SEAL OF THE CITY OF SANTA BARBARA CALIFORNIA

Sewer System Management Plan
Volume II

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Appendix A1 Order (SWRCB Order No. 2006-0003-DWQ)

STATE WATER RESOURCES CONTROL BOARD
ORDER NO. 2006-0003-DWQ

STATEWIDE GENERAL WASTE DISCHARGE REQUIREMENTS FOR SANITARY SEWER SYSTEMS

The State Water Resources Control Board, hereinafter referred to as "State Water Board", finds that:

1. All federal and state agencies, municipalities, counties, districts, and other public entities that own or operate sanitary sewer systems greater than one mile in length that collect and/or convey untreated or partially treated wastewater to a publicly owned treatment facility in the State of California are required to comply with the terms of this Order. Such entities are hereinafter referred to as "Enrollees".

2. Sanitary sewer overflows (SSOs) are overflows from sanitary sewer systems of domestic wastewater, as well as industrial and commercial wastewater, depending on the pattern of land uses in the area served by the sanitary sewer system. SSOs often contain high levels of suspended solids, pathogenic organisms, toxic pollutants, nutrients, oxygen-demanding organic compounds, oil and grease and other pollutants. SSOs may cause a public nuisance, particularly when raw untreated wastewater is discharged to areas with high public exposure, such as streets or surface waters used for drinking, fishing, or body contact recreation. SSOs may pollute surface or ground waters, threaten public health, adversely affect aquatic life, and impair the recreational use and aesthetic enjoyment of surface waters.

3. Sanitary sewer systems experience periodic failures resulting in discharges that may affect waters of the state. There are many factors (including factors related to geology, design, construction methods and materials, age of the system, population growth, and system operation and maintenance), which affect the likelihood of an SSO. A proactive approach that requires Enrollees to ensure a system-wide operation, maintenance, and management plan is in place will reduce the number and frequency of SSOs within the state. This approach will in turn decrease the risk to human health and the environment caused by SSOs.

4. Major causes of SSOs include: grease blockages, root blockages, sewer line flood damage, manhole structure failures, vandalism, pump station mechanical failures, power outages, excessive storm or ground water inflow/infiltration, debris blockages, sanitary sewer system age and construction material failures, lack of proper operation and maintenance, insufficient capacity and contractor-caused damages. Many SSOs are preventable with adequate and appropriate facilities, source control measures and operation and maintenance of the sanitary sewer system.

SEWER SYSTEM MANAGEMENT PLANS

5. To facilitate proper funding and management of sanitary sewer systems, each Enrollee must develop and implement a system-specific Sewer System Management Plan (SSMP). To be effective, SSMPs must include provisions to provide proper and efficient management, operation, and maintenance of sanitary sewer systems, while taking into consideration risk management and cost benefit analysis. Additionally, an SSMP must contain a spill response plan that establishes standard procedures for immediate response to an SSO in a manner designed to minimize water quality impacts and potential nuisance conditions.

6. Many local public agencies in California have already developed SSMPs and implemented measures to reduce SSOs. These entities can build upon their existing efforts to establish a comprehensive SSMP consistent with this Order. Others, however, still require technical assistance and, in some cases, funding to improve sanitary sewer system operation and maintenance in order to reduce SSOs.

7. SSMP certification by technically qualified and experienced persons can provide a useful and cost-effective means for ensuring that SSMPs are developed and implemented appropriately.

8. It is the State Water Board's intent to gather additional information on the causes and sources of SSOs to augment existing information and to determine the full extent of SSOs and consequent public health and/or environmental impacts occurring in the State.

9. Both uniform SSO reporting and a centralized statewide electronic database are needed to collect information to allow the State Water Board and Regional Water Quality Control Boards (Regional Water Boards) to effectively analyze the extent of SSOs statewide and their potential impacts on beneficial uses and public health. The monitoring and reporting program required by this Order and the attached Monitoring and Reporting Program No. 2006-0003-DWQ, are necessary to assure compliance with these waste discharge requirements (WDRs).

10. Information regarding SSOs must be provided to Regional Water Boards and other regulatory agencies in a timely manner and be made available to the public in a complete, concise, and timely fashion.

11. Some Regional Water Boards have issued WDRs or WDRs that serve as National Pollution Discharge Elimination System (NPDES) permits to sanitary sewer system owners/operators within their jurisdictions. This Order establishes minimum requirements to prevent SSOs. Although it is the State Water Board's intent that this Order be the primary regulatory mechanism for sanitary sewer systems statewide, Regional Water Boards may issue more stringent or more

prescriptive WDRs for sanitary sewer systems. Upon issuance or reissuance of a Regional Water Board's WDRs for a system subject to this Order, the Regional Water Board shall coordinate its requirements with stated requirements within this Order, to identify requirements that are more stringent, to remove requirements that are less stringent than this Order, and to provide consistency in reporting.

REGULATORY CONSIDERATIONS

12. California Water Code section 13263 provides that the State Water Board may prescribe general WDRs for a category of discharges if the State Water Board finds or determines that:

    - The discharges are produced by the same or similar operations;
    - The discharges involve the same or similar types of waste;
    - The discharges require the same or similar treatment standards; and
    - The discharges are more appropriately regulated under general discharge requirements than individual discharge requirements.

    This Order establishes requirements for a class of operations, facilities, and discharges that are similar throughout the state.

13. The issuance of general WDRs to the Enrollees will:
    a) Reduce the administrative burden of issuing individual WDRs to each Enrollee;
    b) Provide for a unified statewide approach for the reporting and database tracking of SSOs;
    c) Establish consistent and uniform requirements for SSMP development and implementation;
    d) Provide statewide consistency in reporting; and
    e) Facilitate consistent enforcement for violations.

14. The beneficial uses of surface waters that can be impaired by SSOs include, but are not limited to, aquatic life, drinking water supply, body contact and non-contact recreation, and aesthetics. The beneficial uses of ground water that can be impaired include, but are not limited to, drinking water and agricultural supply. Surface and ground waters throughout the state support these uses to varying degrees.

15. The implementation of requirements set forth in this Order will ensure the reasonable protection of past, present, and probable future beneficial uses of water and the prevention of nuisance. The requirements implement the water quality control plans (Basin Plans) for each region and take into account the environmental characteristics of hydrographic units within the state. Additionally, the State Water Board has considered water quality conditions that could reasonably be achieved through the coordinated control of all factors that affect

water quality in the area, costs associated with compliance with these requirements, the need for developing housing within California, and the need to develop and use recycled water.

16. The Federal Clean Water Act largely prohibits any discharge of pollutants from a point source to waters of the United States except as authorized under an NPDES permit. In general, any point source discharge of sewage effluent to waters of the United States must comply with technology-based, secondary treatment standards, at a minimum, and any more stringent requirements necessary to meet applicable water quality standards and other requirements. Hence, the unpermitted discharge of wastewater from a sanitary sewer system to waters of the United States is illegal under the Clean Water Act. In addition, many Basin Plans adopted by the Regional Water Boards contain discharge prohibitions that apply to the discharge of untreated or partially treated wastewater. Finally, the California Water Code generally prohibits the discharge of waste to land prior to the filing of any required report of waste discharge and the subsequent issuance of either WDRs or a waiver of WDRs.

17. California Water Code section 13263 requires a water board to, after any necessary hearing, prescribe requirements as to the nature of any proposed discharge, existing discharge, or material change in an existing discharge. The requirements shall, among other things, take into consideration the need to prevent nuisance.

18. California Water Code section 13050, subdivision (m), defines nuisance as anything which meets all of the following requirements:
    a. Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property.
    b. Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal.
    c. Occurs during, or as a result of, the treatment or disposal of wastes.

19. This Order is consistent with State Water Board Resolution No. 68-16 (Statement of Policy with Respect to Maintaining High Quality of Waters in California) in that the Order imposes conditions to prevent impacts to water quality, does not allow the degradation of water quality, will not unreasonably affect beneficial uses of water, and will not result in water quality less than prescribed in State Water Board or Regional Water Board plans and policies.

20. The action to adopt this General Order is exempt from the California Environmental Quality Act (Public Resources Code §21000 et seq.) because it is an action taken by a regulatory agency to assure the protection of the environment and the regulatory process involves procedures for protection of the environment. (Cal. Code Regs., tit. 14, §15308). In addition, the action to adopt

this Order is exempt from CEQA pursuant to Cal.Code Regs., title 14, §15301 to the extent that it applies to existing sanitary sewer collection systems that constitute "existing facilities" as that term is used in Section 15301, and §15302, to the extent that it results in the repair or replacement of existing systems involving negligible or no expansion of capacity.

21. The Fact Sheet, which is incorporated by reference in the Order, contains supplemental information that was also considered in establishing these requirements.

22. The State Water Board has notified all affected public agencies and all known interested persons of the intent to prescribe general WDRs that require Enrollees to develop SSMPs and to report all SSOs.

23. The State Water Board conducted a public hearing on February 8, 2006, to receive oral and written comments on the draft order. The State Water Board received and considered, at its May 2, 2006, meeting, additional public comments on substantial changes made to the proposed general WDRs following the February 8, 2006, public hearing. The State Water Board has considered all comments pertaining to the proposed general WDRs.

IT IS HEREBY ORDERED, that pursuant to California Water Code section 13263, the Enrollees, their agents, successors, and assigns, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted hereunder, shall comply with the following:

A. DEFINITIONS

1. **Sanitary sewer overflow (SSO)** - Any overflow, spill, release, discharge or diversion of untreated or partially treated wastewater from a sanitary sewer system. SSOs include:
    - (i) Overflows or releases of untreated or partially treated wastewater that reach waters of the United States;
    - (ii) Overflows or releases of untreated or partially treated wastewater that do not reach waters of the United States; and
    - (iii) Wastewater backups into buildings and on private property that are caused by blockages or flow conditions within the publicly owned portion of a sanitary sewer system.

2. **Sanitary sewer system** – Any system of pipes, pump stations, sewer lines, or other conveyances, upstream of a wastewater treatment plant headworks used to collect and convey wastewater to the publicly owned treatment facility. Temporary storage and conveyance facilities (such as vaults, temporary piping, construction trenches, wet wells, impoundments, tanks, etc.) are considered to be part of the sanitary sewer system, and discharges into these temporary storage facilities are not considered to be SSOs.

For purposes of this Order, sanitary sewer systems include only those systems owned by public agencies that are comprised of more than one mile of pipes or sewer lines.

3. **Enrollee** - A federal or state agency, municipality, county, district, and other public entity that owns or operates a sanitary sewer system, as defined in the general WDRs, and that has submitted a complete and approved application for coverage under this Order.

4. **SSO Reporting System** – Online spill reporting system that is hosted, controlled, and maintained by the State Water Board. The web address for this site is http://ciwqs.waterboards.ca.gov. This online database is maintained on a secure site and is controlled by unique usernames and passwords.

5. **Untreated or partially treated wastewater** – Any volume of waste discharged from the sanitary sewer system upstream of a wastewater treatment plant headworks.

6. **Satellite collection system** – The portion, if any, of a sanitary sewer system owned or operated by a different public agency than the agency that owns and operates the wastewater treatment facility to which the sanitary sewer system is tributary.

7. **Nuisance** - California Water Code section 13050, subdivision (m), defines nuisance as anything which meets all of the following requirements:
    a. Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property.
    b. Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal.
    c. Occurs during, or as a result of, the treatment or disposal of wastes.

B. APPLICATION REQUIREMENTS

1. Deadlines for Application – All public agencies that currently own or operate sanitary sewer systems within the State of California must apply for coverage under the general WDRs within six (6) months of the date of adoption of the general WDRs. Additionally, public agencies that acquire or assume responsibility for operating sanitary sewer systems after the date of adoption of this Order must apply for coverage under the general WDRs at least three (3) months prior to operation of those facilities.

2. Applications under the general WDRs – In order to apply for coverage pursuant to the general WDRs, a legally authorized representative for each agency must submit a complete application package. Within sixty (60) days of adoption of the general WDRs, State Water Board staff will send specific instructions on how to

apply for coverage under the general WDRs to all known public agencies that own sanitary sewer systems. Agencies that do not receive notice may obtain applications and instructions online on the Water Board's website.

3. Coverage under the general WDRs – Permit coverage will be in effect once a complete application package has been submitted and approved by the State Water Board's Division of Water Quality.

C. PROHIBITIONS

1. Any SSO that results in a discharge of untreated or partially treated wastewater to waters of the United States is prohibited.

2. Any SSO that results in a discharge of untreated or partially treated wastewater that creates a nuisance as defined in California Water Code Section 13050(m) is prohibited.

D. PROVISIONS

1. The Enrollee must comply with all conditions of this Order. Any noncompliance with this Order constitutes a violation of the California Water Code and is grounds for enforcement action.

2. It is the intent of the State Water Board that sanitary sewer systems be regulated in a manner consistent with the general WDRs. Nothing in the general WDRs shall be:

   (i) Interpreted or applied in a manner inconsistent with the Federal Clean Water Act, or supersede a more specific or more stringent state or federal requirement in an existing permit, regulation, or administrative/judicial order or Consent Decree;
   (ii) Interpreted or applied to authorize an SSO that is illegal under either the Clean Water Act, an applicable Basin Plan prohibition or water quality standard, or the California Water Code;
   (iii) Interpreted or applied to prohibit a Regional Water Board from issuing an individual NPDES permit or WDR, superseding this general WDR, for a sanitary sewer system, authorized under the Clean Water Act or California Water Code; or
   (iv) Interpreted or applied to supersede any more specific or more stringent WDRs or enforcement order issued by a Regional Water Board.

3. The Enrollee shall take all feasible steps to eliminate SSOs. In the event that an SSO does occur, the Enrollee shall take all feasible steps to contain and mitigate the impacts of an SSO.

4. In the event of an SSO, the Enrollee shall take all feasible steps to prevent untreated or partially treated wastewater from discharging from storm drains into

flood control channels or waters of the United States by blocking the storm drainage system and by removing the wastewater from the storm drains.

5. All SSOs must be reported in accordance with Section G of the general WDRs.

6. In any enforcement action, the State and/or Regional Water Boards will consider the appropriate factors under the duly adopted State Water Board Enforcement Policy. And, consistent with the Enforcement Policy, the State and/or Regional Water Boards must consider the Enrollee's efforts to contain, control, and mitigate SSOs when considering the California Water Code Section 13327 factors. In assessing these factors, the State and/or Regional Water Boards will also consider whether:

   (i) The Enrollee has complied with the requirements of this Order, including requirements for reporting and developing and implementing a SSMP;

   (ii) The Enrollee can identify the cause or likely cause of the discharge event;

   (iii) There were no feasible alternatives to the discharge, such as temporary storage or retention of untreated wastewater, reduction of inflow and infiltration, use of adequate backup equipment, collecting and hauling of untreated wastewater to a treatment facility, or an increase in the capacity of the system as necessary to contain the design storm event identified in the SSMP. It is inappropriate to consider the lack of feasible alternatives, if the Enrollee does not implement a periodic or continuing process to identify and correct problems.

   (iv) The discharge was exceptional, unintentional, temporary, and caused by factors beyond the reasonable control of the Enrollee;

   (v) The discharge could have been prevented by the exercise of reasonable control described in a certified SSMP for:
   - Proper management, operation and maintenance;
   - Adequate treatment facilities, sanitary sewer system facilities, and/or components with an appropriate design capacity, to reasonably prevent SSOs (e.g., adequately enlarging treatment or collection facilities to accommodate growth, infiltration and inflow (I/I), etc.);
   - Preventive maintenance (including cleaning and fats, oils, and grease (FOG) control);
   - Installation of adequate backup equipment; and
   - Inflow and infiltration prevention and control to the extent practicable.

   (vi) The sanitary sewer system design capacity is appropriate to reasonably prevent SSOs.

(vii) The Enrollee took all reasonable steps to stop and mitigate the impact of the discharge as soon as possible.

7. When a sanitary sewer overflow occurs, the Enrollee shall take all feasible steps and necessary remedial actions to 1) control or limit the volume of untreated or partially treated wastewater discharged, 2) terminate the discharge, and 3) recover as much of the wastewater discharged as possible for proper disposal, including any wash down water.

   The Enrollee shall implement all remedial actions to the extent they may be applicable to the discharge and not inconsistent with an emergency response plan, including the following:

   (i) Interception and rerouting of untreated or partially treated wastewater flows around the wastewater line failure;
   (ii) Vacuum truck recovery of sanitary sewer overflows and wash down water;
   (iii) Cleanup of debris at the overflow site;
   (iv) System modifications to prevent another SSO at the same location;
   (v) Adequate sampling to determine the nature and impact of the release; and
   (vi) Adequate public notification to protect the public from exposure to the SSO.

8. The Enrollee shall properly, manage, operate, and maintain all parts of the sanitary sewer system owned or operated by the Enrollee, and shall ensure that the system operators (including employees, contractors, or other agents) are adequately trained and possess adequate knowledge, skills, and abilities.

9. The Enrollee shall allocate adequate resources for the operation, maintenance, and repair of its sanitary sewer system, by establishing a proper rate structure, accounting mechanisms, and auditing procedures to ensure an adequate measure of revenues and expenditures. These procedures must be in compliance with applicable laws and regulations and comply with generally acceptable accounting practices.

10. The Enrollee shall provide adequate capacity to convey base flows and peak flows, including flows related to wet weather events. Capacity shall meet or exceed the design criteria as defined in the Enrollee's System Evaluation and Capacity Assurance Plan for all parts of the sanitary sewer system owned or operated by the Enrollee.

11. The Enrollee shall develop and implement a written Sewer System Management Plan (SSMP) and make it available to the State and/or Regional Water Board upon request. A copy of this document must be publicly available at the Enrollee's office and/or available on the Internet. This SSMP must be approved by the Enrollee's governing board at a public meeting.

12. In accordance with the California Business and Professions Code sections 6735, 7835, and 7835.1, all engineering and geologic evaluations and judgments shall be performed by or under the direction of registered professionals competent and proficient in the fields pertinent to the required activities. Specific elements of the SSMP that require professional evaluation and judgments shall be prepared by or under the direction of appropriately qualified professionals, and shall bear the professional(s)' signature and stamp.

13. The mandatory elements of the SSMP are specified below. However, if the Enrollee believes that any element of this section is not appropriate or applicable to the Enrollee's sanitary sewer system, the SSMP program does not need to address that element. The Enrollee must justify why that element is not applicable. The SSMP must be approved by the deadlines listed in the SSMP Time Schedule below.

Sewer System Management Plan (SSMP)

(i) **Goal**: The goal of the SSMP is to provide a plan and schedule to properly manage, operate, and maintain all parts of the sanitary sewer system. This will help reduce and prevent SSOs, as well as mitigate any SSOs that do occur.

(ii) **Organization**: The SSMP must identify:

(a) The name of the responsible or authorized representative as described in Section J of this Order.

(b) The names and telephone numbers for management, administrative, and maintenance positions responsible for implementing specific measures in the SSMP program. The SSMP must identify lines of authority through an organization chart or similar document with a narrative explanation; and

(c) The chain of communication for reporting SSOs, from receipt of a complaint or other information, including the person responsible for reporting SSOs to the State and Regional Water Board and other agencies if applicable (such as County Health Officer, County Environmental Health Agency, Regional Water Board, and/or State Office of Emergency Services (OES)).

(iii) **Legal Authority:** Each Enrollee must demonstrate, through sanitary sewer system use ordinances, service agreements, or other legally binding procedures, that it possesses the necessary legal authority to:

(a) Prevent illicit discharges into its sanitary sewer system (examples may include I/I, stormwater, chemical dumping, unauthorized debris and cut roots, etc.);

(b) Require that sewers and connections be properly designed and constructed;

(c) Ensure access for maintenance, inspection, or repairs for portions of the lateral owned or maintained by the Public Agency;

(d) Limit the discharge of fats, oils, and grease and other debris that may cause blockages, and

(e) Enforce any violation of its sewer ordinances.

(iv) **Operation and Maintenance Program**. The SSMP must include those elements listed below that are appropriate and applicable to the Enrollee's system:

(a) Maintain an up-to-date map of the sanitary sewer system, showing all gravity line segments and manholes, pumping facilities, pressure pipes and valves, and applicable stormwater conveyance facilities;

(b) Describe routine preventive operation and maintenance activities by staff and contractors, including a system for scheduling regular maintenance and cleaning of the sanitary sewer system with more frequent cleaning and maintenance targeted at known problem areas. The Preventative Maintenance (PM) program should have a system to document scheduled and conducted activities, such as work orders;

(c) Develop a rehabilitation and replacement plan to identify and prioritize system deficiencies and implement short-term and long-term rehabilitation actions to address each deficiency. The program should include regular visual and TV inspections of manholes and sewer pipes, and a system for ranking the condition of sewer pipes and scheduling rehabilitation. Rehabilitation and replacement should focus on sewer pipes that are at risk of collapse or prone to more frequent blockages due to pipe defects. Finally, the rehabilitation and replacement plan should include a capital improvement plan that addresses proper management and protection of the infrastructure assets. The plan shall include a time schedule for implementing the short- and long-term plans plus a schedule for developing the funds needed for the capital improvement plan;

(d) Provide training on a regular basis for staff in sanitary sewer system operations and maintenance, and require contractors to be appropriately trained; and

(e) Provide equipment and replacement part inventories, including identification of critical replacement parts.

(v) **Design and Performance Provisions**:

(a) Design and construction standards and specifications for the installation of new sanitary sewer systems, pump stations and other appurtenances; and for the rehabilitation and repair of existing sanitary sewer systems; and

(b) Procedures and standards for inspecting and testing the installation of new sewers, pumps, and other appurtenances and for rehabilitation and repair projects.

(vi) **Overflow Emergency Response Plan -** Each Enrollee shall develop and implement an overflow emergency response plan that identifies measures to protect public health and the environment. At a minimum, this plan must include the following:

(a) Proper notification procedures so that the primary responders and regulatory agencies are informed of all SSOs in a timely manner;

(b) A program to ensure an appropriate response to all overflows;

(c) Procedures to ensure prompt notification to appropriate regulatory agencies and other potentially affected entities (e.g. health agencies, Regional Water Boards, water suppliers, etc.) of all SSOs that potentially affect public health or reach the waters of the State in accordance with the MRP. All SSOs shall be reported in accordance with this MRP, the California Water Code, other State Law, and other applicable Regional Water Board WDRs or NPDES permit requirements. The SSMP should identify the officials who will receive immediate notification;

(d) Procedures to ensure that appropriate staff and contractor personnel are aware of and follow the Emergency Response Plan and are appropriately trained;

(e) Procedures to address emergency operations, such as traffic and crowd control and other necessary response activities; and

(f) A program to ensure that all reasonable steps are taken to contain and prevent the discharge of untreated and partially treated wastewater to waters of the United States and to minimize or correct any adverse impact on the environment resulting from the SSOs, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the discharge.

(vii) **FOG Control Program:** Each Enrollee shall evaluate its service area to determine whether a FOG control program is needed. If an Enrollee determines that a FOG program is not needed, the Enrollee must provide justification for why it is not needed. If FOG is found to be a problem, the Enrollee must prepare and implement a FOG source control program to reduce the amount of these substances discharged to the sanitary sewer system. This plan shall include the following as appropriate:

(a) An implementation plan and schedule for a public education outreach program that promotes proper disposal of FOG;

(b) A plan and schedule for the disposal of FOG generated within the sanitary sewer system service area. This may include a list of acceptable disposal facilities and/or additional facilities needed to adequately dispose of FOG generated within a sanitary sewer system service area;

(c) The legal authority to prohibit discharges to the system and identify measures to prevent SSOs and blockages caused by FOG;

(d) Requirements to install grease removal devices (such as traps or interceptors), design standards for the removal devices, maintenance requirements, BMP requirements, record keeping and reporting requirements;

(e) Authority to inspect grease producing facilities, enforcement authorities, and whether the Enrollee has sufficient staff to inspect and enforce the FOG ordinance;

(f) An identification of sanitary sewer system sections subject to FOG blockages and establishment of a cleaning maintenance schedule for each section; and

(g) Development and implementation of source control measures for all sources of FOG discharged to the sanitary sewer system for each section identified in (f) above.

(viii) **System Evaluation and Capacity Assurance Plan**: The Enrollee shall prepare and implement a capital improvement plan (CIP) that will provide hydraulic capacity of key sanitary sewer system elements for dry weather peak flow conditions, as well as the appropriate design storm or wet weather event. At a minimum, the plan must include:

(a) **Evaluation**: Actions needed to evaluate those portions of the sanitary sewer system that are experiencing or contributing to an SSO discharge caused by hydraulic deficiency. The evaluation must provide estimates of peak flows (including flows from SSOs that escape from the system) associated with conditions similar to those causing overflow events, estimates of the capacity of key system components, hydraulic deficiencies (including components of the system with limiting capacity) and the major sources that contribute to the peak flows associated with overflow events;

(b) **Design Criteria:** Where design criteria do not exist or are deficient, undertake the evaluation identified in (a) above to establish appropriate design criteria; and

(c) **Capacity Enhancement Measures:** The steps needed to establish a short- and long-term CIP to address identified hydraulic deficiencies, including prioritization, alternatives analysis, and schedules. The CIP may include increases in pipe size, I/I reduction programs, increases and redundancy in pumping capacity, and storage facilities. The CIP shall include an implementation schedule and shall identify sources of funding.

(d) **Schedule:** The Enrollee shall develop a schedule of completion dates for all portions of the capital improvement program developed in (a)-(c) above. This schedule shall be reviewed and updated consistent with the SSMP review and update requirements as described in Section D. 14.

(ix) **Monitoring, Measurement, and Program Modifications:** The Enrollee shall:

(a) Maintain relevant information that can be used to establish and prioritize appropriate SSMP activities;

(b) Monitor the implementation and, where appropriate, measure the effectiveness of each element of the SSMP;

(c) Assess the success of the preventative maintenance program;

(d) Update program elements, as appropriate, based on monitoring or performance evaluations; and

(e) Identify and illustrate SSO trends, including: frequency, location, and volume.

(x) **SSMP Program Audits** - As part of the SSMP, the Enrollee shall conduct periodic internal audits, appropriate to the size of the system and the number of SSOs. At a minimum, these audits must occur every two years and a report must be prepared and kept on file. This audit shall focus on evaluating the effectiveness of the SSMP and the

Enrollee's compliance with the SSMP requirements identified in this subsection (D.13), including identification of any deficiencies in the SSMP and steps to correct them.

(xi) **Communication Program** – The Enrollee shall communicate on a regular basis with the public on the development, implementation, and performance of its SSMP. The communication system shall provide the public the opportunity to provide input to the Enrollee as the program is developed and implemented.

The Enrollee shall also create a plan of communication with systems that are tributary and/or satellite to the Enrollee's sanitary sewer system.

14. Both the SSMP and the Enrollee's program to implement the SSMP must be certified by the Enrollee to be in compliance with the requirements set forth above and must be presented to the Enrollee's governing board for approval at a public meeting. The Enrollee shall certify that the SSMP, and subparts thereof, are in compliance with the general WDRs within the time frames identified in the time schedule provided in subsection D.15, below.

In order to complete this certification, the Enrollee's authorized representative must complete the certification portion in the Online SSO Database Questionnaire by checking the appropriate milestone box, printing and signing the automated form, and sending the form to:

State Water Resources Control Board
Division of Water Quality
Attn: SSO Program Manager
P.O. Box 100
Sacramento, CA 95812

The SSMP must be updated every five (5) years, and must include any significant program changes. Re-certification by the governing board of the Enrollee is required in accordance with D.14 when significant updates to the SSMP are made. To complete the re-certification process, the Enrollee shall enter the data in the Online SSO Database and mail the form to the State Water Board, as described above.

15. The Enrollee shall comply with these requirements according to the following schedule. This time schedule does not supersede existing requirements or time schedules associated with other permits or regulatory requirements.

