



SANITARY SEWER SYSTEM ANNUAL REPORT FY 2018-2019



Trimble and Amberwood Sanitary Sewer Improvement Project - Pipebursting

City of San José
Sanitary Sewer System Annual Report
FY 2018-2019

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I. HISTORY AND BACKGROUND

The City provides sanitary sewer service for the residents and businesses of San José and surrounding areas. The City owns and operates the sewer collection system consisting of approximately 2,030 miles¹ of pipes (which vary in size from 6 inches to 90 inches in diameter), including 10 miles of force mains, 18 pump stations and 39,380 manholes. There are over 202,000 lateral connections to the system. The collected wastewater is conveyed to the San José - Santa Clara Regional Wastewater Facility (RWF) by major interceptor pipelines located in the northern part of San José. This system conveys an average flow of 76 million gallons per day. The City's sanitary sewer collection system benefits from the generally uniform topography of the Santa Clara Valley which allows the majority of the wastewater flows to be conveyed to the RWF using gravity sewer lines with minimal use of lift or pump stations.

The sewer system dates back to the late 1800's which consisted of a main outfall sewer constructed of brick. This system conveyed combined sanitary and storm flows directly into the San Francisco Bay. In the 1950's this combined system was separated, and sanitary flows were directed through the wastewater treatment facility (currently known as the RWF) prior discharging into the bay. Approximately 85 percent of the system, which was constructed between 1950 and 1980 are local collector pipes that are 10 inches or less in diameter.

In general, the sanitary sewer system is overseen and managed by the following departments:

- The Department of Public Works (DPW) designs and builds sanitary sewer infrastructure funded through the City's Capital Improvement Program. Public Works also reviews and inspects sanitary sewer improvements constructed by private developers and other public agencies. The Sanitary Capital and Master Planning Sections are part of the Transportation & Hydraulics Services Division in Public Works. The primary goal of these sections is to plan, design and construct improvements to sanitary sewer system, in an effort to provide safe and reliable sewer service to the current and future residents/ businesses of San José and contributing agencies.
- The Department of Transportation's Infrastructure Maintenance Division (DOT) performs day-to-day operation and maintenance of the system.
- The Environmental Services Department (ESD) manages the wastewater from the collection system to suitable treatment and discharge into the San Francisco Bay and for beneficial reuse to protect the environment and public health.

¹ Total length was updated in 2019 based on the latest GIS data to exclude sewer mains that were abandoned or owned by adjacent agencies or private developers.

