Map 1 on the next page for all water distribution system leaks by location.) Water main leaks are attributed to a variety of causes including age of pipe, condition of the main, how the main was installed, type of soil the main is in, and ground movement due to freeze/thaw or drought conditions. Late 2010 is generally considered the beginning of the most recent drought, which lasted into early 2013. The increase of water main leaks in 2011 and 2012 is attributed to the dry soil conditions during that time. (See Graph 3.) The funding increase for water main replacement projects has contributed to the decrease of water leaks in 2013, 2014, and 2015. Continuous leak tracking and leak data collection is used in water main replacement project selection, which target known problem areas.

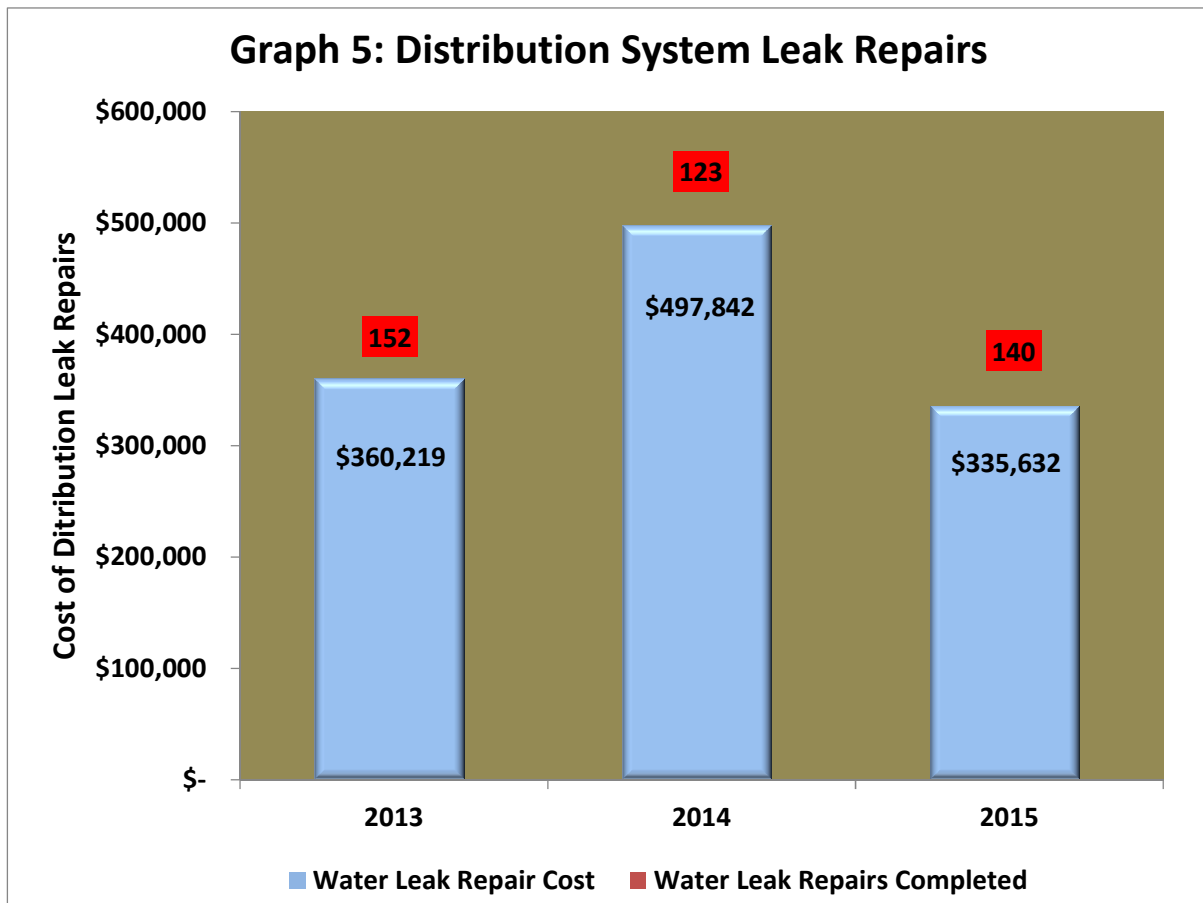


2015 Water Distribution System Leaks
140 Leaks Cost: \$335,632



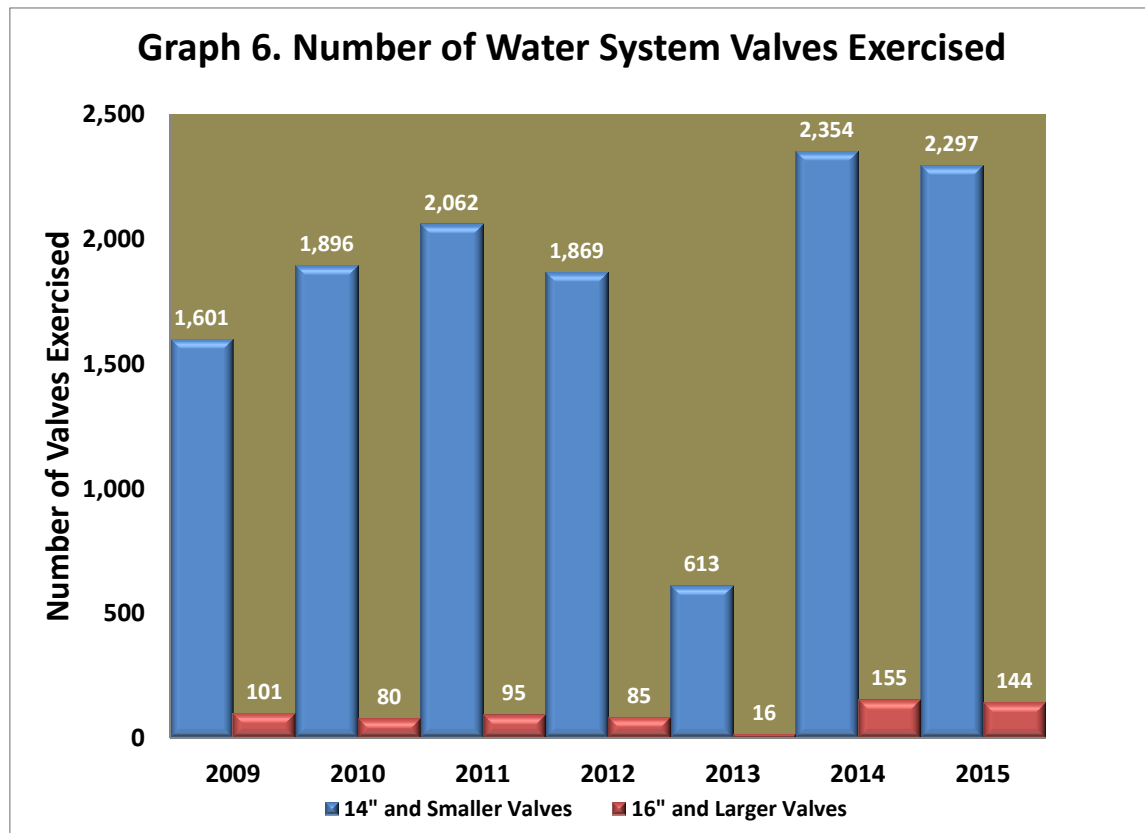
The water distribution system leaks that occurred in 2015 cost the City \$335,632 to repair. Over half of the leaks were caused by corrosion or splits in the water main (See Graph 4.) Although there were fewer water main leaks in 2014 versus 2013 and 2015, the total cost of repairs was higher due to major street damage at three different leak locations adding an additional \$173,035 to the overall leak repair cost. The total number of leaks and the corresponding repair costs were at a three year low in 2015. (See Graph 5 on the next page)





The Utilities Field group has implemented programs to systematically maintain the distribution and collections systems. One of these programs for the distribution system is the valve exercising program. All 14" and smaller valves are on a 3 year rotational exercise program. All 16" and larger valves are on a 1 year rotational exercise program. All 16" and larger valves are on an annual schedule because of the critical role they play in isolating larger areas of the distribution system. The valve exercise programs are important to the reliability of the water distribution system because unused valves can become inoperable and unable to close. This results in additional customers out of service during the repair of the main. In 2013, fewer valves were exercised due to personnel resources. Crews were again able to perform at planned levels in 2014 and 2015. (See Graph 6 on the next page).