Sewer System Management Plan Time Schedule

Task and Associated Section	**Completion Date**			
	Population > 100,000	Population between 100,000 and 10,000	Population between 10,000 and 2,500	Population < 2,500
Application for Permit Coverage **_Section C_**	6 months after WDRs Adoption			
Reporting Program **_Section G_**	6 months after WDRs Adoption[1]			
SSMP Development Plan and Schedule **_No specific Section_**	9 months after WDRs Adoption[2]	12 months after WDRs Adoption[2]	15 months after WDRs Adoption[2]	18 months after WDRs Adoption[2]
Goals and Organization Structure **_Section D 13 (i) & (ii)_**	12 months after WDRs Adoption[2]		18 months after WDRs Adoption[2]	
Overflow Emergency Response Program **_Section D 13 (vi)_**	24 months after WDRs Adoption[2]	30 months after WDRs Adoption[2]	36 months after WDRs Adoption[2]	39 months after WDRs Adoption[2]
Legal Authority **_Section D 13 (iii)_**				
Operation and Maintenance Program **_Section D 13 (iv)_**				
Grease Control Program **_Section D 13 (vii)_**				
Design and Performance **_Section D 13 (v)_**	36 months after WDRs Adoption	39 months after WDRs Adoption	48 months after WDRs Adoption	51 months after WDRs Adoption
System Evaluation and Capacity Assurance Plan **_Section D 13 (viii)_**				
Final SSMP, incorporating all of the SSMP requirements **_Section D 13_**				

1. In the event that by July 1, 2006 the Executive Director is able to execute a memorandum of agreement (MOA) with the California Water Environment Association (CWEA) or discharger representatives outlining a strategy and time schedule for CWEA or another entity to provide statewide training on the adopted monitoring program, SSO database electronic reporting, and SSMP development, consistent with this Order, then the schedule of Reporting Program Section G shall be replaced with the following schedule:

Reporting Program ***Section G***	
Regional Boards 4, 8, and 9	8 months after WDRs Adoption
Regional Boards 1, 2, and 3	12 months after WDRs Adoption
Regional Boards 5, 6, and 7	16 months after WDRs Adoption

If this MOU is not executed by July 1, 2006, the reporting program time schedule will remain six (6) months for all regions and agency size categories.

2. In the event that the Executive Director executes the MOA identified in note 1 by July 1, 2006, then the deadline for this task shall be extended by six (6) months. The time schedule identified in the MOA must be consistent with the extended time schedule provided by this note. If the MOA is not executed by July 1, 2006, the six (6) month time extension will not be granted.

E. WDRs and SSMP AVAILABILITY

1. A copy of the general WDRs and the certified SSMP shall be maintained at appropriate locations (such as the Enrollee's offices, facilities, and/or Internet homepage) and shall be available to sanitary sewer system operating and maintenance personnel at all times.

F. ENTRY AND INSPECTION

1. The Enrollee shall allow the State or Regional Water Boards or their authorized representative, upon presentation of credentials and other documents as may be required by law, to:

    a. Enter upon the Enrollee's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order;

    b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and

d. Sample or monitor at reasonable times, for the purposes of assuring compliance with this Order or as otherwise authorized by the California Water Code, any substances or parameters at any location.

G. GENERAL MONITORING AND REPORTING REQUIREMENTS

1. The Enrollee shall furnish to the State or Regional Water Board, within a reasonable time, any information that the State or Regional Water Board may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order. The Enrollee shall also furnish to the Executive Director of the State Water Board or Executive Officer of the applicable Regional Water Board, upon request, copies of records required to be kept by this Order.

2. The Enrollee shall comply with the attached Monitoring and Reporting Program No. 2006-0003 and future revisions thereto, as specified by the Executive Director. Monitoring results shall be reported at the intervals specified in Monitoring and Reporting Program No. 2006-0003. Unless superseded by a specific enforcement Order for a specific Enrollee, these reporting requirements are intended to replace other mandatory routine written reports associated with SSOs.

3. All Enrollees must obtain SSO Database accounts and receive a “Username” and “Password” by registering through the California Integrated Water Quality System (CIWQS). These accounts will allow controlled and secure entry into the SSO Database. Additionally, within 30days of receiving an account and prior to recording spills into the SSO Database, all Enrollees must complete the “Collection System Questionnaire”, which collects pertinent information regarding a Enrollee’s collection system. The “Collection System Questionnaire” must be updated at least every 12 months.

4. Pursuant to Health and Safety Code section 5411.5, any person who, without regard to intent or negligence, causes or permits any untreated wastewater or other waste to be discharged in or on any waters of the State, or discharged in or deposited where it is, or probably will be, discharged in or on any surface waters of the State, as soon as that person has knowledge of the discharge, shall immediately notify the local health officer of the discharge. Discharges of untreated or partially treated wastewater to storm drains and drainage channels, whether man-made or natural or concrete-lined, shall be reported as required above.

   Any SSO greater than 1,000 gallons discharged in or on any waters of the State, or discharged in or deposited where it is, or probably will be, discharged in or on any surface waters of the State shall also be reported to the Office of Emergency Services pursuant to California Water Code section 13271.

H. CHANGE IN OWNERSHIP

1. This Order is not transferable to any person or party, except after notice to the Executive Director. The Enrollee shall submit this notice in writing at least 30 days in advance of any proposed transfer. The notice must include a written agreement between the existing and new Enrollee containing a specific date for the transfer of this Order's responsibility and coverage between the existing Enrollee and the new Enrollee. This agreement shall include an acknowledgement that the existing Enrollee is liable for violations up to the transfer date and that the new Enrollee is liable from the transfer date forward.

I. INCOMPLETE REPORTS

1. If an Enrollee becomes aware that it failed to submit any relevant facts in any report required under this Order, the Enrollee shall promptly submit such facts or information by formally amending the report in the Online SSO Database.

J. REPORT DECLARATION

1. All applications, reports, or information shall be signed and certified as follows:

    (i) All reports required by this Order and other information required by the State or Regional Water Board shall be signed and certified by a person designated, for a municipality, state, federal or other public agency, as either a principal executive officer or ranking elected official, or by a duly authorized representative of that person, as described in paragraph (ii) of this provision. (For purposes of electronic reporting, an electronic signature and accompanying certification, which is in compliance with the Online SSO database procedures, meet this certification requirement.)

    (ii) An individual is a duly authorized representative only if:

        (a) The authorization is made in writing by a person described in paragraph (i) of this provision; and

        (b) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity.

K. CIVIL MONETARY REMEDIES FOR DISCHARGE VIOLATIONS

1. The California Water Code provides various enforcement options, including civil monetary remedies, for violations of this Order.

2. The California Water Code also provides that any person failing or refusing to furnish technical or monitoring program reports, as required under this Order, or

falsifying any information provided in the technical or monitoring reports is subject to civil monetary penalties.

L. SEVERABILITY

1. The provisions of this Order are severable, and if any provision of this Order, or the application of any provision of this Order to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this Order, shall not be affected thereby.

2. This order does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to persons or property, nor protect the Enrollee from liability under federal, state or local laws, nor create a vested right for the Enrollee to continue the waste discharge.

CERTIFICATION

The undersigned Clerk to the State Water Board does hereby certify that the foregoing is a full, true, and correct copy of general WDRs duly and regularly adopted at a meeting of the State Water Resources Control Board held on May 2, 2006.

AYE: Tam M. Doduc
Gerald D. Secundy

NO: Arthur G. Baggett

ABSENT: None

ABSTAIN: None

Song Her
Clerk to the Board

STATE OF CALIFORNIA
WATER RESOURCES CONTROL BOARD
ORDER NO. WQ 2013-0058-EXEC

AMENDING MONITORING AND REPORTING PROGRAM FOR STATEWIDE GENERAL WASTE DISCHARGE REQUIREMENTS FOR SANITARY SEWER SYSTEMS

The State of California, Water Resources Control Board (hereafter State Water Board) finds:

1. The State Water Board is authorized to prescribe statewide general Waste Discharge Requirements (WDRs) for categories of discharges that involve the same or similar operations and the same or similar types of waste pursuant to Water Code section 13263(i).
2. Water Code section 13193 *et seq.* requires the Regional Water Quality Control Boards (Regional Water Boards) and the State Water Board (collectively, the Water Boards) to gather Sanitary Sewer Overflow (SSO) information and make this information available to the public, including but not limited to, SSO cause, estimated volume, location, date, time, duration, whether or not the SSO reached or may have reached waters of the state, response and corrective action taken, and an enrollee's contact information for each SSO event. An enrollee is defined as the public entity having legal authority over the operation and maintenance of, or capital improvements to, a sanitary sewer system greater than one mile in length.
3. Water Code section 13271, *et seq.* requires notification to the California Office of Emergency Services (Cal OES), formerly the California Emergency Management Agency, for certain unauthorized discharges, including SSOs.
4. On May 2, 2006, the State Water Board adopted Order 2006-0003-DWQ, "Statewide Waste Discharge Requirements for Sanitary Sewer Systems"[1] (hereafter SSS WDRs) to comply with Water Code section 13193 and to establish the framework for the statewide SSO Reduction Program.
5. Subsection G.2 of the SSS WDRs and the Monitoring and Reporting Program (MRP) provide that the Executive Director may modify the terms of the MRP at any time.
6. On February 20, 2008, the State Water Board Executive Director adopted a revised MRP for the SSS WDRs to rectify early notification deficiencies and ensure that first responders are notified in a timely manner of SSOs discharged into waters of the state.
7. When notified of an SSO that reaches a drainage channel or surface water of the state, Cal OES, pursuant to Water Code section 13271(a)(3), forwards the SSO notification information[2] to local government agencies and first responders including local public health officials and the applicable Regional Water Board. Receipt of notifications for a single SSO event from both the SSO reporter

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[1] Available for download at:
http://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2006/wqo/wqo2006_0003.pdf

[2] Cal OES Hazardous Materials Spill Reports available Online at:
http://w3.calema.ca.gov/operational/malhaz.nsf/$defaultview and http://w3.calema.ca.gov/operational/malhaz.nsf

and Cal OES is duplicative. To address this, the SSO notification requirements added by the February 20, 2008 MRP revision are being removed in this MRP revision.

8. In the February 28, 2008 Memorandum of Agreement between the State Water Board and the California Water and Environment Association (CWEA), the State Water Board committed to re-designing the CIWQS[3] Online SSO Database to allow "event" based SSO reporting versus the original "location" based reporting. Revisions to this MRP and accompanying changes to the CIWQS Online SSO Database will implement this change by allowing for multiple SSO appearance points to be associated with each SSO event caused by a single asset failure.

9. Based on stakeholder input and Water Board staff experience implementing the SSO Reduction Program, SSO categories have been revised in this MRP. In the prior version of the MRP, SSOs have been categorized as Category 1 or Category 2. This MRP implements changes to SSO categories by adding a Category 3 SSO type. This change will improve data management to further assist Water Board staff with evaluation of high threat and low threat SSOs by placing them in unique categories (i.e., Category 1 and Category 3, respectively). This change will also assist enrollees in identifying SSOs that require Cal OES notification.

10. Based on over six years of implementation of the SSS WDRs, the State Water Board concludes that the February 20, 2008 MRP must be updated to better advance the SSO Reduction Program[4] objectives, assess compliance, and enforce the requirements of the SSS WDRs.

IT IS HEREBY ORDERED THAT:

Pursuant to the authority delegated by Water Code section 13267(f), Resolution 2002-0104, and Order 2006-0003-DWQ, the MRP for the SSS WDRs (Order 2006-0003-DWQ) is hereby amended as shown in Attachment A and shall be effective on September 9, 2013.

8/6/13
Date

Thomas Howard
Executive Director

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[3] California Integrated Water Quality System (CIWQS) publicly available at http://www.waterboards.ca.gov/ciwqs/publicreports.shtml

[4] Statewide Sanitary Sewer Overflow Reduction Program information is available at: http://www.waterboards.ca.gov/water_issues/programs/sso/

Appendix A2 Monitoring and Reporting Requirements

Order No. WQ 2013-0058-EXEC

ATTACHMENT A

STATE WATER RESOURCES CONTROL BOARD
ORDER NO. WQ 2013-0058-EXEC

AMENDING MONITORING AND REPORTING PROGRAM
FOR
STATEWIDE GENERAL WASTE DISCHARGE REQUIREMENTS FOR
SANITARY SEWER SYSTEMS

This Monitoring and Reporting Program (MRP) establishes monitoring, record keeping, reporting and public notification requirements for Order 2006-0003-DWQ, “Statewide General Waste Discharge Requirements for Sanitary Sewer Systems” (SSS WDRs). This MRP shall be effective from September 9, 2013 until it is rescinded. The Executive Director may make revisions to this MRP at any time. These revisions may include a reduction or increase in the monitoring and reporting requirements. All site specific records and data developed pursuant to the SSS WDRs and this MRP shall be complete, accurate, and justified by evidence maintained by the enrollee. Failure to comply with this MRP may subject an enrollee to civil liabilities of up to $5,000 a day per violation pursuant to Water Code section 13350; up to $1,000 a day per violation pursuant to Water Code section 13268; or referral to the Attorney General for judicial civil enforcement. The State Water Resources Control Board (State Water Board) reserves the right to take any further enforcement action authorized by law.

A. SUMMARY OF MRP REQUIREMENTS

Table 1 – Spill Categories and Definitions

CATEGORIES	**DEFINITIONS** [see Section A on page 5 of Order 2006-0003-DWQ, for Sanitary Sewer Overflow (SSO) definition]
CATEGORY 1	Discharges of untreated or partially treated wastewater of **any volume** resulting from an enrollee’s sanitary sewer system failure or flow condition that: • Reach surface water and/or reach a drainage channel tributary to a surface water; or • Reach a Municipal Separate Storm Sewer System (MS4) and are not fully captured and returned to the sanitary sewer system or not otherwise captured and disposed of properly. Any volume of wastewater not recovered from the MS4 is considered to have reached surface water unless the storm drain system discharges to a dedicated storm water or groundwater infiltration basin (e.g., infiltration pit, percolation pond).
CATEGORY 2	Discharges of untreated or partially treated wastewater of **1,000 gallons or greater** resulting from an enrollee’s sanitary sewer system failure or flow condition that **do not** reach surface water, a drainage channel, or a MS4 unless the entire SSO discharged to the storm drain system is fully recovered and disposed of properly.
CATEGORY 3	All other discharges of untreated or partially treated wastewater resulting from an enrollee’s sanitary sewer system failure or flow condition.
PRIVATE LATERAL SEWAGE DISCHARGE (PLSD)	Discharges of untreated or partially treated wastewater resulting from blockages or other problems **within a privately owned sewer lateral** connected to the enrollee’s sanitary sewer system or from other private sewer assets. PLSDs that the enrollee becomes aware of may be voluntarily reported to the California Integrated Water Quality System (CIWQS) Online SSO Database.

Table 2 – Notification, Reporting, Monitoring, and Record Keeping Requirements

ELEMENT	REQUIREMENT	METHOD
NOTIFICATION **(see section B of MRP)**	• Within two hours of becoming aware of any Category 1 SSO **<u>greater than or equal to 1,000 gallons discharged to surface water or spilled in a location where it probably will be discharged to surface water</u>**, notify the California Office of Emergency Services (Cal OES) and obtain a notification control number.	Call Cal OES at: **(800) 852-7550**
REPORTING **(see section C of MRP)**	• Category 1 SSO: Submit draft report within three business days of becoming aware of the SSO and certify within 15 calendar days of SSO end date. • Category 2 SSO: Submit draft report within 3 business days of becoming aware of the SSO and certify within 15 calendar days of the SSO end date. • Category 3 SSO: Submit certified report within 30 calendar days of the end of month in which SSO the occurred. • SSO Technical Report: Submit within 45 calendar days after the end date of any Category 1 SSO in which 50,000 gallons or greater are spilled to surface waters. • "No Spill" Certification: Certify that no SSOs occurred within 30 calendar days of the end of the month or, if reporting quarterly, the quarter in which no SSOs occurred. • Collection System Questionnaire: Update and certify every 12 months.	Enter data into the CIWQS Online SSO Database (<u>http://ciwqs.waterboards.ca.gov/</u>), certified by enrollee's Legally Responsible Official(s).
WATER QUALITY MONITORING **(see section D of MRP)**	• Conduct water quality sampling **<u>within 48 hours</u>** after initial SSO notification for Category 1 SSOs in which 50,000 gallons or greater are spilled to surface waters.	Water quality results are required to be uploaded into CIWQS for Category 1 SSOs in which 50,000 gallons or greater are spilled to surface waters.
RECORD KEEPING **(see section E of MRP)**	• SSO event records. • Records documenting Sanitary Sewer Management Plan (SSMP) implementation and changes/updates to the SSMP. • Records to document Water Quality Monitoring for SSOs of 50,000 gallons or greater spilled to surface waters. • Collection system telemetry records if relied upon to document and/or estimate SSO Volume.	Self-maintained records shall be available during inspections or upon request.

B. NOTIFICATION REQUIREMENTS

Although Regional Water Quality Control Boards (Regional Water Boards) and the State Water Board (collectively, the Water Boards) staff do not have duties as first responders, this MRP is an appropriate mechanism to ensure that the agencies that have first responder duties are notified in a timely manner in order to protect public health and beneficial uses.

1. For any Category 1 SSO greater than or equal to 1,000 gallons that results in a discharge to a surface water or spilled in a location where it probably will be discharged to surface water, either directly or by way of a drainage channel or MS4, the enrollee shall, as soon as possible, but not later than two (2) hours after (A) the enrollee has knowledge of the discharge, (B) notification is possible, and (C) notification can be provided without substantially impeding cleanup or other emergency measures, notify the Cal OES and obtain a notification control number.

2. To satisfy notification requirements for each applicable SSO, the enrollee shall provide the information requested by Cal OES before receiving a control number. Spill information requested by Cal OES may include:

   i. Name of person notifying Cal OES and direct return phone number.
   ii. Estimated SSO volume discharged (gallons).
   iii. If ongoing, estimated SSO discharge rate (gallons per minute).
   iv. SSO Incident Description:
      a. Brief narrative.
      b. On-scene point of contact for additional information (name and cell phone number).
      c. Date and time enrollee became aware of the SSO.
      d. Name of sanitary sewer system agency causing the SSO.
      e. SSO cause (if known).
   v. Indication of whether the SSO has been contained.
   vi. Indication of whether surface water is impacted.
   vii. Name of surface water impacted by the SSO, if applicable.
   viii. Indication of whether a drinking water supply is or may be impacted by the SSO.
   ix. Any other known SSO impacts.
   x. SSO incident location (address, city, state, and zip code).

3. Following the initial notification to Cal OES and until such time that an enrollee certifies the SSO report in the CIWQS Online SSO Database, the enrollee shall provide updates to Cal OES regarding substantial changes to the estimated volume of untreated or partially treated sewage discharged and any substantial change(s) to known impact(s).

4. PLSDs: The enrollee is strongly encouraged to notify Cal OES of discharges greater than or equal to 1,000 gallons of untreated or partially treated wastewater that result or may result in a discharge to surface water resulting from failures or flow conditions within a privately owned sewer lateral or from other private sewer asset(s) if the enrollee becomes aware of the PLSD.

C. REPORTING REQUIREMENTS

1. **CIWQS Online SSO Database Account:** All enrollees shall obtain a CIWQS Online SSO Database account and receive a "Username" and "Password" by registering through CIWQS. These accounts allow controlled and secure entry into the CIWQS Online SSO Database.

2. **SSO Mandatory Reporting Information:** For reporting purposes, if one SSO event results in multiple appearance points in a sewer system asset, the enrollee shall complete one SSO report in the CIWQS Online SSO Database which includes the GPS coordinates for the location of the SSO appearance point closest to the failure point, blockage or location of the flow condition that caused the SSO, and provide descriptions of the locations of all other discharge points associated with the SSO event.

3. **SSO Categories**

   i. **Category 1** – Discharges of untreated or partially treated wastewater of any volume resulting from an enrollee's sanitary sewer system failure or flow condition that:

      a. Reach surface water and/or reach a drainage channel tributary to a surface water; or

      b. Reach a MS4 and are not fully captured and returned to the sanitary sewer system or not otherwise captured and disposed of properly. Any volume of wastewater not recovered from the MS4 is considered to have reached surface water unless the storm drain system discharges to a dedicated storm water or groundwater infiltration basin (e.g., infiltration pit, percolation pond).

   ii. **Category 2** – Discharges of untreated or partially treated wastewater greater than or equal to 1,000 gallons resulting from an enrollee's sanitary sewer system failure or flow condition that does not reach a surface water, a drainage channel, or the MS4 unless the entire SSO volume discharged to the storm drain system is fully recovered and disposed of properly.

   iii. **Category 3** – All other discharges of untreated or partially treated wastewater resulting from an enrollee's sanitary sewer system failure or flow condition.

4. **Sanitary Sewer Overflow Reporting to CIWQS - Timeframes**

   i. **Category 1 and Category 2 SSOs** – All SSOs that meet the above criteria for Category 1 or Category 2 SSOs shall be reported to the CIWQS Online SSO Database:

      a. Draft reports for Category 1 and Category 2 SSOs shall be submitted to the CIWQS Online SSO Database within three (3) business days of the enrollee becoming aware of the SSO. Minimum information that shall be reported in a draft Category 1 SSO report shall include all information identified in section 8.i.a. below. Minimum information that shall be reported in a Category 2 SSO draft report shall include all information identified in section 8.i.c below.

      b. A final Category 1 or Category 2 SSO report shall be certified through the CIWQS Online SSO Database within 15 calendar days of the end date of the SSO. Minimum information that shall be certified in the final Category 1 SSO report shall include all information identified in section 8.i.b below. Minimum information that shall be certified in a final Category 2 SSO report shall include all information identified in section 8.i.d below.

ii. **Category 3 SSOs** – All SSOs that meet the above criteria for Category 3 SSOs shall be reported to the CIWQS Online SSO Database and certified within 30 calendar days after the end of the calendar month in which the SSO occurs (e.g., all Category 3 SSOs occurring in the month of February shall be entered into the database and certified by March 30). Minimum information that shall be certified in a final Category 3 SSO report shall include all information identified in section 8.i.e below.

iii. **"No Spill" Certification** – If there are no SSOs during the calendar month, the enrollee shall either 1) certify, within 30 calendar days after the end of each calendar month, a "No Spill" certification statement in the CIWQS Online SSO Database certifying that there were no SSOs for the designated month, or 2) certify, quarterly within 30 calendar days after the end of each quarter, "No Spill" certification statements in the CIWQS Online SSO Database certifying that there were no SSOs for each month in the quarter being reported on. For quarterly reporting, the quarters are Q1 - January/ February/ March, Q2 - April/May/June, Q3 - July/August/September, and Q4 - October/November/December.

If there are no SSOs during a calendar month but the enrollee reported a PLSD, the enrollee shall still certify a "No Spill" certification statement for that month.

iv. **Amended SSO Reports** – The enrollee may update or add additional information to a certified SSO report within 120 calendar days after the SSO end date by amending the report or by adding an attachment to the SSO report in the CIWQS Online SSO Database. SSO reports certified in the CIWQS Online SSO Database prior to the adoption date of this MRP may only be amended up to 120 days after the effective date of this MRP. After 120 days, the enrollee may contact the SSO Program Manager to request to amend an SSO report if the enrollee also submits justification for why the additional information was not available prior to the end of the 120 days.

5. SSO Technical Report

The enrollee shall submit an SSO Technical Report in the CIWQS Online SSO Database within 45 calendar days of the SSO end date for any SSO in which 50,000 gallons or greater are spilled to surface waters. This report, which does not preclude the Water Boards from requiring more detailed analyses if requested, shall include at a minimum, the following:

i. Causes and Circumstances of the SSO:

a. Complete and detailed explanation of how and when the SSO was discovered.

b. Diagram showing the SSO failure point, appearance point(s), and final destination(s).

c. Detailed description of the methodology employed and available data used to calculate the volume of the SSO and, if applicable, the SSO volume recovered.

d. Detailed description of the cause(s) of the SSO.

e. Copies of original field crew records used to document the SSO.

f. Historical maintenance records for the failure location.

ii. Enrollee's Response to SSO:

a. Chronological narrative description of all actions taken by enrollee to terminate the spill.

b. Explanation of how the SSMP Overflow Emergency Response plan was implemented to respond to and mitigate the SSO.

c. Final corrective action(s) completed and/or planned to be completed, including a schedule for actions not yet completed.

iii. **Water Quality Monitoring:**

a. Description of all water quality sampling activities conducted including analytical results and evaluation of the results.

b. Detailed location map illustrating all water quality sampling points.

6. **PLSDs**

Discharges of untreated or partially treated wastewater resulting from blockages or other problems within a privately owned sewer lateral connected to the enrollee's sanitary sewer system or from other private sanitary sewer system assets may be voluntarily reported to the CIWQS Online SSO Database.

i. The enrollee is also encouraged to provide notification to Cal OES per section B above when a PLSD greater than or equal to 1,000 gallons has or may result in a discharge to surface water. For any PLSD greater than or equal to 1,000 gallons regardless of the spill destination, the enrollee is also encouraged to file a spill report as required by Health and Safety Code section 5410 et. seq. and Water Code section 13271, or notify the responsible party that notification and reporting should be completed as specified above and required by State law.

ii. If a PLSD is recorded in the CIWQS Online SSO Database, the enrollee must identify the sewage discharge as occurring and caused by a private sanitary sewer system asset and should identify a responsible party (other than the enrollee), if known. Certification of PLSD reports by enrollees is not required.

7. **CIWQS Online SSO Database Unavailability**

In the event that the CIWQS Online SSO Database is not available, the enrollee must fax or e-mail all required information to the appropriate Regional Water Board office in accordance with the time schedules identified herein. In such event, the enrollee must also enter all required information into the CIWQS Online SSO Database when the database becomes available.

8. **Mandatory Information to be Included in CIWQS Online SSO Reporting**

All enrollees shall obtain a CIWQS Online SSO Database account and receive a "Username" and "Password" by registering through CIWQS which can be reached at CIWQS@waterboards.ca.gov or by calling (866) 792-4977, M-F, 8 A.M. to 5 P.M. These accounts will allow controlled and secure entry into the CIWQS Online SSO Database. Additionally, within thirty (30) days of initial enrollment and prior to recording SSOs into the CIWQS Online SSO Database, all enrollees must complete a Collection System Questionnaire (Questionnaire). The Questionnaire shall be updated at least once every 12 months.

i. **SSO Reports**

At a minimum, the following mandatory information shall be reported prior to finalizing and certifying an SSO report for each category of SSO:

a. **Draft Category 1 SSOs**: At a minimum, the following mandatory information shall be reported for a draft Category 1 SSO report:

1. SSO Contact Information: Name and telephone number of enrollee contact person who can answer specific questions about the SSO being reported.
2. SSO Location Name.
3. Location of the overflow event (SSO) by entering GPS coordinates. If a single overflow event results in multiple appearance points, provide GPS coordinates for the appearance point closest to the failure point and describe each additional appearance point in the SSO appearance point explanation field.
4. Whether or not the SSO reached surface water, a drainage channel, or entered and was discharged from a drainage structure.
5. Whether or not the SSO reached a municipal separate storm drain system.
6. Whether or not the total SSO volume that reached a municipal separate storm drain system was fully recovered.
7. Estimate of the SSO volume, inclusive of all discharge point(s).
8. Estimate of the SSO volume that reached surface water, a drainage channel, or was not recovered from a storm drain.
9. Estimate of the SSO volume recovered (if applicable).
10. Number of SSO appearance point(s).
11. Description and location of SSO appearance point(s). If a single sanitary sewer system failure results in multiple SSO appearance points, each appearance point must be described.
12. SSO start date and time.
13. Date and time the enrollee was notified of, or self-discovered, the SSO.
14. Estimated operator arrival time.
15. For spills greater than or equal to 1,000 gallons, the date and time Cal OES was called.
16. For spills greater than or equal to 1,000 gallons, the Cal OES control number.

b. **Certified Category 1 SSOs**: At a minimum, the following mandatory information shall be reported for a certified Category 1 SSO report, in addition to all fields in section 8.i.a :

1. Description of SSO destination(s).
2. SSO end date and time.
3. SSO causes (mainline blockage, roots, etc.).
4. SSO failure point (main, lateral, etc.).
5. Whether or not the spill was associated with a storm event.
6. Description of spill corrective action, including steps planned or taken to reduce, eliminate, and prevent reoccurrence of the overflow; and a schedule of major milestones for those steps.
7. Description of spill response activities.
8. Spill response completion date.
9. Whether or not there is an ongoing investigation, the reasons for the investigation and the expected date of completion.

