



City of Lawrence

2018 MUNICIPAL SERVICES & OPERATIONS REPORT FIELD OPERATIONS

2018 saw the merger of the City's Public Works and Utilities Departments into the Municipal Services & Operations (MSO) Department. As a result of the merger, the Field Operations group is responsible for maintaining the City's water distribution system, wastewater collection system, stormwater collection system, streets, and traffic operations, including the following:

- 556 miles of waterlines (up 6.3% from 2017)
- 15,522 valves (down 0.7%, removed private valves from count)
- 3,653 hydrants (up 1.5%)
- 33 miles of City-maintained sanitary sewer force main (same as 2017)
- 425 miles of City-maintained gravity sewers (up 0.2%)
- 10,770 manholes (up 0.9%)
- 34,315 water meters (up 1.1%)
- 19.6 miles of levees
- 121 miles of open drainage
- 867 lane miles

To maintain the reliability of the City's water distribution system, sanitary sewer collection system, stormwater collection system, street maintenance, and traffic operations, Field Operations is responsible for the following:

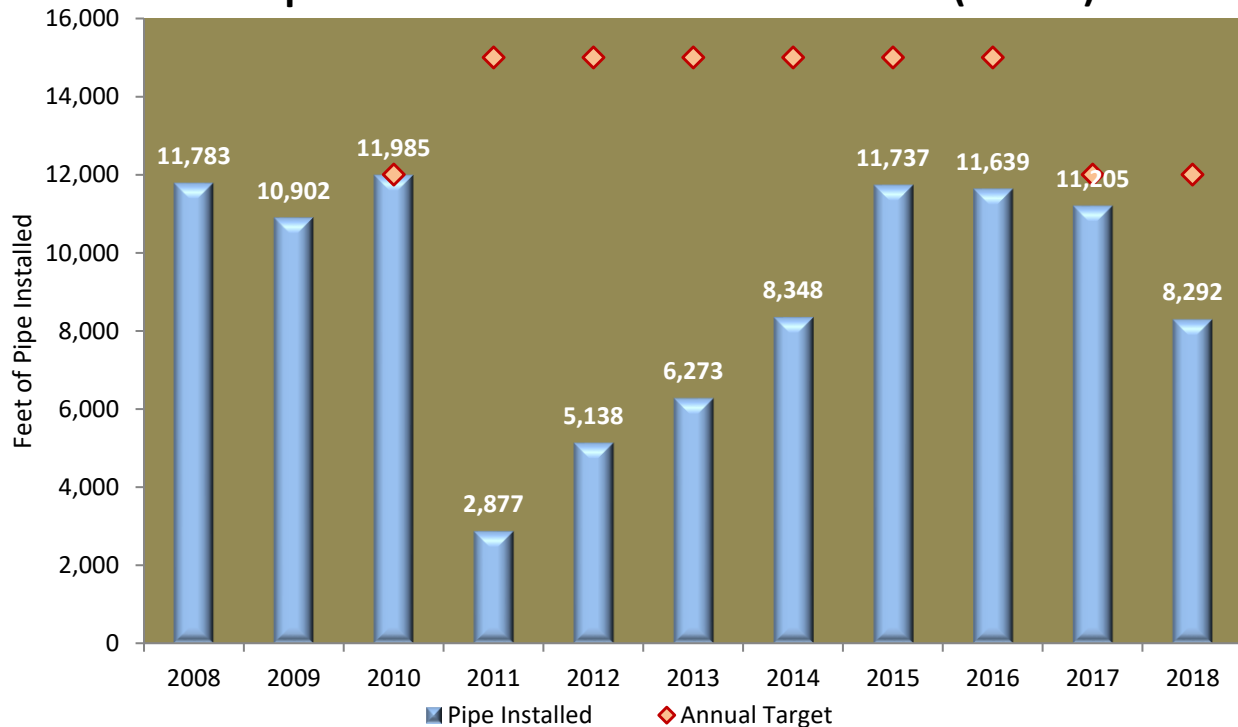
- Replace water mains, typically 8" and under. Water main replacements are based on main breaks, pipe material used, age, capacity, fire protection needs, the criticality of the water main within the system, and the number of services affected.
- Repair water main leaks as they occur, usually within 4 hours of identification and the completion of utility line locates.
- 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.
- Complete monthly readings of water meters for billing.
- Perform service shutoff and restores.
- Replace aging or defective water meters.
- Maintain the Kansas River Levee system by mowing, maintaining and repairing items per US Army Corps of Engineers requirements.
- Monitor Kansas River levels and respond to rising water levels.
- Clean ditches, storm sewer pipes, inlet throats and catch basins.
- Install or replace storm sewer pipe and structures.
- Patch potholes.
- Asphalt paving.
- Repair curb and gutter, City-owned curb ramps and sidewalks.
- Inspect and maintain traffic signals, street lights, and traffic signs.
- Sweep streets.
- Remove snow from City-owned streets and sidewalks.

Several programs were deferred and performance measures were not met in 2018 because of staff leaving the Field Operations group. While most of the positions have been staffed, performance measures for 2019 may be adjusted to account for completion of the deferred programs.

Water Distribution Systems

In conjunction with the water main replacement program, Field Operations staff typically replace 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 on California St between 4th and 5th St due to multiple water main leaks that occurred over a short period of time. In 2018, MSO Field Operations crews installed 8,292 feet of water main with in-house resources. The water main replacement program replaced existing water main due to excess leaks, critical location, or meeting specific criteria and was based on available resources. In 2011 the water main replacement program was decelerated due to funding concerns. Since then the program has ramped back up to pre-2011 levels. The decrease from 2017 to 2018 in footage of water main installed is primarily due to the water main crews being pulled from their projects to work on water main leak repairs. To obtain current levels two crews have been used intermittently, as availability allows, and productivity has improved as new staff gained experience and increased efficiency (see Graph 1). Along with funding and crew availability, annual footage totals will also vary due to the site conditions of specific projects, such as; work in the roadway, subsurface conditions, pipe size, number of services, etc.

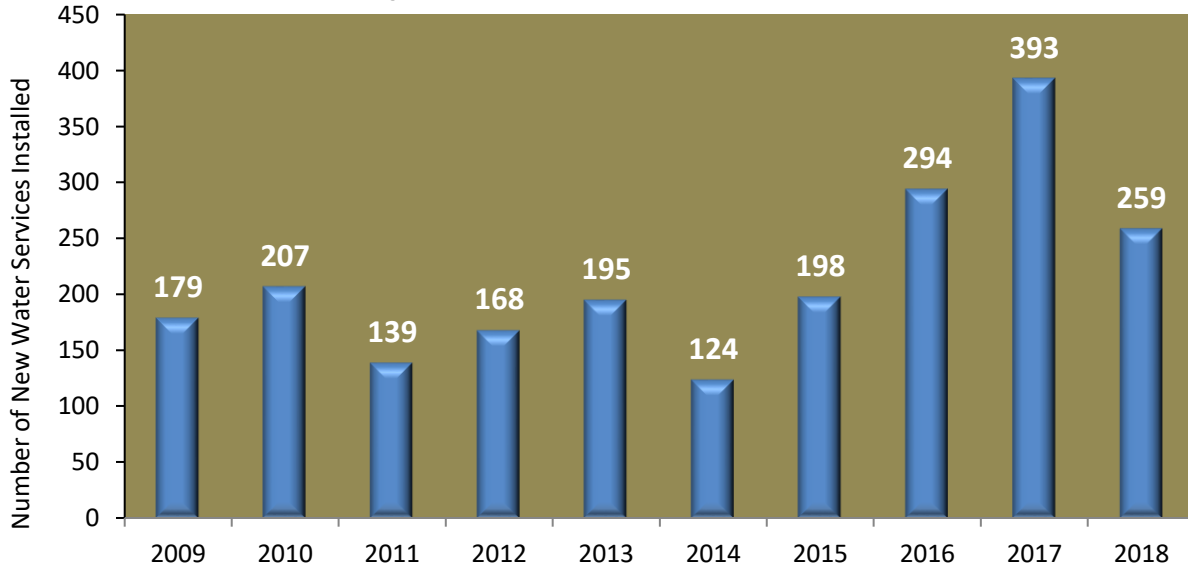
Graph 1. In-House Water Main Installed (in feet)



Prior to 2018, MSO Field Operations crews installed new 1" or smaller, generally residential, water services. Starting in 2018, customers had the option to purchase a meter kit and have the 1" or smaller water services installed by a licensed plumber or qualified contractor. The number