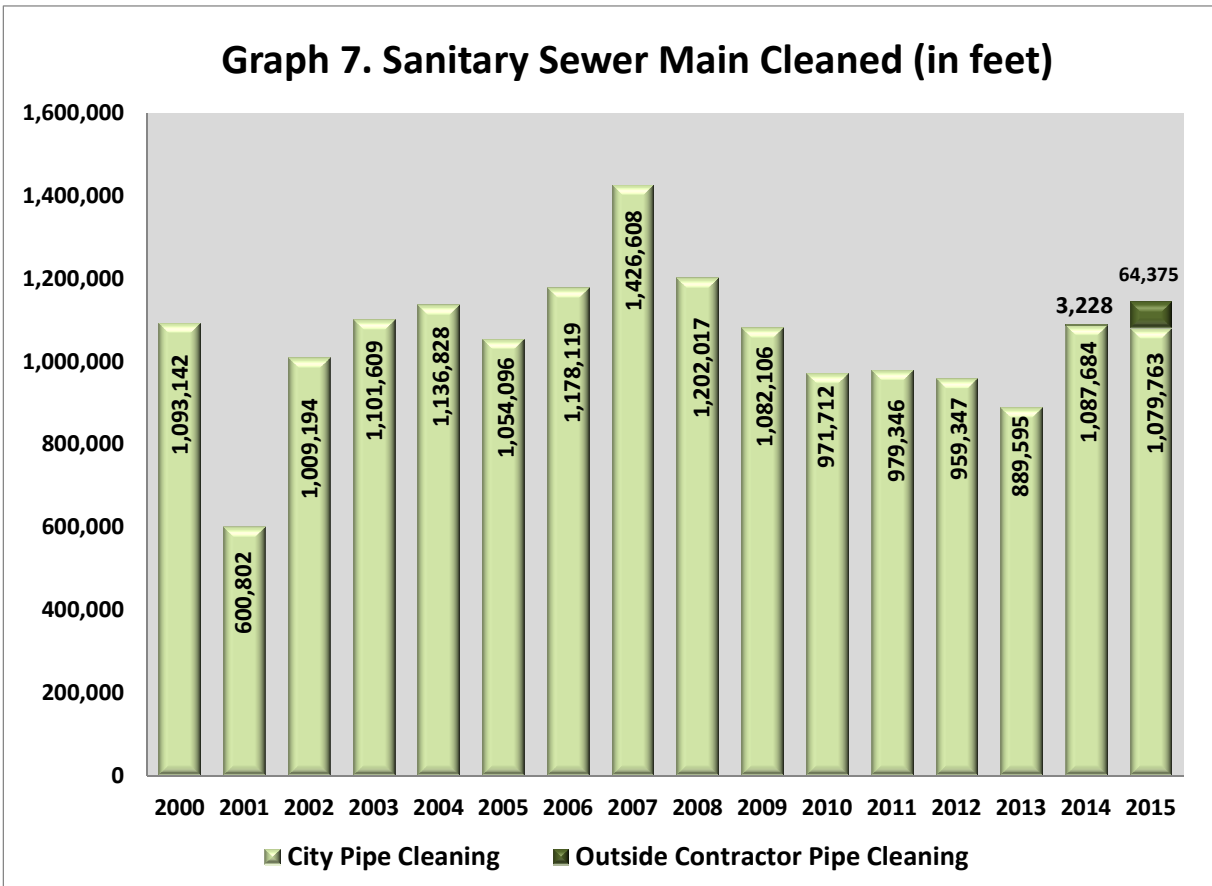
Other annual programs used to maintain water distribution system reliability are the Fire Hydrant Maintenance Program, Fire Hydrant Flow Testing Program, and Large Water Meter Testing and Replacement Programs. The Fire Hydrant Maintenance Program is used to test and maintain all fire hydrants in good working condition in a 2 year rotation. This assures that the Fire Department has access to water at hydrants closest to the location needed. Similarly, during freezing weather, Field Operations crews also test for frozen fire hydrants and thaw them as needed. The Fire Hydrant Flow Testing Program tests and records the flow of every hydrant in a 4 year rotation to document available flow. The Large Water Meter Testing Program tests 6" or larger water meters, which are used for commercial and industrial customers, and wholesale water contracts, to assure that they are functioning properly. The Large Meter Replacement Program replaces 1 ½ inch and larger meters on a 15 year schedule. Field operations staff coordinates with the Finance Department annually to update the list of large meters.



Wastewater Collection System

Utilities Field crews clean the sanitary sewer mains to remove any debris or items that may become lodged in the main and restrict wastewater flow, resulting in a back-up. Utilities Field crews use preventive maintenance programs to ensure the reliability of the sanitary sewers. (See Graph 7.) These programs include:

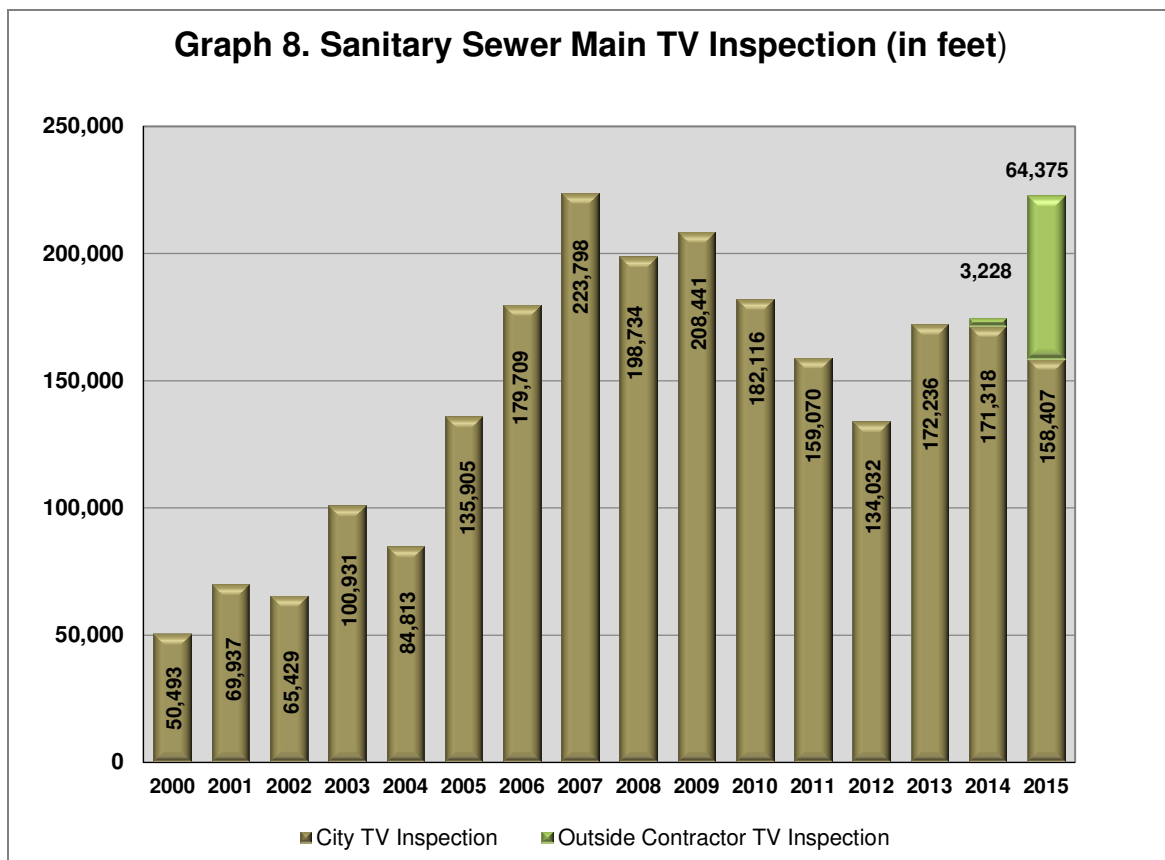
- Section Cleaning Program - cleans all city sewer lines 18" or smaller once every 4 years, or 538,941 feet annually. In 2015, the department completed the 4th cycle of section cleaning. Specific sections of the collection system may be placed on a routine maintenance program (described below), recommended for lining with the CIPP (Cured-in-Place-Pipe) Program, or placed on the Chemical Root Control Program.
- Preventive Maintenance Program - scheduled cleaning of sewer mains due to specific targeted problems such as grease, roots, or paper into monthly, 3-month, 6-month, or annual cleaning.
- Outside contractors associated with the Ecoflow Rapid Rainwater Reduction Program and the CIPP Program cleaned an additional 64,375 feet of sanitary sewers.



The Utilities Field crews use close circuit cameras (CCTV) to inspect the sanitary sewer lines to locate areas of defects, inflow and infiltration, blockages, and assess pipe condition. (See Graph 8 on the next page.) The inspection programs include:

- 10 year Vitriified Clay Pipe TV Inspection Program – inspects and assesses the condition of vitrified clay pipe, at least 100,000 feet annually. This program was started in 2009.
- Sewer Main Backup TV Inspection Program – inspects the sanitary sewer main after a backup to determine the cause.
- CIP/PIP Bond TV Inspection Program – inspect new sewer main construction prior to the end of the warranty period.