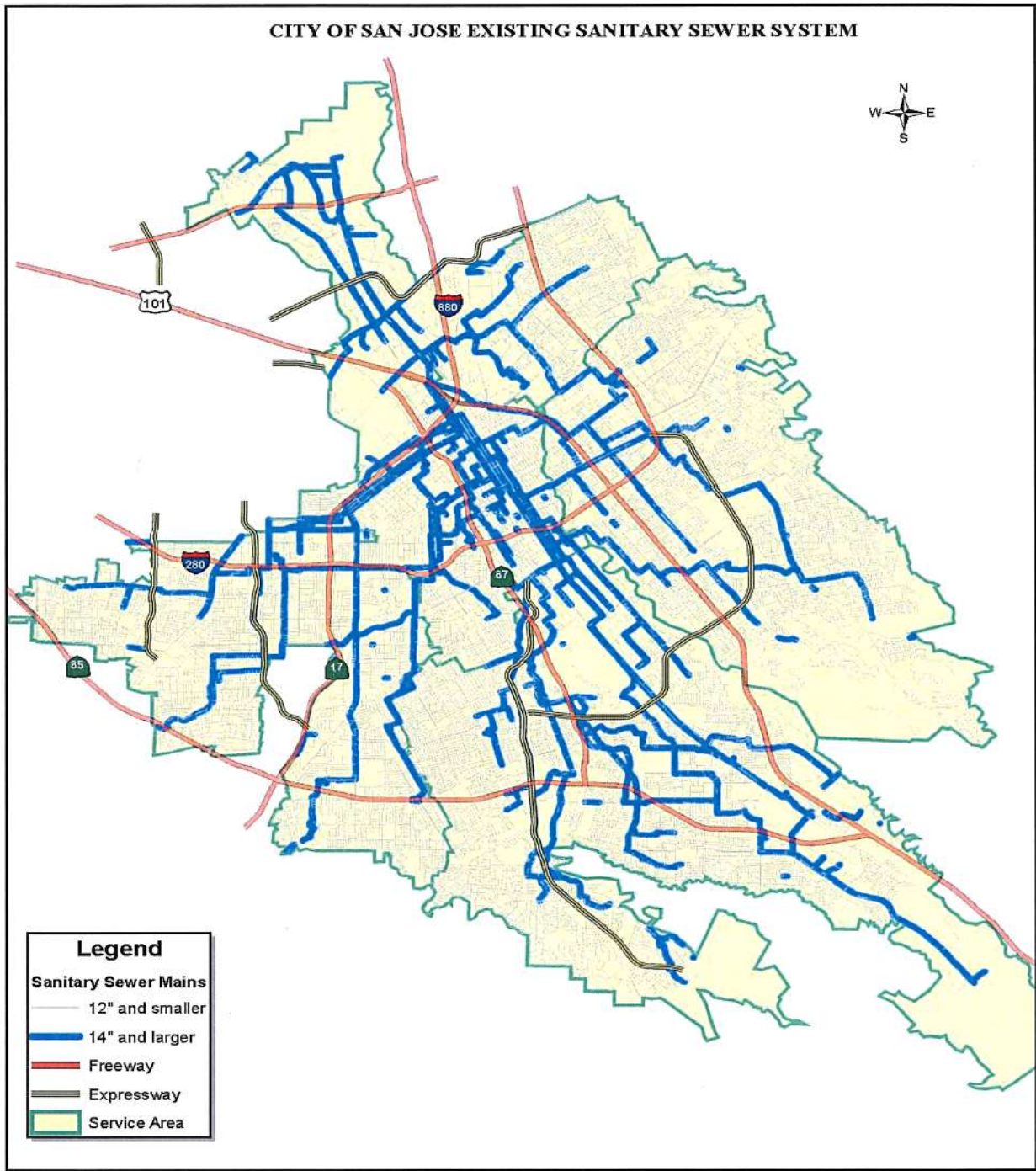


Figure 1 - City of San Jose Sanitary Sewer System

II. PROGRAM FUNDING

A. Adopted FY 2018-19 CIP Budget Revenue

Primary sources of funding include an annual transfer from the Sewer Service and Use Charge Fund, the Sanitary Sewer Connection Fee, and joint participation revenues. The Sewer Service and Use Charge Fund provides funding for capital improvement projects through the Sewer Service and Use Charge Capital Improvement Fund.

Sanitary Sewer Connection Fee Fund (Fund 540 - \$3,197,997; 5-Year CIP) – Connection fees are charged to developers for connecting to the City’s sanitary sewer system. Funds are restricted to the construction and reconstruction of the sewer system.

Sewer Service and Use Charge Capital Improvement Fund (Fund 545 - \$39,556,888; 5-Year CIP) Sewer service and use charges are collected from existing property owners of the City. This funding accounts for the majority of the construction and rehabilitation of the sanitary sewer collection system.

Joint Participation Revenues (\$8,480,000) – A portion of West Valley Sanitation District’s, County Sanitation District 2-3, and Cupertino Sanitation District’s sewage flows through the City’s collection system. This revenue consists of the respective agencies’ fair share contribution for the City’s expenditures on capital improvements on the shared system.

B. Adopted FY 2018-19 CIP Budget Expenditures

The Sanitary CIP Program consists of a \$191.2 million, 5-year budget. This funding is allocated between three broad categories which include capacity improvements, rehabilitation and non-construction activities.

Capacity improvements are identified through the on-going collection of flow monitoring data which is inputted into the computerized hydraulic model of the sewer network. Improvements are based on existing capacity deficiencies and capacity needs projected with the build out of the Envision 2040 General Plan. Projects in this category generally consist of upsizing of existing sewers or installation of new sewers designed to reroute sewage flows from capacity deficient sewers to sewers with adequate capacity.

Rehabilitation projects originate from on-going maintenance history and results of the closed circuit television inspection and condition assessment programs. Projects typically consist of removal and replacement or rehabilitation of structurally compromised and root/grease prone sewers. Also included in this category is the rehabilitation of pump stations which typically involves upgrading of electrical and mechanical components.

The primary expenditures for non-construction activities are for the flow monitoring/ master planning and closed circuit television inspection/condition assessment programs. Each of these programs is essential to the planning and prioritization of capital improvements within the sanitary sewer system.

C. Adopted FY 2018-19 Operations and Maintenance Budget Expenditures

The annual ongoing operating and maintenance budget is approximately \$18 million, which provides funding for the Department of Transportation administration, engineering, and maintenance.

III. PROGRAM ACTIVITY

A. Neighborhood Sewer Rehabilitation

Approximately 1,750 miles or 85 percent of the City's sanitary sewer system is considered neighborhood sewers. The average age of the neighborhood sewer system is approximately 45 years. These sewers generally consist of smaller diameter (6 to 10 inches) pipes constructed of vitrified clay or cast iron and buried three to six feet deep. These characteristics result in a variety of operational and maintenance issues including root intrusion, grease accumulation, corrosion (of the cast iron sewers), structural damage due to the depth of cover and the array of other utilities common at similar depths as the sewers. For these reasons, the vast majority of sanitary sewer overflows (SSOs) occur in these types of sewers.

During FY 2018-19, forty (40) separate contracts were either awarded and/or completed to address issues in neighborhood sewers. The total value of these contracts was \$56.9 million. In order to address these issues in a timely and cost effective manner, a variety of types of construction contracts and methods were implemented. Traditional remove and replace contracts were utilized for cast iron sewer replacements and for system replacements which required changes in horizontal or vertical alignment. Changes in alignment are typically necessary to improve flow and prevent grease accumulation. Rehabilitation contracts, which consist of insertion of a liner into the existing sewer or pulling in a new polyethylene pipe while breaking the old pipes, were utilized to repair sewers with mild to moderate damage and prevent root intrusion. Point repair contracts, which consist of multiple locations under a single contract, were utilized to repair sewers which had severe localized structural damage.



Capital projects on neighborhood sewers are often developed to address on-going, repeated maintenance activities by the Department of Transportation. A total of six Cast Iron Replacement projects were completed in FY 2018-19 to replace 16,470 feet of old and corroded 6-inch and 8-inch cast iron sewer pipes with a more corrosion resistant ceramic-lined ductile iron pipe at a total cost of \$6.6 million. In addition, several Miscellaneous Sewer Repairs and Sewer Rehabilitation and Replacement projects were completed, and two General On-Call Engineering Contracts were utilized in FY 2018-19 at a total cost of \$6.7 million to address structural defects found in the system at various locations throughout the City in an effort to reduce SSOs.