10. Whether or not a beach closure occurred or may have occurred as a result of the SSO.
11. Whether or not health warnings were posted as a result of the SSO.
12. Name of beach(es) closed and/or impacted. If no beach was impacted, NA shall be selected.
13. Name of surface water(s) impacted.
14. If water quality samples were collected, identify parameters the water quality samples were analyzed for. If no samples were taken, NA shall be selected.
15. If water quality samples were taken, identify which regulatory agencies received sample results (if applicable). If no samples were taken, NA shall be selected.
16. Description of methodology(ies) and type of data relied upon for estimations of the SSO volume discharged and recovered.
17. SSO Certification: Upon SSO Certification, the CIWQS Online SSO Database will issue a final SSO identification (ID) number.

c. **Draft Category 2 SSOs**: At a minimum, the following mandatory information shall be reported for a draft Category 2 SSO report:

1. Items 1-14 in section 8.i.a above for Draft Category 1 SSO.

d. **Certified Category 2 SSOs**: At a minimum, the following mandatory information shall be reported for a certified Category 2 SSO report:

1. Items 1-14 in section 8.i.a above for Draft Category 1 SSO and Items 1-9, and 17 in section 8.i.b above for Certified Category 1 SSO.

e. **Certified Category 3 SSOs**: At a minimum, the following mandatory information shall be reported for a certified Category 3 SSO report:

1. Items 1-14 in section 8.i.a above for Draft Category 1 SSO and Items 1-5, and 17 in section 8.i.b above for Certified Category 1 SSO.

ii. Reporting SSOs to Other Regulatory Agencies

These reporting requirements do not preclude an enrollee from reporting SSOs to other regulatory agencies pursuant to state law. In addition, these reporting requirements do not replace other Regional Water Board notification and reporting requirements for SSOs.

iii. Collection System Questionnaire

The required Questionnaire (see subsection G of the SSS WDRs) provides the Water Boards with site-specific information related to the enrollee's sanitary sewer system. The enrollee shall complete and certify the Questionnaire at least every 12 months to facilitate program implementation, compliance assessment, and enforcement response.

iv. SSMP Availability

The enrollee shall provide the publicly available internet web site address to the CIWQS Online SSO Database where a downloadable copy of the enrollee's approved SSMP, critical supporting documents referenced in the SSMP, and proof of local governing board approval of the SSMP is posted. If all of the SSMP documentation listed in this subsection is not publicly available on the Internet, the enrollee shall comply with the following procedure:

a. Submit an **electronic** copy of the enrollee's approved SSMP, critical supporting documents referenced in the SSMP, and proof of local governing board approval of the SSMP to the State Water Board, within 30 days of that approval and within 30 days of any subsequent SSMP re-certifications, to the following mailing address:

State Water Resources Control Board
Division of Water Quality
Attn: SSO Program Manager
1001 I Street, 15th Floor, Sacramento, CA 95814

D. WATER QUALITY MONITORING REQUIREMENTS:

To comply with subsection D.7(v) of the SSS WDRs, the enrollee shall develop and implement an SSO Water Quality Monitoring Program to assess impacts from SSOs to surface waters in which 50,000 gallons or greater are spilled to surface waters. The SSO Water Quality Monitoring Program, shall, at a minimum:

1. Contain protocols for water quality monitoring.
2. Account for spill travel time in the surface water and scenarios where monitoring may not be possible (e.g. safety, access restrictions, etc.).
3. Require water quality analyses for ammonia and bacterial indicators to be performed by an accredited or certified laboratory.
4. Require monitoring instruments and devices used to implement the SSO Water Quality Monitoring Program to be properly maintained and calibrated, including any records to document maintenance and calibration, as necessary, to ensure their continued accuracy.
5. Within 48 hours of the enrollee becoming aware of the SSO, require water quality sampling for, at a minimum, the following constituents:
   - i. Ammonia
   - ii. Appropriate Bacterial indicator(s) per the applicable Basin Plan water quality objective or Regional Board direction which may include total and fecal coliform, enterococcus, and e-coli.

E. RECORD KEEPING REQUIREMENTS:

The following records shall be maintained by the enrollee for a minimum of five (5) years and shall be made available for review by the Water Boards during an onsite inspection or through an information request:

1. General Records: The enrollee shall maintain records to document compliance with all provisions of the SSS WDRs and this MRP for each sanitary sewer system owned including any required records generated by an enrollee's sanitary sewer system contractor(s).
2. SSO Records: The enrollee shall maintain records for each SSO event, including but not limited to:
   - i. Complaint records documenting how the enrollee responded to all notifications of possible or actual SSOs, both during and after business hours, including complaints that do not

result in SSOs. Each complaint record shall, at a minimum, include the following information:

a. Date, time, and method of notification.

b. Date and time the complainant or informant first noticed the SSO.

c. Narrative description of the complaint, including any information the caller can provide regarding whether or not the complainant or informant reporting the potential SSO knows if the SSO has reached surface waters, drainage channels or storm drains.

d. Follow-up return contact information for complainant or informant for each complaint received, if not reported anonymously.

e. Final resolution of the complaint.

ii. Records documenting steps and/or remedial actions undertaken by enrollee, using all available information, to comply with section D.7 of the SSS WDRs.

iii. Records documenting how all estimate(s) of volume(s) discharged and, if applicable, volume(s) recovered were calculated.

3. Records documenting all changes made to the SSMP since its last certification indicating when a subsection(s) of the SSMP was changed and/or updated and who authorized the change or update. These records shall be attached to the SSMP.

4. Electronic monitoring records relied upon for documenting SSO events and/or estimating the SSO volume discharged, including, but not limited to records from:

    i. Supervisory Control and Data Acquisition (SCADA) systems

    ii. Alarm system(s)

    iii. Flow monitoring device(s) or other instrument(s) used to estimate wastewater levels, flow rates and/or volumes.

F. CERTIFICATION

1. All information required to be reported into the CIWQS Online SSO Database shall be certified by a person designated as described in subsection J of the SSS WDRs. This designated person is also known as a Legally Responsible Official (LRO). An enrollee may have more than one LRO.

2. Any designated person (i.e. an LRO) shall be registered with the State Water Board to certify reports in accordance with the CIWQS protocols for reporting.

3. Data Submitter (DS): Any enrollee employee or contractor may enter draft data into the CIWQS Online SSO Database on behalf of the enrollee if authorized by the LRO and registered with the State Water Board. However, only LROs may certify reports in CIWQS.

4. The enrollee shall maintain continuous coverage by an LRO. Any change of a registered LRO or DS (e.g., retired staff), including deactivation or a change to the LRO's or DS's contact information, shall be submitted by the enrollee to the State Water Board within 30 days of the change by calling (866) 792-4977 or e-mailing help@ciwqs.waterboards.ca.gov.

5. A registered designated person (i.e., an LRO) shall certify all required reports under penalty of perjury laws of the state as stated in the CIWQS Online SSO Database at the time of certification.

CERTIFICATION

The undersigned Clerk to the Board does hereby certify that the foregoing is a full, true, and correct copy of an order amended by the Executive Director of the State Water Resources Control Board.

7/30/13
Date

Jeanine Townsend
Clerk to the Board

Appendix C1 Legally Responsible Officials and Data Submitters

Legally Responsible Officials and Data Submitters

Party	Party Type	Party Name	Role	Relationship Effective Date	Relationship End Date
80361	Person	Rebecca J Bjork Public Works Director	Is Onsite Manager For	4/6/2006	
552695	Person	Joshua Haggmark Water Resources Division Manager	Is Onsite Manager For	9/9/2015	
600390	Person	Amanda Flesse Wastewater System Manager	Is Onsite Manager For	7/29/2019	
558314	Person	Bradley Joseph Rahrer Wastewater Collection Superintendent	Is Onsite Manager For	8/1/2016	
547773	Person	Esteban Zambrano Wastewater Collection System Supervisor	Is A Data Submitter For	7/25/2014	

Appendix C2 Staff Responsible for SSMP Implementation

Staff Responsible for SSMP Implementation				
Wastewater Collection Personnel Contact Information				
Department/Title	**Contact Name**	**Office**	**Work Cell**	**Responsibilities**
Water Resources Manager	Joshua Haggmark	564-5393	729-5137	Plans, organizes, and directs the operation and maintenance of the City water and wastewater storage, treatment, distribution and collection systems, and more.
Wastewater System Manager	Amanda Flesse	564-5412	335-0668	Overall responsibility for managing the Wastewater Section staff and the wastewater treatment, collection and Water Resources laboratory facilities. Manages the program's effectiveness by reviewing program metrics.
Wastewater Collection System Staff (Full Time)				
Wastewater Collection System Superintendent	Bradley Rahrer	568-1080	335-7711	Responsible for developing, implementing, and maintaining all elements of the City's SSMP; authorized to submit verbal, electronic, and written spill reports to the RWQCB, SWRCB, Santa Barbara County Health Department, and Cal OES; and authorized to certify electronic spill reports submitted to the SWRCB via CIWQS.
Wastewater Collection System Supervisor	Esteban Zambrano	568-1026	319-6746	Directly responsible for supervising collection system field staff, including scheduling the day to day activities and training. Authorized to act as the City's Authorized Representative in the WCS Superintendent's absence.
Wastewater Collection System Lead Operator	Ramon Bravo	568-1090	450-0149	Assists the Wastewater Collection System Supervisor with scheduling daily field activities and training collection system field staff.
Wastewater Planner/Scheduler (CCTV)	Matt Lombardi	568-1037		Maintains the data in the Cartegraph OMS system, ensures pipes are scheduled appropriately, reviews and QA/QC CCTV results, and updates collection system asset attribute information.

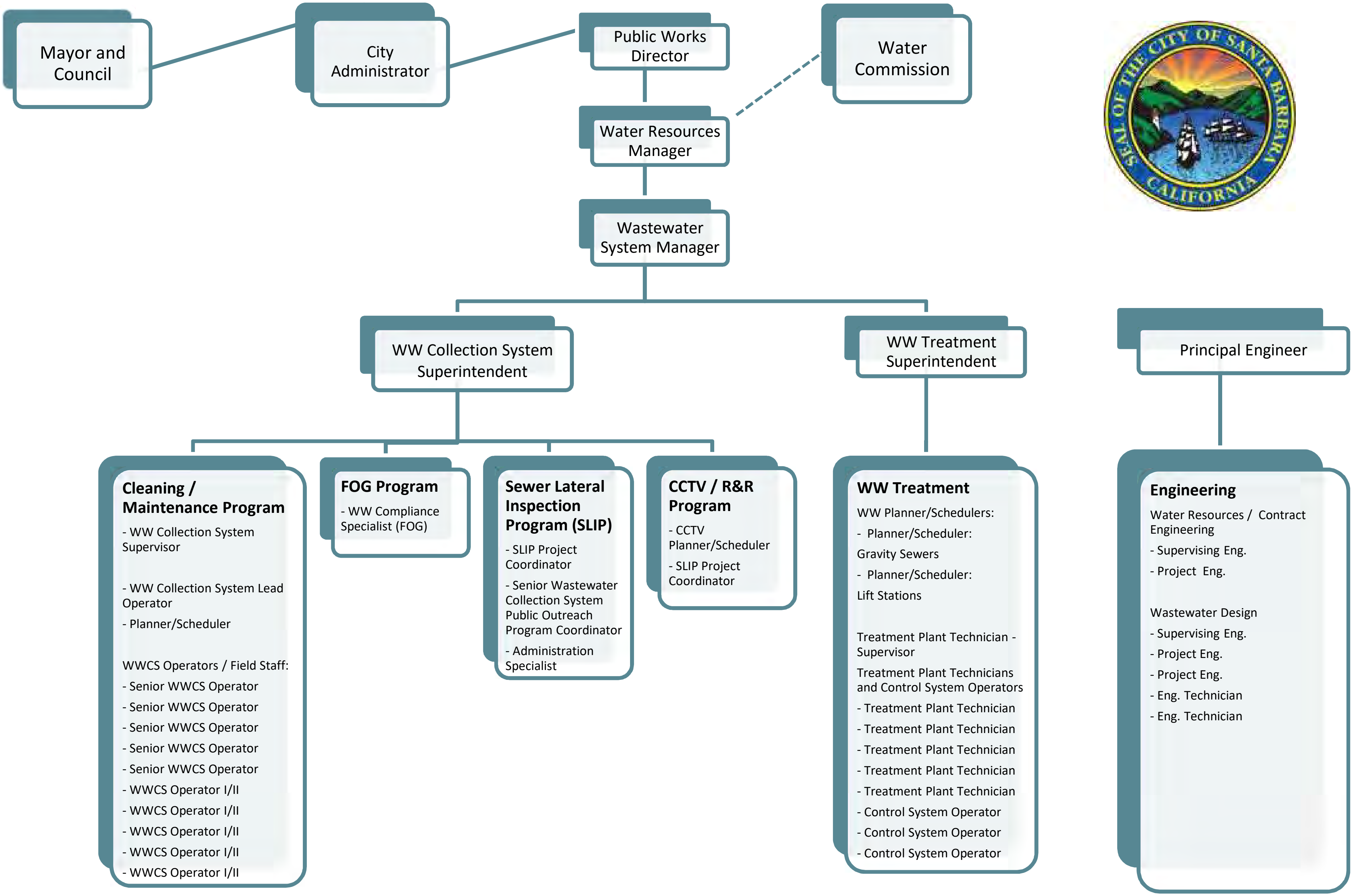
Wastewater Planner/Scheduler (Cleaning)	Robert Johns	568-1038		Maintains the data in the Cartegraph OMS system, ensures pipes are scheduled appropriately, reviews and QA/QC cleaning results, and updates collection system asset attribute information.
Wastewater Planner/Scheduler (Maintenance)	Steve Corral	568-1096		Maintains the data in the Maintenance Connection CMMS , ensures preventative maintenance (PM) tasks are scheduled appropriately for treatment and 7 city-owned lift stations, reviews and QA/QC PM results, and updates collection system asset attribute information
Wastewater Collection System Project Coordinator (CIP)	Louis Gutierrez	568-1027	319-6744	Coordinates the various activities related to contractor work for capital improvement programs, and maintains the data in the Cartegraph OMS system. Updates collection system asset attribute information from contractor submittals.
Sr. Wastewater Collection System Operator	John McCoy	568-1010		Leads and performs skilled labor in the installation, maintenance, operation, repair, and related service activities for wastewater collection systems.
Sr. Wastewater Collection System Operator	Simon Perez	568-1010		Leads and performs skilled labor in the installation, maintenance, operation, repair, and related service activities for wastewater collection systems.
Sr. Wastewater Collection System Operator	Ray Urrutia	568-1010		Leads and performs skilled labor in the installation, maintenance, operation, repair, and related service activities for wastewater collection systems.
Wastewater Collection System Operator II	Luke Pico	568-1010		Performs semi-skilled labor in the maintenance, operation, repair, and related service activities for wastewater and collection systems.

Wastewater Collection System Operator II	Oscar Cornejo	568-1010		Performs semi skilled labor in the maintenance, operation, repair, and related service activities for wastewater and collection systems.
Wastewater Collection System Operator I	Frank Cruz	568-1010		Performs semi skilled labor in the maintenance, operation, repair, and related service activities for wastewater and collection systems.
Wastewater Collection System Operator I	Jose Flores	568-1010		Performs semi skilled labor in the maintenance, operation, repair, and related service activities for wastewater and collection systems.
Wastewater Collection System Operator I	Christopher Velazquez	568-1010		Performs semi skilled labor in the maintenance, operation, repair, and related service activities for wastewater and collection systems.
Wastewater Compliance Specialist (FOG)	Tom Mozako	568-1005	729-1093	Performs FOG inspections and manages inspection schedules/data. Responsible for public education, monitoring FSE compliance, and program reporting.
Wastewater Collection System Project Coordinator (SLIP)	Dale Escobar	568-1032		Plans, coordinates, and participates in the work of staff, contractors, and consultants responsible for providing work in the Wastewater section.
Wastewater Collection System Project Coordinator (SLIP)	Isaac Garcia	568-1084		Plans, coordinates, and participates in the work of staff, contractors, and consultants responsible for providing work in the Wastewater section.
Senior Wastewater Collection System Outreach Coordinator (SLIP)	Mariana Cruz	560-7586		Identifies, develops, and implements education and outreach programs and coordinates with program staff.
Administrative Specialist (SLIP)	Maribel Barrios	568-1086		Supports SLIP Project Coordinator on scheduling SLIP cases and file management.
Treatment Plant Technician Supervisor	Amador Escalante	568-1030		Supervises, assigns, reviews, and participates in the work of staff responsible for providing equipment maintenance services for wastewater treatment operations within the Public Works Department.

Senior Control System Operator Specialist	Ignacio Just	568-1092		Leads, plans, assigns, trains, and reviews the work of staff responsible for technical duties involving the operation, installation, maintenance, calibration, and repair of electrical power, electronic, mechanical, and communication systems used for measurement and control.
Control System Operator Specialist II	Brian Passani	568-1014		Maintains, troubleshoots, repairs, inspects, calibrates, modifies, designs, and installs electrical systems, substations, motor control centers, Programmable Logic Controllers (PLCs), instrumentation, control systems and SCADA monitoring systems for wastewater facilities and collection systems.
Control System Operator Specialist II	Eric Massey	568-1016		Maintains, troubleshoots, repairs, inspects, calibrates, modifies, designs, and installs electrical systems, substations, motor control centers, Programmable Logic Controllers (PLCs), instrumentation, control systems and SCADA monitoring systems for wastewater facilities and collection systems.
Senior Treatment Plant Technician	Joaquin Ortega	568-1091		Leads, oversees, and participates in the more complex and difficult work of staff responsible for maintaining, repairing, and installing a variety of treatment process equipment for water and wastewater treatment facilities.
Senior Treatment Plant Technician	Chito Macario	568-1031		Leads, oversees, and participates in the more complex and difficult work of staff responsible for maintaining, repairing, and installing a variety of treatment process equipment for water and wastewater treatment facilities.
Treatment Plant Technician	Robert Cerda	568-1033		Performs skilled and semi-skilled maintenance, repair, and installation activities for water and wastewater treatment process equipment.

Treatment Plant Technician	Porfirio Diaz	568-1010		Performs skilled and semi-skilled maintenance, repair, and installation activities for water and wastewater treatment process equipment.
Treatment Plant Technician	Jose Flores			Performs skilled and semi-skilled maintenance, repair, and installation activities for water and wastewater treatment process equipment.
Wastewater Engineering Staff				
Principal Civil Engineer	Linda Sumansky	564-5361		Manages subordinate Engineering staff and responsible for delivery of wastewater CIP projects.
Supervising Civil Engineer	Carson Wollert	564-5424		Supervises Engineering staff and oversees design and construction of wastewater CIP projects.
Supervising Civil Engineer	Phil Maldonado	564-5486		Supervises Engineering staff and oversees design and construction of wastewater CIP projects.
Geographic Information Systems (GIS) Coordinator				Information System Division staff member who manages spatial data.
Geographic Information Systems (GIS) Technician				Information System Division staff member who manages GIS data.
Cartegraph OMS Administrator				Information System Division staff member who administers Cartegraph OMS CMMS
Water Resources Control 10 and 14				
Water Resources Control 10	Monday-Friday 7:00 AM – 3:30 PM	564-5413	n/a	
Water Resources Control 14	After Hours Emergency	963-4286	n/a	

Appendix C3 Wastewater Organizational Chart



Mayor and Council

City Administrator

Public Works Director

Water Commission

Water Resources Manager

Wastewater System Manager

WW Collection System Superintendent

WW Treatment Superintendent

Principal Engineer

Cleaning / Maintenance Program

- WW Collection System Supervisor

- WW Collection System Lead Operator
- Planner/Scheduler

WWCS Operators / Field Staff:
- Senior WWCS Operator
- Senior WWCS Operator
- Senior WWCS Operator
- Senior WWCS Operator
- Senior WWCS Operator
- WWCS Operator I/II
- WWCS Operator I/II
- WWCS Operator I/II
- WWCS Operator I/II
- WWCS Operator I/II

FOG Program
- WW Compliance Specialist (FOG)

Sewer Lateral Inspection Program (SLIP)
- SLIP Project Coordinator
- Senior Wastewater Collection System Public Outreach Program Coordinator
- Administration Specialist

CCTV / R&R Program
- CCTV Planner/Scheduler
- SLIP Project Coordinator

WW Treatment

WW Planner/Schedulers:
- Planner/Scheduler: Gravity Sewers
- Planner/Scheduler: Lift Stations

Treatment Plant Technician - Supervisor

Treatment Plant Technicians and Control System Operators
- Treatment Plant Technician
- Treatment Plant Technician
- Treatment Plant Technician
- Treatment Plant Technician
- Treatment Plant Technician
- Control System Operator
- Control System Operator
- Control System Operator

Engineering

Water Resources / Contract Engineering
- Supervising Eng.
- Project Eng.

Wastewater Design
- Supervising Eng.
- Project Eng.
- Project Eng.
- Eng. Technician
- Eng. Technician

SEAL OF THE CITY OF SANTA BARBARA CALIFORNIA

Updated December 2020

Appendix E1 Collection System Information Technology Governance Plan

Collection System Information Technology Governance Plan

City of Santa Barbara

Revised
December 2020

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Revision History

Version	Date	Comment	Author
1	10/31/2011	Initial draft	Kent Thompson
2	11/9/2011	Changes from City IT review	Kent Thompson
3	12/12/2011	Updates from Chris Toth	Kent Thompson
4	12/27/2011	Final revisions; miscellaneous updates to Tables 3-2, 3-3, 3-4, 3-5, 3-9, 3-10 and 3-11. Updates to Appendix A	Kent Thompson
5	5/18/2012	Updated limitations section	Allan Scott
6	7/9/2012	Updated to address data management planning	Allan Scott
7	7/27/2012	Minor updates to data management plan	Allan Scott
8	6/21/2013	Added 'Definitions Section', Added Process Descriptions 3.3.11 & 3.3.12	Allan Scott
9	9/15/15	Updated based on 2015 SSMP audit and review.	Allan Scott
10	06/2018	Updated to reflect changes from Cartegraph OMS upgrade	Brown and Caldwell City of Santa Barbara
11	12/2020	Updated to include new processes since 2018 version and Condition Assessment webservice.	HDR City of Santa Barbara

Section 1: Introduction

The objective of the City of Santa Barbara's Wastewater Collection System Business Process Improvement project is to enhance and update its wastewater collection system management approach, plan documents, work practices and information systems in order to become more efficient and align itself with proven, regulator-accepted best practices. To support these activities, various information technology components such as Cartegraph OMS, GIS, server hardware, and network infrastructure have been employed. These tools provide key features to support daily work activities, mapping, and reporting. To help ensure that this technical infrastructure is sustainable, efficient and well aligned with the Wastewater Collection Section's objectives, the City intends to leverage best practices associated with Information Technology Governance (IT Governance).

The IT Governance Institute defines IT Governance as "the leadership and organizational structures and processes that ensure that the organization's IT sustains and extends the organization's strategies and objectives". With this definition in mind, this document identifies the groups, roles, associated processes/responsibilities and the computer systems that are needed to support the business processes within the scope of the City's Wastewater Collection System project.

The benefits of documenting and implementing IT Governance include:

- Better alignment between technical solutions, business needs and strategic organizational objectives;
- Improved support and levels of service by clearly identifying ownership and responsibilities;
- Common understanding from technology stakeholders and increased visibility and involvement from management; and
- Better risk management capabilities to ensure business continuity.

1.1 Purpose & Scope

As mentioned above, the purpose of this document is to define the various roles, responsibilities, process and supporting computer systems needed to align the City's technical infrastructure and IT services, provided by the Information Technology Division (ITD), with the needs of the Wastewater Collection Section (WCS). Much of the technical infrastructure is shared with other departments (e.g., Cartegraph OMS and GIS) and therefore the scope of this document will only apply to the Wastewater Collection Section. It also assumes that governance activities related to server/desktop hardware, network and their associated disaster recovery processes have been previously addressed (where applicable references will be made to existing City documents).

1.2 Document Organization

This document is composed of the following sections:

- Section 1: Introduction; Describes the purpose of this document and its organization
- Section 2: IT Governance Overview; introduces the different roles and processes covered in this document
- Section 3: IT Governance Process Descriptions; details each of the governance processes

1.3 Definitions and Acronyms

The various definitions and acronyms used in the report are listed in Volume I of the SSMP.

1.4 Key Roles and Responsibilities

The key roles and responsibilities of Wastewater Collection System staff that carry out the SSMP and various program activities are listed in Volume I – Element 2 of the SSMP.

Section 2: IT Governance Overview

Figure 2-1 below depicts the various technical components and roles in use by WCS.

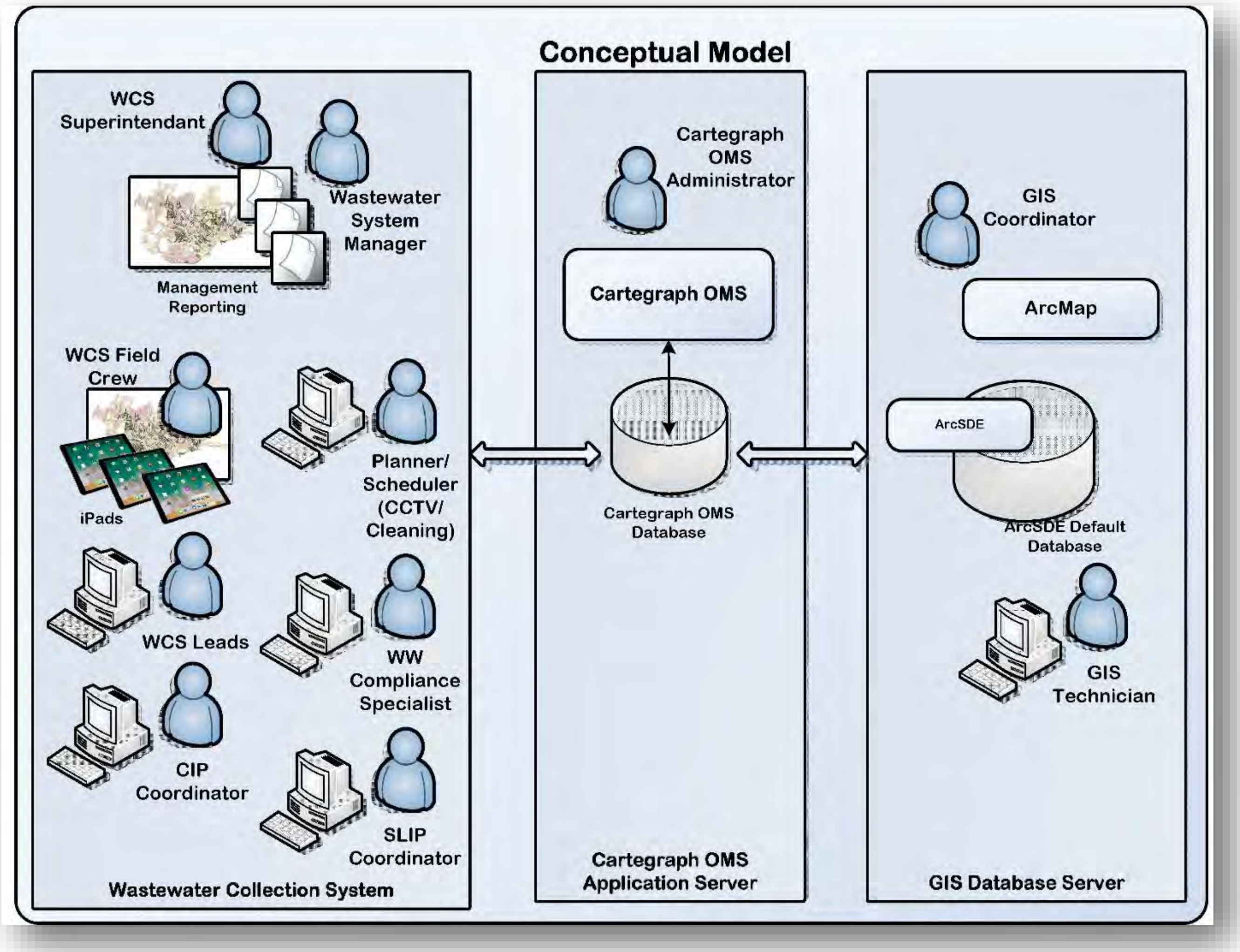


Figure 2-1. Conceptual model showing the IT-supported technology components.

The technical infrastructure includes the CMMS, geographic information system including ArcMap and ArcSDE (GIS) and associated server hardware/network components. These systems are the primary technology components to support WCS operations. WCS Staff interacts directly with Cartegraph OMS to schedule upcoming tasks, complete the work in the field, and review completed work. Together, the different groups, roles, business process activities and information systems provide the City with the ability to implement strategic objectives. Figure 2-2 below, depicts these groups, roles and governance processes. The box at the top lists the main WCS's strategic objectives that are supported by these information technology components. The boxes across the middle depict the City staff, groups and roles involved in governance while the box across the bottom lists activities that the participants will perform.