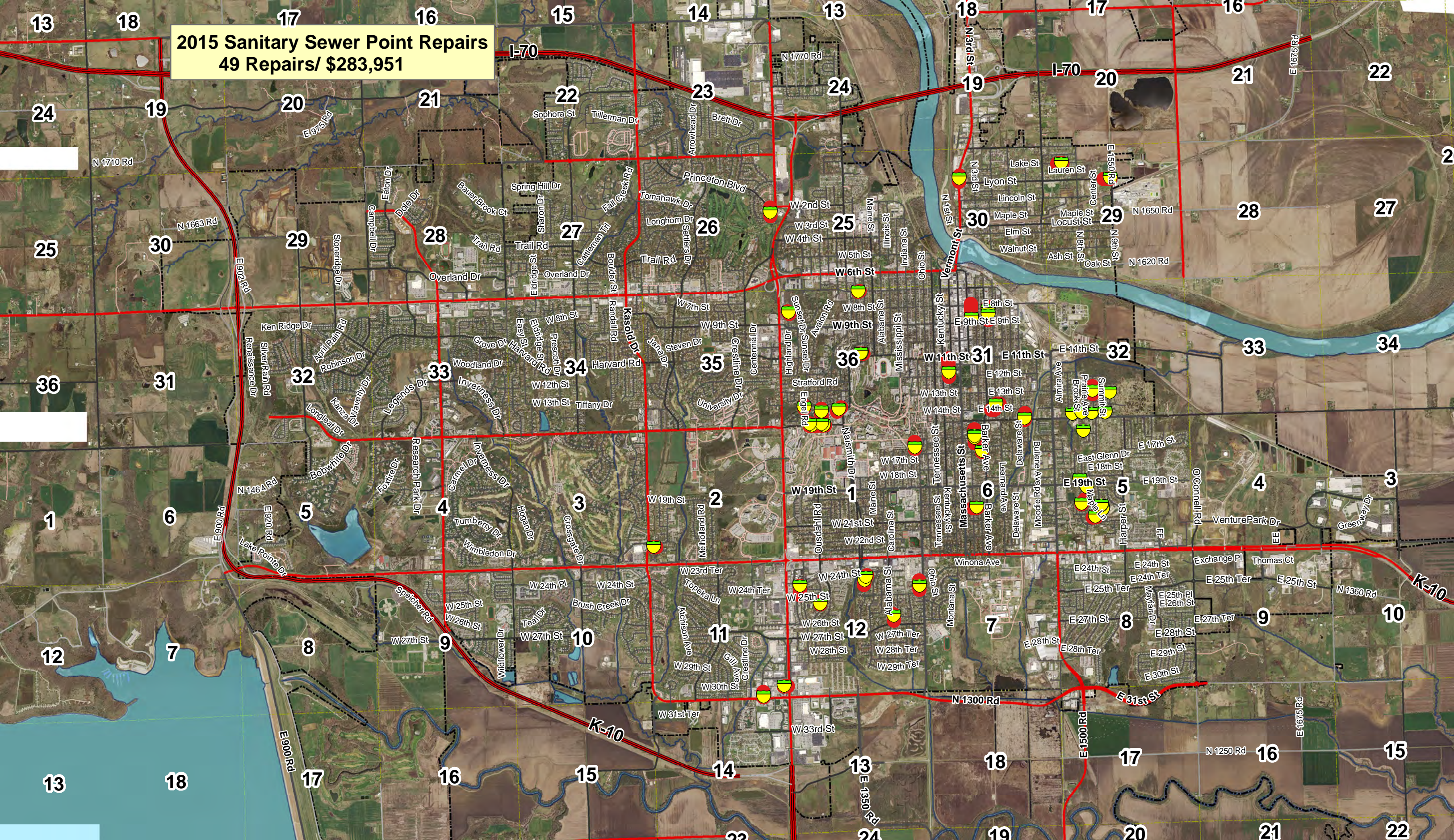
In addition to the above in-house inspection programs, outside contractors use CCTV to inspect unlined clay pipe in the Ecoflow area and sanitary sewer main before and after CIPP installation. In 2015, the Ecoflow and CIPP programs completed TV inspection on 64,375 feet of sanitary sewer