Prior to these projects, the sewer systems in many of these areas required regular cleaning by DOT maintenance staff on a monthly to weekly basis due to heavy grease accumulation, corrosion, and

root intrusion in the sewer main pipes. Each cleaning effort consisted of an average of four hours with a two person crew with a combination of vector/flushing truck.



The combined effort of capital improvements and the Department of Transportation’s cleaning and maintenance program has resulted in a continued reduction in the number of SSOs, down from 192 in FY 2011-12 to 42 in FY 2018-2019, as shown in Figure 2.

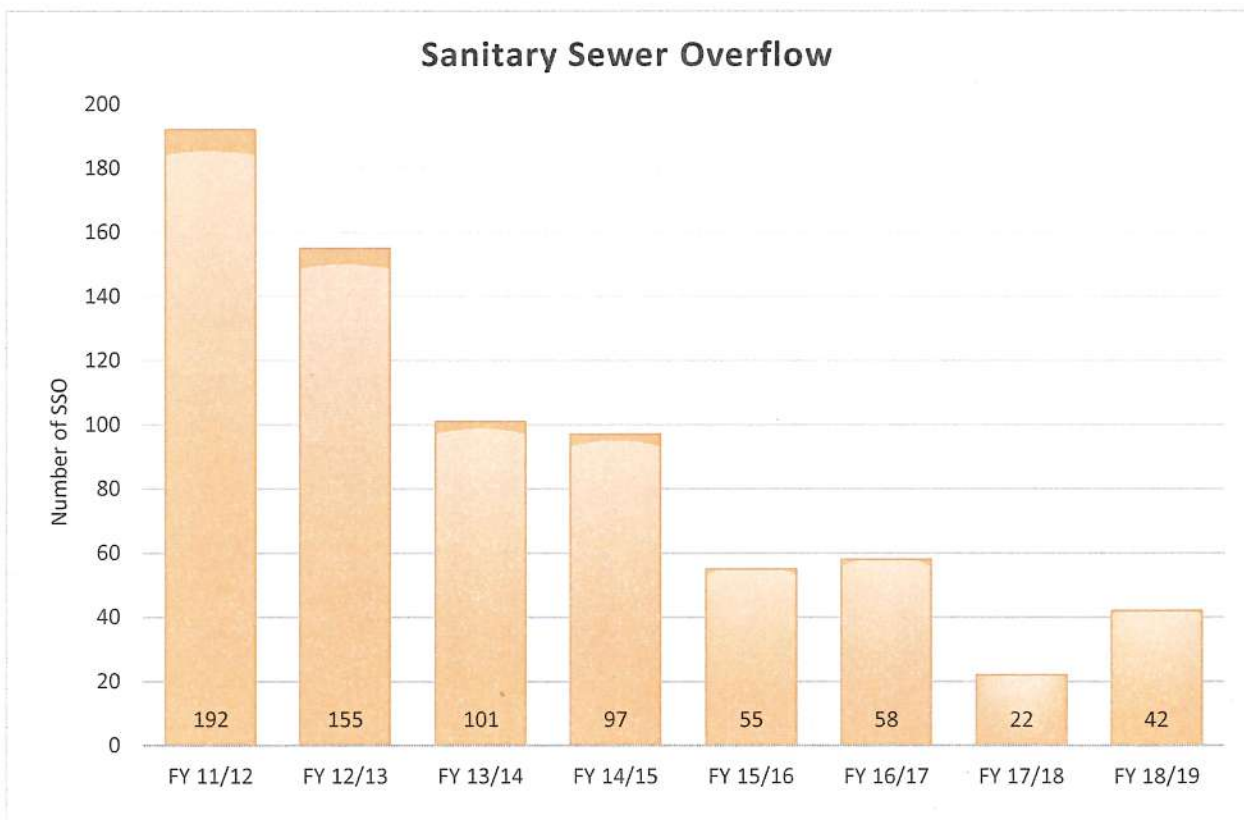


Figure 2 – Sanitary Sewer Overflow Summary

B. Exfiltration Abatement Program

In mid-2016, to resolve a lawsuit brought by San Francisco Baykeeper (“Baykeeper”), a California non-profit corporation, and with neither party admitting liability, the City and Baykeeper entered into a Consent Decree to resolve any potential Clean Water Act claims. The City agreed to develop

and implement an Exfiltration Abatement Program in order to minimize the risk of wastewater leaking out of the sanitary sewer pipes and entering into an adjacent storm sewer system. The Consent Decree requires the City to identify all High-Risk sanitary sewer pipes and repair or rehabilitate these pipes within the next ten (10) years. High-Risk pipes are sewer segments that meet all of the following conditions:

1. Sewer segments that are constructed of vitrified clay or reinforced concrete,
2. Sewer segments that cross above a storm pipe, or are above and within ten (10) feet horizontally of storm pipes,
3. Sewer segments that are fifty years or older with a condition assessment that identifies that the segment has a medium to severe crack, offset joint, or some other high grade structural defect per the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certificate Program (PACP) standards, and,
4. Sewer segments that are above the water table.

Sanitary sewer segments that are considered High-Risk will be repaired/rehabilitated by the City at an average rate of 6.5 miles annually and total of 65 miles over the 10-year term of the Consent Decree. In FY 2018-19, four Sanitary Sewer Repair projects were completed to address these High-Risk segments with the replacement, repair, and rehabilitation of approximately 10 miles of sanitary sewer mains at a total cost of \$5.6 million.