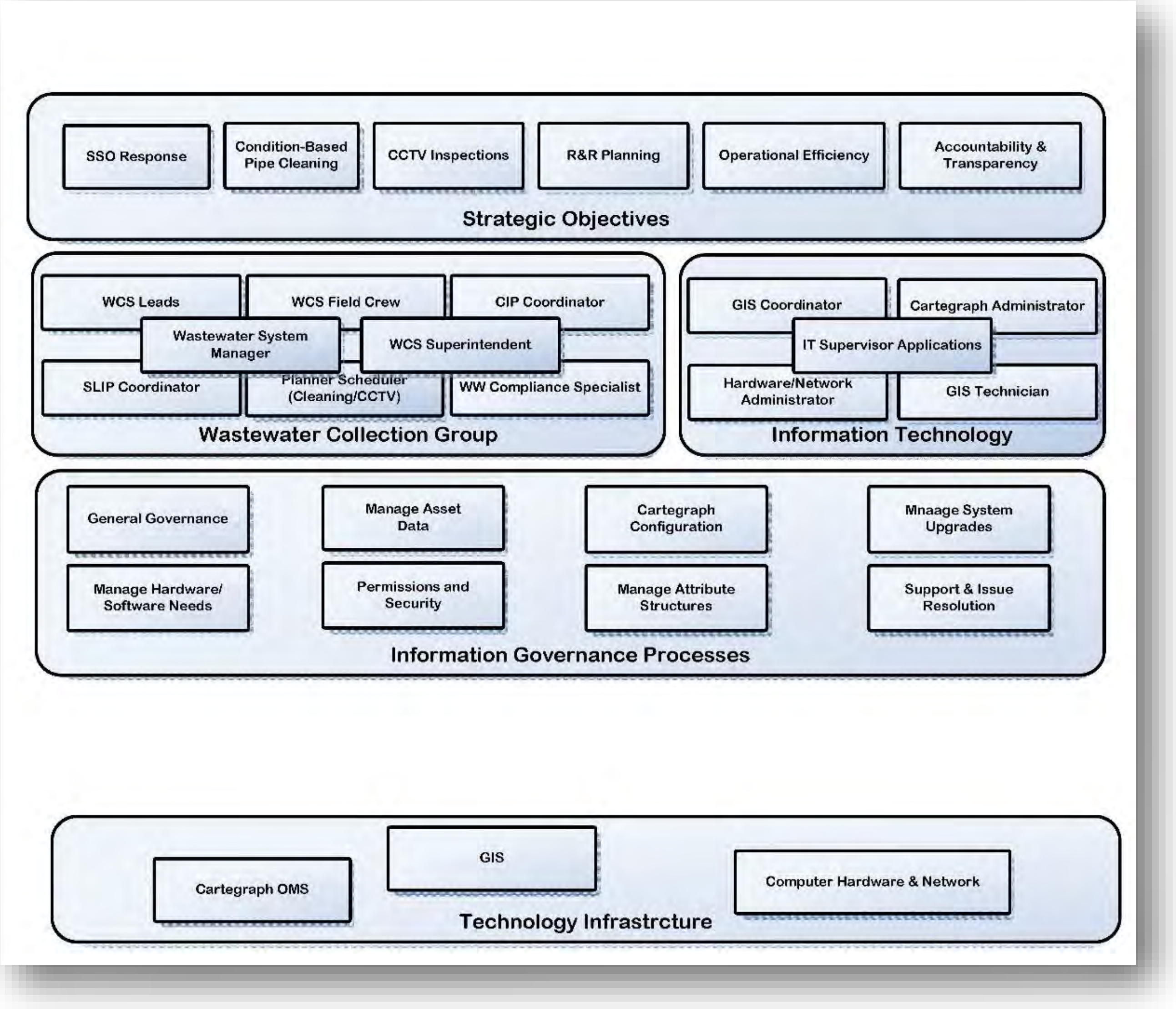


Figure 2-2. IT Governance Overview

Table 2-1 on the following page shows which roles are involved in each of the information governance processes that support the WCS operations. The details behind these processes are documented in Section 3, IT Governance Process Descriptions.

Table 2-1. Roles and Activities

	GIS Coordinator	GIS Technician	Cartegraph OMS Administrator	Hardware/ Network Administrator	IT Supervisor (Applications)	WCS Lead	Planner/ Scheduler (Cleaning/ CCTV)	CIP/SLIP Coordinator	WCS Superintendent	WCS Manager
General Governance (Section 3.1)	X	X	X		X		X	X	X	X
Cartegraph OMS Configuration (Section 3.2)			X		X		X	X	X	
Manage Asset Data (Section 3.3)		X				X	X	X	X	X
Manage Attribute Structure (Section 3.5)	X	X	X							
Permissions/ Security (Section 3.6)	X		X	X	X				X	X

Section 3: IT Governance Process Descriptions

3.1 General Governance

General governance is the process of ensuring that information technology is closely aligned with existing and upcoming strategic objectives for WCS. General governance is accomplished through a series of standard and ad-hoc meetings between WCS, ITD, and Engineering. There is a City-wide GIS Technical Committee that meets to discuss GIS technology improvements and updates, and Wastewater Collection Staff is one of the participating members. There is a City-wide Cartegraph users group that meets as-needed to discuss issues and future plans for Cartegraph OMS. Other issues that come up (e.g. system and network upgrades, new hardware, other software upgrades) are discussed on an as-needed basis. Special meetings are set up if needed.

These governance groups should meet periodically to evaluate how well the technical infrastructure is supporting WCS initiatives.

3.2 Cartegraph OMS Configuration

2017 was spent configuring Cartegraph OMS to meet the needs of WCS operations. All WCS staff were involved throughout the conversion process and worked in conjunction with ITD in order to ensure a successful implementation. Adjustments to Cartegraph OMS may be required to improve reporting, streamline data collection (i.e. forms), etc in the future as new technology needs arise or procedures change.

The Wastewater Manager role in Cartegraph OMS is the primary power user role for the WCS staff. This role can assist with the majority of configuring minor changes to layouts, libraries and permissions. All other roles covering WCS staff are more job specific.

3.3 Manage Asset Data

Cartegraph OMS asset and work order data are tightly coupled with wastewater mains, structure, and sewer lateral data in GIS (i.e. the asset system of record). Cartegraph OMS allows WCS to project work activities on a map for scheduling purposes, provide asset information to field crews (e.g. size of pipe, manhole location, etc.), and simplifies asset data updates. Specific asset update procedures are covered in more detail in the various sections below.

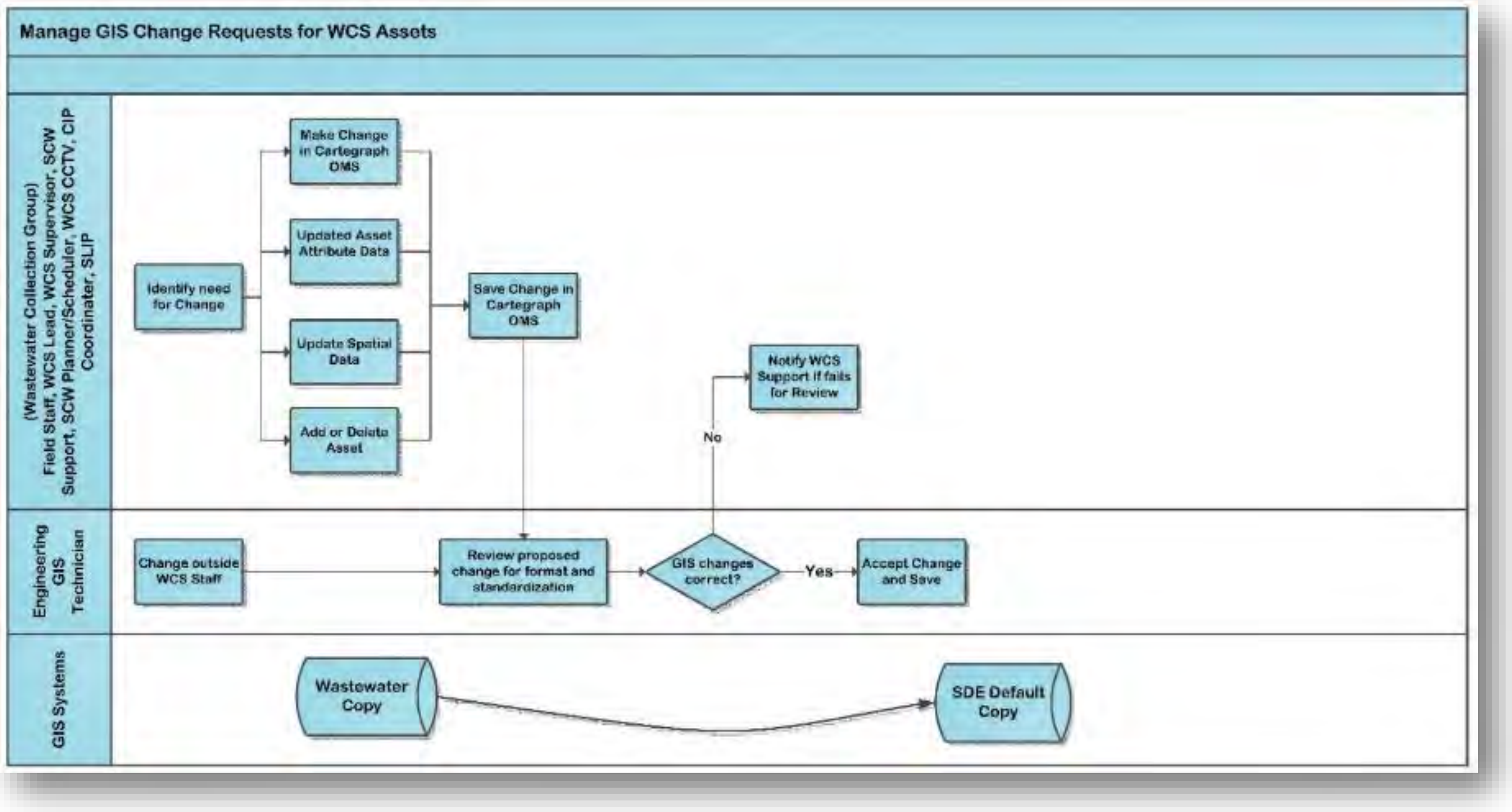


Figure 3-1. Workflow to Manage Changes for WCS Assets

Figure 3-1 above depicts the common workflow for managing updates to GIS asset data for WCS assets. Each horizontal swim lane depicts a role or system that participates in the updates. The roles identified in each swim lane are described in Section 2. Individual steps in the process are shown by the blue boxes and the sequence is defined by the workflow arrows. The lighter colored boxes in the workflow diagram are defined for each specific scenario in the following Sections.

The two primary ways that updates are initiated in general are either through the (1) WCS Staff, who may observe data discrepancies in the field, CCTV QA/QC or Capital Projects or through (2) other Public Works Staff such as inspectors, who oversee land development projects not routed through WCS Staff.

Sources of updates vary according to the nature of the project or update. The variations are as follows:

- Capital Improvement Projects (CIP): WCS staff observe data discrepancies in the field and notify the CIP Coordinator, who makes relevant changes in Cartegraph OMS.
- O&M Repair Projects: The CCTV Planner/Scheduler performs analysis of CCTV videos and data and updates any repair needs in Cartegraph OMS for the CIP Coordinator to review and initiate.
- Cleaning and CCTV Review Committee meetings: WCS staff observe data discrepancies in the field and notify the Cleaning and CCTV Planner/Schedulers, respectively. Updates are also based on research and data analysis performed on past cleanings, rehabilitations, jetscans, and CCTV visual verifications.Planner/Scheduler Quality Control (QC) work: The Planner/Scheduler submits changes to the WCS Superintendent, who does QC work to approve any changes made in Cartegraph OMS.
- Land-development – not City-initiated: Public Works staff may observe data discrepancies in the field and notify the relevant WCS staff member of the necessary updates.

Stormwater GIS: Data discrepancies are sent to the GIS technician as they are discovered. The GIS Technician will periodically review Cartegraph OMS change logs and make updates to the default SDE copy based on WCS staff proposed changes. Once this is completed, the Default SDE Copy should match the Cartegraph OMS WCS copy. For other updates initiated by staff outside of WCS staff, the GIS technician will coordinate with and notify WCS Superintendent about change.

The GIS Technician produces a monthly update report that is distributed to WCS. Reviewing the monthly reports for final verification of changes completes the work process.

The following sections describe specific data maintenance actions that will follow this overall workflow. The maintenance actions described are:

- Section 3.3.1: New Asset Installation
- Section 3.3.2: Remove Asset
- Section 3.3.3: Structure Type Change
- Section 3.3.4: Asset Replacement
- Section 3.3.5: Abandon/Retire Asset
- Section 3.3.6: Asset Rehabilitation
- Section 3.3.7: Update Location or Attribute Data for Existing Asset

3.3.1 New Asset Installation

New Asset Installation	
Process Scenario	New sewer mains, manholes and/or sewer laterals are added to the collection system asset inventory either by installation or discovery via City staff or contractors
Process Owner	WCS Staff or GIS Technician
Process Initiator(s)	• WCS Staff • GIS Technician
Available Information	• Construction Drawings and/or Marked up map (red line) • Map update package • Spatial location of mains and structures • Attribute data • New Structure Attributes (see GIS Data Dictionary) • New Sewer Main Attributes (see GIS Data Dictionary) • New Sewer Lateral Attributes (see GIS Data Dictionary) • Installation Date, if available
Assumption, Issues or Constraints	• Any new mains added to Cartegraph OMS need to be given a frequency, initial cleaning program and COF.
Cartegraph OMS/GIS Updates	• Digitize new asset • Assign IDs • Apply attribute data • Create Installation Task • Schedule next cleaning date (for sewer main assets only)

3.3.2 Remove Asset

Remove Asset	
Process Scenario	An asset is removed from the public system. Or, WCS Field Crews report that there is an asset in GIS that does not exist in the field or asset needs to be moved to the Private layers
Process Owner	WCS Staff
Process Initiator(s)	• WCS Staff
Available Information	• ID of linked assets in Cartegraph OMS • ID of assets to remain in GIS
Assumption, Issues or Constraints	• When an asset is removed the GIS Technician is notified through the change log. • Staff merge or address any remaining assets
Cartegraph OMS/GIS Updates	• The structure is retired and deleted in Cartegraph OMS • Use judgement to address linked assets • If the existing asset needs to be moved to a private wastewater asset layer, WCS Staff will notify GIS Technician.

3.3.3 Structure Type Change

Structure Type Change	
Process Scenario	A structure requiring a type change (i.e. Manhole to Cleanout, or vice-versa)
Process Owner	WCS Staff
Process Initiator(s)	• WCS Staff
Available Information	• ID of existing assets • Structure ownership (“City, or “Private, Non-City”)
Assumption, Issues or Constraints	• Existing asset is retired and deleted and correct structure type is added to inventory in Cartegraph OMS.
Cartegragh OMS/GIS Updates	• The structure ID is changed in Cartegraph OMS • Related attribute data is retained (if applicable) with the new structure ID. • Associate new asset type to other linked assets (i.e. adjacent sewer mains)

3.3.4 Asset Replacement

Asset Replacement	
Process Scenario	An existing main, structure or lateral is removed and is *completely* replaced with new material and the function of that asset has not changed.
Process Owner	WCS Staff
Process Initiator(s)	• WCS Field Crew • GIS Technician
Available Information	• ID of existing main

	• Replacement date • Asset attribute data (see GIS Data Dictionary)
Assumptions, Issues or Constraints	• The sewer asset being replaced will continue to have the same function as before replacement. • Historical maintenance data is important to retain
Cartegraph OMS/GIS Updates	• Update attribute data in OMS. • GIS Technician to use replacement date as new install date in SDE Default. • Add Replacement task to the asset to populate Replacement Date. • Complete Replacement Task • If sewer main, ensure next cleaning is scheduled appropriately.

3.3.5 Abandon/Retire Asset

Abandon/Retire Asset	
Process Scenario	A sewer asset is disconnected from the rest of the system and left in the ground
Process Owner	WCS Staff
Process Initiator(s)	• WCS Field Crew • GIS Technician
Available Information	• ID of abandoned asset • Linked asset IDs of main • GIS update package
Assumptions, Issues or Constraints	• GIS Technician notifies WCS Staff prior to making the change. • The abandoned asset should remain visible in the map book
Cartegraph OMS/GIS Updates	• The asset attribute data is update to reflect abandonment. • Status in SDE Default changed to “ABAN” • Add Retire task to asset being abandoned and complete the task.

3.3.6 Asset Rehabilitation

Asset Rehabilitation	
Process Scenario	An asset has been rehabilitated to improve its performance and expected life
Process Owner	WCS Staff
Process Initiator(s)	• WCS Staff
Available Information	• Asset ID • Rehabilitation information such as material, date, and any other pertinent information.
Assumptions, Issues or Constraints	• WCS Staff need a way to determine if an asset is rehabilitated

Cartegraph OMS/GIS Updates	• The lining (or rehabilitation) method field in Cartegraph OMS will be updated for the asset • Add Rehabilitation task and complete the task • GIS Technician populates “Rehab Mat” and “Rehab Date” fields in SDE Default with Lining Method and Rehabilitation Task Actual Start Date, respectively.

3.3.7 Update Location or Attribute Data for Existing Asset

Location or Attribute Data for Existing Asset	
Process Scenario	An existing sewer asset requires relocation or realignment based on actual field location.
Process Owner	WCS Staff
Process Initiator(s)	• WCS Staff
Available Information	• Information for existing asset • GPS data, red lined map, fields notes, comments , measurements, and other details (ex. location) about the revised location
Assumptions, Issues or Constraints	• Location or alignment is significant and causes major problems for planning or field work. • Minor errors in location will not be made if they are within the tolerance of GIS accuracy.
Cartegraph OMS/GIS Updates	• Existing assets are relocated/adjusted to accommodate the change. The Length of the newly adjusted main may be updated in OMS. • GIS Technician makes change in SDE Default to spatial data and any changed attribute data based on change in WCS Cartegraph OMS copy.

3.4 Cartegraph OMS Data Retention

Cartegraph OMS and historical data is stored in accordance with ITD policies and practices. OMS data resides in the database forever.

3.5 Managing Asset Attribute Structure

Both Cartegraph OMS and GIS contain assets such as sewer mains, structures, and laterals (the data definition of these assets are included in Appendix A). These systems also allow Cartegraph OMS Administrator to add or modify an asset’s data fields (referred to as ‘records’ in Cartegraph OMS and ‘attributes’ in GIS). Assets and their fields are linked using a map service to share between the two applications: GIS and Cartegraph OMS. ITD can adjust the linked fields as necessary and as requested by WCS Staff.

3.6 Permissions and Security

Permissions and security of the technical components described in this document should follow the City’s standard procedures. OMS users are added based on a formal Cartegraph OMS Access Request Form and approval from WCS Superintendent.

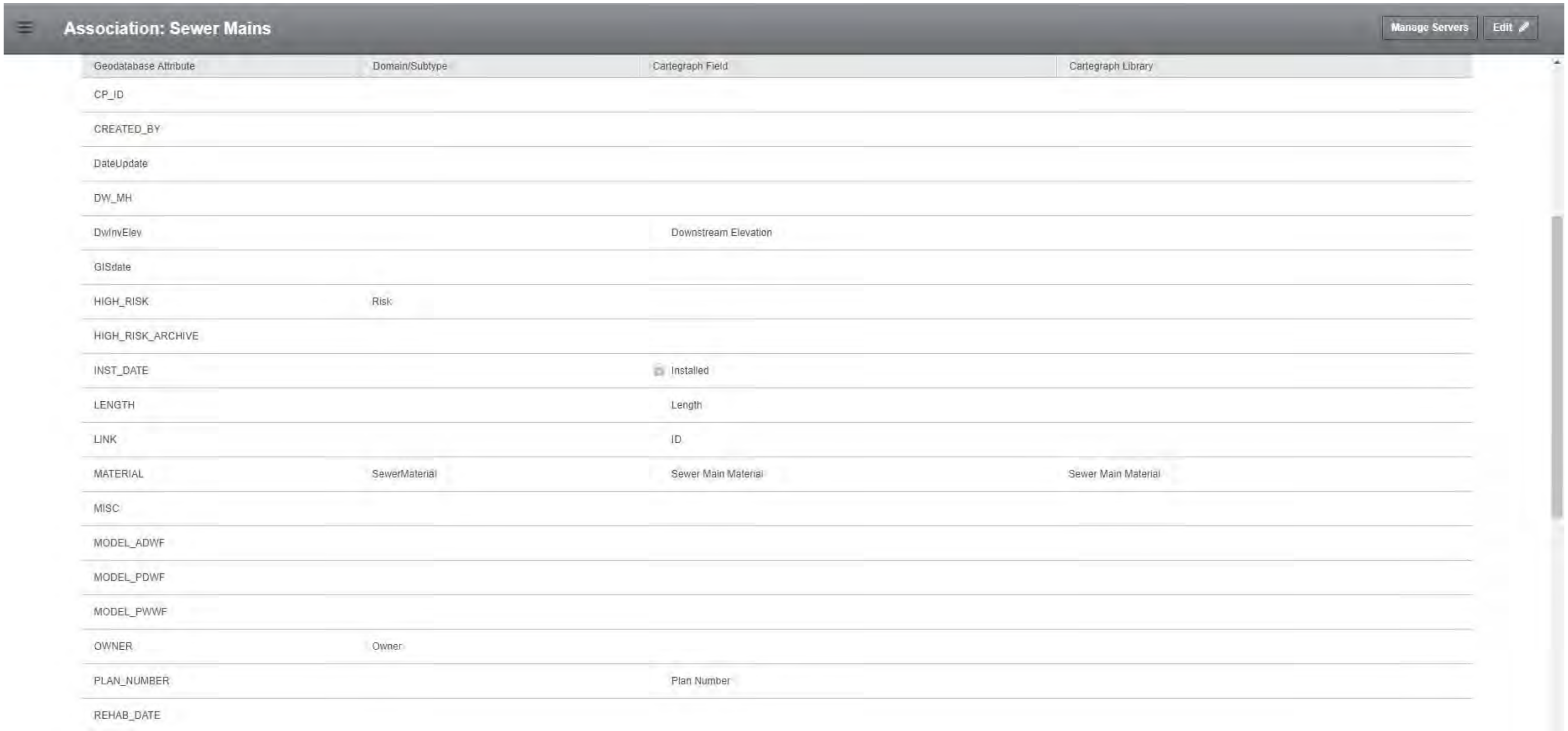
3.7 Backup/Recovery

Backup and recovery of data and systems described in this document should follow the City’s standard procedures. The City’s alternate datacenter, BCC, provides server housing and is capable of providing continuity and recovery services but has not been configured for high availability server transfer at this time. It is a multi-server VMware cluster with same SAN configuration as the primary City Hall datacenter.

3.8 Data Management Plan

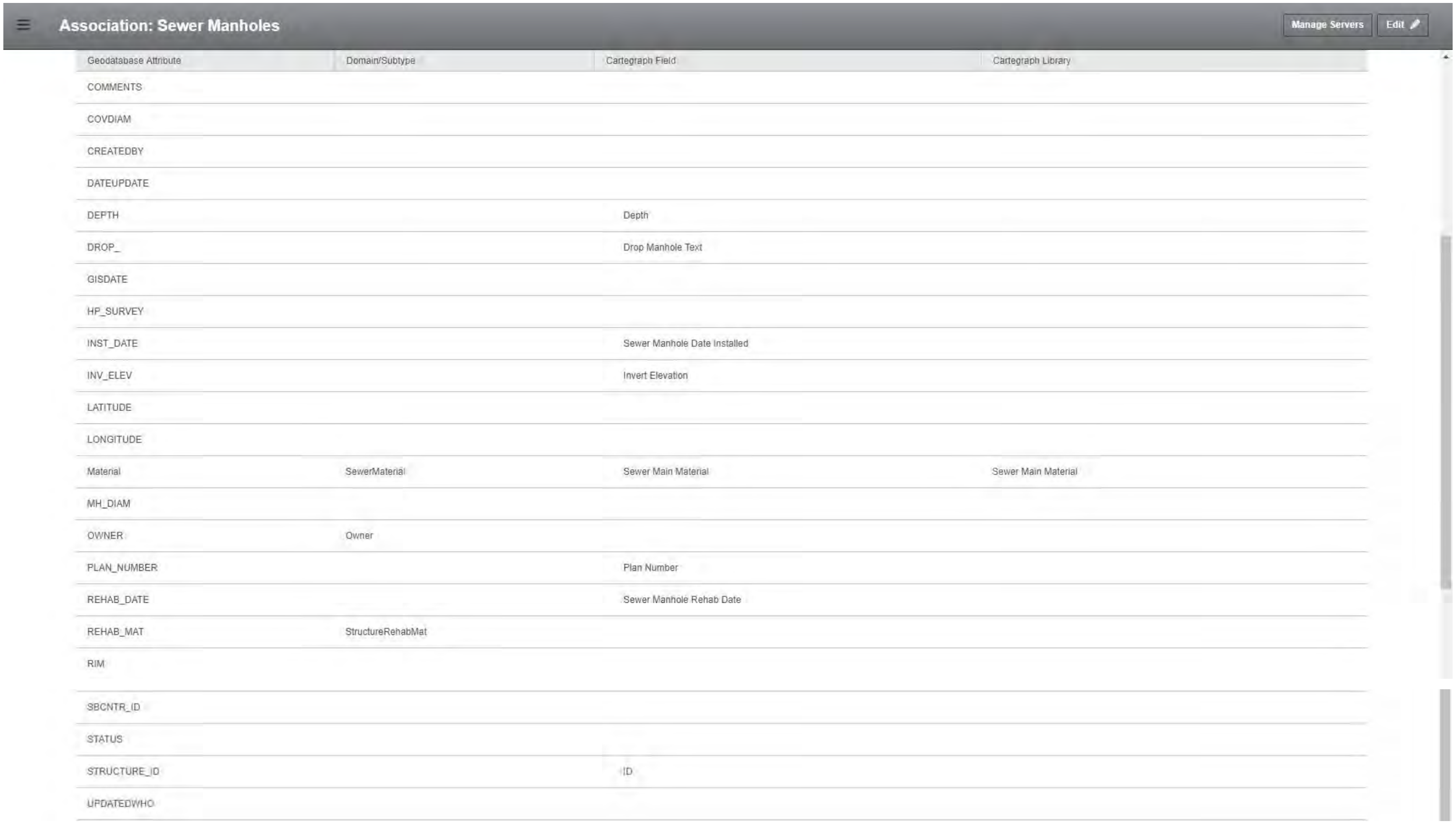
In order for the technology systems to be effective in supporting the WCS work practices, the CMMS and GIS databases must be complete and accurate. These databases must contain information essential to the City's collection system operations and maintenance activities. Appendix A shows the list of fields being stored in GIS and linked to Cartegraph OMS for sewer asset management. GIS and WCS Staff have standardized the values to make this process more efficient and accurate.