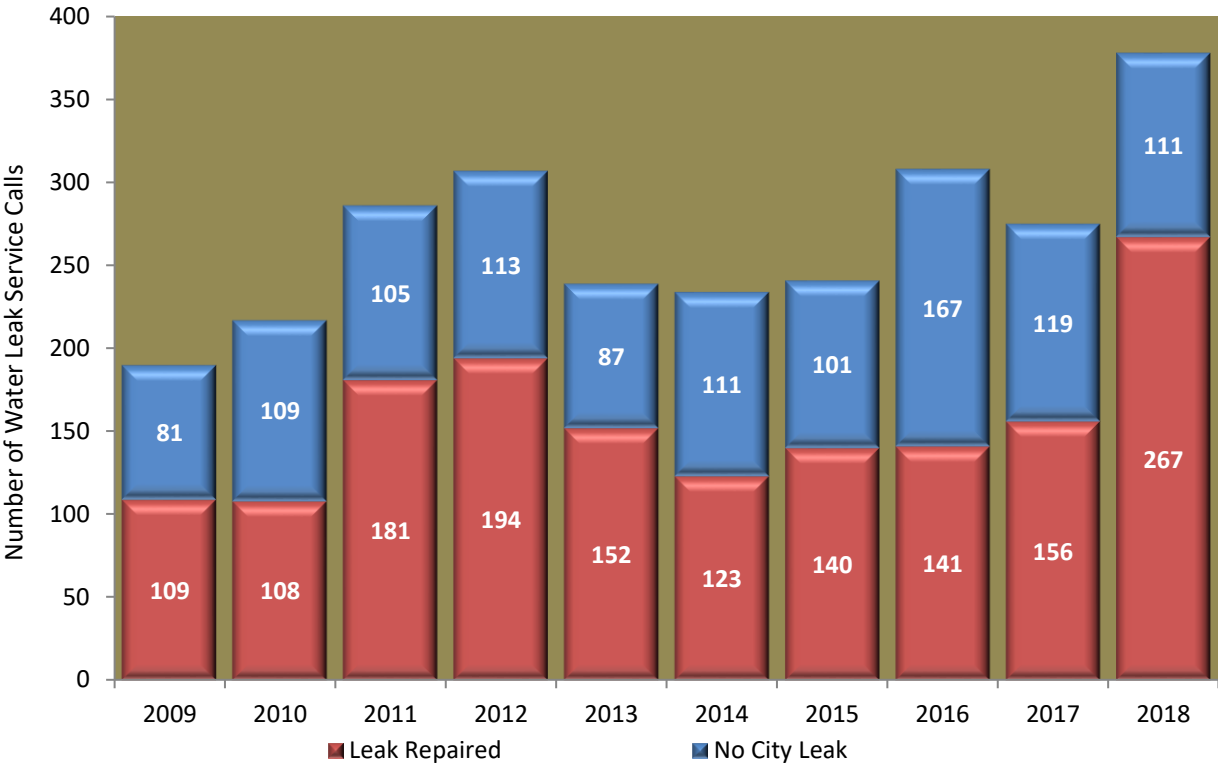
of new service installations completed by staff is based on the number of requests received (see Graph 2). In 2018, 259 new services were installed, which includes 147 new services installed by Field Operations crews, 22 small meter kit sales installed by contractors, and 90 meter sales installed by contractors.

Graph 2. New Service Installations

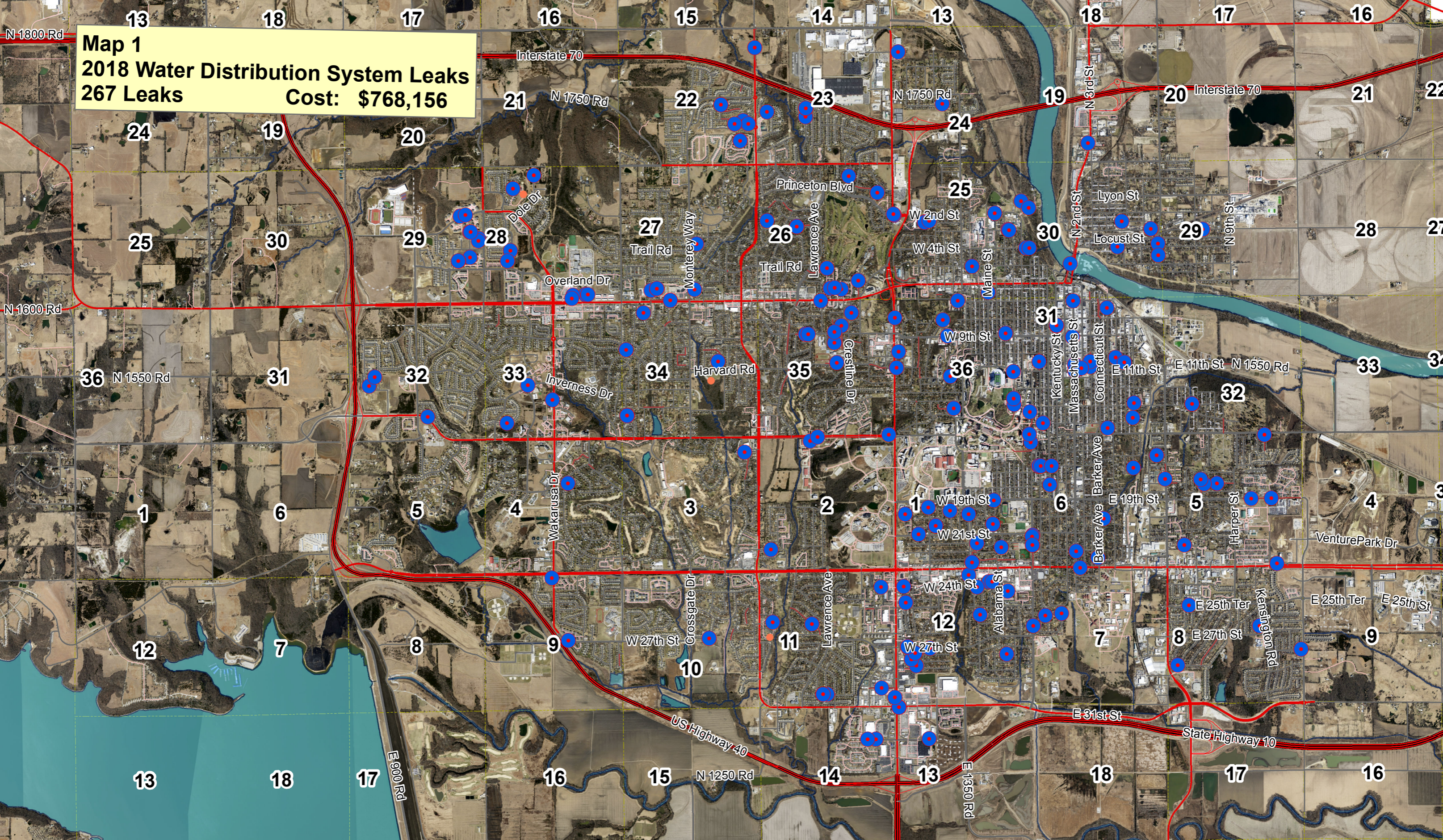


In 2018, the MSO Field crews responded to 378 customer service calls for the water distribution system. Of these calls, 267 resulted in an identified leak, which was repaired and the main put back in service. Crews verified that the other 111 calls did not fall under City responsibility. The water distribution 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 surrounding the main, and ground movement due to freeze/thaw or drought conditions. The number of customer service calls and leaks increased by approximately 100 from 2017 to 2018 (see Graph 3). The larger number of leaks in 2018 can be attributed to 42 more leaks on water mains and 54 more leaks on water services. Approximately 50 leaks occurred in January 2018 due to frozen water meters. Field Operations staff began using new leak detection equipment from Gutermann in 2018 and as a result found additional leaks that may not have been found until becoming more severe. Leaks on cast iron water mains increased from 46 in 2017 to 56 in 2018 and leaks on ductile iron water mains increased from 21 in 2017 to 35 in 2018. Ductile iron pipe that was installed in the 1990’s and 2000’s has been a growing concern because of the number and severity of leaks on this relatively new pipe. Leaks on Packer Court and Bob Billings Parkway required full replacement of the water mains because the ductile iron pipe was in such poor condition. Continuous leak tracking data is used to assist in selecting water main replacement projects by enabling the department to target known problem areas.