C. Pump Stations

The average age of the City’s 18 sanitary sewer pump stations is approximately 31 years. These facilities are listed in Table 1. The standard design-life of the mechanical and electrical components of pump stations are 10 to 25 years. Due to the wide range of pumping capacity for each station, the total cost to rehabilitate and/or replace these pump stations can range between \$2 million and \$10 million each.

Generally, the structural rehabilitation of a pump station would prolong the life and improve the reliability of the system; similarly, the upgrades of the electrical, mechanical and data communication components will allow staff to monitor and operate these pumps remotely and also reduce the maintenance effort required to keep these pump stations operating effectively.

Table 1 – Sanitary Pump Stations

Sanitary Pump Stations and Other Facilities (Alphabetical Order)		
Name	Year Built	Year Rehabilitated/Status
Pump Stations		
1. Basking Ridge	2006	Pumps replaced by DOT in 2011
2. Brookside	2013	New pump station
3. Communications Hill	2007	To be abandoned with Communications Hill Phase 3 public improvements in 2021.
4. Gateway	1988	Initial assessment in progress; possible abandonment/rehabilitation

5. Happy Hollow Zoo	1967	Pump replaced in 2009
6. Junction	1979	*
7. Lamplighter	1984	Force main condition assessment completed in 2008
8. Margaret	1952	*
9. Montague	1978	Design for replacement completed and pending easement acquisition
10. Nordale	1960	Rehabilitated in 2018
11. Nortech	1983	Condition assessment in progress
12. Padres	2012	New pump station constructed in August 2012
13. Ridder Park	1982	*
14. San Felipe	1989	Abandoned in 2018; rerouted the flow to a new gravity system
15. Spreckles	1975	Rehabilitated in 2014
16. Tea Garden	1986	Rehabilitated in 1997
17. Willow	2003	Rehabilitated in June 2019
18. Zero Waste (Los Esteros)	2014	*
Other Facilities (Odor Control Stations)		
19. Canoas Ferrous Chloride Injection	1962	Tank replacement in 2018
20. Canoas Soil Bed Filter	1994	Planned for assessment
21. Zanker Soil Bed Filter	1995	Condition assessed in 2008; planned for re-assessment

* No information on status

In FY 2018-19, approximately \$1.6 million was allocated to complete the rehabilitation and upgrade of various pump station projects.

Willow Pump Station - This pump station was constructed in 2003 to temporarily replace a damaged creek-crossing siphon until a new siphon was built. Staff later determined that upgrading the existing pump station would be a better alternative compared to constructing a new siphon due to constructability and the stringent permitting process. In 2016, the U.S. Army Corps of Engineers in coordination with the Santa Clara Valley Water District informed the City that they had a plan to widen the creek, thus staff had coordinated with the agencies to alter the design and accommodate the creek widening project. The project was awarded in June 2017 and construction was completed in June 2019.

Montague Sanitary Pump Station - This station is located at the southeast corner of the intersection of Montague Expressway and North First Street. Built in 1978, the pump station has been offline since the mid-1980s as the pumping capacity of this station has been accommodated by the Lamplighter pump station to the north. The upgrade of Montague Sanitary Pump Station is necessary to accommodate anticipated future development in the area. Staff completed the design, and along with the City's Real Estate Division, they are in negotiations with the new property owner adjacent to the existing pump station to acquire a larger easement for the pump station expansion. The project is scheduled for award in FY 2019-20.

D. Interceptor and Capacity Improvements

The interceptor system between the RWF and approximately Empire Street consists of four parallel large diameter (60 to 90-inch) sewers. The locations of various reaches of the system are designated by Phases I through VII, with Phase I located furthest to the north entering the RWF and Phase VII located near Empire Street, accepting flows from major trunk sewers. This system conveys approximately 80 percent of the total wastewater flows to the RWF. A schematic diagram of the interceptor system is shown in Figure 3 below.



Figure 3 - Sanitary Sewer Interceptor System

Capacity improvements to the interceptor system between the RWF and U.S. Highway 101 (Phases I through V) have been completed over the last two decades. Phases VI and VII improvements are being scheduled for the out years with the primary focus on the Phase VI reach along North Fourth Street between U.S. Highway 101 and Commercial Street. This phase consists of upsizing approximately 5,000 feet of 54-inch diameter sewer to 84-inch. A design-build contract in the amount of \$42.5 million was awarded in May 2018 to complete the design and construction of the project. Staff and the design-build contractor have already acquired the necessary Caltrans permit for the work related to the U.S. Highway 101 undercrossing. Construction of the project is anticipated to be completed in Fall 2021.

Initiation of design for the Phase VII capacity improvements is scheduled in the next few years. When completed, the interceptor system will maintain enough capacity to allow any one of the parallel interceptors to be taken out of service during dry weather for maintenance and/or rehabilitation.

During the FY 2018-19, several large capacity improvement projects had achieved their beneficial use status including the Rincon Avenue-Virginia Avenue Sanitary Sewer Improvement, and the Trimble Road and Amberwood Lane Sanitary Sewer Improvement projects. In addition, several capacity improvement projects were awarded or are in construction including the Forest-Rosa 5 - Westmont Avenue and Harriet Avenue Sanitary Sewer Improvement, and the Bollinger Road - Blaney Avenue Sanitary Sewer Improvement projects. These projects, with an estimated total cost of \$26.7 million, were developed to upsize the existing sanitary sewer system to eliminate capacity deficiency in the system.