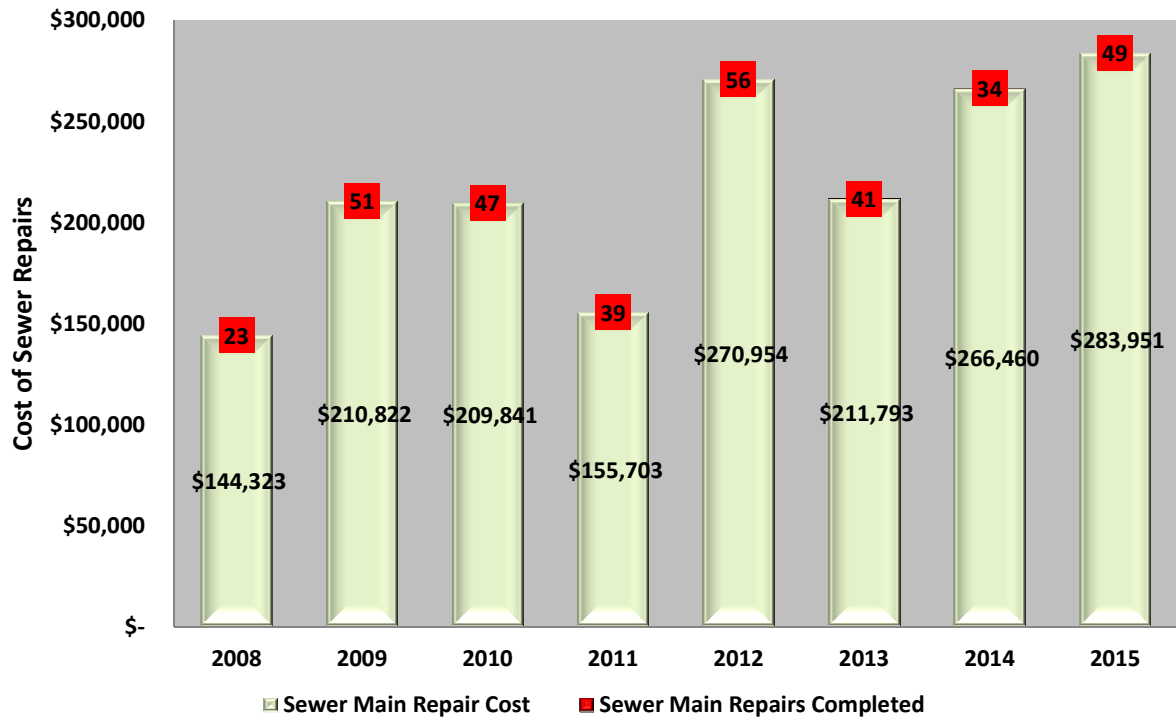
CCTV inspections are used to determine the condition of the sanitary sewer lines. Point repairs that are identified with the CCTV inspection are repaired within 30 days. The sanitary sewer point repairs were located generally on the east side of the City. Many of the repair locations were identified through the 10 year Vitrified Clay Pipe TV Inspection Program, as well as from inspections related to the Ecoflow Rapid Rainwater Reduction Program. (See Map 2 for all wastewater collection system repairs by location.) The 49 sanitary sewer point repairs in 2015 cost the City \$283,951. (See Graph 9.)

In 2015, the Utilities Field crews responded to 125 customer service calls for the wastewater collection system. Of those 125 calls, 17 resulted in an identified blockage of the City main, which crews removed. Crews verified that the remainder of the customer calls had a clear City main. The decrease in customer calls and City main blockages over the past 15 years and ability to maintain the current low level of City main blockages is attributed to the planned Sewer Preventive Maintenance Programs and schedules discussed previously. The planned sewer preventive maintenance programs were implemented by the department in 1998. (See Graph 10.)

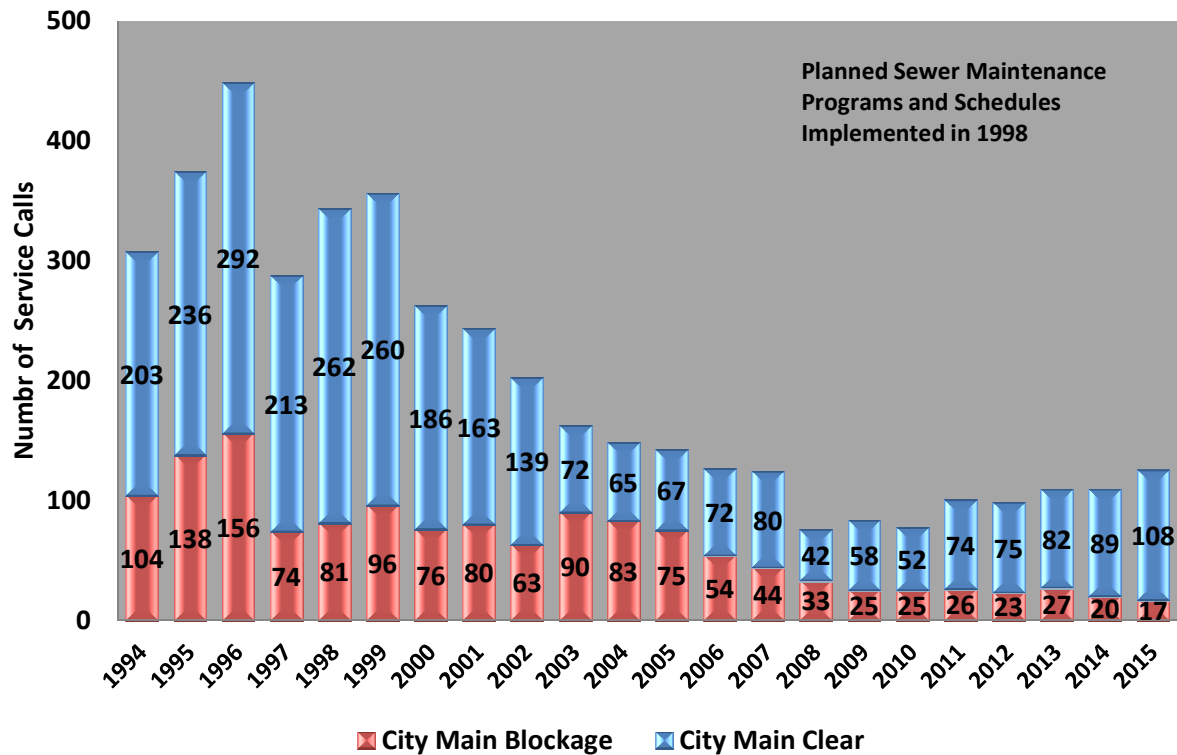
2015 Sanitary Sewer Point Repairs
49 Repairs/ \$283,951