Graph 3. Water Distribution System Customer Service Calls/Leaks

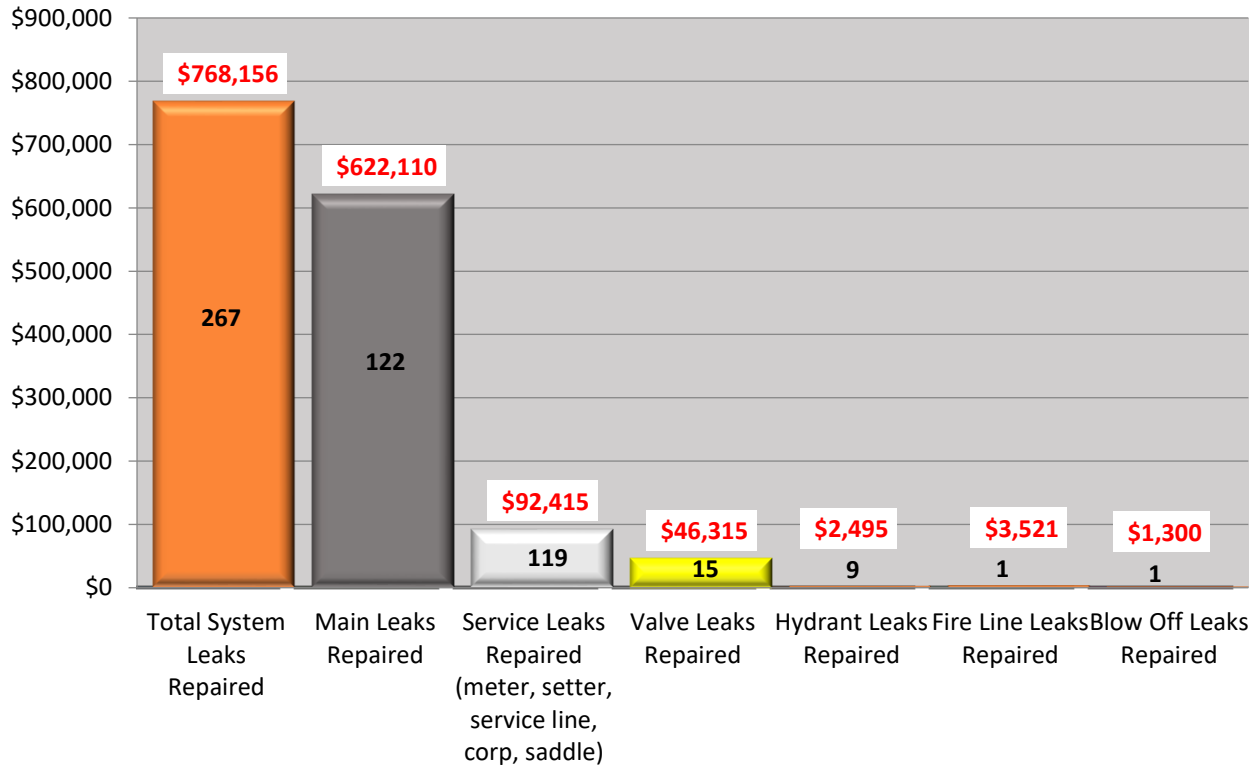


Map 1
2018 Water Distribution System Leaks
267 Leaks **Cost: \$768,156**

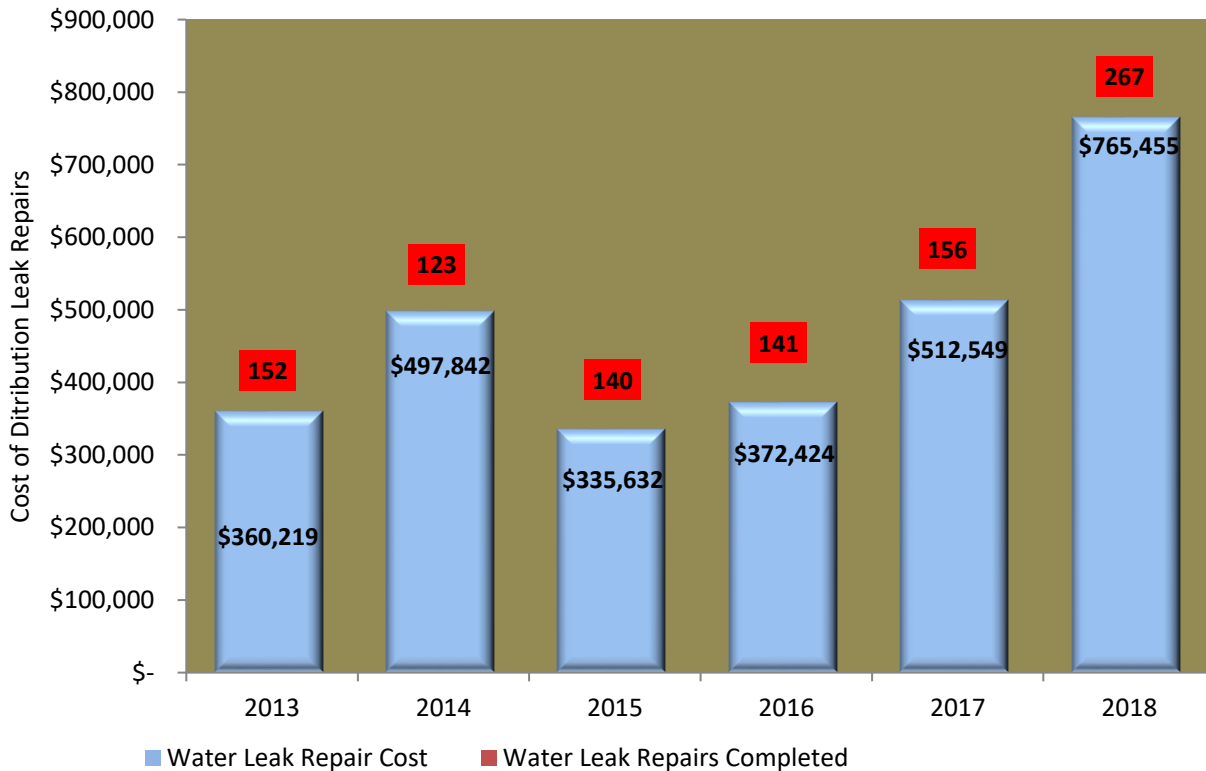


The water distribution system leaks that occurred in 2018 cost the City \$768,156 to repair. Approximately half of the leaks were caused by corrosion or splits in the water main (see Graph 4). The total cost of repairs in 2018 was higher than previous years due to an increase in the total number of leaks and repairs in streets, driveways, and sidewalks. (see Graph 5). Leaks on Packer Court and Bob Billings Parkway required Contractors to replace the waterlines for a total cost of \$150,707.

Graph 4. 2018 Water System Leak Repair Cost and Types



Graph 5. Distribution System Leak Repairs



The MSO 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 a repair of the main. The annual target for exercising 16” and larger valves was met in 2018. The annual target for exercising 14” and smaller valves was not met in 2018 and fewer 14” and smaller valves were exercised in 2018 than the previous four years primarily due to the increase in water main leak repairs and staff shortages (see Graph 6). Even though the annual target has not been met, valves are still exercised in specific areas such as during a water main leak and prior to starting a waterline replacement project. Moving forward the number of valves exercised will continue to be monitored with the belief that targets can be reached without taking away from other necessary services, assuming full staff resources. If targets cannot be met, additional resources may need to be devoted to the valve exercising program.