E. Sanitary Sewer Condition Assessment Program

The Sanitary Sewer Condition Assessment (SSCA) Pilot Program was initiated by DPW in 2010. The original pilot project utilized closed circuit television (CCTV) to video inspect and collect data on a 46 mile representative sample of the City's 2,030 mile sanitary sewer system. The results from this study were used to determine the funding need and develop a road map for the comprehensive SSCA program. Likewise, DOT had made investments for additional equipment and personnel in conjunction with its operations and maintenance program to assist the SSCA program.

In 2013, the City procured a sanitary sewer asset management software program to develop risk assessments based on an array of the sewer's physical properties and consequence of failure. Since early 2014, City staff utilized the software, along with available CCTV data and maintenance records, to analyze collected data and determine the risk level of the City's sanitary sewer system. Based on the risk levels, staff has developed a priority list of the sanitary sewer basin areas to assess with a goal to inspect all small diameter pipes in ten years.

Table 2 – CCTV Inspection

Year	Fiscal Year	Miles of Pipeline (from SSCA and CIP)	Miles of Pipeline (from DOT)
0	2010 Pilot and Prior to 2011	123.5	No data
1	2011-2012	26.4	No data
2	2012-2013	222.4	45.2
3	2013-2014	40.8	43.8
4	2014-2015	79.1	67.7
5	2015-2016	91.9	80.7
6	2016-2017	179.7	71.0

7	2017-2018	208.9	84.0
8	2018-2019	117.8	98
	Total	1,090.5 (54%)	490.4 (24%)

* Chart numbers have been revised to reflect actual inspection information in the InfoMaster database. Previous reports were based on funding and contract award period.

Ten CCTV projects, including the Downer-Canoas Collector System Cleaning and the Sanitary Sewer Siphon Condition Assessment Pilot Program, were completed in FY 2018-19 at a total cost of \$10.2 million. In addition, three CCTV projects totaling an estimated cost of \$2.9 million were awarded in FY 2018-19. Data for these three projects have not been received nor entered in the InfoMaster database as of this report. The miles will be adjusted accordingly in the next report after these projects are completed.

In an effort to minimize sanitary sewer repairs which would necessitate dig outs on a newly paved roadway, , DOT video inspected sanitary sewer lines on roads scheduled to be resurfaced as part of the Pavement Maintenance Program. Repair of sewer defects identified on these roadways were coordinated so they were completed prior to paving.

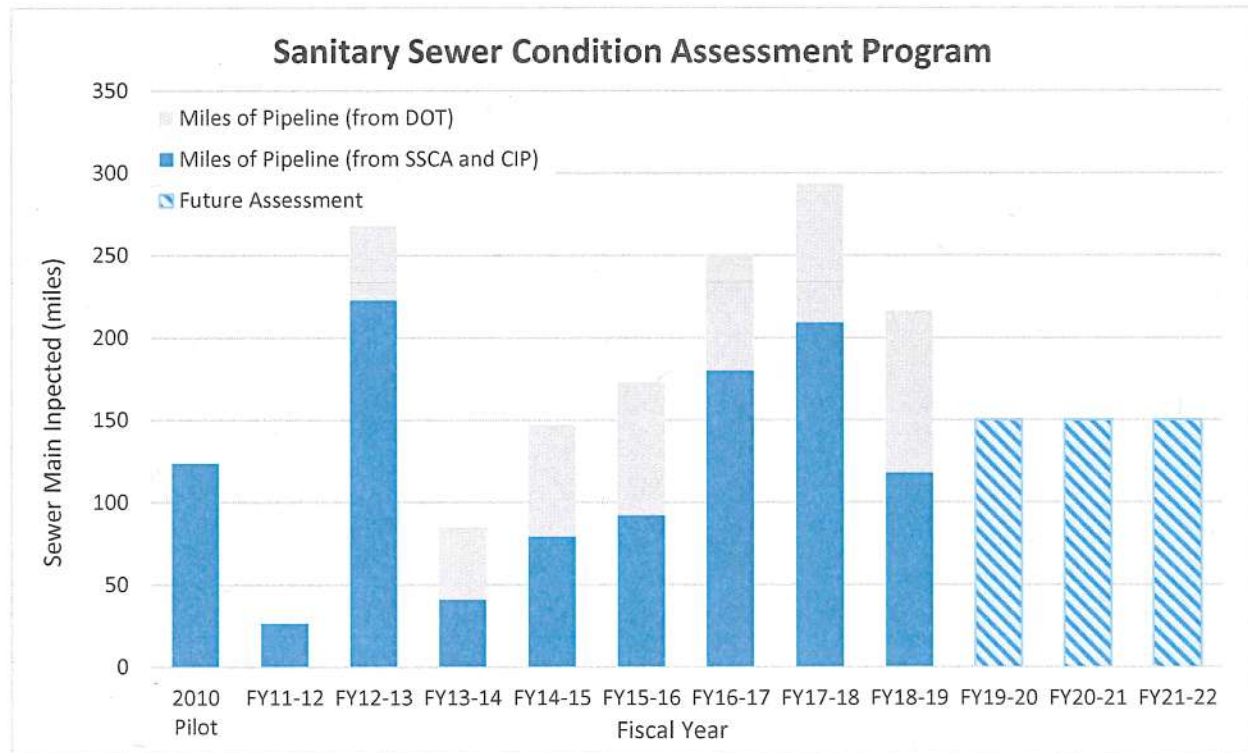


Figure 4 - Sanitary Sewer Condition Assessment

Data collected through PW’s CCTV contracts and DOT’s cleaning and CCTV inspection program will be used in developing the City’s Sanitary CIP program to proactively repair or rehabilitate these pipelines before they fail. A decision tree model has been created to determine the most appropriate repair or rehabilitation techniques for each pipeline. The model will be used to forecast and determine the total cost to repair and rehabilitate the City’s sanitary sewer system. As larger

data sets are gathered through each year's CCTV contracts, more analysis can be performed to better adjust the decision tree model.