Appendix A: Cartegraph OMS and GIS Asset Data Field Mapping



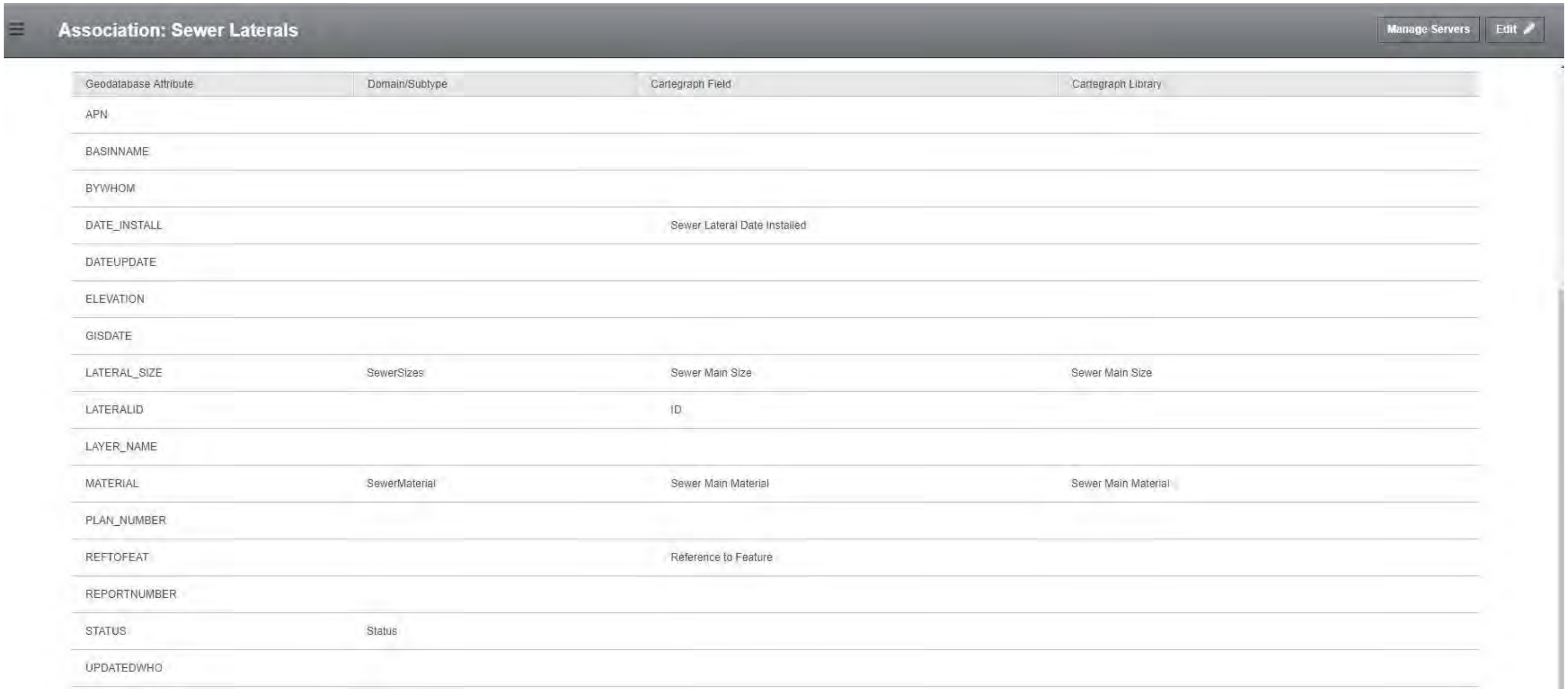
Association: Sewer Mains

Geodatabase Attribute	Domain/Subtype	Cartegraph Field	Cartegraph Library
CP_ID			
CREATED_BY			
DateUpdate			
DW_MH			
DwInvElev		Downstream Elevation	
GISdate			
HIGH_RISK	Risk		
HIGH_RISK_ARCHIVE			
INST_DATE		Installed	
LENGTH		Length	
LINK		ID	
MATERIAL	SewerMaterial	Sewer Main Material	Sewer Main Material
MISC			
MODEL_ADWF			
MODEL_PDWF			
MODEL_PWWF			
OWNER	Owner		
PLAN_NUMBER		Plan Number	
REHAB_DATE			



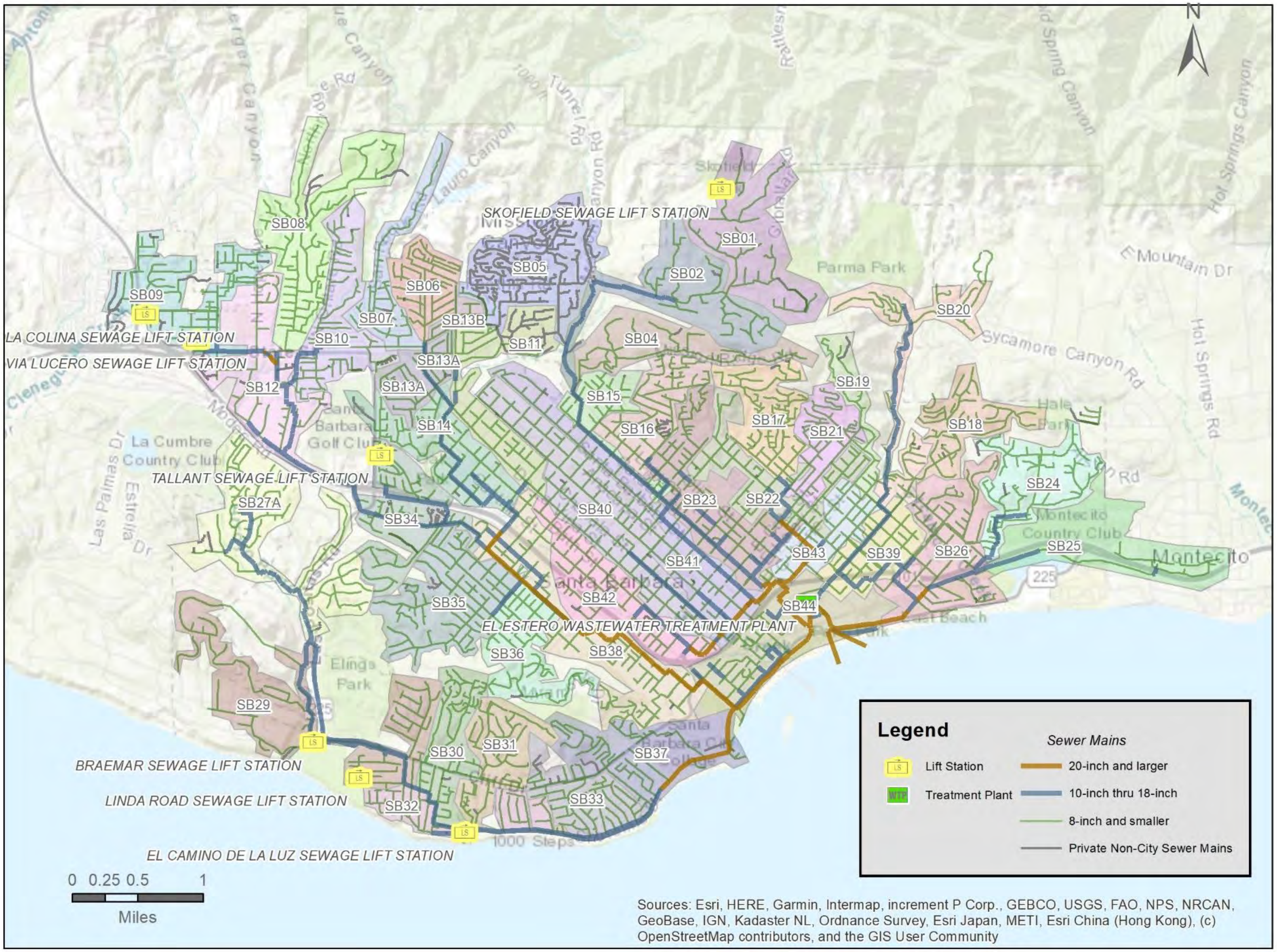
Association: Sewer Manholes

Geodatabase Attribute	Domain/Subtype	Cartegraph Field	Cartegraph Library
COMMENTS			
COVDIAM			
CREATEDBY			
DATEUPDATE			
DEPTH		Depth	
DROP_		Drop Manhole Text	
GISDATE			
HP_SURVEY			
INST_DATE		Sewer Manhole Date Installed	
INV_ELEV		Invert Elevation	
LATITUDE			
LONGITUDE			
Material	SewerMaterial	Sewer Main Material	Sewer Main Material
MH_DIAM			
OWNER	Owner		
PLAN_NUMBER		Plan Number	
REHAB_DATE		Sewer Manhole Rehab Date	
REHAB_MAT	StructureRehabMat		
RIM			
SBCNTR_ID			
STATUS			
STRUCTURE_ID		ID	
UPDATEDWHO			



Geodatabase Attribute	Domain/Subtype	Cartegraph Field	Cartegraph Library
APN			
BASINNAME			
BYWHOM			
DATE_INSTALL		Sewer Lateral Date Installed	
DATEUPDATE			
ELEVATION			
GISDATE			
LATERAL_SIZE	SewerSizes	Sewer Main Size	Sewer Main Size
LATERALID		ID	
LAYER_NAME			
MATERIAL	SewerMaterial	Sewer Main Material	Sewer Main Material
PLAN_NUMBER			
REFTOFEAT		Reference to Feature	
REPORTNUMBER			
STATUS	Status		
UPDATEDWHO			

Appendix E2 Map of Wastewater Collection System



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

City of Santa Barbara Wastewater Collection System, Lift Stations and Treatment Plant

Updated December 2020

Appendix E3 Gravity Sewer Cleaning and Inspection Program

Gravity Sewer Cleaning and Inspection Program

City of Santa Barbara

Revised
December 2020

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List of Figures

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: Introduction

This document describes the City's gravity wastewater collection system cleaning program; specifically, the wastewater collection system infrastructure, the overall cleaning plan, the logic for setting cleaning schedules, and the general cleaning workflow. The document includes the following sections:

Section 1 – Introduction: Describes the purpose and structure of the document.

Section 2 – Background and Program Plan: Summarizes program improvements, performance measures, and cleaning resources.

Section 3 – Cleaning Plan: Summarizes program improvements, performance measures, and

Section 3 – Progress Measurement and Reporting: Describes how the effectiveness of the program will be measured and defines the reports used to measure program effectiveness and progress.

Section 4 – Quality Assurance: Provides an overview of the quality assurance methods to determine if the cleaning process is being carried out effectively including monitoring of quality, quality assurance elements, and quality control measures.

: Background and Program Plan

2.1 Program Improvements

The City made changes to its cleaning program in 2012, which dramatically reduced the number of SSOs, and has continued to review and improve its cleaning program on an annual basis to reduce maintenance related SSOs and blockages. An analysis of the City's SSO history determined the main cause of SSOs is maintenance related, with root intrusion being the predominant cause.

2.2 Performance Measures

The indicators that the City uses to measure the performance of its wastewater collection system and the effectiveness of its cleaning program are:

Total number of SSOs (by cause);

Total number of gravity pipe miles cleaned;

Percentage of system cleaned annually; and

Number of restaurants inspected for compliance with grease trap requirements.

2.3 Cleaning Resources

2.3.1 Equipment

A majority of cleaning tasks are completed by a two- or three-person crew with a sewer cleaning vehicle and a utility vehicle. Appendix E7, *Wastewater System Equipment List*, identifies the cleaning and utility vehicles the City uses to maintain the collection system. Additional emergency and critical operation equipment is also provided in Appendix E7.

2.3.2 Additional Cleaning Resources

Additional cleaning-related equipment used to support the Cleaning Program include the easement machine, CCTV Van, Acoustic Testing equipment, and nozzle camera. Additionally, the City relies on contract cleaning to augment internal resources when needed.

2.3.2.1 Easement Machine

The City uses an easement machine to clean pipes that cannot be reached by the sewer cleaning trucks. There are approximately 16,000 feet of pipe in the City that are located within easements that are not accessible by road. The easement machine is a cleaning device on tracks, designed to mobilize flushing equipment to these locations. Cleaning with the easement machine follows the same SOP that is used for the sewer cleaning trucks.

The City also has an easement cart small enough to be maneuvered through gates and into backyards. This piece of equipment supports cleaning efforts in easement locations where the easement machine and trucks can not reach. Cleaning with the easement cart also follows the same SOPs and standards staff follow for routine cleaning.

2.3.2.2 CCTV Van

CCTV inspections are performed by the City Inspection Crew using the City-owned CCTV van. This van contains the CCTV equipment, computers, and other components necessary to perform CCTV inspections per PACP standards.

The Wastewater Collection Section uses software, currently ITPipes, to collect and manage video recordings generated from CCTV inspections on the City's CCTV van. CCTV inspection data and video is used to assess the condition of pipe, identify and record defects along pipe segments, determine if a pipe needs to be cleaned, and verify cleaning results. The software is installed on a computer located in the CCTV truck. The Server is cloud-based and is used as the permanent repository of CCTV video.

2.3.2.3 Acoustic Testing Equipment

A sewer line rapid assessment tool (SL-RAT) is used for acoustic testing to identify potential blockages in sewer pipes. If a blockage is identified, City cleaning and/or inspection crews will perform a follow-up cleaning and/or visual inspection task to verify if/what the blockage is.

2.3.2.4 Nozzle Camera

City crews have nozzle cameras, capable of capturing high quality video of the inside of a sewer main. The nozzle uses the pressure from the sewer cleaning truck to propel it along the sewer main, capturing video as is moves along the pipe. The video is catalogued by the Pipe ID and stored along with the PACP inspection data. The information captured by the nozzle camera helps staff analyze the effectiveness of cleaning and identify maintenance issues associated with a pipe.

2.3.2.5 Contract Cleaning and Inspection

In addition to the cleaning and inspection resources available within the Wastewater Collection Section, the City also utilizes contract cleaners, CCTV inspectors, acoustic sounding equipment, and root control chemicals applied by a contractor as needed to augment their internal resources during times of increased cleaning and inspection needs. The contract cleaning, root control, and inspection resources are procured on short-term contracts to clean or inspect a specified set of pipes. Cleaning and inspection procedures followed by the contractors are consistent with the procedures followed by the City’s field crews. Acoustic sounding is managed and planned by Wastewater Staff and sometimes is contracted out.

Section 3: Cleaning Plan

The City has four distinct pipe cleaning programs designed to focus on problem areas while not over-cleaning less problematic pipes, and prevent maintenance-related spills and blockages. The four cleaning programs are summarized below and described in detail in this document:

System-Wide Cleaning Program is designed to ensure that larger diameter pipes (greater than eight inches in diameter) are cleaned at least once within a 5-year period. Six- and eight- inch diameter pipes are cleaned at least once within a 3-year period.

Accelerated Cleaning Program is used when pipes require more frequent cleaning due to accumulation of non-root related material within the pipe.

Chemical Root Control Program is designed to control root intrusion in sewer pipes with a history of roots through an application of chemical herbicide products.

Accelerated Root Cleaning Program is used for pipes with a history of root findings that requires cleaning on an annual basis (or more frequent) until the source of roots is identified and eliminated or it is placed into the Chemical Root Control Program.

The City's approach to scheduling cleaning is to adjust the cleaning frequency based on recent cleaning findings as described in detail in this document. This allows staff to schedule pipe cleaning prior to blockage material accumulating. Figure 3-1 shows the standard cleaning frequency intervals.

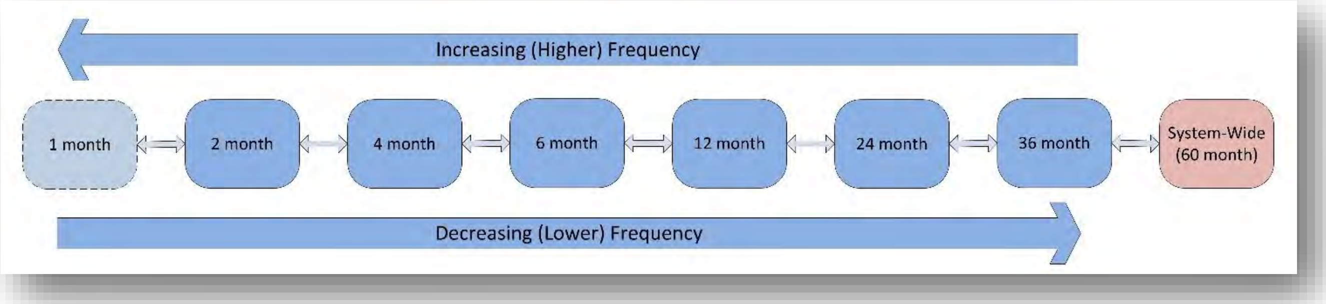


Figure 3-1 Pipe Cleaning Frequencies

3.1 General Cleaning Methods

Santa Barbara's primary process for cleaning the wastewater collection system is to remove roots, deposits, and debris through hydraulic cleaning using a truck mounted sewer flushing/vacuum machine. This system is designed to clean prevent potential blockages from roots, sand/debris, and fats, oils and grease (FOG), and other deposits in the City's sewer system. The specific procedures for cleaning sewer pipes are described in the *Wastewater Collection Section SOP 2.0.0 - Combination Machine Cleaning*. Occasionally, an alternate cleaning approach will be utilized for sewer mains with steep slopes or usually/restricted access locations.

The general process is as follows:

Each sewer main section is cleaned from its downstream manhole up to the adjacent upstream manhole. Cleaning through intermediate manholes is avoided whenever possible.

During cleaning from the downstream manhole, a basket and/or debris trap is set up at the downstream manhole to collect sand, rocks, grease, roots, and other material flushed from the pipe. If there is a significant amount of debris, the vacuum system is used to remove the collected material.

Cleaning rates are at 35 feet per minute or less, typically at 2000 PSI in most circumstances.

The material seen or removed from the pipe is quantified as ‘clear’, ‘light’, ‘medium’ or ‘heavy’ and appropriately recorded in Cartegraph OMS.

The cleaning crew makes as many passes as necessary, based on the condition findings definitions, to fully clear the pipe.

A proof skid is used, whenever possible, to prove that the pipe is clean and that there are no protruding service connections, misaligned joints, or deformed pipe.

The amount and type of materials removed during cleaning and interval from the last cleaning are evaluated by the Cleaning Planner/Schedule and used as a factor to ensure the pipe is in the appropriate cleaning program and on the correct frequency. Cartegraph OMS then uses the cleaning program and frequency to set the next Estimated Start Date.

This process is applied to all cleaning programs. Other related SOPs implemented for the cleaning program are:

- Easement Clearing
- Easement Machine Operation
- Manhole Cleaning
- Manhole Dish Insert Checks

Most cleaning is completed using the vactor trucks but there are some places, typically along easements, that are inaccessible by the trucks. These areas are cleaned using the easement machine because it can maneuver into these areas for cleaning. The cleaning process is the same for both the vactor trucks and the easement machine, except for using the vacuum to remove significant debris.

3.2 System-Wide Cleaning Program (SWC)

The System-Wide Cleaning (SWC) Program is designed for pipes that do not have a history of maintenance problems, SSOs or blockages. All pipes fall under the SWC program unless cleaning findings indicate that the pipe should be cleaned more often.

Pipes larger than eight inches in diameter are cleaned at least once in a five-year (60-month) period and pipes eight inches in diameter or smaller are cleaned at least once in a three-year (36 month) period. Pipes requiring more frequent cleaning are placed in the Accelerated Cleaning Program, Accelerated Root Cleaning Program or the Chemical Root Control Program. These programs are described in the sections below. Exceptions are sewer mains 21” or larger in diameter when inspections demonstrate cleaning is not required.

Pipes scheduled under the SWC Program will have a target cleaning date set either 36 or 60 months, as applicable, from the date the pipe was last cleaned. These pipes typically do not have any previous maintenance problems, have been found to have clear or light findings during their most recent cleaning, and do not have a history of root findings.

Pipes must be cleaned within the cleaning date range (the range between the cleaning Estimated Start Date and Due Date). Pipes can be moved between the SWC Program and the other cleaning programs according to the scheduling rules described for each program.

3.3 Accelerated Cleaning Program

Some pipes require cleaning more frequently than what is allowed under the SWC Program to prevent the build-up of blockage material that can potentially cause an SSO. Pipes that qualify for this program cannot have a history of roots, but do require more frequency cleaning due to other causes, such as debris. These pipes are maintained under the Accelerated Cleaning Program.

Under this program, cleaning frequencies are set for each pipe based on the amount of material found during the previous cleaning. These frequencies range from one month to 24 months. Each pipe has its own cleaning frequency and cleaning date range. Cleaning frequencies are adjusted as necessary to time the next cleaning when blockage material is just beginning to accumulate. Pipe cleaning frequencies are adjusted according to the criteria defined in the Changing Cleaning Frequencies section below.

3.4 Accelerated Root Cleaning Program (ARCP)

Root intrusion is a unique problem within a sewer system because roots are constantly growing and attempting to access water and nutrients found in wastewater. Unlike grit, debris and, to a certain extent, FOG, the process of cleaning a pipe with the current cleaning tools (controlled rotational nozzles) has a tendency, in most cases, to disperse roots to a point that they are difficult to capture and quantify cleaning findings. Therefore, pipes with a history of root findings are placed in the Accelerated Root Cleaning Program (ARCP) and will not have their cleaning frequencies adjusted in the same manner as those pipes in the Accelerated Cleaning Program.

Under the ARCP, a cleaning scheduling strategy has been implemented to optimize the cleaning frequency for each pipe, so the City's cleaning resources focus on preventing SSOs. Each pipe segment is scheduled to be cleaned at least annually (every 12-months) or more frequent if required. Pipes assigned to the ARCP will remain in the program until the source of root intrusion is identified and eliminated, or moved to the Chemical Root Control Program.

3.5 Chemical Root Control Program (CRC)

Pipes with a history of roots may be placed into the Chemical Root Control (CRC) Program to abate regrowth of roots for two to three years. A specified timed pre-cleaning is associated with this cleaning plan. In order for the proper adhesion of the herbicide foam to the roots of the vegetation, a cleaning of the main has to occur a minimum of 6 weeks prior to the use of the herbicide foam spray. This allows enough regrowth of the vegetation to allow contact with the herbicide while maintaining a cleaned main. The foaming chemical herbicide product is applied to the pipe, from manhole to manhole, which kills the roots on contact without harming trees or other above vegetation. Generally, the sewer pipe is initially treated and must then be treated again in two (2) years. Afterwards, pipes are then chemically treated on three (3) year intervals.

This program is used in areas that show potential for the cleaning frequency to be longer (i.e. easements) and other areas where access may be limited or hindered for Field staff.

Pipes placed in the CRC will be treated until the source of roots is identified and eliminated, or it is placed into ARCP.

3.6 Cleaning Scheduling Strategy

3.6.1 Initial Frequency and Cleaning Program

The City adopted a dynamic scheduling strategy utilizing the results of the latest cleaning event to determine the next scheduled cleaning task's Estimated Start Date. Each sewer main is assigned into a Preventative Maintenance Plan associated with its assigned cleaning program and current cleaning frequency. For example, a sewer main with a 6-month frequency and in the ARCP cleaning program would have a future cleaning task with a Plan name of "WW-ARCP 6-month". See Table 3-1 below for allowable Preventative Maintenance Plan combinations.

The overall process Cartegraph OMS uses to create future cleaning tasks is as follows:

Each pipe segment has it's own cleaning frequency, cleaning program and Preventative Maintenance plan which defines the next Estimated Start Date;

Pipes are grouped and assigned for cleaning by the Wastewater Collection Supervisor and/or Lead Operator according to the cleaning task's Estimated Start Date and geographic area to efficiently use the cleaning crew's time and resources. Pipe diameters, accessibility, traffic control requirements and other factors are also considered when attempting to clean the main;

Cartegraph OMS is used in conjunction with spatial information to plan each month's cleaning assignments:

Each active gravity sewer main in Cartegraph has an Estimated Start Date identified in the database.

The Estimated Start Date is automatically generated by the Preventative Maintenance tool which is part of Cartegraph OMS system.

The WCS Supervisor and/or Lead assigns the upcoming cleaning assignments through Cartegraph OMS system to field crews

Cleaning is typically grouped together geographically unless there are specific circumstances that prohibit this (i.e. traffic control, large diameter, CalTrans, easement access, etc.).

After cleaning each sewer main, field crews record the cleaning findings for each pipe segment as 'clear', 'light', 'medium', 'heavy' (definitions for these findings are in the section below) directly into the Cartegraph OMS database using a mobile device.

Cleaning results are reviewed by the Cleaning Program Planner/Scheduler.

The cleaning frequency assigned to each pipe is evaluated by the Planner/Scheduler using available information and the QA/QC evaluation is documented in Cartegraph OMS.

For changes to cleaning frequencies that need additional discussion or increasing cleaning frequencies outside of the algorithm logic, the Cleaning Program Planner/Scheduler will bring these proposed changes to the monthly Cleaning Scheduling Review Committee.

All changes to the cleaning frequency field outside the logic of the cleaning algorithm are documented in Cartegraph OMS by use of a cleaning frequency change code.

For the ACRP Program, these scheduling principles also apply:

Pipes with a history of root findings will be placed into the ARCP and cleaned on a 12-month or more frequent cleaning cycle until the pipe is removed from the ARCP. Pipes may be removed from the ARCP if the source of roots is identified and eliminated, or if the pipe is moved to the CRC program.

Pipes will be initially placed on a 12-month cleaning frequency or less, if needed, and will remain on that cleaning frequency. Future cleaning frequency modifications will be based on cleaning observations or visual observation data until the pipe is removed from the ARCP.

3.6.1.1 Preventative Maintenance Plans

In Cartegraph OMS, Preventative Maintenance Plans are a combination of the frequency and cleaning program specified for each sewer main. Cleaning tasks will be automatically created by the Preventative Maintenance Plan (PMP) tool. Once a cleaning task is completed and the work record is saved, the PMP tool creates a new cleaning task with a status of "Projected", with an Estimated Start Date in the future, dependent on the Frequency. Once the scheduled Estimated Start Date for the cleaning task has elapsed, the task is converted from a Projected to Planned Status and automatically assigns a Due Date based on the frequency. Figure 3.2 below shows how the Cleaning Program Planner/Scheduler adjusts the Cleaning Program and frequency so that the PMP tool schedules the Estimated Start Date and Due Date for the next cleaning task. Appendix A shows the relationship between Estimated Start Date and Due Date for each frequency.

Table 3-1. Cleaning Preventative Maintenance Plans in Cartegraph OMS

Cleaning Program	**Frequency**							
	1	2	4	6	12	24	36	60
System Wide Cleaning							WW-System Wide Cleaning 36 Month	WW-System Wide Cleaning 60 Month
Accelerated Cleaning	WW-Accel 1 Month	WW-Accel 2 Month	WW-Accel 4 Month	WW-Accel 6 Month	WW-Accel 12 Month	WW-Accel 24 Month		
Accelerated Root Cleaning Program	WW-ARCP 1 Month	WW- ARCP 2 Month	WW- ARCP 4 Month	WW- ARCP 6 Month	WW- ARCP 12 Month			
Chemical Root Control				WW- CRC 6 Month	WW- CRC 12 Month	WW- CRC 24 Month	WW-CRC 36 Month	

3.6.2 Changing Cleaning Frequencies

Each time a pipe segment is cleaned, the cleaning frequency is evaluated by the Cleaning Program Planner/Scheduler and it is based on the cleaning results documented by field staff. This allows the time interval between cleanings to be adjusted to reach an optimal cleaning frequency for each pipe. The four standard cleaning observations and quantities are shown in Table 3-2 below:

Table 3-2. Descriptions of Cleaning Observations

	Clear	Light	Medium	Heavy
Roots	An amount less than "Light."	Visual: Clustered fibers on hose w/first pass Basket holding roots 1/8 full	Visual: Clustered fibers on hose w/second pass Basket holding roots ¼ full Roots up to 12" long Roots with diameter of 1/8"	Visual: Basket holding roots ¼ full or greater Roots longer than 12" Root diameter greater than ¼"
Grease	An amount less than "Light."	Visual: No evidence of grease or very small bits of grease in flow or stuck to sewer cleaning hose. Water color change to light milky color with some odor.	Visual: Popcorn size bits of grease with some larger chunks from ½" to 1" diameter. Water color change to light tan/brown with odor.	Visual: Any Large chunks, logs or calcified grease of significant size. Water color change to dark brown to black with foul odor.
Debris (includes "RAGS/PAPER")	An amount less than "Light."	Visual: No evidence of any debris. Conditions do not require shortening standard step length. No operator concern for blockage (no indication debris is concentrated in a small area). Quantity: Max pass less than: *1 gallon (8 inch) *2 gallons (10 inches) *3 gallons (>= 12 inch) Or - For every 25-feet step increment, less than 5% of channel filled.	Visual: Debris is removed held by trap, but conditions do not require shortening standard step length. No operator concern for blockage (no indication debris is concentrated in a small area). Quantity: Max pass between: *1-3 gallons (<= 8 inch) *2-5 gallons (10 inches) *3-7 gallons (>= 12 inch) Or - For every 25-feet step increment, must be between 5-20% of channel filled.	Visual: Large amounts of debris returned with each pass. Condition requires shortening standard step length. Operator concern for blockage (debris feels concentrated in a small area) Quantity: Max pass, more than: *3 gallons (<= 8 inch) *5 gallons (10 inches) *7 gallons (>= 12 inch) Or - For every 25-feet step increment, must be more than 20% of channel filled.
Other	Other: Similar to "Debris" (but not rags or paper) Field Staff shall write down their observations. For example: "Broken PVC pipe" or "Concrete chunks the size of grapefruit" or "landscape trash", etc.			

The objective of this process is to determine the optimum frequency so that each pipe is just beginning to need cleaning at the next cleaning date and returns a 'light' finding. Pipe cleaning that results in removal of more material (e.g. 'medium' or 'heavy') indicates that the pipes are not being cleaned frequently enough and are candidates for a more frequent cleaning. Pipes that are consistently ‘clear’ of any material or have trace amounts of material are candidates for less frequent cleaning. See Appendix A for Cartegraph OMS cleaning windows for each Frequency identified above.

Frequencies may be adjusted by the Cleaning Program Planner/Scheduler for individual sewer mains based on the findings associated with cleaning algorithm logic shown in Figure 3-3 below. The figure shows the decision logic for adjusting sewer main cleaning frequencies, and applies to pipe cleaning findings for debris, FOG and other. Pipe cleaning frequency interval changes for pipes with root findings will be per the Accelerated Root Cleaning Program or the Chemical Root Control Program. All other changes to frequencies not following the logic in Figure 3-2 shall be noted in the cleaning task using a Frequency Change code.