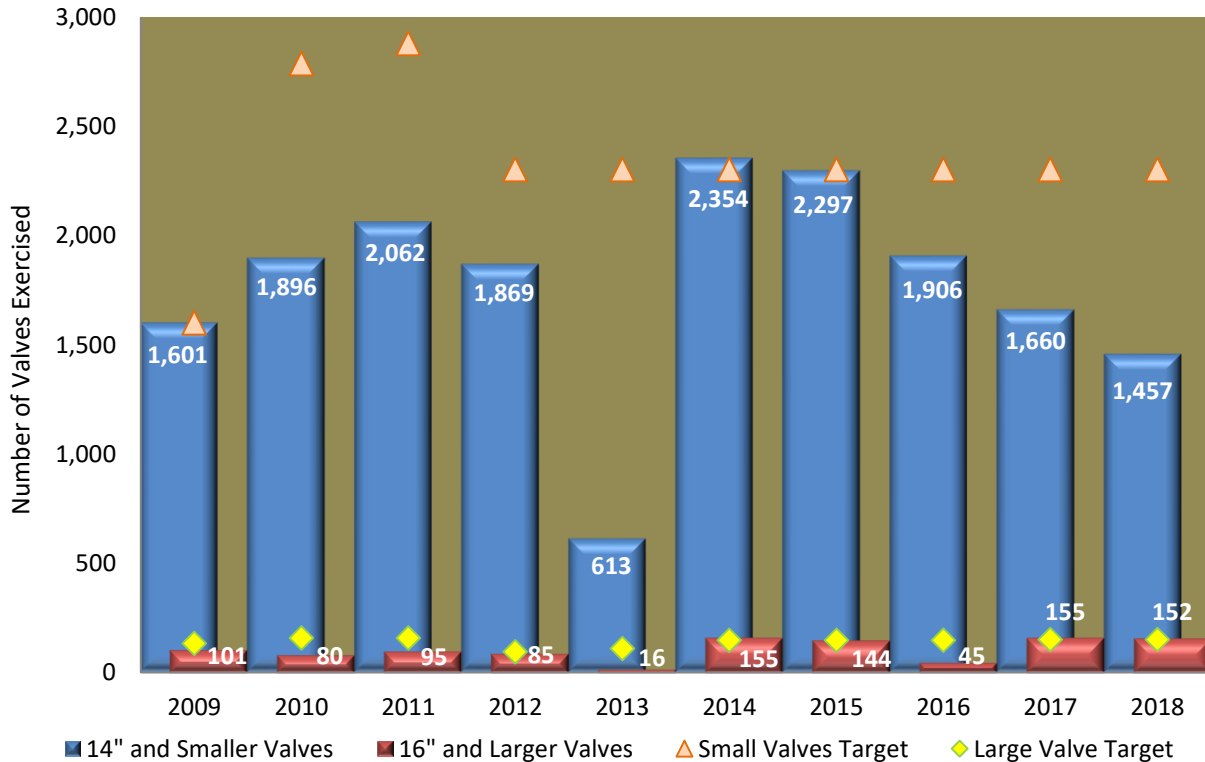
Other annual programs used to maintain water distribution system reliability include:

- The Fire Hydrant Maintenance Program – tests and maintains 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.
- Fire Hydrant Flow Testing Program – tests and records the flow of every hydrant in a 4-year rotation to document available flow. This program was not performed in 2017;

however, the fire hydrant flow tests scheduled for 2017 and 2018 were completed in 2018.

- 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.
- Large Water Meter Replacement Programs – replaces 1½ 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.

Graph 6. Number of Water System Valves Exercised

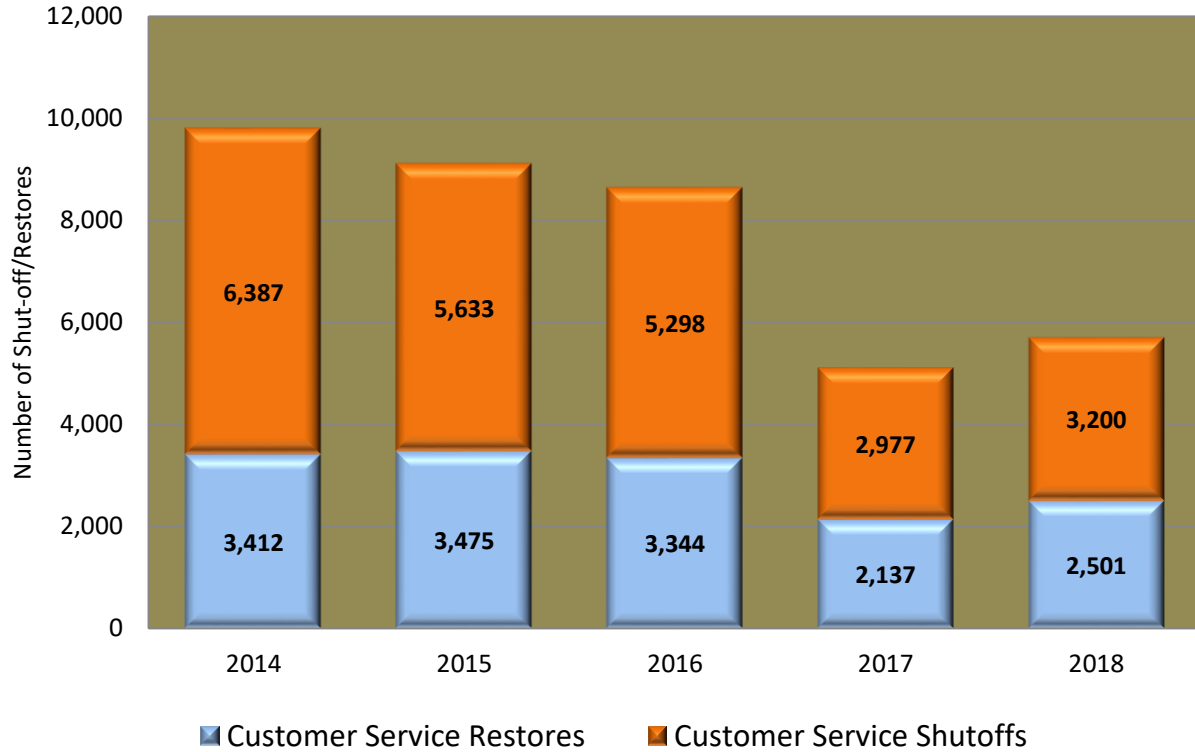


In 2016, 10 of the 11 Meter Reader/Field Services Representative FTE positions, and all of the workload previously performed by this 11-person staff, moved from Finance/Utility Billing to MSO Field Operations (1 vacant Field Services Representative FTE remained with Finance for use in internal position reclassifications). Additional Field Operations staff support as needed, increased technical resources and other implemented operational efficiencies have enabled continued performance of this workload with improved accuracy and timeliness, as evident by the 2018 data. Full staffing is a critical component to meeting key customer service deliverables.

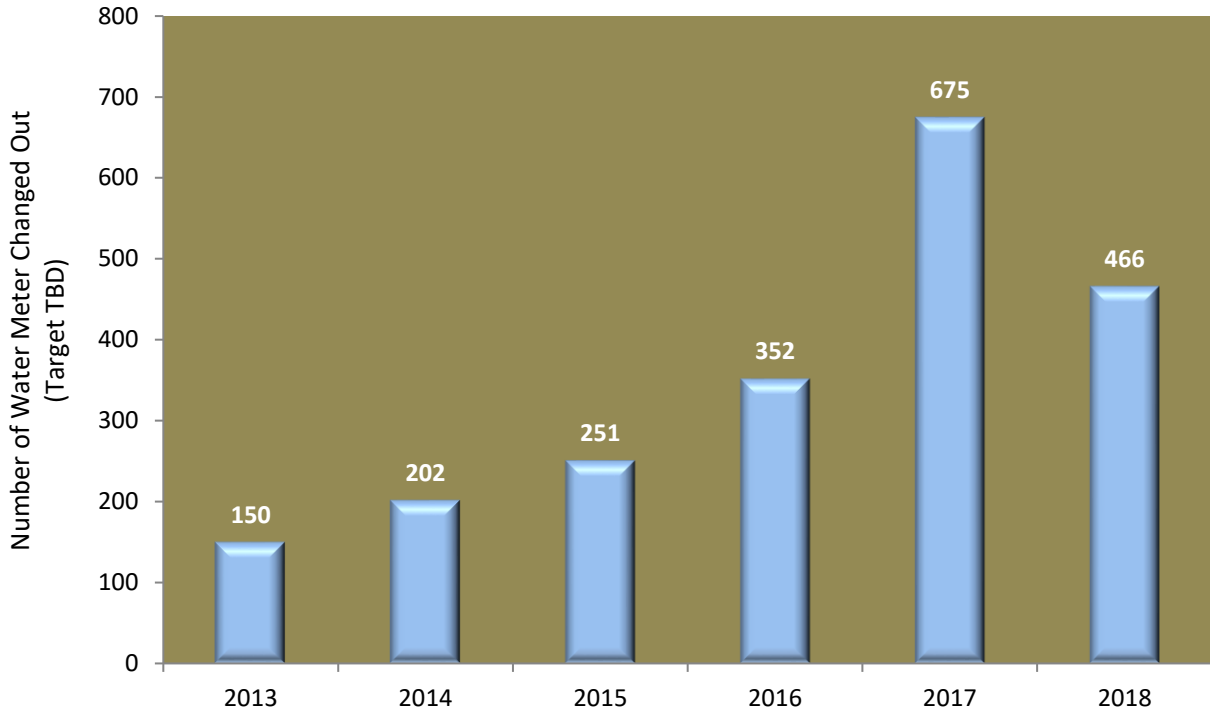
The Meter Services staff performed 3,200 meter shut offs due to non-payment of utility bills (see Graph 7). This number is similar to 2017 but much lower than the previous three years because a higher percentage of scheduled shut offs were canceled prior to shut off. There were several reasons for a higher cancelation rate, including a higher billing threshold for shut offs (\$150 vs. \$100) and delinquency notification emails that encourage more online payments. This group also performed 466 small, 5/8” and 1”, meter change-outs as part of the ongoing meter replacement program. The program was deferred for a few months in 2018 which resulted in a decrease of 209 small meter change-outs from 2017 (see Graph 8). In 2018 there were 1,386

meter rereads necessary because of incorrect initial reads, questions from utility billing, or customer requests for rereads (see graph 9 on the next page). The 2018 rereads are similar to 2017 but much lower than the previous three years due to improved communications, education and training between Field Operations and Utility Billing.