As of the end of FY 2018-19, the City had video inspected 78% of the system and is on track to complete the first video inspection cycle in FY 2021-22.

F. Master Planning

1. Capacity Management

a. Sanitary Sewer Master Plan Studies (Capacity Assessments)

Sanitary sewer collection systems are designed to convey anticipated peak flows, based on current and predicted/planned future demands under both dry weather and design storm conditions. The State Water Resources Control Board requires sewer agencies to prepare System Evaluation and Capacity Assurance Plans to evaluate the capacity of key system components and hydraulic deficiencies and to develop capacity enhancement measures.

The Citywide Trunk Sanitary Sewer Master Plan (Phase I) completed in early 2013 evaluated the sewer system of 10-inch and larger in diameter. Subsequently, the City also completed a detailed Sewer Master Plan Study for the North San Jose Development Policy Area (Phase II) to evaluate the capacity of the entire system of this area. These Master Plan studies incorporated Census 2000 population, non-residential water use, latest development and General Plan 2040 land uses, and flow information. The Master Plans recommended a CIP program that included 105 cost-effective capacity assurance pipeline improvement projects comprised of the installation of 200,000 feet of relief sewer mains totaling approximately \$188 million (2013 dollars). The program level CEQA of the citywide Trunk Sewer Master Plan was approved as an Addendum to the Envision San Jose 2040 General Plan in June 2015.

In early 2015, City staff started the effort of developing an all-pipe model network by expanding the trunk system model to include all smaller diameter (6-inch and 8-inch) pipes of the City's sewer system. This multi-year, Phase III Master Plan, will also incorporate additional manhole survey information, 2010 census population, latest water use data, and available temporary and long-term flow monitoring data to further refine and calibrate the model and subsequently evaluate deficiencies of the small diameter sewers. The citywide all-pipe sewer system master plan will recommend a CIP for small diameter sewer improvement and update the existing trunk sewer CIP project recommendations.

Currently, the Phase III Master Plan has incorporated all the sewers into the ICM model, and completed dry weather flow calibration for approximately 70% of City's sewer system. Staff expects to identify a list of deficiencies under existing dry weather flow conditions by June 2020. The Phase III Master Plan with deficiencies under both dry and wet weather flows is anticipated to be completed by the end of 2022.