It should be noted that 4- and 6-month schedules are considered normal cleaning frequencies for some pipes, but 1-month cleaning frequencies are not. Any pipe that falls to a 1-month cleaning frequency will be flagged for additional investigation to determine the cause of material buildup. The pipe will continue to be cleaned each month until it has two consecutive ‘clear’ findings or until the cause is identified and resolved, at which time the frequency can be adjusted to a 2-month frequency.

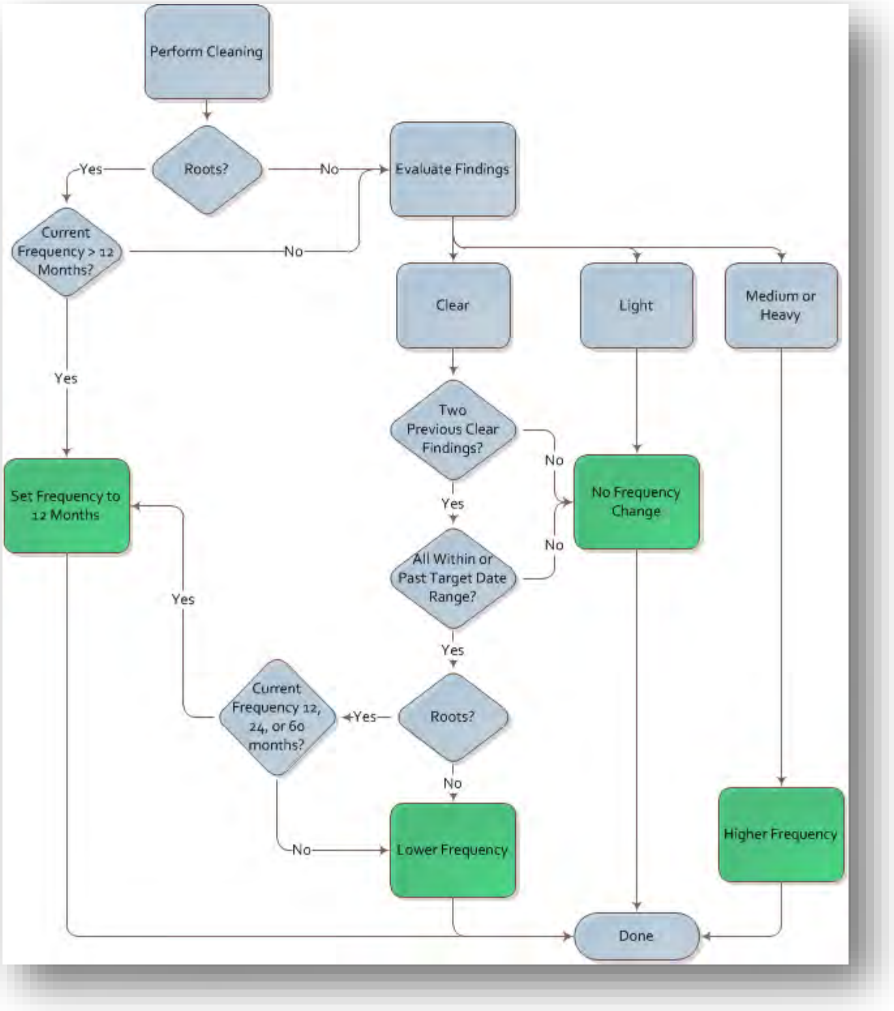


Figure 3-2 Decision Logic for Setting Cleaning Frequencies

Each pipe will be cleaned according to the standard procedures and the condition findings found will be classified as ‘clear’, ‘light’, ‘medium’ or ‘heavy’ according to the standard definitions. If the findings are ‘light’ and the cleaning was performed within or after the Estimated Start Date, the frequency will remain the same. If the pipe is cleaned before the Estimated Start Date, the frequency will remain the same and a new cleaning date will be established based on the actual last cleaning date, unless the Cleaning Planner/Scheduler determines that the cleaning was unscheduled due to maintenance reasons or additional information suggests a more aggressive cleaning interval is necessary. If the findings are ‘clear’ and the two previous cleaning tasks yielded ‘clear’ findings, and all three cleanings were within or past the Estimated Start Date, then the cleaning frequency will be lowered. If the findings are ‘medium’ or ‘heavy’, and the cleaning occurred within, or before or after the Due Date, then the pipe will be assigned the next higher cleaning frequency to determine the next Estimated Start Date.

The process logic described here is used by the Cleaning Program Planner/Scheduler to confirm the pipe is on the appropriate cleaning frequency. These are provided as recommendations and may be changed based on review by the Cleaning Scheduling Review Committee. This committee is composed of the Wastewater Collection System Superintendent and other relevant City staff who will meet monthly to review the past months cleaning program metrics. The committee makes the final cleaning frequency determination and may change it based on additional information available. In addition, other factors may be involved in making cleaning frequency determinations including recent SSO activity, pipe repairs, lining or rehabilitation, known seasonal issues, known chronic problem areas, and age or size of pipe.

3.6.3 Event-Driven Cleaning

The City currently has event-driven cleaning throughout their system. Each year in early August, the City holds what is called the "Old Spanish Days Fiesta", which last for five days. During this week, the City experiences an increase in visitors, and the collection system plans for pre-cleaning of select pipelines that are impacted in the area of the event. The cleaning is annually scheduled for completion by the end of July.

The City has in place a wet weather procedure as an event-driven cleaning that focuses on cleaning specific areas in order to increase capacity to handle a rain event. These areas typically focus on, but are not limited to, syphons throughout the system.

3.6.4 Basin Cleaning Strategy

For the purposes of cleaning pipe in a geographic manner, the City uses the 42 gravity sewersheds or "basins" to group pipes with cleaning frequency intervals of 12, 24 and 36, and 60 months each. Approximately 3-5 basins are cleaned monthly. The Planner/Scheduler assigns basins, with the goal of allowing City resources greater response times in the event of an emergency.

3.7 Overall Cleaning Process

Figure 3-3 shows the workflow for the overall cleaning process. Each box represents a key step in the cleaning process. The sequence of activities is shown by the arrows connecting the boxes.

The work process is divided into five general sub-processes. Each process is described in more detail below the figure.

The following roles are directly involved in completing the cleaning task:

Wastewater Collection System Superintendent: Manages the QA/QC for cleaning program and reviews Cleaning Program Planner/Scheduler analysis.

Wastewater Collection System Supervisor: Manages the cleaning process from assigning cleaning tasks to Field Crew through task completion.

Cleaning Program Planner/Scheduler: Monitoring cleaning projections and provides thorough QA/QC of cleaning task data in Cartegraph OMS.

Wastewater/Collection Lead Operator: Oversees assignments and provides field support.

Field Crew: Completes sewer main cleaning and documents findings directly into Cartegraph OMS.

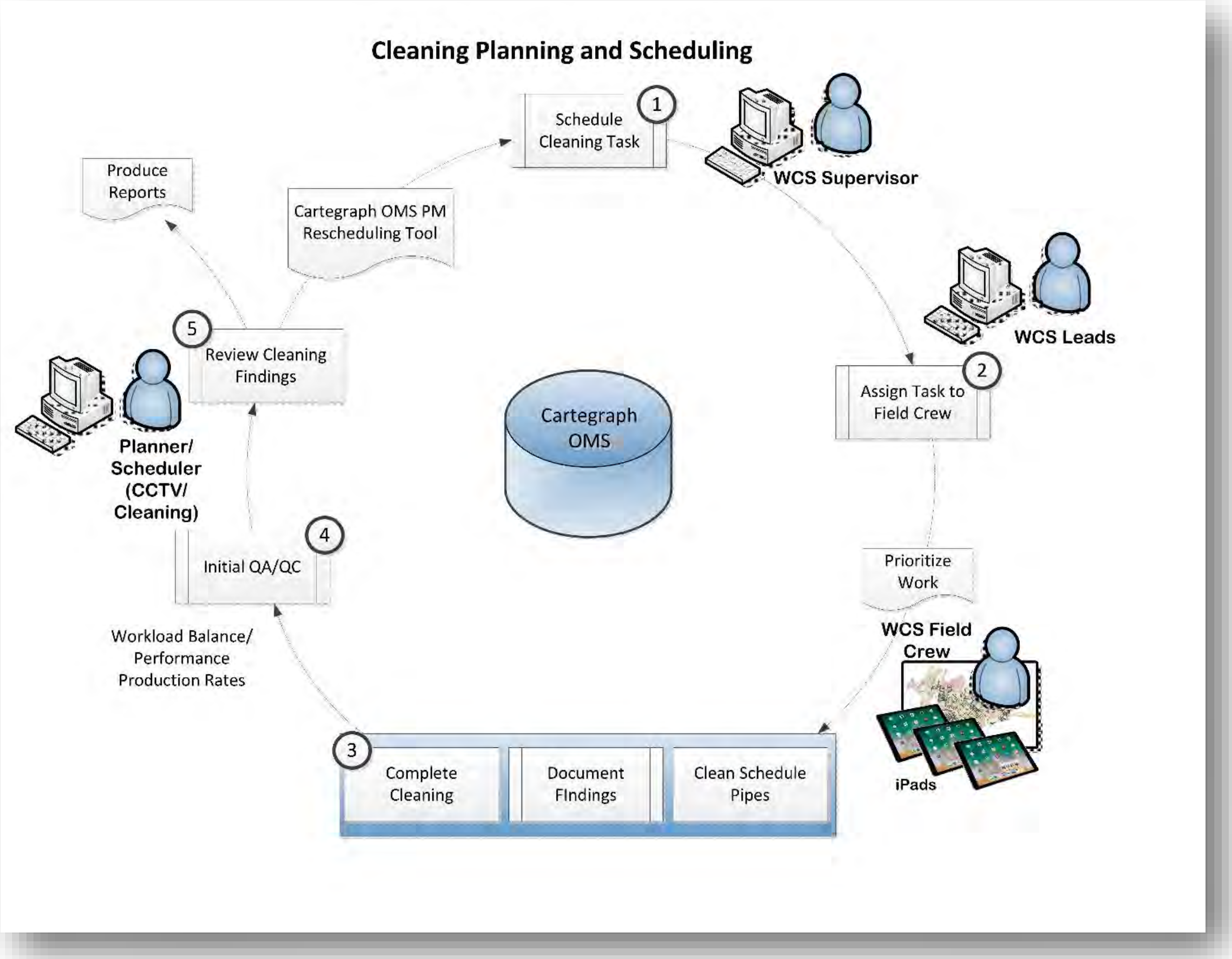


Figure 3-3 Overall Cleaning Process Workflow

Cleaning Process Steps:

Schedule Cleaning Task: Cartegraph OMS stores the cleaning frequencies and program for each individual sewer main in the City's database system. When the Estimated Start Date occurs, the cleaning task's status changes from "Projected" to "Planned" and the task is given a Due Date based on its cleaning frequency.

Assign task to field crew: These mains are reviewed by the WCS Supervisor and/or WCS Operator Lead and assigned to field crews for cleaning. The field crew reviews these cleaning assignments in Cartegraph OMS either on the computer or on a tablet. The field crew then prioritizes work based on location, difficulty of access, special scheduling considerations and plans their routes for the day.

Complete Cleaning: All findings and other relevant information for the task are documented directly into the assigned cleaning task in Cartegraph OMS using the tablet. Once the field crew reviews and completes the data entry and changes the task status to “Completed”, the field crew’s cleaning assignment in Cartegraph OMS is complete.

Initial QA/QC: After each cleaning assignment is completed and saved in Cartegraph OMS, an initial QA/QC is performed by the WCS Supervisor and/or Lead. The WCS Supervisor or Lead Operator check to ensure each pipe that was scheduled for the day had the findings documented and confirms task status is complete. This is also when any task notes from the field crew are reviewed and addressed.

Review Cleaning Results: Ensuring that the field crews data entry into the tablets while out in the field is accurate is an integral part of the Cleaning Program Planner/Scheduler’s QA/QC review process. Shortly after the day’s cleaning tasks have been completed and saved, the Cleaning Planner/Scheduler performs their QA/QC on all cleaning tasks and documents the review in the QA/QC fields within Cartegraph OMS. As part of the QA/QC, the Cleaning Program Planner/Scheduler confirms the frequency as noted in the system or makes changes if merited. At this time, the Planner/Scheduler will also review any other pertinent information like if the cleaning task was unscheduled or part of the Preventative Maintenance Plan, or if there are any videos to gain insight on the source of any material field crews document in their cleaning findings. The Cleaning Program Planner/Scheduler’s QA/QC work is documented in the task by entering in the date of review, reviewer’s initials and any notes regarding what the Planner/Scheduler did as part of the QA/QC review. Reports are then reviewed by the Superintendent. Once the cleaning tasks are saved and the Planner/Scheduler has confirmed the sewer main is in the appropriate cleaning program and has the correct cleaning frequency, the Cartegraph OMS Preventative Maintenance Tool creates a new future cleaning task and the process restarts at Step 1.

3.7.1 Reporting

After the QA/QC review by Cleaning Program Planner/Scheduler is completed, a completed cleaning task report is reviewed by the Superintendent. The report is intended to demonstrate that proper QA/QC procedures have been completed for evaluating the correct cleaning program and frequency for each sewer main cleaned over the last week. Additionally, these reports are used by the Cleaning Program Planner/Scheduler to confirm the proper proofer or skid was used to complete the sewer main cleaning. The Superintendent will review for completeness and accuracy.

3.8 Inspections

The Wastewater Collection Section utilizes CCTV, nozzle cameras, and acoustic sounding to assess the condition of the wastewater sewer pipes. Contractor services are also used to perform these activities to supplement in-house staff.

A specialized sewer video camera system using a tractor-mounted camera travels through the pipe, enabling the CCTV operator to observe the structural and operational condition of the pipe. Structural and operational defects are categorized using the Pipeline Assessment and Certification Program (PACP) methodology. The PACP methodology is an industry standard pipeline defect coding procedure established by the National Association of Sewer Services Companies (NASSCO). Structural and operational defects encountered during inspection are categorized by type and severity and includes the distance from the manhole to facilitate future repairs. This includes structural problems and any material collected in the pipe that needs to be removed to prevent blockage. PACP coding is used throughout the United States and is supported by many software companies, CCTV vendors, and inspection contractors.

The City is currently using ITPipes CCTV software to record observations from CCTV video using PACP codes.

The standardization defined by PACP allows defects to be consistently documented and compared over time, data collected from multiple crews and contractors to be integrated and compared, and data generated from PACP CCTV inspections to be seamlessly shared by multiple software systems to facilitate reporting, analysis, and decision-making.

CCTV observations may also be used to characterize the type and location of material deposited in a sewer main. This knowledge will aid in identifying solutions to reduce or prevent future deposition of roots, grease, debris and/or other materials.

CCTV inspections support the cleaning program in several ways. CCTV can be used prior to cleaning to determine if a pipe needs to be cleaned. Whenever a CCTV inspection reveals significant material in a pipe, a cleaning request can be generated to clean the pipe, regardless of its upcoming target date. In addition, if a pipe is determined to be clear based on the CCTV inspection, the Cleaning Scheduling Review Committee can adjust the cleaning schedule or frequency depending upon how close the pipe is to its next scheduled cleaning date.

If CCTV observations indicate there is an eminent risk of a stoppage, a cleaning crew can be diverted from their normal, preventive maintenance activities. The Field Crew can respond immediately to clear the potential blockage.

Cleaning Performance Quality Assurance/Quality Control (QA/QC): CCTV is also used to check to see if a recently cleaned sewer main was properly cleaned. Once a pipe is cleaned, it can be inspected using CCTV to verify the results. This allows the Superintendent to monitor the effectiveness of the cleaning program and verify that the cleaning assessments are accurately recorded.

3.8.1 Nozzle Camera

City crews have four nozzle cameras, capable of capturing high quality video of the inside of a sewer main. The nozzle uses the pressure from the sewer cleaing truck to propel it along the sewer main, capturing video as is moves along the pipe. The video is catalogued by the Pipe ID and stored along with the PACP inspection data. The information captured by the nozzle camera helps staff analyze the effectiveness of cleaning and identify maintenance issues associated with a pipe.

3.8.2 Acoustic Sounding

Acoustic sounding (SL-RAT) is used to determine if there is a potential blockage in the pipe. SL-RAT evaluates sound traveling between manholes in the air-filled portion of the pipe. It has two components: One transmits a blast of sound with known frequency and volume characteristics, and the other listens for that blast. Positioned above grade at adjoining open manholes, the transmitter and receiver are linked wirelessly and acoustically. By measuring the time interval from when the transmitter shouts and the receiver hears, and by measuring the volume and clarity at the receiver, the receiver calculates and grades the pipe on a scale of zero to 10. The inspection also factors in pipe diameter, pipe material and segment length. The pipe grade is determined, in part, by comparing the received sound characteristics to a sound library that includes hundreds of pipe sounds ranging from completely unobstructed (grade 10) to fully clogged (grade 0).

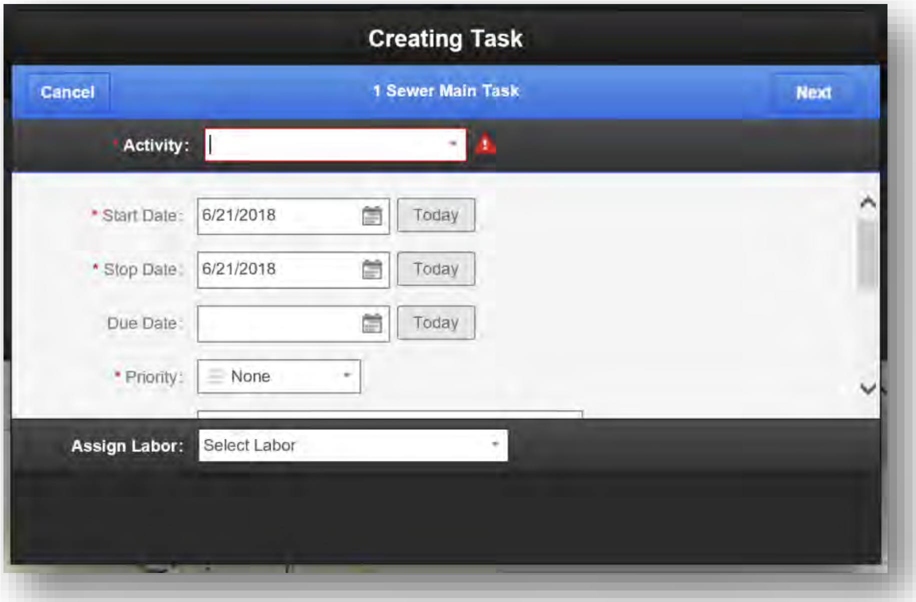
3.9 Communication

This section describes the formal and informal communication that takes place internal to the City related to pipe cleaning activities and expectations. Formal activities include meetings, memoranda and reports. Informal communications are ad-hoc communication that can take place through conversations, in meetings, or by email.

3.9.1 Communication between Management and Field Crews

3.9.1.1 Formal Communication

The Wastewater Collection System Superintendent, Supervisor and Lead Operator mainly assign work electronically through Cartegraph OMS. The process involves creating a task and/or assigning the task to one or more operators through the Cartegraph OMS interface. The Activity type, Estimated Start Date, Due Date, Priority, Task Description and any Unscheduled Cleaning Reason is entered. Once the task is created and saved, it is immediately available to the assigned staff member for their review or completion. Figure 3-4 below shows an example of the task data entry form from Cartegraph OMS.



* Activity:
* Start Date: 6/21/2018
* Stop Date: 6/21/2018
Due Date:
* Priority: None
Assign Labor: Select Labor

Figure 3-4 Task Creation Form in Cartegraph OMS

Other forms of communication for coordination include briefings and meetings between Field Crews, Lead Operator, WCS Supervisor, Superintendent and Planner/Scheduler. In addition, a daily morning briefing is held by the Lead Operator prior to going out in the field to verify resources, review assigned tasks and make announcements.

The Cleaning Program Planner/Scheduler holds a monthly Cleaning Review Committee meeting as a cleaning program review and forum to discuss proposed frequency changes. Also, the Wastewater Collection Planning Group, consisting of the Planner/Schedulers, Coordinators, and Supervisors meets as needed to review work assignments. A safety meeting is also held every other week with all Treatment and Laboratory staff.

3.9.1.2 Informal Communication

Informal communication takes place on an on-going basis between Cleaning Crews and Management. There are daily informal discussions regarding work plans, to review what has been encountered during cleaning activities and other daily issues. In addition, informal communication takes place using the City's email system. Brief meetings are also conducted on a regular basis between management and supervisory staff to discuss progress and resolve issues

3.9.2 Communication between Teams (CCTV, Cleaning, Repairs, etc)

3.9.2.1 Formal Communication

Most formal communication between field crews takes place through assigned tasks from one program to another. These communications are usually coordinated by the staff overseeing each program. As cleaning takes place, field crews identify the need for CCTV inspections, point repairs, or other maintenance for specific segments of pipe or manholes. These tasks are noted in the field and entered into Cartegraph OMS as requests to investigate, CCTV Inspection, or repairs and assigned to the appropriate staff for further evaluations using an automation manager.

3.9.2.2 Informal Communication

Informal communication takes place on an ongoing basis. The Superintendent, Supervisor, Lead Operator and field crews coordinate with each other via radio, telephone, and email to obtain and provide information about field conditions, discuss issues encountered, request support and coordinate activities. Additionally, the Wastewater Planner/Schedulers (Cleaning and CCTV Programs), CIP Coordinator, SLIP Coordinator, Administrative Specialists, WCS Supervisor, Lead Operator and Wastewater Collection System Superintendent typically hold a weekly meeting to discuss workload and upcoming priorities.

3.9.3 Communication with and the Public and Other Departments regarding Sewer Cleaning

Public

For normal cleaning operations, the field crews will periodically make contact with residents or tenants of commercial spaces when they need to gain access to their property via an easement or if other issues exist. A list of contact information for relevant members of the public is maintained in each sewer main asset record in Cartegraph OMS and available to field crews when they are prioritizing their cleaning workload.

When Emergency or unscheduled cleaning occurs, the Lead Operator, WCS Supervisor or Superintendent will try to make contact with the necessary members of the public in order to inform them of the need for cleaning.

For contractor cleaning, the Contractor is tasked with notifying the public of the cleaning or inspection work, generally 72 hours in advance. Sometimes, additional notifications and coordination is required when the work is located within an easement.

Communication to other Departments

The Wastewater Collection Section also informally communicates with other City Departments, Divisions, and Sections including the Engineering Division, the Wastewater Treatment Plant Section, the Streets Division, the Creeks Division, and the Building and Safety Division. This communication takes place either through ad-hoc face-to-face meetings, telephone calls, or emails to address specific issues as necessary.

The Wastewater System Manager and the Wastewater Collection System Superintendent meet with select members of the Engineering Division on a monthly basis to discuss ongoing collection system activities. These include replacement, rehabilitation, repairs, system-wide inspections of sewer mains and other activities. Weekly meetings are conducted for specific projects as needed (such as progress meetings for CIP projects) while projects are on-going.

Section 4: Progress Measurement and Reporting

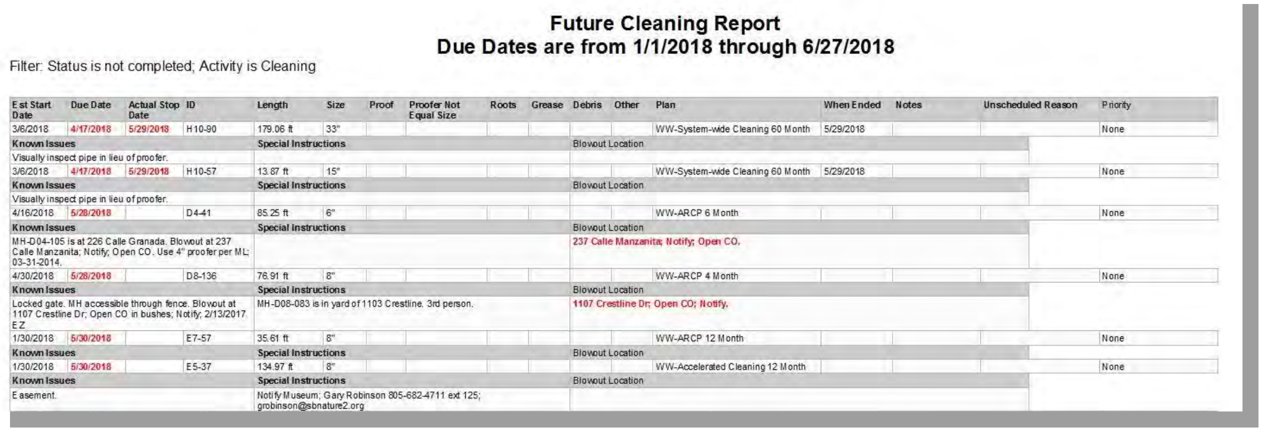
4.1 Progress Measurement

Best practices dictate that the cleaning process should be monitored for effectiveness and how well the program is accomplishing its goals. With the conversion to Cartegraph OMS, information can be provided using a combination of filters and reports and results are displayed on maps within the Cartegraph OMS environment. These reports and filters are shared between users to help monitor progress across all wastewater collection programs.

A few of the main tools Wastewater Collection Staff use to manage the cleaning program are discussed in more depth below.

4.1.1 Future Cleaning Report

The "Future Cleaning Report" is primarily used to review how much cleaning is expected before a future Due Date, but can also identify any pipes that may be cleaned after the Due Date. Pipes that are cleaned late (after Due Date) potentially have a higher risk of stoppage if debris, roots, or grease accumulate to critical levels so this report is critical for the Lead Operator, WCS Supervisor, Cleaning Program Planner/Scheduler and Superintendent to ensure that any pipes which may have past the due date are prioritized for cleaning. An example of this report is shown in Figure 4-1.



Future Cleaning Report
Due Dates are from 1/1/2018 through 6/27/2018

Filter: Status is not completed; Activity is Cleaning

Est Start Date	Due Date	Actual Stop Date	ID	Length	Size	Proof	Proofer Not Equal Size	Roots	Grease	Debris	Other	Plan	When Ended	Notes	Unscheduled Reason	Priority
3/6/2018	4/17/2018	5/29/2018	H10-90	179.06 ft	33"							WW-System-wide Cleaning 60 Month	5/29/2018			None
Known Issues				**Special Instructions**						Blowout Location						
Visually inspect pipe in lieu of proofer.																
3/6/2018	4/17/2018	5/29/2018	H10-57	13.87 ft	15"							WW-System-wide Cleaning 60 Month	5/29/2018			None
Known Issues				**Special Instructions**						Blowout Location						
Visually inspect pipe in lieu of proofer.																
4/16/2018	5/28/2018		D4-41	85.25 ft	6"							WW-ARCP 6 Month				None
Known Issues				**Special Instructions**						Blowout Location						
MH-D04-105 is at 226 Calle Granada. Blowout at 237 Calle Manzanita; Notify; Open CO. Use 4" proofer per ML; 03-31-2014.										237 Calle Manzanita; Notify; Open CO.						
4/30/2018	5/28/2018		D8-136	76.91 ft	8"							WW-ARCP 4 Month				None
Known Issues				**Special Instructions**						Blowout Location						
Locked gate. MH accessible through fence. Blowout at 1107 Crestline Dr; Open CO in bushes; Notify; 2/13/2017 EZ				MH-D08-083 is in yard of 1103 Crestline. 3rd person.						1107 Crestline Dr; Open CO; Notify.						
1/30/2018	5/30/2018		E7-57	35.61 ft	8"							WW-ARCP 12 Month				None
Known Issues				**Special Instructions**						Blowout Location						
1/30/2018	5/30/2018		E5-37	134.97 ft	8"							WW-Accelerated Cleaning 12 Month				None
Known Issues				**Special Instructions**						Blowout Location						
Easement.				Notify Museum; Gary Robinson 805-682-4711 ext 125; grobinson@sbnature2.org												

Figure 4-1. Sample Future Cleaning Report

4.1.2 Filters and Maps

Many of the progress reporting tasks can be performed using filters or the dashboard in Cartegraph OMS. Routine filters or those beneficial to multiple users can be saved and shared with other users working closely to the cleaning program. When filters are run, either in the Assets or Work tabs, the results can be displayed in a table and map within Cartegraph OMS. The tasks or assets returned as a result of these filters can be exported to Excel for further analysis as well as maps can be used to look for spatial patterns or reschedule future maintenance tasks.