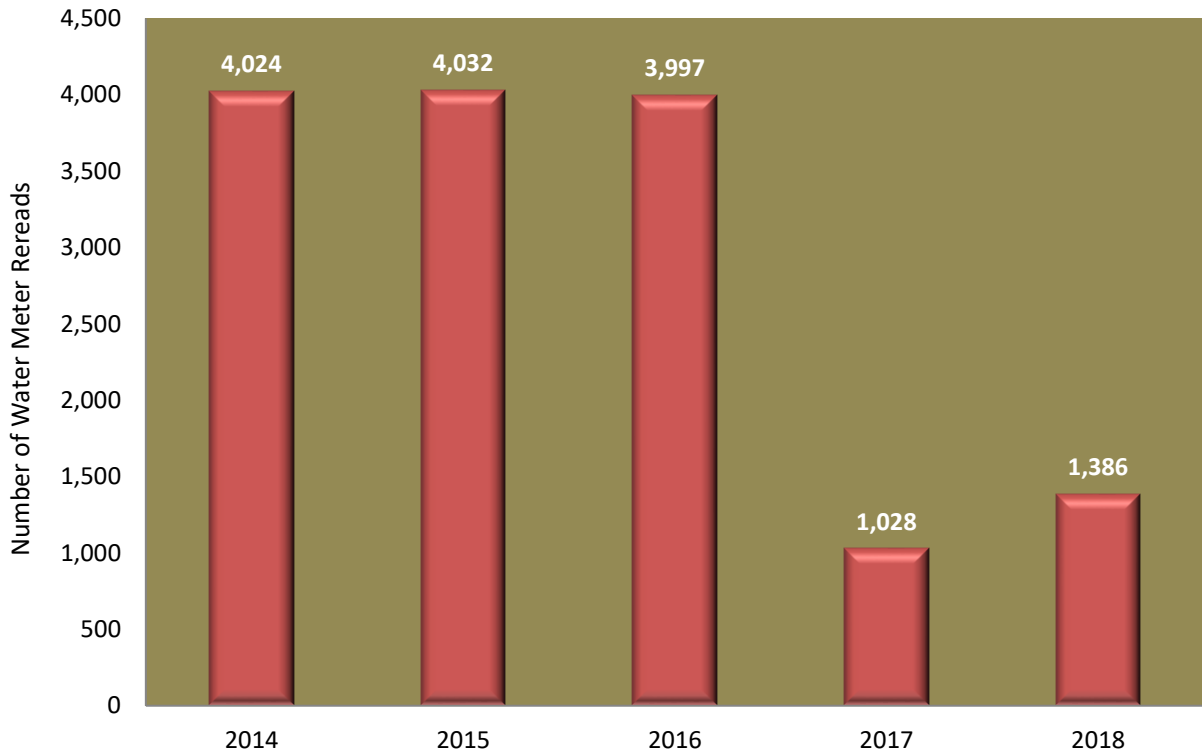
Graph 7. Customer Service Shut-off/Restores



Graph 8. Small Water Meter Change-Outs



Graph 9. Meter Service Meter Rereads

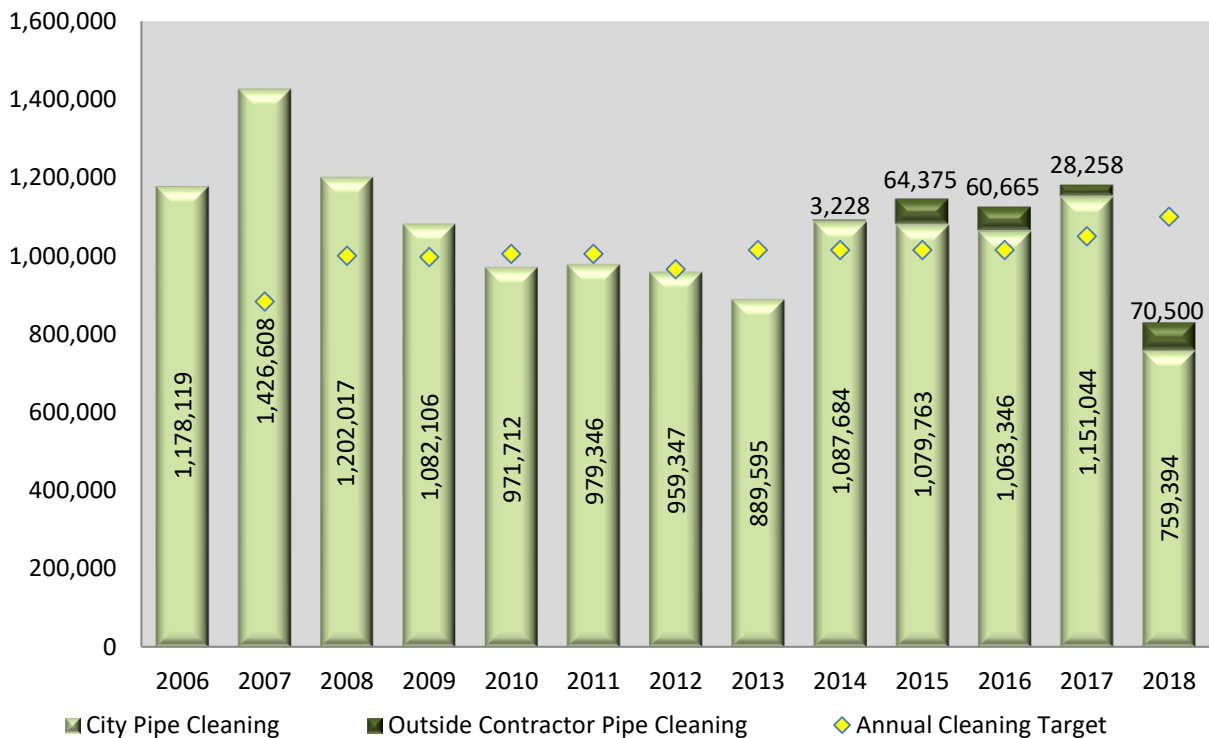


Wastewater Collection System

MSO 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. MSO Field crews use preventive maintenance programs to ensure the reliability of the sanitary sewers (see Graph 10). These programs include:

- Section Cleaning Program – cleans all city sewer lines 18” or smaller once every 4 years, or 559,680 feet annually. In 2018, the department continued the 5th 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. Section cleaning was suspended for 5 months due to staff shortage and workload in other areas.
- 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 70,500 feet of sanitary sewers in 2018.