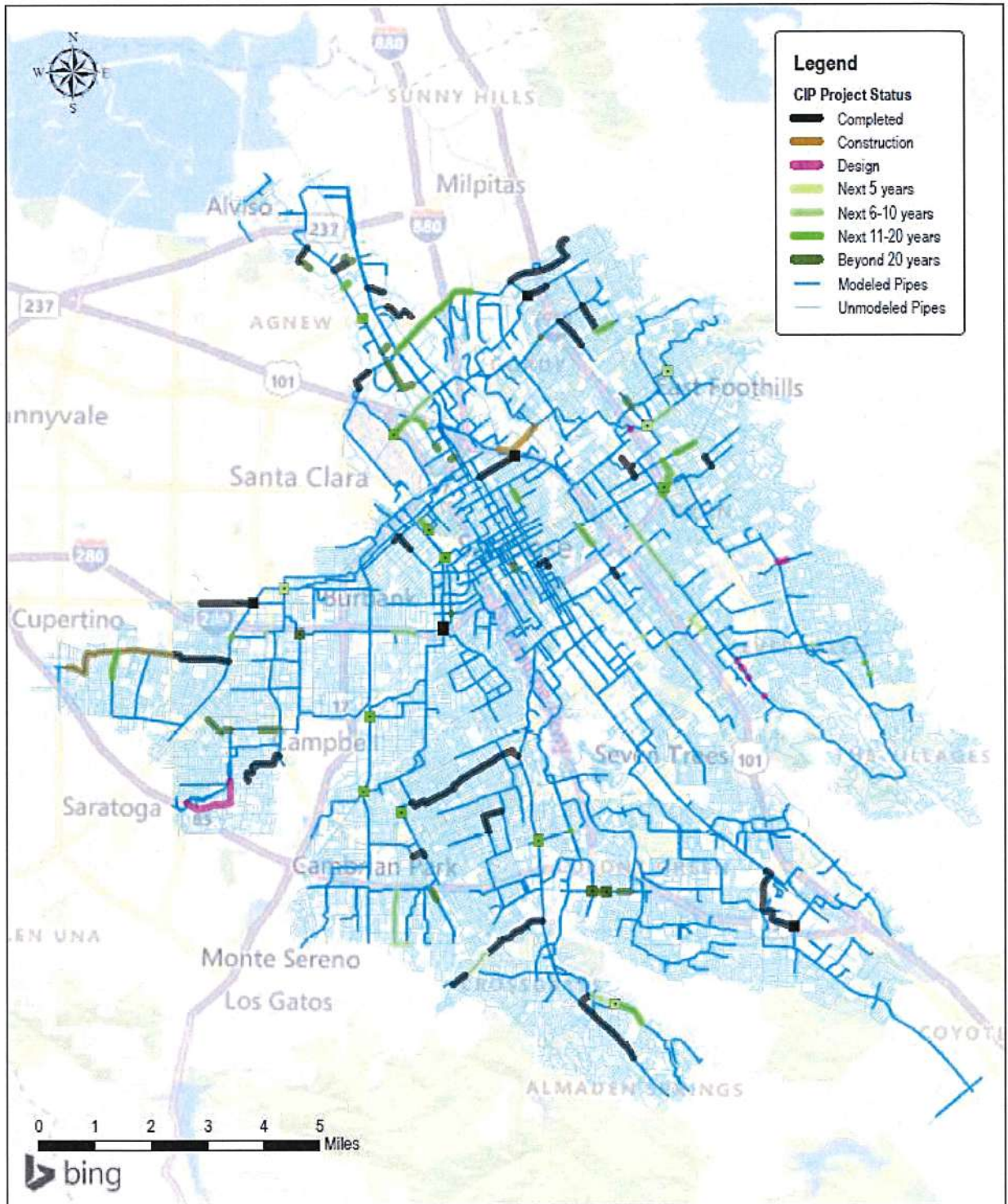


Figure 5 - Master Plan Sanitary Sewer Improvement Locations and Status

b. Master Plan Project Confirmation and Implementation

Flow monitoring during the Phase I and Phase II Master Plan studies was limited to a number of large trunk line locations. Presumptions were made to estimate flow amount at upstream locations or within the neighboring sewer sheds where flows were not measured in order to identify the deficiencies in the system. Therefore, for those projects that are not previously confirmed by flow monitoring data under the existing condition, flow monitoring activities will be required before these projects can be programed in to the 5-year CIP. Ideally, flow monitoring at a location should include a period of rainy weather to verify the wet weather deficiencies. Sometimes, a wet season does not have a large enough storm; therefore, staff would need to perform an additional flow monitoring in the next wet season. Through these project confirmation exercises, some projects were confirmed, some were determined to be unnecessary, and others would need to wait for sufficient wet weather flow data for further evaluation.

Since the completion of the Sewer Master Plans, based on the prioritization results, staff developed a 20-year plan for CIP project implementation. The 20-year plan is frequently updated with the results from on-going project confirmation activities. The color-coded map in Figure 5 provides the project timeline in the 20-year plan along with completed projects and projects in design and construction phases. To date, the City has incorporated 39 master plan projects into the 5-year CIPs, including nine projects as part of public improvements in development projects.

c. Flow Monitoring Program

The City has a long-term flow/rainfall monitoring system that consists of 52 flow meter and 16 rain gauge sites. The flow/rainfall monitoring system provides the City with near real-time flow/rainfall measurements via the ADS IntelliServe web-based data collection and review platform. Each flow meter is equipped with a real-time high flow alarm system that reports high flow conditions to City staff in a timely manner. In addition to the long-term flow monitoring system, temporary or short-duration meters can be installed to collect flow data to confirm master plan recommended capacity projects, to assist the design of sewer improvement projects and the review of land use development projects, as well as to conduct inflow/infiltration investigation to further narrow down areas with high inflow/infiltration in response to rainfall.

Monitoring of flow and rainfall at strategic locations is necessary to understand the hydraulic performance of the sewer system and changes in sewer flow over time, to develop an accurate correlation between rainfall and inflow/infiltration into the system, to establish the effect of water conservation practices, and to provide additional data for on-going update, verification, and refinement of the hydraulic model. A few of the long-term meters are used to monitor flow dynamics downstream of the approved or potential development projects to determine the timing of an improvement project to provide capacity assurance for next development projects. Also, a few meters are placed at locations to monitor high flow and surcharge that may be caused by pipe conditions, groundwater fluctuation, and/or activities related to sewer maintenance and operations.

2. Support for Economic Development

City staff from DPW, DOT and ESD have been working very closely with outside agencies such as VTA, and developers to provide review and assistance to resolve sewer capacity issues for many land use development projects.

A development project may cause or increase the capacity deficiency of an existing sewer system. In such case, City staff will perform a capacity analysis and evaluate the degree of deficiencies and determine the urgency of an improvement project. Some of these sewer improvements may be constructed by the developments which could receive credits and partial cost reimbursement towards the improvements.

Development projects may be discharging to a sewer with existing capacity deficiencies. During the Phase II Master Plan study, existing deficiencies were identified at various locations in the sewer systems that serve the Diridon, Downtown, and some urban village planning areas. The City's capacity analysis determined that the following development projects would cause deficiencies or would connect to an already deficient sewer downstream:

- Diridon/Google Village/Downtown/BART Transit-Oriented Development (TOD) – multiple new and existing sewer deficiencies are identified downstream of one or more of these development projects.
- Flea Market – Additional intensification was proposed and would cause the need to upsize the existing twin siphon crossing under Coyote Creek.
- Perry Arrillaga – Development will contribute to an existing deficient sewer downstream on East Brokaw Road between 101 and Zanker Road.
- Stevens Creek at Lopina – Development would cause deficiencies in segments on South Kiely Blvd.

Master Plan team recommended a capacity improvement for each deficiency identified for development projects. All sewer improvement projects are required to be designed to convey flows generated by General Plan 2040 land use scenarios and to meet the City's sewer design standards.

IV. OPERATIONS AND MAINTENANCE

Funded directly from the Sewer Service and Use Charge Fund, the day-to-day maintenance and operation of the sanitary sewer collection system is primarily the responsibility of DOT. Functions performed by DOT generally include the following:

- Video inspection, cleaning, and removal of grease, roots, and other debris from the City's sewer lines with a focus on local collector lines.
- Repairing localized failures and deficiencies in the City's sewer mains and lower lateral pipes with City-approved cleanouts.