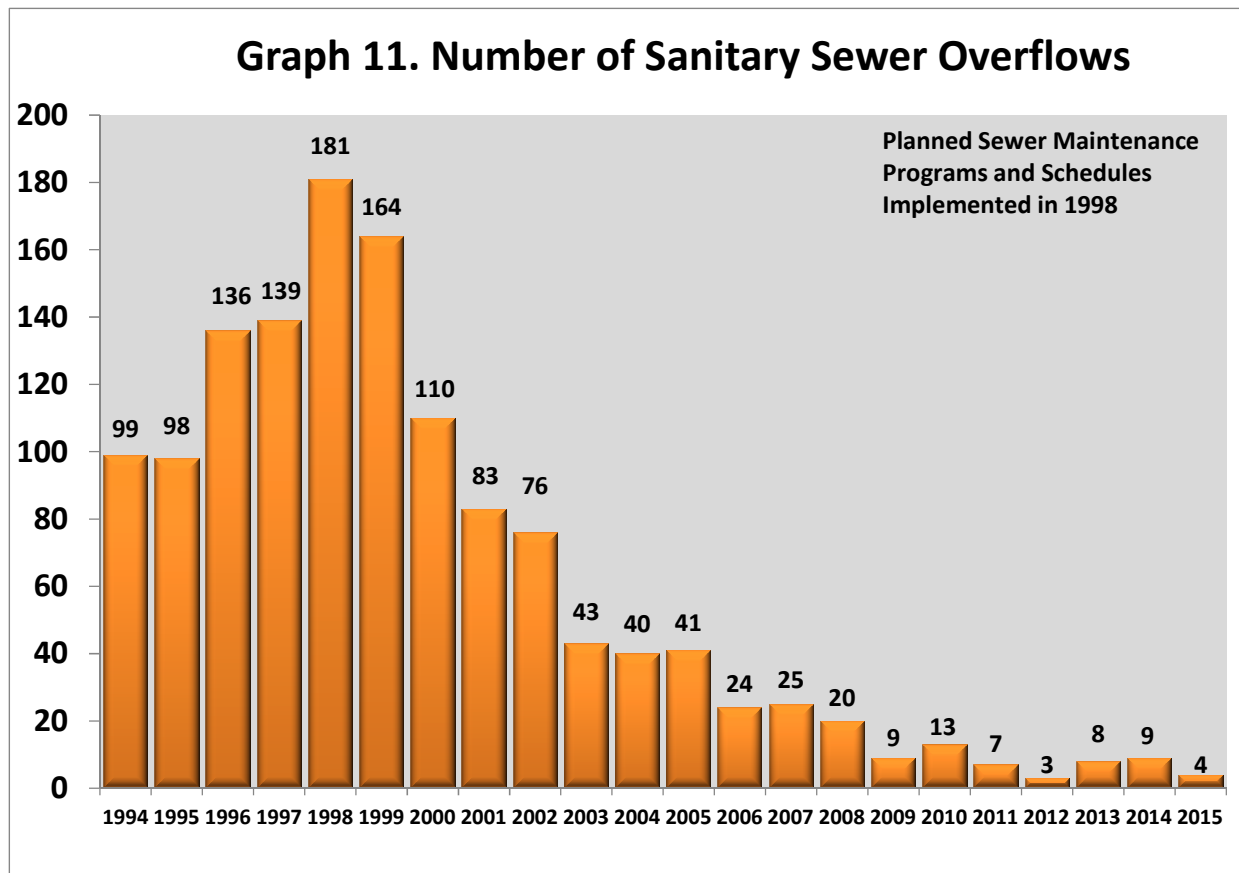
Graph 9. Sanitary Sewer Main Repairs



Graph 10. Sanitary Sewer Service Calls



Sanitary Sewer Overflows (SSO's) are when wastewater leaves the collections system. This can be overflowing manholes, which can lead to environmental degradation by flowing from the manhole into nearby streams or storm sewers, or basement back-ups, which can cause significant property damage. Either scenario may contribute to a public health concern. In addition, SSO's also require notification to the Kansas Department of Health and Environment. It has been a Department goal to reduce SSO's. Preventive maintenance programs have played a major part in reduction of SSOs and the leveling off to the current level, where they will likely remain with continued attention to sanitary sewer maintenance. In 2015 the department had 4 SSO's. (See Graph 11.)

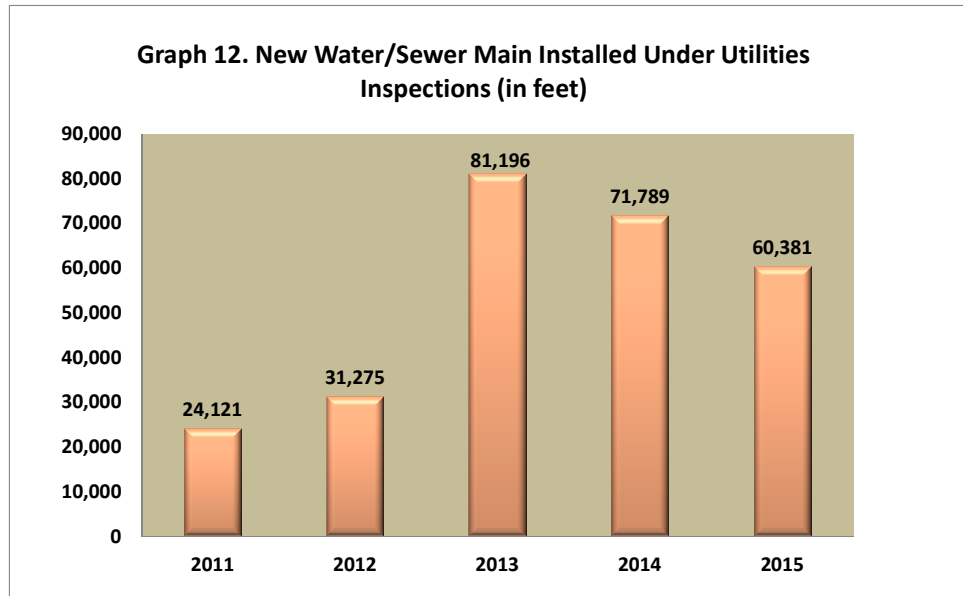


Field Operations Support

The Utilities inspectors, which are part of the Field Operations group, remain on site for capital and public improvement projects that are installing new water or sewer mains. In these projects, utilities inspectors observe, inspect, and test these new lines to make sure the lines meet all specifications, criteria, and requirements for materials and installation methods. The 2013-2015 inspection rates are attributed to additional CIP and benefit district funding and private development projects. (See Graph 12.) Although the footage inspected has decreased over the past two years, the number of inspected projects continues to increase. Thirty-seven projects were inspected