Graph 10. Sanitary Sewer Main Cleaned (in feet)



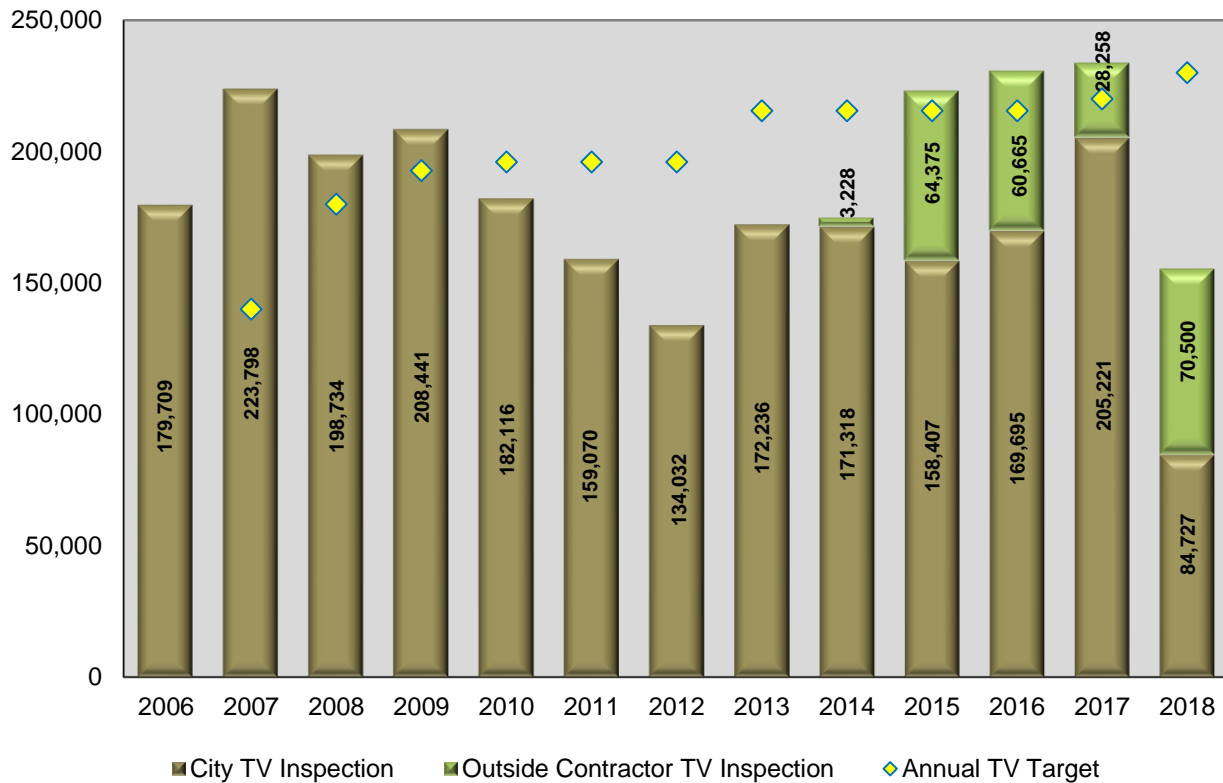
The MSO Field crews use closed circuit cameras (CCTV) to inspect the sanitary sewer lines to locate areas of defects, inflow and infiltration, blockages, and assess pipe condition (see Graph 11). The inspection programs include:

- 10-year Vitrified 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. The inspection program was reduced in 2018 for the same reasons as the section cleaning program.
- 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 2018, the Ecoflow and CIPP programs completed TV inspection on 70,500 feet of sanitary sewer. The annual TV inspection target for all programs is 230,000 feet.

Graph 11. Sanitary Sewer Main TV Inspection (in feet)

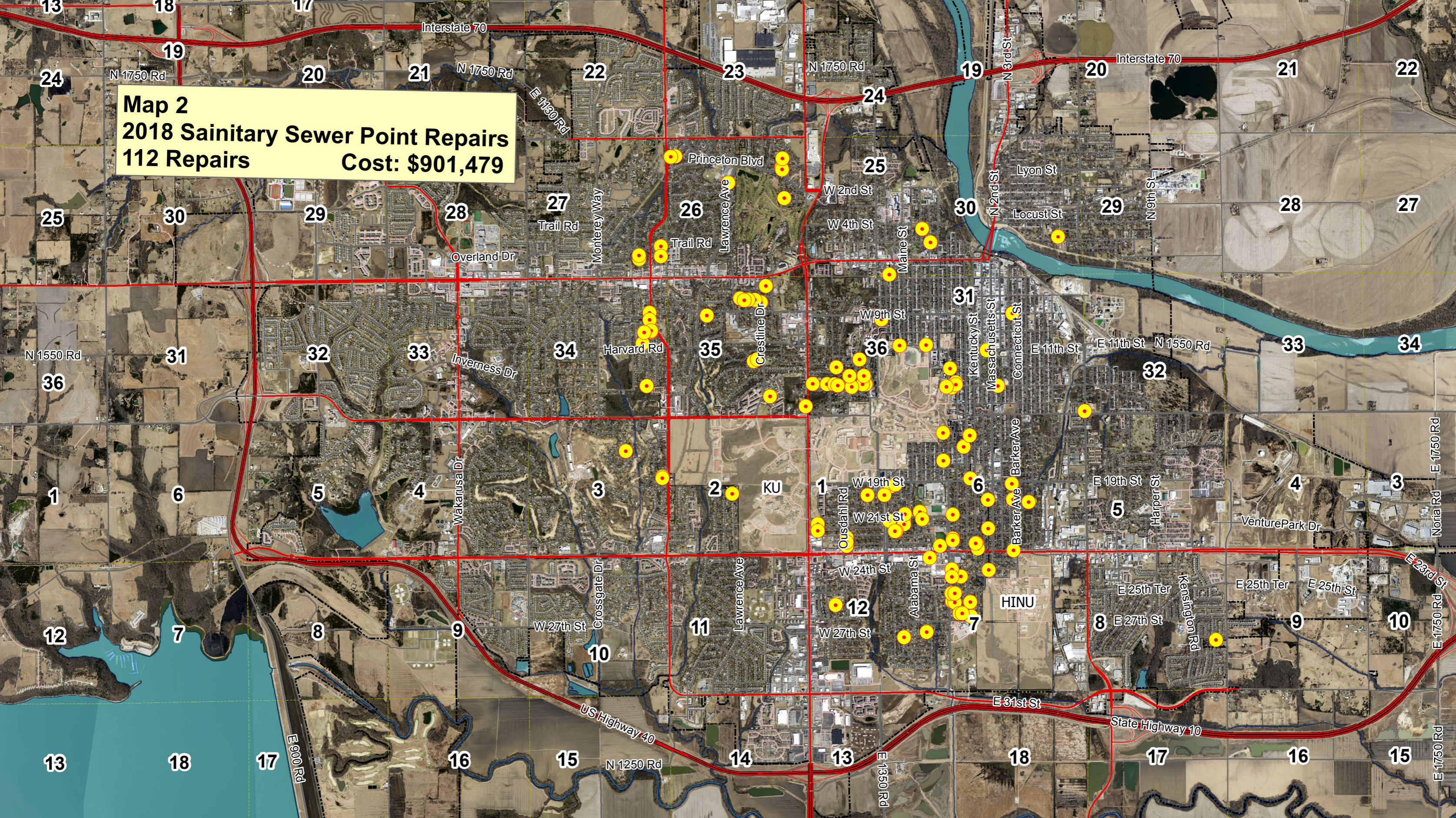


CCTV inspections are used to determine the condition of the sanitary sewer lines. Point repairs that are identified with the CCTV inspection are repaired within 30 days. The sanitary sewer point repairs were located generally on the east side of the City. Many of the repair locations were identified 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 112 sanitary sewer point repairs in 2018 cost the City \$901,479 (see Graph 12). The graph shows the total number of repairs and the cost attributed to emergency repairs and repairs related to the Rapid Inflow and Infiltration Program. The Rapid I/I program began in 2013 and spending has increased annually.