- Inspecting, maintaining, and repairing pumps and other pump station facilities.
- Responding to and resolving reported sewer problems.

The primary goal of DOT's maintenance functions is to reduce or eliminate occurrences of Sanitary Sewer Overflows (SSOs) in which untreated sewage escapes the sewer system due to a sewer line blockage or other system malfunction. DOT has invested in and implemented a multi-year plan which has greatly reduced the number and severity of SSOs that occur in the City each year. Specific elements of this plan include the following:

- Assigning specific cleaning frequencies (e.g. weekly, monthly, annually, etc.) to sewer line segments to prevent stoppages in known problematic areas.
- Performing sewer line inspections to identify needed cleaning, root control, and repairs.
- Managing the First Responder Program to ensure timely response to reported sewer problems and prevent and reduce the impact of SSOs.
- Optimizing the Computerized Maintenance Management System (CMMS) and analyzing the performance of the sewer system, identifying and planning effective maintenance strategies, and evaluating and managing the maintenance operations.
- Replacing obsolete and unreliable maintenance equipment and purchasing additional equipment to maximize the efficiency of the maintenance operations.
- Providing training for the sewer line cleaning crews.

Performance data and information indicate that DOT's SSO reduction plan has been successful in reducing SSOs. Table 3 below highlights some of the results achieved by DOT over the past six years.

Table 3 – Performance Improvement Result

Key Indicator	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19
Number of SSOs	101	97	55	58	22	42
SSOs per 100 miles of pipe per year	4.6	4.3	2.4	2.5	1.1	2.1
Gallons of sewage spilled to surface water	22,266	49,188	35,018	19,318	3,920	19,823
Percent of reported sewer problems responded to within 30 minutes	74%	71%	68%	69%	66%	57%
Percent of SSOs responded to within 30 minutes	86%	89%	81%	91%	86%	83%
Miles of sewer lines cleaned	984	1035	993	936	942	1,021

Note: Prior to FY 2012-13, DOT's timeliness standard for responding to reported sewer problems was 4 hours.

From FY 15-16 to the present, the results show a consistent trend in the number of SSOs, indicating that the investments and improvements made by DOT to reduce SSOs have paid off. The most significant contributor to the year to year variance in the total SSO number appears to be the amount of rainfall. The amount of rainfall during FY 17-18, was about half the normal amount of a typical storm season. The rainfall during FY 15-16, FY 16-17, and FY 18-19 was consistent with a typical storm season which shows the consistent trend. The number of gallons of sewage lost to surface water increased in FY 2018-2019 due to one large overflow. DOT restarted the Root Control program in FY 2018-2019 applying treatment to more than 21,000 linear feet of pipe. The rate of response to reported sewer problems within 30 minutes has continued to decrease slightly from a high in FY 2013-14 because of various factors, especially increased traffic congestion, particularly during rush hours, which may be attributed to recent economic growth in the region.

Currently, DOT receives approximately \$18 million in on-going funding each year to maintain and operate the sanitary sewer collection system. In FY 2015-2016, DOT was funded as a result of the River Watch Consent Decree with \$300,000 for creation of a sewer lateral repair grant. The program launched in October of 2018. Going forward, DOT believes the performance of the sanitary sewer system and the productivity of maintenance staff will be sustained with continuous investments in equipment, training, and personnel. Most notably, DOT will continue to enhance CMMS and invest in additional technology. Staffing alignments will continue to be analyzed to optimize field productivity, data collection and overall sewer system management.

V. CONCLUSION

The Sanitary Sewer Capital Improvement Program continues to utilize strategic planning tools such as the Sanitary Master Plan and Condition Assessment program, in addition to input from our Operations and Maintenance partners in the Department of Transportation, to prioritize and implement improvements to the sanitary sewer system. Construction of these improvements will ensure safe and reliable sewer service to current and future residents/businesses of San José and tributary agencies. Increasing regulatory oversight, reducing SSOs, and supporting economic development all require continued investment in active management, maintenance, and improvement of the City's 2,030 miles of sanitary sewer system. Increased capital funding for the sanitary capital program has increased our ability to maintain and enhance the system. The \$32 million annual transfer which began in FY 2015-16, while still being short of the targeted revenue of \$37 million per year, has allowed staff to deliver projects and clear up most of the backlogged repairs. The ending fund balance has been reduced significantly at the end of the year, and with the awarding of the Phase VI interceptor project of over \$42 million in FY 2017-2018, the accumulated ending fund balance has been further reduced.

- Thirteen (13) capital projects were awarded and twenty-seven (27) capital projects were completed to improve the capacity, restore the integrity and conveyance of the system, and/or reducing maintenance costs and the probability of SSOs and/or blockages.

- The Master Plan program has helped reduce the cost of development by providing efficiency in the sewer capacity review process and finding cost-effective measures to improve sewer capacity needed for land use development.
- 39,934 linear feet of structurally deficient sewer were removed and replaced.
- 66,569 linear feet of moderately deteriorated sewers were rehabilitated.
- 216 miles of sewers were inspected by closed circuit television inspection.
- Two of the most deteriorated sanitary pump stations were rehabilitated.
- The Sanitary Sewer Master Plan was continually updated and calibrated to develop and prioritize sanitary sewer capacity projects.
- The Condition Assessment program was developed and assists with development of a prioritized and proactive rehabilitation program.
- More than 909 miles of sewer lines were cleaned.
- The continued development of the Computerized Maintenance Management System and technology enhancements have contributed to planning effective maintenance strategies in order to maximize efficiency.