Some of the typical filters used to measure and track progress for the cleaning program include:
Monthly and Annual Cleaning Footages;
Cleaning Tasks Completed Past the Due Date;
“Preventative Maintenance Plan” Cleaning Tasks Completed;
“Unscheduled” Cleaning Tasks Completed;
6-month Cleaning Projection (Planned and Projected Cleaning Tasks); and
Cleaning Frequency and Cleaning Program Changes

4.2 Quality Assurance and Quality Control

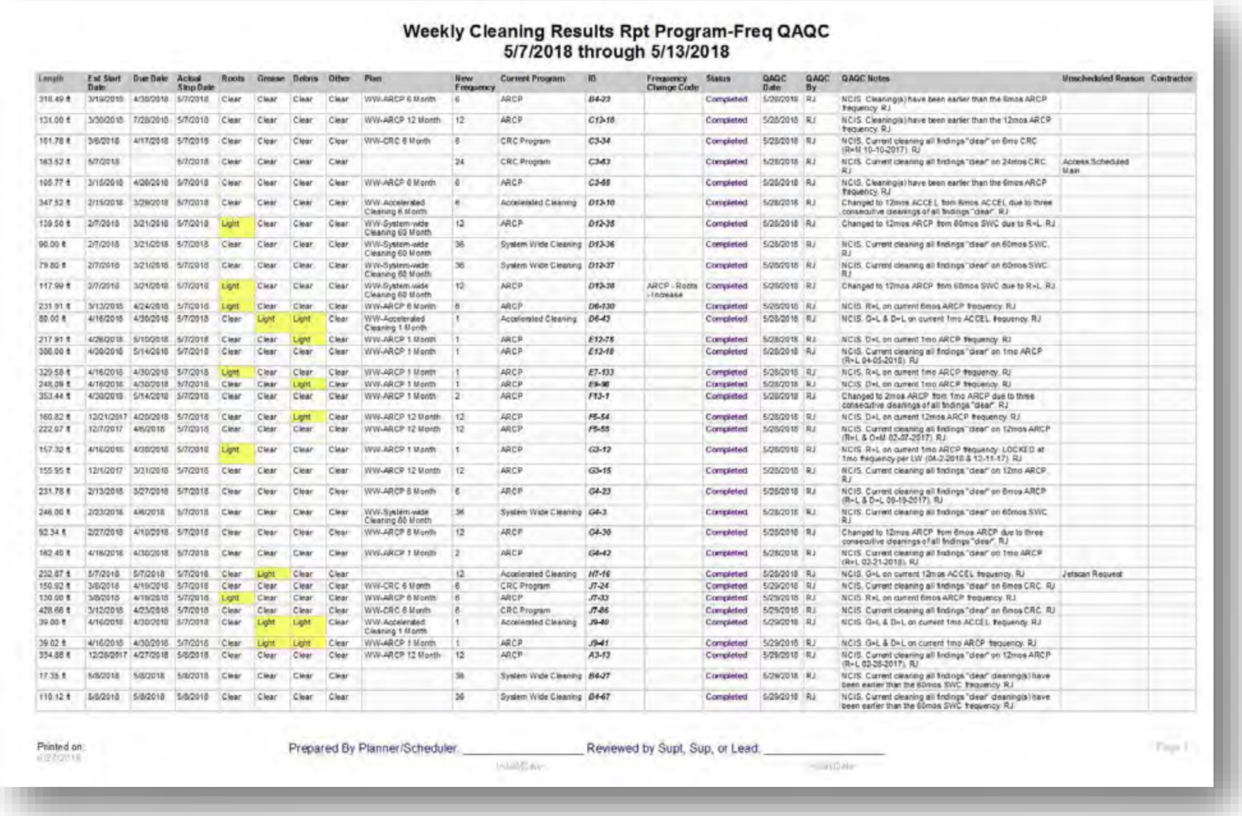
The Wastewater Collection Section has implemented a quality assurance and quality control (QA/QC) plan to ensure that the cleaning program is achieving its overall objectives, verify that the pipes are being cleaned as planned, confirm that the processes and procedures are being followed, and to make sure that accurate and complete data are being entered into the CMMS. Since the cleaning strategy and program success relies on the ability to accurately determine the next cleaning target date from previous cleaning results, it is equally important to ensure that the proper data has been entered into the system as it is to effectively clean the pipe segments themselves.

The two key aspects of quality are discussed in this section. Quality assurance focuses on the cleaning process itself to verify that the desired results are being obtained. Quality control addresses the process of evaluating the outcome of the cleaning process.

4.2.1 Weekly Cleaning Results QAQC Reports

Once the cleaning results are entered into Cartegraph OMS by the Field Crew, the Cleaning Program Planner/Scheduler will review each task’s cleaning results, proofer size and crew notes. Most of the review work is completed digitally by the Cleaning Program Planner/Scheduler through review of the cleaning history and CCTV Inspection data, but this report assists with tracking the QA/QC of the cleaning tasks, including a review to ensure each task status has been changed from “Planned” or “In Progress” to “Completed” which means that the pipe will be rescheduled by Cartegraph OMS. The Preventative Maintenance Plan for each cleaning task, the new cleaning frequency and current cleaning program, along with QA/QC notes document the work performed to confirm that the pipe is being scheduled in the right cleaning frequency and program. Once all cleaning tasks have been reviewed by the Cleaning Program Planner/Scheduler, the report is prepared for the Superintendent’s final review.

The Cleaning Program Planner/Scheduler uses two reports to assist with QA/QC of the cleaning tasks; the “Weekly Cleaning Results Report – Program-Freq QAQC” and “Weekly Cleaning Results Report – Proofer vs Known Issues QAQC Report”. Examples of these reports are provided in Figure 4-2 and Figure 4-3 below.



Weekly Cleaning Results Rpt Program-Freq QAQC
5/7/2018 through 5/13/2018

Length	Est Start Date	Due Date	Actual Stop Date	Roots	Grease	Debris	Other	Plan	New Frequency	Current Program	ID	Frequency Change Code	Status	QAQC Date	QAQC By	QAQC Notes	Unscheduled Reason	Contractor
318.49 ft	3/19/2018	4/30/2018	5/7/2018	Clear	Clear	Clear	Clear	WW-ARCP 6 Month	6	ARCP	*B4-23*		Completed	5/28/2018	RJ	NCIS. Cleaning(s) have been earlier than the 6mos ARCP frequency. RJ		
131.00 ft	3/30/2018	7/28/2018	5/7/2018	Clear	Clear	Clear	Clear	WW-ARCP 12 Month	12	ARCP	*C12-18*		Completed	5/28/2018	RJ	NCIS. Cleaning(s) have been earlier than the 12mos ARCP frequency. RJ		
101.78 ft	3/6/2018	4/17/2018	5/7/2018	Clear	Clear	Clear	Clear	WW-CRC 6 Month	6	CRC Program	*C3-34*		Completed	5/28/2018	RJ	NCIS. Current cleaning all findings "clear" on 6mo CRC (R=M 10-10-2017). RJ		
163.52 ft	5/7/2018		5/7/2018	Clear	Clear	Clear	Clear		24	CRC Program	*C3-63*		Completed	5/28/2018	RJ	NCIS. Current cleaning all findings "clear" on 24mos CRC. RJ	Access Scheduled Main	
105.77 ft	3/15/2018	4/26/2018	5/7/2018	Clear	Clear	Clear	Clear	WW-ARCP 6 Month	6	ARCP	*C3-65*		Completed	5/28/2018	RJ	NCIS. Cleaning(s) have been earlier than the 6mos ARCP frequency. RJ		
347.52 ft	2/15/2018	3/29/2018	5/7/2018	Clear	Clear	Clear	Clear	WW-Accelerated Cleaning 6 Month	6	Accelerated Cleaning	*D12-10*		Completed	5/28/2018	RJ	Changed to 12mos ACCEL from 6mos ACCEL due to three consecutive cleanings of all findings "clear". RJ		
139.50 ft	2/7/2018	3/21/2018	5/7/2018	Light	Clear	Clear	Clear	WW-System-wide Cleaning 60 Month	12	ARCP	*D12-35*		Completed	5/28/2018	RJ	Changed to 12mos ARCP from 60mos SWC due to R=L. RJ		
90.00 ft	2/7/2018	3/21/2018	5/7/2018	Clear	Clear	Clear	Clear	WW-System-wide Cleaning 60 Month	36	System Wide Cleaning	*D12-36*		Completed	5/28/2018	RJ	NCIS. Current cleaning all findings "clear" on 60mos SWC. RJ		
79.80 ft	2/7/2018	3/21/2018	5/7/2018	Clear	Clear	Clear	Clear	WW-System-wide Cleaning 60 Month	36	System Wide Cleaning	*D12-37*		Completed	5/28/2018	RJ	NCIS. Current cleaning all findings "clear" on 60mos SWC. RJ		
117.99 ft	2/7/2018	3/21/2018	5/7/2018	Light	Clear	Clear	Clear	WW-System-wide Cleaning 60 Month	12	ARCP	*D12-38*	ARCP - Roots - Increase	Completed	5/28/2018	RJ	Changed to 12mos ARCP from 60mos SWC due to R=L. RJ		
231.91 ft	3/13/2018	4/24/2018	5/7/2018	Light	Clear	Clear	Clear	WW-ARCP 6 Month	6	ARCP	*D6-130*		Completed	5/28/2018	RJ	NCIS. R=L on current 6mos ARCP frequency. RJ		
80.00 ft	4/16/2018	4/30/2018	5/7/2018	Clear	Light	Light	Clear	WW-Accelerated Cleaning 1 Month	1	Accelerated Cleaning	*D6-43*		Completed	5/28/2018	RJ	NCIS. G=L & D=L on current 1mo ACCEL frequency. RJ		
217.91 ft	4/28/2018	5/10/2018	5/7/2018	Clear	Clear	Light	Clear	WW-ARCP 1 Month	1	ARCP	*E12-75*		Completed	5/28/2018	RJ	NCIS. D=L on current 1mo ARCP frequency. RJ		
306.00 ft	4/30/2018	5/14/2018	5/7/2018	Clear	Clear	Clear	Clear	WW-ARCP 1 Month	1	ARCP	*E12-18*		Completed	5/28/2018	RJ	NCIS. Current cleaning all findings "clear" on 1mo ARCP (R=L 04-05-2018). RJ		
329.58 ft	4/16/2018	4/30/2018	5/7/2018	Light	Clear	Clear	Clear	WW-ARCP 1 Month	1	ARCP	*E7-133*		Completed	5/28/2018	RJ	NCIS. R=L on current 1mo ARCP frequency. RJ		
248.09 ft	4/16/2018	4/30/2018	5/7/2018	Clear	Clear	Light	Clear	WW-ARCP 1 Month	1	ARCP	*E9-98*		Completed	5/28/2018	RJ	NCIS. D=L on current 1mo ARCP frequency. RJ		
353.44 ft	4/30/2018	5/14/2018	5/7/2018	Clear	Clear	Clear	Clear	WW-ARCP 1 Month	2	ARCP	*F13-1*		Completed	5/28/2018	RJ	Changed to 2mos ARCP from 1mo ARCP due to three consecutive cleanings of all findings "clear". RJ		
160.82 ft	12/21/2017	4/20/2018	5/7/2018	Clear	Clear	Light	Clear	WW-ARCP 12 Month	12	ARCP	*F5-54*		Completed	5/28/2018	RJ	NCIS. D=L on current 12mos ARCP frequency. RJ		
222.07 ft	12/7/2017	4/6/2018	5/7/2018	Clear	Clear	Clear	Clear	WW-ARCP 12 Month	12	ARCP	*F5-55*		Completed	5/28/2018	RJ	NCIS. Current cleaning all findings "clear" on 12mos ARCP (R=L & O=M 02-07-2017). RJ		
157.32 ft	4/16/2018	4/30/2018	5/7/2018	Light	Clear	Clear	Clear	WW-ARCP 1 Month	1	ARCP	*G3-12*		Completed	5/28/2018	RJ	NCIS. R=L on current 1mo ARCP frequency. LOCKED at 1mo frequency per LW (04-2-2018 & 12-11-17). RJ		
155.95 ft	12/1/2017	3/31/2018	5/7/2018	Clear	Clear	Clear	Clear	WW-ARCP 12 Month	12	ARCP	*G3-15*		Completed	5/28/2018	RJ	NCIS. Current cleaning all findings "clear" on 12mo ARCP. RJ		
231.78 ft	2/13/2018	3/27/2018	5/7/2018	Clear	Clear	Clear	Clear	WW-ARCP 6 Month	6	ARCP	*G4-23*		Completed	5/28/2018	RJ	NCIS. Current cleaning all findings "clear" on 6mos ARCP (R=L & D=L 09-19-2017). RJ		
246.00 ft	2/23/2018	4/6/2018	5/7/2018	Clear	Clear	Clear	Clear	WW-System-wide Cleaning 60 Month	36	System Wide Cleaning	*G4-3*		Completed	5/28/2018	RJ	NCIS. Current cleaning all findings "clear" on 60mos SWC. RJ		
92.34 ft	2/27/2018	4/10/2018	5/7/2018	Clear	Clear	Clear	Clear	WW-ARCP 6 Month	12	ARCP	*G4-30*		Completed	5/28/2018	RJ	Changed to 12mos ARCP from 6mos ARCP due to three consecutive cleanings of all findings "clear". RJ		
142.40 ft	4/16/2018	4/30/2018	5/7/2018	Clear	Clear	Clear	Clear	WW-ARCP 1 Month	2	ARCP	*G4-42*		Completed	5/28/2018	RJ	NCIS. Current cleaning all findings "clear" on 1mo ARCP (R=L 02-21-2018). RJ		
232.87 ft	5/7/2018	5/7/2018	5/7/2018	Clear	Light	Clear	Clear		12	Accelerated Cleaning	*H7-16*		Completed	5/28/2018	RJ	NCIS. G=L on current 12mos ACCEL frequency. RJ	Jetscan Request	
150.92 ft	3/8/2018	4/19/2018	5/7/2018	Clear	Clear	Clear	Clear	WW-CRC 6 Month	6	CRC Program	*J7-24*		Completed	5/29/2018	RJ	NCIS. Current cleaning all findings "clear" on 6mos CRC. RJ		
130.00 ft	3/8/2018	4/19/2018	5/7/2018	Light	Clear	Clear	Clear	WW-ARCP 6 Month	6	ARCP	*J7-33*		Completed	5/29/2018	RJ	NCIS. R=L on current 6mos ARCP frequency. RJ		
428.66 ft	3/12/2018	4/23/2018	5/7/2018	Clear	Clear	Clear	Clear	WW-CRC 6 Month	6	CRC Program	*J7-86*		Completed	5/29/2018	RJ	NCIS. Current cleaning all findings "clear" on 6mos CRC. RJ		
39.00 ft	4/16/2018	4/30/2018	5/7/2018	Clear	Light	Light	Clear	WW-Accelerated Cleaning 1 Month	1	Accelerated Cleaning	*J9-40*		Completed	5/29/2018	RJ	NCIS. G=L & D=L on current 1mo ACCEL frequency. RJ		
39.02 ft	4/16/2018	4/30/2018	5/7/2018	Clear	Light	Light	Clear	WW-ARCP 1 Month	1	ARCP	*J9-41*		Completed	5/29/2018	RJ	NCIS. G=L & D=L on current 1mo ARCP frequency. RJ		
334.88 ft	12/28/2017	4/27/2018	5/8/2018	Clear	Clear	Clear	Clear	WW-ARCP 12 Month	12	ARCP	*A3-13*		Completed	5/29/2018	RJ	NCIS. Current cleaning all findings "clear" on 12mos ARCP (R=L 02-28-2017). RJ		
17.35 ft	5/8/2018	5/8/2018	5/8/2018	Clear	Clear	Clear	Clear		36	System Wide Cleaning	*B4-27*		Completed	5/29/2018	RJ	NCIS. Current cleaning all findings "clear" cleaning(s) have been earlier than the 60mos SWC frequency. RJ		
110.12 ft	5/8/2018	5/8/2018	5/8/2018	Clear	Clear	Clear	Clear		36	System Wide Cleaning	*B4-67*		Completed	5/29/2018	RJ	NCIS. Current cleaning all findings "clear" cleaning(s) have been earlier than the 60mos SWC frequency. RJ		

Printed on:
6/27/2018

Prepared By Planner/Scheduler: ____________________ Reviewed by Supt, Sup, or Lead: ____________________

Initial/Date Initial/Date

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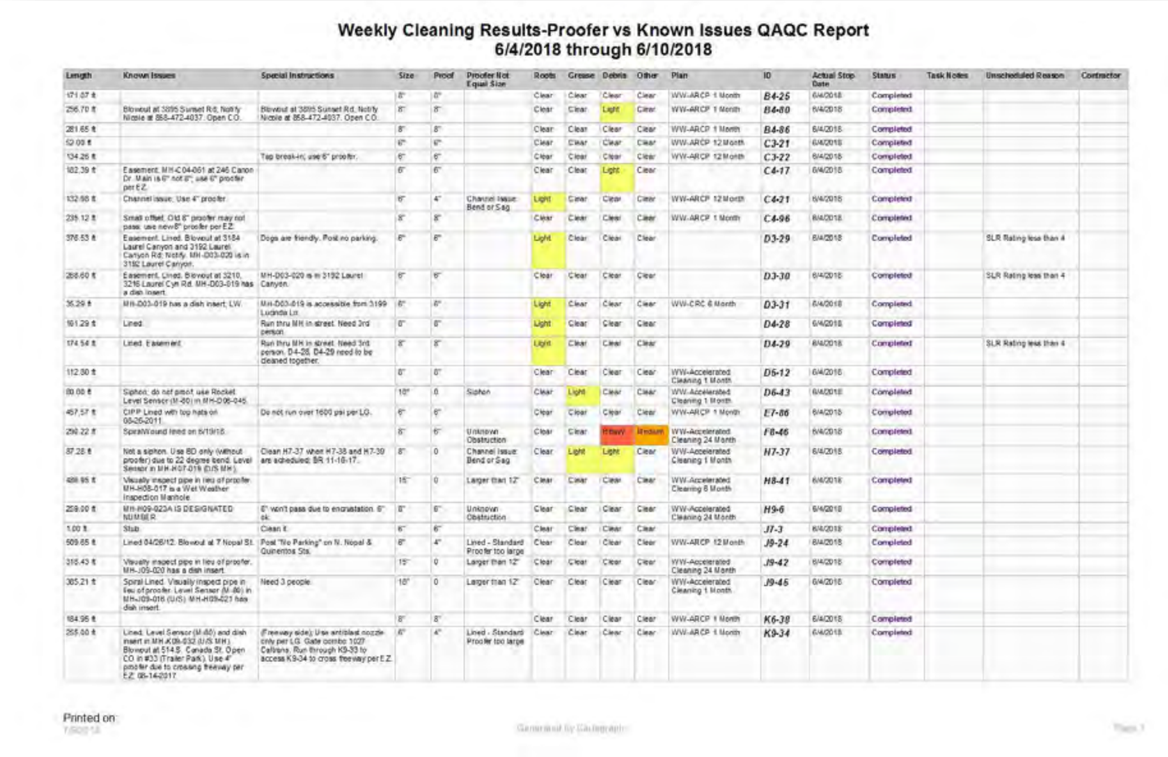
Figure 4-2 Typical Weekly Cleaning Results Program Frequency Report



Weekly Cleaning Results-Proofer vs Known Issues QAQC Report
6/4/2018 through 6/10/2018

Length	Known Issues	Special Instructions	Size	Proof	Proofer Not Equal Size	Roots	Grease	Debris	Other	Plan	ID	Actual Stop Date	Status	Task Notes	Unscheduled Reason	Contractor
171.07 ft			8"	8"		Clear	Clear	Clear	Clear	WW-ARCP 1 Month	B4-25	6/4/2018	Completed			
256.70 ft	Blowout at 3895 Sunset Rd, Notify Nicole at 858-472-4037. Open CO.	Blowout at 3895 Sunset Rd, Notify Nicole at 858-472-4037. Open CO.	8"	8"		Clear	Clear	Light	Clear	WW-ARCP 1 Month	B4-80	6/4/2018	Completed			
281.65 ft			8"	8"		Clear	Clear	Clear	Clear	WW-ARCP 1 Month	B4-86	6/4/2018	Completed			
52.00 ft			6"	6"		Clear	Clear	Clear	Clear	WW-ARCP 12 Month	C3-21	6/4/2018	Completed			
134.26 ft		Tap break-in; use 6" proofer.	6"	6"		Clear	Clear	Clear	Clear	WW-ARCP 12 Month	C3-22	6/4/2018	Completed			
182.39 ft	Easement. MH-C04-061 at 246 Canon Dr. Main is 6" not 8"; use 6" proofer per EZ.		6"	6"		Clear	Clear	Light	Clear		C4-17	6/4/2018	Completed			
132.98 ft	Channel issue; Use 4" proofer.		6"	4"	Channel Issue: Bend or Sag	Light	Clear	Clear	Clear	WW-ARCP 12 Month	C4-21	6/4/2018	Completed			
235.12 ft	Small offset. Old 8" proofer may not pass; use new8" proofer per EZ.		8"	8"		Clear	Clear	Clear	Clear	WW-ARCP 1 Month	C4-96	6/4/2018	Completed			
376.53 ft	Easement. Lined. Blowout at 3184 Laurel Canyon and 3192 Laurel Canyon Rd; Notify. MH-D03-020 is in 3192 Laurel Canyon.	Dogs are friendly. Post no parking.	6"	6"		Light	Clear	Clear	Clear		D3-29	6/4/2018	Completed		SLR Rating less than 4	
288.60 ft	Easement. Lined. Blowout at 3210, 3216 Laurel Cyn Rd. MH-D03-019 has a dish insert.	MH-D03-020 is in 3192 Laurel Canyon.	6"	6"		Clear	Clear	Clear	Clear		D3-30	6/4/2018	Completed		SLR Rating less than 4	
35.29 ft	MH-D03-019 has a dish insert; LW.	MH-D03-019 is accessible from 3199 Lucinda Ln.	6"	6"		Light	Clear	Clear	Clear	WW-CRC 6 Month	D3-31	6/4/2018	Completed			
161.29 ft	Lined.	Run thru MH in street. Need 3rd person.	8"	8"		Light	Clear	Clear	Clear		D4-28	6/4/2018	Completed			
174.54 ft	Lined. Easement.	Run thru MH in street. Need 3rd person. D4-28, D4-29 need to be cleaned together.	8"	8"		Light	Clear	Clear	Clear		D4-29	6/4/2018	Completed		SLR Rating less than 4	
112.80 ft			8"	8"		Clear	Clear	Clear	Clear	WW-Accelerated Cleaning 1 Month	D5-12	6/4/2018	Completed			
80.00 ft	Siphon; do not proof, use Rocket Level Sensor (M-80) in MH-D06-045.		10"	0	Siphon	Clear	Light	Clear	Clear	WW-Accelerated Cleaning 1 Month	D6-43	6/4/2018	Completed			
457.57 ft	CIPP Lined with top hats on 08-26-2011.	Do not run over 1600 psi per LG.	6"	6"		Clear	Clear	Clear	Clear	WW-ARCP 1 Month	E7-86	6/4/2018	Completed			
290.22 ft	SpiralWound lined on 6/19/18.		8"	6"	Unknown Obstruction	Clear	Clear	Heavy	Medium	WW-Accelerated Cleaning 24 Month	F8-46	6/4/2018	Completed			
87.28 ft	Not a siphon. Use BD only (without proofer) due to 22 degree bend. Level Sensor in MH-H07-019 (D/S MH).	Clean H7-37 when H7-38 and H7-39 are scheduled. BR 11-16-17.	8"	0	Channel Issue: Bend or Sag	Clear	Light	Light	Clear	WW-Accelerated Cleaning 1 Month	H7-37	6/4/2018	Completed			
488.95 ft	Visually inspect pipe in lieu of proofer. MH-H08-017 is a Wet Weather Inspection Manhole.		15"	0	Larger than 12"	Clear	Clear	Clear	Clear	WW-Accelerated Cleaning 6 Month	H8-41	6/4/2018	Completed			
208.00 ft	MH-H09-023A IS DESIGNATED NUMBER.	6" won't pass due to encrustation. 6" ok.	8"	6"	Unknown Obstruction	Clear	Clear	Clear	Clear	WW-Accelerated Cleaning 24 Month	H9-6	6/4/2018	Completed			
1.00 ft	Stub.	Clean it.	6"	6"		Clear	Clear	Clear	Clear		J7-3	6/4/2018	Completed			
509.65 ft	Lined 04/26/12. Blowout at 7 Nopal St.	Post "No Parking" on N. Nopal & Quinientos Sts.	6"	4"	Lined - Standard Proofer too large	Clear	Clear	Clear	Clear	WW-ARCP 12 Month	J9-24	6/4/2018	Completed			
316.43 ft	Visually inspect pipe in lieu of proofer. MH-J09-020 has a dish insert.		15"	0	Larger than 12"	Clear	Clear	Clear	Clear	WW-Accelerated Cleaning 24 Month	J9-42	6/4/2018	Completed			
305.21 ft	Spiral Lined. Visually inspect pipe in lieu of proofer. Level Sensor (M-80) in MH-J09-016 (U/S). MH-H09-021 has dish insert.	Need 3 people.	18"	0	Larger than 12"	Clear	Clear	Clear	Clear	WW-Accelerated Cleaning 1 Month	J9-45	6/4/2018	Completed			
184.95 ft			8"	8"		Clear	Clear	Clear	Clear	WW-ARCP 1 Month	K6-38	6/4/2018	Completed			
255.00 ft	Lined. Level Sensor (M-80) and dish insert in MH-K09-032 (U/S MH). Blowout at 514 S. Canada St. Open CO in #33 (Trailer Park). Use 4" proofer due to crossing freeway per EZ 08-14-2017.	(Freeway side); Use antiblast nozzle only per LG. Gate combo 1027 Caltrans. Run through K9-33 to access K9-34 to cross freeway per EZ.	6"	4"	Lined - Standard Proofer too large	Clear	Clear	Clear	Clear	WW-ARCP 1 Month	K9-34	6/4/2018	Completed			

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Figure 4-3. Typical Weekly Cleaning Results Program Frequency Report

4.3 Monitoring Quality Assurance and Quality Control Plan

4.3.1 Monitoring the Overall Cleaning Program Quality

The overall result of the pipe cleaning program is to reduce or eliminate SSOs and blockages that are preventable through proper maintenance. The primary quality indicator for this is to track the number of SSOs and blockages that occur over time. Santa Barbara has set performance goals for overflows and reports these metrics every quarter (3 months). The key metrics related to these performance goals are:

Percentage of system sewer main geographic miles cleaned;

Miles of pipeline inspected using CCTV per PACP Standards;

Miles of sewer main cleaned on unscheduled maintenance;

Number of private sewer lateral overflows responded to;

Number of private sewer laterals requiring inspection;

Number of private sewer laterals requiring repairs; and

Volume, in gallons, of sanitary sewer overflow water reaching surface waters not recovered.

The City has established annual targets for these metrics and evaluates their effectiveness to meet these metrics on their P3 report which is produced twice yearly. While there are other programs and activities that affect these metrics, the cleaning program is designed to enable the City to achieve or exceed their goals. If any of these metrics are off target, the City will identify the cause of the metric being off target and determine if additional changes are needed in the cleaning program (or other programs) to bring the measures within acceptable limits.

In addition, as part of any overflow response, the Wastewater Collection Section performs a failure analysis and documents it in a SSO Response and Analysis Report. This form is used to identify the cause of an SSO and may result in changes in the cleaning process or other activities to reduce future occurrences of spills.

4.3.2 Quality Assurance within Cleaning Operations

As mentioned above, quality assurance is used to determine that the proper cleaning processes and procedures are being followed. The key questions to be addressed are:

Are City standard operating procedures for sewer main cleaning being followed?

Are the pipes that have been scheduled to be cleaned getting cleaned?

Is the cleaning being performed within the defined target date range?

The four key quality assurance components to address these questions are:

Training: All field staff will be trained on the equipment and procedure used to perform pipe cleaning and proofing. Training records are documented to ensure that procedures are consistently and effectively performed.

Audit and observation: The Superintendent, Supervisor or Lead Operator will conduct random, periodic field audits to ensure that the field crews are following procedures and document these field audits in a tracking spreadsheet maintained by the Superintendent.

GPS: Each cleaning truck is mounted with a GPS unit that records the trucks location during the day. The GPS logs are regularly reviewed by the Superintendent or Supervisor to determine if the crews are spending an adequate amount of time at each cleaning site to achieve the cleaning rates required (35 ft per minute or less).

Standard Reports/Standard Filters: Standard reports and filters can be generated by the CMMS to determine if sewer main cleaning is completed within the target date range or cleaning window. In order for the City's cleaning strategy to work, it is imperative that the work be performed between the Estimated Start Date and Due Date. Standard reports or filters can be generated to verify that sewer mains are cleaned at least once within 60 months and to monitor the other pipe cleaning frequencies.