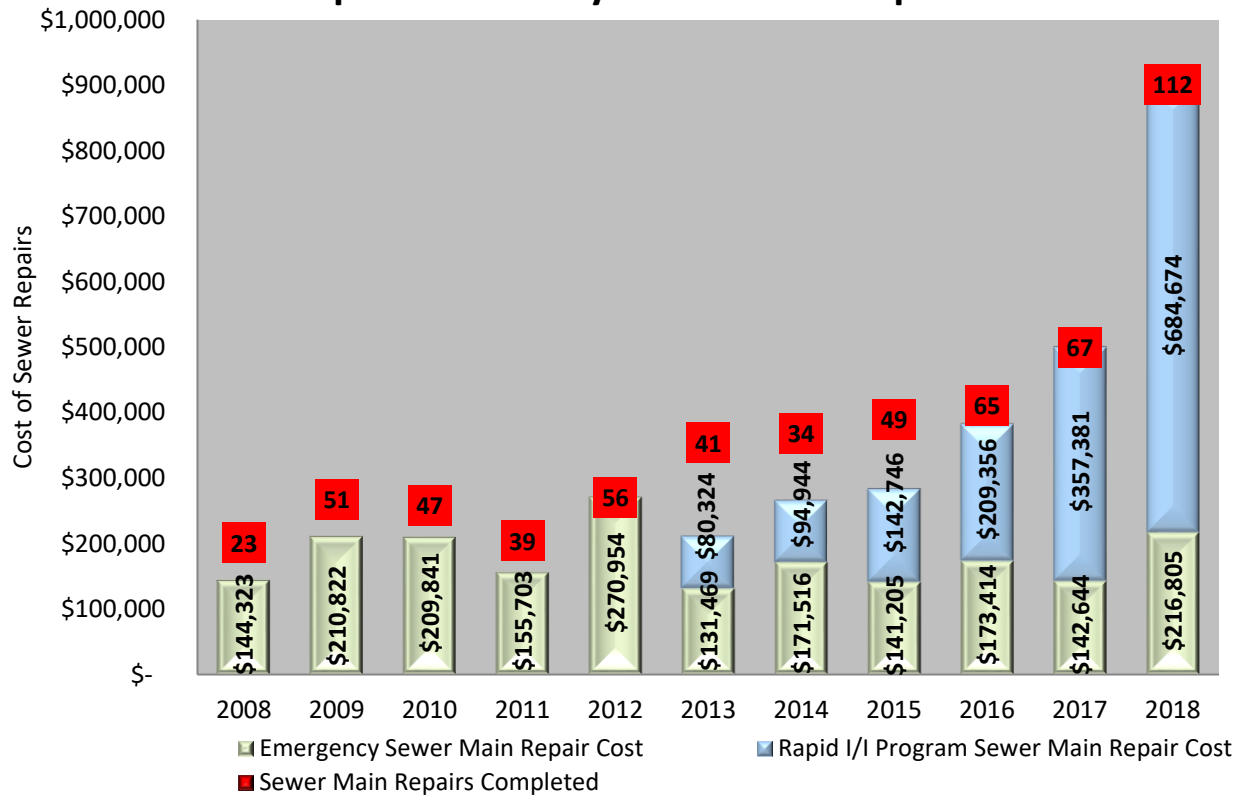
In 2018, the MSO Field crews responded to 87 customer service calls for the wastewater collection system. Of those 87 calls, 23 resulted in an identified blockage of the City main, which crews removed. Crews verified that the remainder of the customer calls had a clear City main. The decrease in customer 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 13). The number of main blockages in 2018 was 7 higher than the previous three years. The

increased number of blockages may be partly related to the reduction in section cleaning. The number of sewer customer service calls requiring staff response was the lowest since 2010. Staff will continue to monitor the number of service calls and its effect on department service levels.

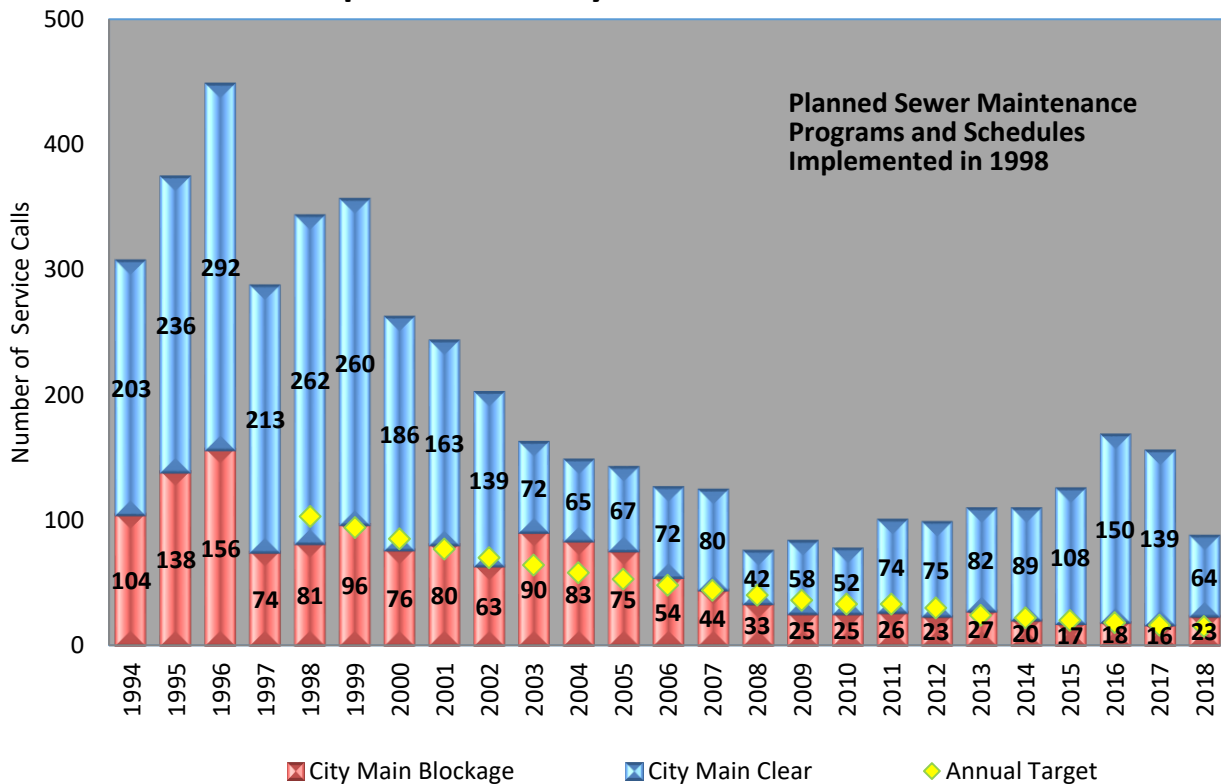
Map 2
2018 Sainitary Sewer Point Repairs
112 Repairs
Cost: \$901,479



Graph 12. Sanitary Sewer Main Repairs

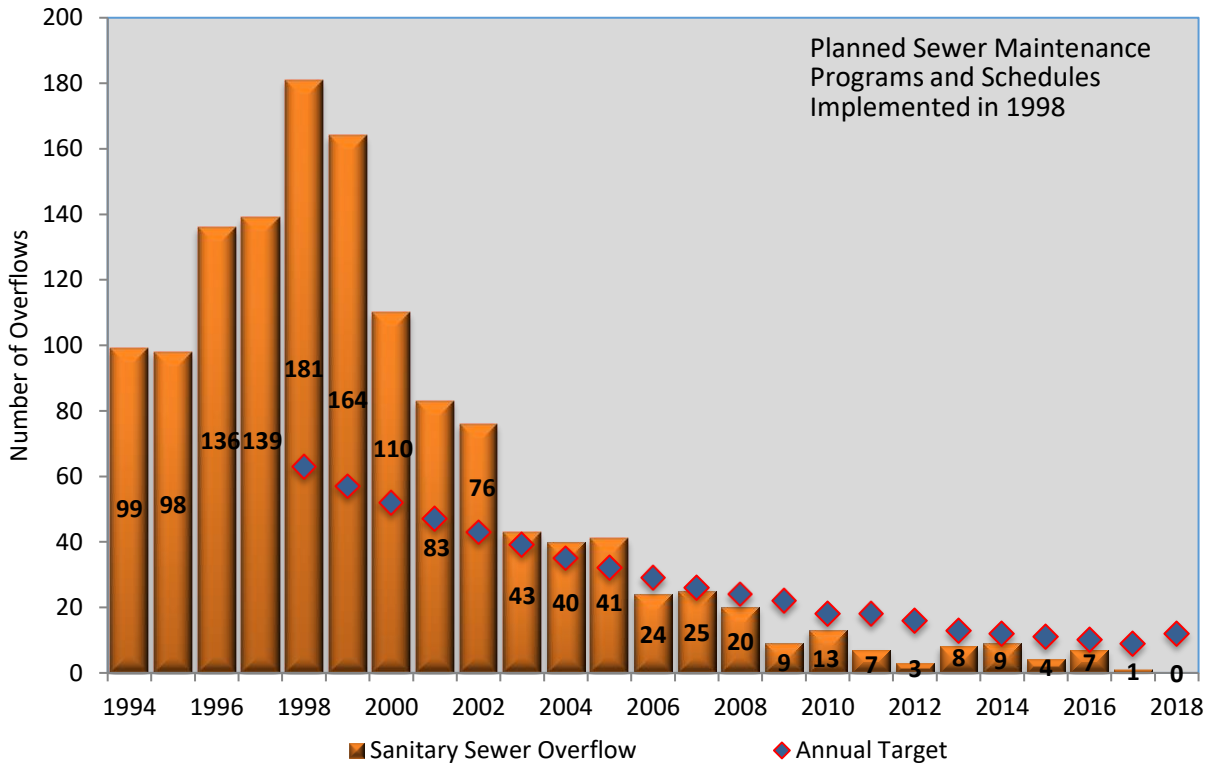


Graph 13. Sanitary Sewer Service Calls



Sanitary Sewer Overflows (SSOs) 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, SSOs also require notification to the Kansas Department of Health and Environment (KDHE). It has been a Department goal to reduce SSOs. 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 2018 the department had no SSOs (see Graph 14).