in 2015 versus 34 projects in 2014 and 28 projects in 2013. In addition, inspectors assisted with site and structure inspections for the Wakarusa Wastewater Treatment Plant and Pump Station 10 project. Outside of projects, 18 water services and 5 fire lines were inspected in 2015 as well.

Inspectors are also responsible for various other tasks that include:

- coordinating with contractors on demolition projects to verify that abandonment of existing utilities meets the requirements of the City of Lawrence and to ensure protection of the public infrastructure
- delivering, picking up, and maintaining the fire hydrant meters used by contractors for water during construction
- using an R10 Trimble GPS unit to get GPS coordinates and elevations of Utilities' infrastructure to be updated in the department GIS map.



Two full time Utilities Field staff provides locates for the department's underground infrastructure, as well as provide the service for Public Work's storm sewers and first call for traffic signals. These locates are provided whenever residents or contractors call 1-800-DIG-SAFE to request these locates before excavation can occur. The accurate location of City infrastructure is critical to avoid excavators from hitting and damaging our water and sewer mains, as well as other underground infrastructure. Staff are allowed up to 3 days to complete routine locate requests. Emergency locates must be completed within 2 hours. Increases in buried infrastructure locates are due to communications projects such as installing of fiber lines and a general increase of projects. (See Graph 13).