Graph 14. Number of Sanitary Sewer Overflows



Stormwater Collection System

Routine maintenance of the existing stormwater network includes cleaning of ditches, storm sewer pipes, inlet throats and catch basins. Stormwater maintenance crews maintain the following stormwater infrastructure:

- Kansas River Levee 19.6 miles/2,600 acres
- Channel/Ditches 122,610 feet/23 miles
- Streams 516,163 feet/98 miles
- Stormwater Pipe 883,037 feet/167 miles
- Stormwater MH 538
- Storm Inlets 5,137
- Area Inlets 584

Stormwater maintenance completed in 2018 include:

- Stormwater Pipe Installed: 2,831 feet
- Stormwater Pipe Point Repairs: 53 feet
- Stormwater TV Inspection: 46,504 feet/8.81 miles stormwater pipe
- Stormwater Inlets: 33 inlets
- Stormwater Inlets Cleaned: 2,334 inlets
- Ditch Maintenance: 2,294 feet/0.43 miles
- Channel Maintenance: 2,142 feet/0.41 miles
- Street Sweeping: 1,705 lane miles
- Street Sweeping Debris Collected: 4,405 cubic yards
- Concrete Sidewalk Repair: 783 linear feet
- ADA Ramp Replacement: 7
- Curb Replaced: 5,48 linear feet
- Concrete Pavement Replaced: 2,665 square feet

2018 Accomplishments:

- Implemented Lucity Work order system
- Implemented ESRI Collector application
- Merger with Utilities 09/2018
- City cell phones for field staff
- Tablets/Lap Tops/Surface Pro for field staff to complete work orders in the field/collect data
- Developed Performance Measures and work load

Street Maintenance

MSO Street Maintenance crews are responsible for the routine maintenance of the City's streets, alleys, curbs, and gutters. Activities include pot hole patching, curb and gutter repair, City-owned sidewalks and wheel chair ramps, crack sealing, street sweeping, snow removal and storm drain and pipe cleaning. The majority of work completed by the division is routine maintenance and small projects that are not cost effective to contract. Street Maintenance.

Crews maintain the following infrastructure:

- 867 lane miles of roadway
- 356 miles of sidewalk

Street Maintenance projects completed in 2018 include:

- Sidewalk Concrete Sidewalk Replaced: 972 linear feet
- ADA Ramp Replacement: 23
- Curb Replaced: 4,253 linear feet
- Concrete Pavement Replaced: 18,198 square feet
- Concrete Material Used: 853 yards
- Potholes Repaired: 12,530
- Collector Road Crack Seal Completed: 21,679 CL feet/4.5 CL miles/10 lane miles
- Residential Road Crack Seal Completed: 52,245 CL feet/9.9 CL miles/19.8 lane miles
- In-House Street Paving: 2 miles
- Utility Patching: 132 patches
- Hot Mix Asphalt Used: 1,995 tons
- Cold Patch Asphalt Used: 19 tons
- Crack Seal Material Used: 60,114 pounds

- Guardrail Replaced: 50 feet
- Fence Replaced: 24 feet
- Parking Meter Post Replaced: 6
- Special Event Barricades: 9 events

2018 Accomplishments:

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Traffic Operations

MSO Traffic Operations crews provide signal maintenance, fiber optic network oversight, signal timing, street signs, pavement markings, city-owned street-lighting and assist in emergency operations.

Crews maintain the following infrastructure:

- 98 traffic Signals
- 17 Hawk Pedestrian Signal Crossings
- 40 School Beacons
- Street Lights
- 16,442+ signs

Traffic Operations is in a transition period where staffing has changed, collecting asset data and past work completed. Through this transition period, staff will have an accounting of assets, develop performance measures and workloads. Also will develop Best Management Practices as well has policies and procedures.

Field Operations Support

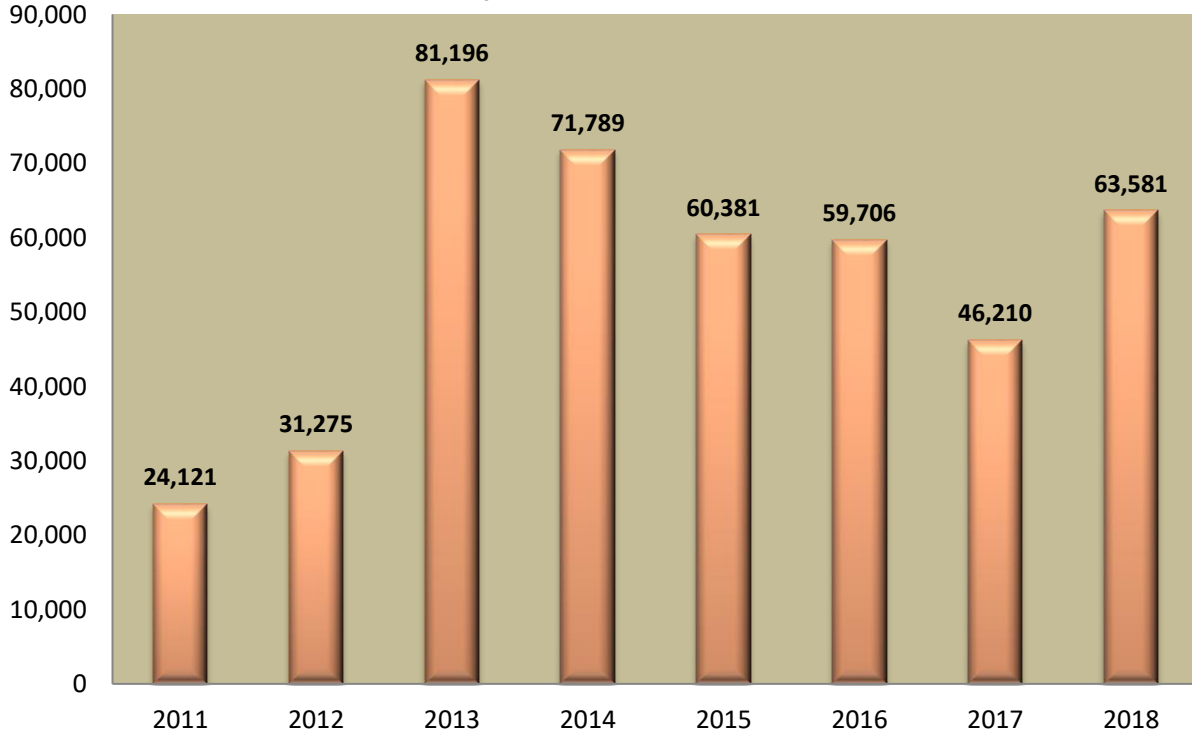
The MSO inspectors, which are part of the Field Operations group, remain on site for capital and public improvement projects that are installing new public infrastructure, including streets, sidewalks, water mains, sanitary sewers, storm sewers, traffic signals, street lights, and traffic signs. For these projects, MSO inspectors observe, inspect, and test the new infrastructure to make sure it meets all specifications, criteria, and requirements for materials and installation methods. The total footage of new water and sewer mains increased in 2018 to levels similar to 2015 and 2016 (see Graph 15). Inspectors also assisted with site and structure inspections for the Wakarusa Wastewater Treatment Plant and Pump Station 10 project. Water services that are not installed by the City and fire lines are inspected 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 MSO infrastructure to be updated in the department GIS map.

Graph 15. New Water/Sewer Main Installed Under MSO Inspections (in feet)



Two full-time MSO Field staff provide locates for the department’s underground infrastructure. 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 the City’s 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 the installation of fiber lines and a general increase in the total number of construction projects within the City (see Graph 16). In 2018 two MSO Field staff were able to complete locates within the time requirements; however, if locate requests continue to increase additional staff may be required.

Graph 16. Infrastructure Locate Totals