4.3.3 Quality Control within Cleaning Operations

Evaluation of cleaning results is a component of an effective program. The key elements of concern associated with sewer main cleaning include determining if the pipe was adequately cleaned and determining if the cleaning findings were adequately documented. The City verifies effectiveness of its cleaning operations through CCTV inspections, proofing, and standardization of steel debris traps.

CCTV inspections are performed throughout the system to identify defects and to determine the maintenance status of a sewer main. If a recently cleaned pipe is found to require additional cleaning, it is flagged for further investigation. This method verifies whether pipes are being adequately cleaned or if structural issues may be contributing to debris deposition.

Proofing is conducted as part of the cleaning process to verify that the pipe is free of debris, defects, and obstructions. The proofer is a skid that is sized within one inch of the diameter of the pipe. If the proofer passes through the entire pipe length without encountering an obstruction or accumulated debris, it indicates that the pipe is adequately clean. As part of the standard cleaning procedure, the cleaning crew should not leave the site until the proofer does not encounter debris as it passes through the entire pipe (however, if there is an obstruction that cannot be cleared, the pipe will be flagged for further investigation). When the appropriately sized proofer is unable to pass through the pipe and the cause was verified through follow-up inspection (e.g. protruding lateral, offset joint, etc.), it is documented in Cartegraph OMS as a known issue.

Steel traps, in the form of baskets, are used to collect material downstream as each pipe segment is cleaned. The amount and type of material recovered in the trap is integral to the assessment of findings. The traps have been standardized so that the amount of material recovered can be classified in a standard quantity. This enables each crew to report findings consistently to facilitate accurate scheduling of the next cleaning task for each pipe. During field audits, the Superintendent, Supervisor or Lead will verify that the field crews are classifying the findings appropriately.

4.3.4 Information Quality Assurance and Quality Control

The City's pipe cleaning program is highly dependent upon accurate and complete data being entered into the CMMS for proper scheduling of pipe cleaning and effective allocation of cleaning resources. These data include correct scheduling, and special instructions for the field crews, the proper recording of cleaning results by the field crews and the person reviewing the data into the CMMS. In addition, it is important that the sewer mains assigned to field crews are cleaned and documented in the CMMS in a timely manner.

In order to ensure that quality data is being entered into the CMMS and that the cleaning process is being completed in a timely manner, each scheduled cleaning event follows a lifecycle process that allows the City to perform QA/QC on the data from initiation to completion. This scheduled cleaning event lifecycle has three phases, and specific criteria are needed to be met at the end of each phase in order for a scheduled cleaning event to move to the next phase. Each scheduled cleaning event may be tracked by assigning to it a status related where it is in the overall lifecycle. The three task statuses are described below and correlate to the process illustrated in Figure 3-3 (Section 3).

Projected - A future cleaning event will have a status of ‘Projected’ when it has been given an Estimated Start Date to begin cleaning (from the Preventative Maintenance Tool in Cartegraph OMS) and before the Estimated Start Date has elapsed. These pipes will remain in the database until this estimated start date is reached. When the estimated start date occurs, the cleaning event will be changed from ‘Projected’ to ‘Planned’ status.

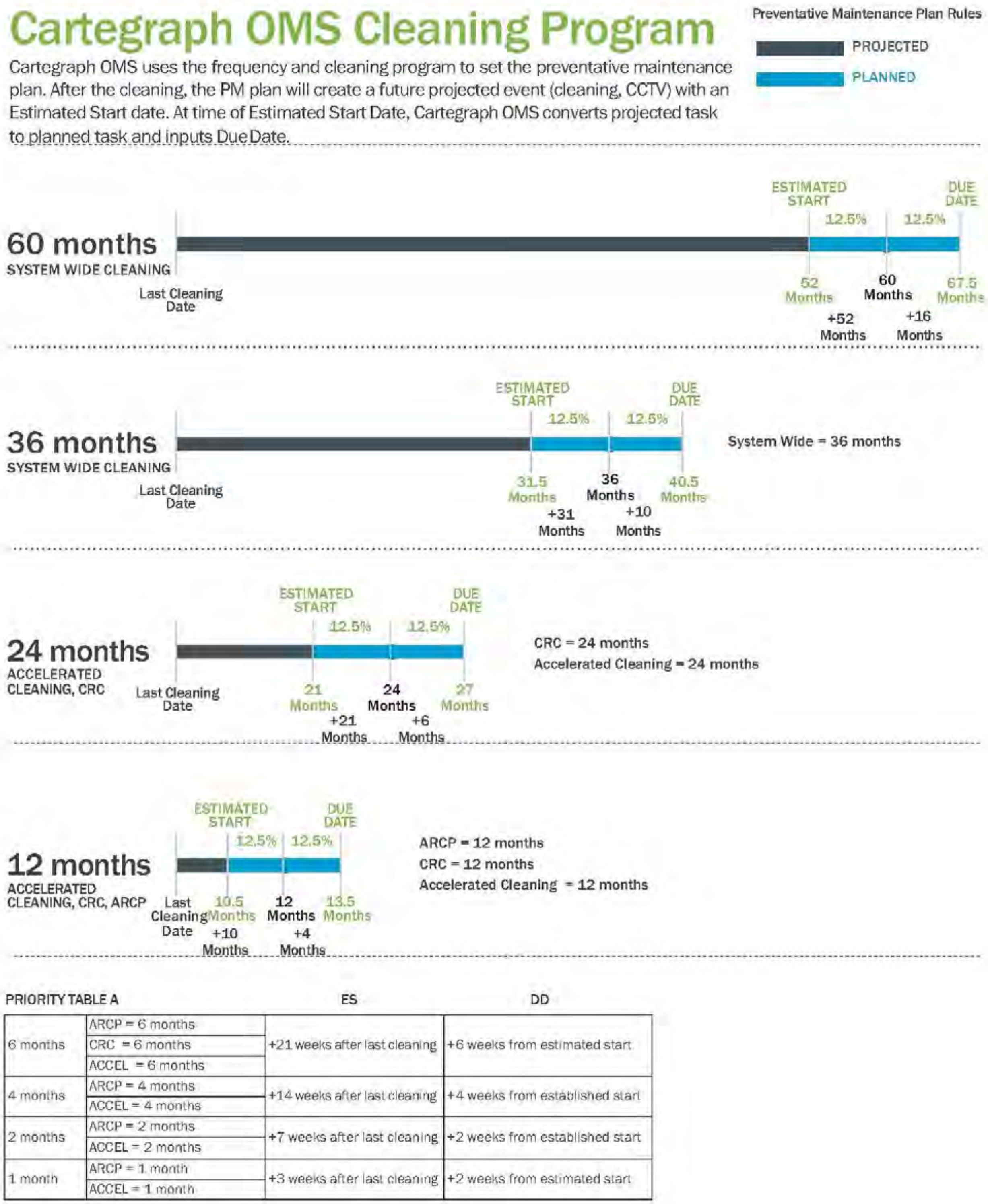
Planned - Once a scheduled cleaning event reaches its Estimated Start Date, the task status will convert from “Projected” to "Planned". At this point, a Due Date is assigned based on the pipes cleaning frequency and is reviewed by the WCS Supervisor or Lead prior to being assigned to a field crew. During this phase, the crew will be assigned a set of mains to prioritize for cleaning, clean each of the sewer mains, and record the results in the tablets.

Completed - After all of the sewer mains have been cleaned and the cleaning findings recorded in the tablets, it is synced back to the Cartegraph OMS Database to the WCS Supervisor/Lead for review. Once the task is initially QA/QC’d for completeness, the Planner/Scheduler then performs their review of Cleaning Findings. During this review, the cleaning findings, along with the duration between the current cleaning task and the last cleaning task are evaluated by the Planner/Scheduler to confirm the pipe is in the right frequency and cleaning program. The equipment used is also reviewed at this phase. The Planner/Scheduler will also resolve any issues directly with the Lead Operator and/or WCS Supervisor.

In addition to monitoring the cleaning lifecycle, the WCS Supervisor and/or Lead will monitor the database to verify that all pipes that have been cleaned during their cleaning windows. .

Appendix A: Overview of Frequencies in Cartegraph OMS

Appendix A



Cartegraph OMS Cleaning Program

Cartegraph OMS uses the frequency and cleaning program to set the preventative maintenance plan. After the cleaning, the PM plan will create a future projected event (cleaning, CCTV) with an Estimated Start date. At time of Estimated Start Date, Cartegraph OMS converts projected task to planned task and inputs Due Date.

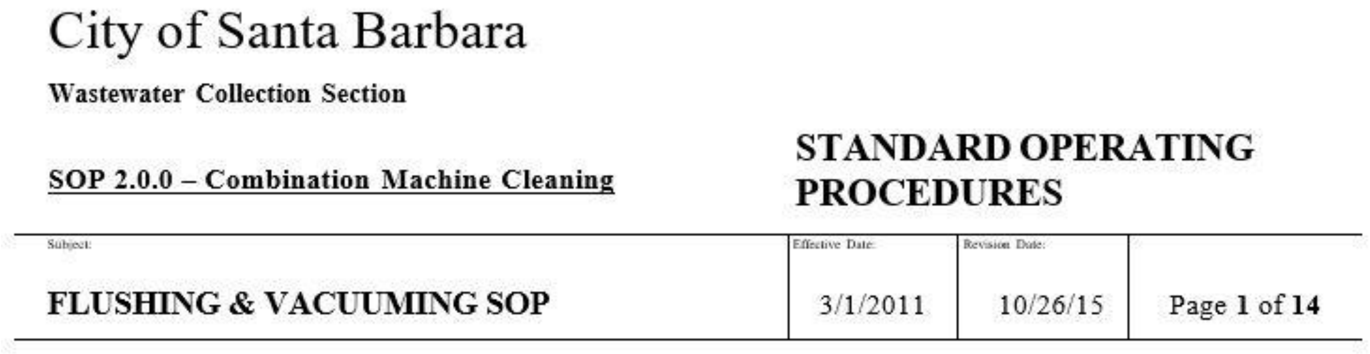
System Wide = 36 months

CRC = 24 months
Accelerated Cleaning = 24 months

ARCP = 12 months
CRC = 12 months
Accelerated Cleaning = 12 months

PRIORITY TABLE A		ES	DD
6 months	ARCP = 6 months CRC = 6 months ACCEL = 6 months	+21 weeks after last cleaning	+6 weeks from estimated start
4 months	ARCP = 4 months ACCEL = 4 months	+14 weeks after last cleaning	+4 weeks from established start
2 months	ARCP = 2 months ACCEL = 2 months	+7 weeks after last cleaning	+2 weeks from established start
1 month	ARCP = 1 month ACCEL = 1 month	+3 weeks after last cleaning	+2 weeks from estimated start

Appendix B: SOP 2.0.0 Combination Machine Cleaning



City of Santa Barbara

Wastewater Collection Section

SOP 2.0.0 – Combination Machine Cleaning

STANDARD OPERATING PROCEDURES

Subject:	Effective Date:	Revision Date:	
FLUSHING & VACUUMING SOP	3/1/2011	10/26/15	Page **1** of **14**

1. POLICY

In its policy of maintaining the sanitary sewer system and eliminating sanitary sewer spills in the City of Santa Barbara, California, Wastewater Collection section utilizes different types of equipment and processes. Among these are hydraulic cleaning using a truck mounted sewer flushing/vacuum machine (Combo) in preventive and predictive pipe cleaning operations. The following Standard Operating Procedures (SOPs) are designed to create a standard use guide of field operations that will help avoid injury and damage to equipment or property; achieve efficient and effective line cleaning, and provide continuity in equipment use between operators.

2. PURPOSE

The intent of operating this equipment is to remove deposits and organic materials that can interrupt flow and result in sanitary sewer overflows (SSOs). The intent of cleaning should be to restore up to 95% of the cross section of the pipe during cleaning operations. This requires special tools and techniques as well as accurate recording and reporting to help determine whether a given pipe needs further cleaning, repair, or replacement because of structural problems. This field document describes the protocols of operation that will best ensure this result. The SOP assumes that the operator is experienced with this equipment beyond novice level or that an experienced operator is present to oversee the work. For specific detailed information about the specific machine, refer to the manufacturer's operation and maintenance manuals.

This document relates standards of operation under normal or anticipated conditions as used by section personnel under departmental policy and/or past practice. Documentation of these practices in no way limits equipment operation to these practices alone. This document is intended only as a guideline in equipment operation; during emergencies or other abnormal circumstances, some flexibility in using the equipment may be required.

As an expectation of productivity, pipe maintenance crews are expected to clean a minimum of 2,000 linear feet of pipe per shift, following the SOP guidelines for this equipment use. In that expectation, it is understood that challenging easement access and pipes with heavy debris loads may impact this footage on a given shift.

The primary goal of operations is to ensure every pipe cleaned meets the standard of care and safe operation as outlined in the SOP. Pipes with heavy debris which take time to clean should be noted in the daily log, if taking an inordinate amount of time to clean due to conditions, the Lead shall be notified. Under no circumstances is a pipe to be left prior to its being fully cleaned and proofed.

Any questions, comments, additions, corrections, or changes to this SOP should be addressed to the appropriate field supervisor or their designee. Annual review of this document is encouraged.

3. PROCEDURES

3.1 Personal Safety Equipment

All operators working in the field with this equipment must be protected from any hazards of operation that may be encountered. Operators and other personnel shall wear clothing appropriate to the weather conditions, as may be needed during operation, and observe departmental policy regarding steel-toed shoes; traffic safety vests; high visibility jackets and head gear; hard hats; gloves; respiratory , hearing, and/or eye protection.

3.2 Hazard Identification

Any operator who sees, suspects, or knows of a potential safety hazard, including any equipment component, tool, set-up condition, traffic condition, etc., must immediately bring it to the attention of their supervisor, responsible party of the work crew, and/or other crew members. Any additional action(s) should be taken with this information in mind if corrective, anticipatory, or preventive measures are needed. If the hazard cannot be resolved with such action(s), the operator shall notify the supervisor prior to proceeding.

3.3 Training

Each operator of line-cleaning and flushing equipment shall be fully trained in machine operation and field use, and be thoroughly familiar with its operating techniques, including mechanical systems, safe set-up and control functions, tool selection, and driving the vehicle. No operator may ever attempt to enter a manhole when the machine is operating or without following departmental policy concerning proper confined space entry.

If any inexperienced personnel are in the field with this equipment at any time, an experienced operator must be present; each operator must complete suitable field training and demonstrate competency before operating equipment without an experienced operator present. Operational training shall include mechanical system awareness, detection of anomalies in operation and machine performance, field operation instruction, and debris disposal.

Cross-training on various maintenance equipment will be provided as needed.

Each operator of this equipment shall read the manufacturer's operation and maintenance manuals and any other current reference materials used by department about the machine.

3.4 Operation Parameters

An operator may never, under any circumstances, operate equipment while under the influence of drugs or alcohol as defined by City policy. Operators shall follow all applicable Utility and Federal Department of Transportation codes pertaining to Commercial Driver's License and other requirements.

Operators shall be classified employees and have the following minimum qualifications: Experienced operators must:

- Be fully trained and familiar with all systems and tools necessary for specific conditions;
- Be able to set up and operate the machine under various field conditions; and
- Demonstrate proper operational technique to the satisfaction of department.

Inexperienced operators may operate the equipment only under immediate supervision of an experienced operator.

In addition to the above, the operator shall:

- Demonstrate the ability to read, comprehend, and interpret operation manuals, safety codes, and other information pertinent to correct and safe operation of the flushing and vacuum machine;
- Possess knowledge of emergency procedures for equipment shut-down and how to summon assistance if needed;
- Demonstrate to the department the ability to operate the specific type of equipment or provide other satisfactory evidence of qualifications and experience to do so;
- Be familiar with all relevant safety standards or safety codes, applicable government regulations, and departmental policies as they apply to the equipment, procedure, circumstance, and safety;
- Recognize and be responsible for all maintenance requirements of the flushing/vacuum machine operated by the operator or by any trainee(s) under the operator's supervision;
- Be thoroughly familiar with the flushing and vacuum control functions and tool applications; and
- Have read, fully understood, and signed off on these operation procedures, and have worked with a competent operator prior to sole operation of this equipment.

3.5 Operator Mechanical Familiarity

Operators shall be familiar with the equipment's mechanical systems and maintenance, including: Chassis:

- Location of fluid reservoirs and how to check levels;
- All vehicle directional indicators, brake lights, and night running lights;
- All emergency lighting, including beacons, traffic control arrows, and night operation lighting;
- Air brake system and appropriate CDL-required checks; and
- Tire condition and inflation pressures.

Hydraulic System:

- Location of hydraulic reservoirs for fluid checks; and
- Hydraulic oil pressure gauge and reading.

Hose Reel:

- Location of bearings for greasing, including reel and articulation bearing;
- Location and inspection of reel articulating;
- Location and familiarity of hose reel grease points; and
- Condition of sewer cleaning hose.

Electrical System:

- Location of all electric components and switches for operation and lighting; and
- Location of electrical system fuse block for the machine components.

Basic Controls:

- Location and operation of power take off from chassis and emergency shut-downs;
- Operation of debris body for dumping and decanting water, and travel after use;
- Location and operation of water control valves for sewer hose use;
- Location and operation of hose reel direction and speed control valve;
- Location and reading of hydraulic and water pressure gauges;
- Location and operation of footage meter;
- Location and operation of vacuum boom controls on boom tower and on both reel and pendant; and
- Location of debris tank fill level indicator.

Refer to the original chassis and the equipment manufacturers' operation and maintenance manuals for suggested maintenance intervals on these systems.

3.6 Machine Pre-Inspection and Maintenance

Operators, as assigned, shall inspect the consumable inventory weekly, operational equipment inventory should be inventoried monthly. The inventory shall ensure that the proper minimum of mechanical tools, operational equipment, nozzles, and safety items are on board and in proper operational condition. Whenever the truck returns from motor pool or vendor service, an inventory should conducted.

Regular checks of the following items as required by the chassis and equipment manufacturer maintenance guidelines, departmental policy, and/or the Daily Pre-Trip Inspection Report should be made, including:

- Check engine fluid levels (oil, transmission, coolant, etc.) in chassis;
- Check water system strainers (fill and pump) and flushing of water pump;
- Check belts, hoses, and other typical wear items as noted on the form;
- Check lights, signals, tail and brake lights, and emergency beacons and flashers;
- Check tire inflation and lugs;
- Check air brakes and bleed tanks;
- Start and warm up engine before leaving the yard and note operation of chassis gauges; and
- Check debris tank lift at least weekly and ensure that tank and boom are returned to travel positions.

Routine maintenance shall be conducted by Fleet Maintenance at regular intervals for oil changes and other mechanical procedures, as defined by the manufacturers' operation and maintenance manuals and good mechanical practice.

Check vacuum system filtration after use to ensure that it is clean and well-maintained.

3.7 Machine Start-up and Transport

Follow these steps when starting the machine or chassis and when traveling to field work:

1. Fill out Daily Pre-Trip Inspection Report before using the machine and return it to the supervisor at the end of the shift.

2. Check for vacuum tubes, manhole gaffing tools, scoops, etc. Examine nozzles periodically to ensure that orifices are not clogged by debris or worn, and repair or replace them as needed. Check tiger tail and replace it when wear is excessive and no longer protects the sewer hose.

3. Ensure that all required field equipment is on the truck. This may include, but is not limited to:

- Traffic safety equipment, including cones (12 recommended), etc.
- Field tools, shovels, picks, etc.
- Personal protection equipment (vests, high visibility hats, gloves, hard hats, etc.);
- Manhole lid hooks, sledge hammer, and other necessary access tools;
- Manhole tools, including debris removal tools, traps baskets and scoops, etc.
- Portable radio(s), maps, and data collection forms and instruments; and
- Any other required equipment, as needed.

4. Once equipment is loaded, secure all tool boxes on the truck for travel. When leaving the truck unattended, lock the tool boxes.

5. Start chassis engine and wait for air system to charge. Be sure that oil and air pressures are up and that beacon lights are functioning before moving the vehicle.

3.8 Machine Transport

Observe proper driving procedures for vehicles of this class, which include:

- Adjust all mirrors as needed by the driver before putting truck in gear;
- Buckle seat belts (this applies to all passengers as well as the driver);
- Avoid sudden starts and stops;
- Do not exceed the posted speed limit;
- Slow down when on unimproved or flawed roads, at railroad crossings, or near other hazards;
- Set up for any turns by being in the proper lane at least 100 yards before the turn;
- Use directional signals before changing direction;
- Avoid making sharp turns at high speed; and
- Do not back up without a backing assistant to clear the path.

3.9 Street Set-up

Personnel should behave in a polite, professional manner when working in the field.

Whenever possible, determine the machine position on the street before arriving at the work site. This can be done from maps or experience, knowing the direction of flow, and always working from the downstream manhole whenever possible. Look for and take into consideration any traffic concerns or other hazards that may exist on or near the site. Once at the work site, observe the following procedures before operation:

- Turn on amber emergency beacon lighting and directional arrow board to dictate traffic flow;
- Place road cones around the vehicle and work area of the manhole being accessed; and

- When an operator goes to the far manhole, set out cones at that work area, as needed based on conditions.

3.9.1 Manhole Opening and Closing

1. Follow sound lifting practices when opening and handling manhole covers. Lift with your legs, not your back.
2. Immediately after opening manhole cover, allow the manhole to ventilate when working above grade at open manholes.
3. Following completion of the work, clean manhole frame to remove debris and install the manhole cover with any special locking devices (as applicable) properly secured. All manholes shall be re- secured by the end of each cleaning run or when the staff leaves it unattended.
4. Prior to leaving the manhole worksite, operators are responsible to confirm that the manhole cover is free from any debris which could cause the manhole to not sit correctly and create a noisy condition to exist.

3.10 Machine Set-up—Flushing System

Maneuvering the machine for operation may require reel articulation or maneuvering of the truck to reach the manhole or to center the hose in the manhole itself. Avoid blocking all road traffic whenever possible, leave at least one lane for passing traffic.

1. Maneuver the reel to the proper location for use. Then set out road cones and engage the PTO for the water pump; see *Figures 1 and 2*.
2. Once positioned, or anytime the driver is not in the truck, wheel chocks shall be used.
3. Remove the end of the hose from the hose reel, using care not to move out of the protected area of the machine and cones and select the nozzle for the type of work being done.
4. Install a tiger tail to protect the hose from being cut on the invert opening; see *Figure 3*.

Figure 1

Figure 2

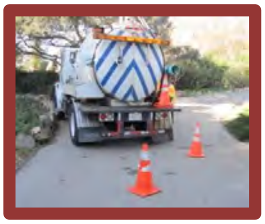


Figure 3

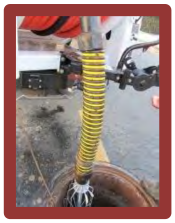


Figure 4

5. A finned nozzle extension, or skid, appropriate for the size nozzle being used to prevent the nozzle from turning up service connections or jumping out of the pipe in manholes that may be hidden is required. A proofing tool can be used as a centering skid. - *Figure 4*.
6. Lower the hose and tiger tail to the invert, lay them flat on the floor of the pipe, and engage the water pressure to about 500 pounds per square inch (psi) to move the nozzle into the pipe.

7. A debris basket or scoop trap in the downstream invert is required for all set ups unless access or safety prevent its use. These devices trap and quantify materials removed during cleaning, this can be either an expanded metal (baskets) or commercial scoop type - *Figure 5 and 6.*

Figure 5

Figure 6

8. When the nozzle moves up the line, provide enough slack so that about half the tiger tail runs into the pipe and is secured by hose tension to the crown of the pipe. Tie off the tiger tail so it will not move up the pipe. Operation will begin from here unless the vacuum system is necessary.

9. Operational cleaning speed has been determined to be at or below 35' per minute rate of pull back on cleaning passes. Additionally, pipes typically can be cleaned at approximately 1500 psi in most circumstances. In pipes over 8" more pressure can be used, in pipes 6" diameter and under 1500 psi should be the upper limit.

10. To avoid purged plumbing complaints (blown toilets), use caution in lines that have a low slope, are shallow, and/or have low flow in them, and use the appropriate nozzle and lower pressure to clean. When feasible, open the far manhole to introduce more air into the line to relieve the negative air pressure caused by nozzles that drain toilet traps.

11. When cleaning lines, check the upstream manhole to confirm that the nozzle has reached the far manhole and be sure that it has not pushed rocks or other objects into the structure, and to ensure manhole structure and cover integrity. If unsafe conditions for this inspection exist, consider a different time of day to mitigate traffic, use of a chase truck, or call in a support vehicle to assist.

12. When possible, the cleaning tool should be run approximately the length of the leader hose up the next pipe section to ensure materials just outside the manhole do not interrupt flow.

13. Record all cleaning results, such as the type of debris and other materials seen or removed, the amount removed from the line section (clear, light, medium, heavy), and any other information about the job, including manhole inspections at each manhole access.

3.11 Machine Set-up—Vacuum System

The vacuum should be used when debris from cleaning work is in amounts which are difficult or time consuming to remove by hand. When using the vacuum, all visible materials should be removed from the pipe invert, associated pipe inverts in the manhole, and shelf areas.

1. In areas where it is difficult for personnel to stand or access, stand-off (remote) pendant control for the vacuum boom can be used. Determine whether the stand-off pendant control will be needed during operation; if so, ensure that the pendant is plugged in and operational. Otherwise, use the panel-mounted controls.

2. Whenever the vacuum boom is in use, hard hats should be worn by the crew until the boon has returned to its stowed position on the truck. – *Figure 7.*

3. Before using the vacuum boom, stand away from the vehicle and look for any overhead obstructions such as trees, building porticos, overhead pipes, or other assemblies, and–most importantly–power and telephone lines.

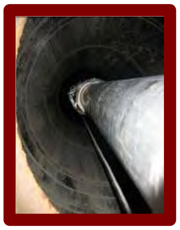
4. Determine the number and type of aluminum vacuum tube sections needed and assemble them either as they are placed into the manhole or on the ground before lifting them into the manhole - *Figure 8*.

Figure 7

Figure 8

Figure 9

Figure 10



5. To prevent unintentional release, duct tape may be used on clamps going below ground. A length of rope can be tied to the vacuum nozzle tube to support the tube column as it is assembled or disassembled and to retrieve the tubes if the tube clamp fails. - *Figures 9 - 10*.

6. Vacuum tubes can be assembled on the ground and raised up into the manhole, or assembled in the manhole section at a time using rope to hold the sections from falling. Attach the boom hose to the tubes once the right height has been reached.

7. If the proper flushing nozzle has not been installed with the hose in the line, install it first, then lower the vacuum into the manhole for use during cleaning operations.

8. The vacuum can be used as the flushing nozzle cleans, or, if the downstream manhole is blocked or has a debris catcher installed, it can be used periodically during cleaning operations.

9. To trap and remove debris, set up a debris catcher (trap/scoop) in the downstream invert to trap up to a finding of heavy. Clean any line with significant debris with the vacuum system as needed.

10. In pipes of 15” diameter or more, specialized traps may be needed to trap debris so it does not escape downstream. Periodic debris removal may be required during these operations.

3.12 Machine Operation

Operation of the flushing system depends on the pipe condition, materials being removed, location, and the need to remove debris. Although operation techniques vary for different cleaning situations (such as grease, sand, and other materials) under all circumstances, use the following techniques:

- Do not try to remove too much debris in one pass of the nozzle and bury the hose;
- When removing large amounts of debris, grit, dirt, rocks, etc., use short, repeated cleaning passes;
- Use a wire-braid-reinforced leader hose, especially when removing static debris;
- Protect the hose by using a tiger tail, stationary roller, or other device at remote manholes; and
- Be aware of and monitor the water level in the water storage tanks, and do not let the system run dry.

3.13 Water Fill-up

Water fill-up is allowed from any fire hydrant in the City of Santa Barbara with exception of polished brass toped hydrants, and any hydrant in the area maintained by Montecito Sanitary District.

Exercise care when operating hydrants by using the proper wrenches and the proper opening/closing techniques to avoid turbulence that discolors the water, avoid water hammer, and reduce the chance of a hydrant bursting underground.

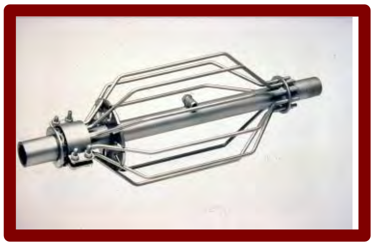
- To turn hydrant water on/off, use only a hydrant wrench;
- Use appropriate fill hose for filling, and, after filling, for proper draining and stowing.
- Be sure that the condition of the fill hose is good and that it is not leaking.

3.14 Cleaning Protocols

Finned Nozzle Extension

Finned nozzle extensions come in a variety of sizes to accommodate various nozzle sizes and types, and are used as the main cleaning mounting for the nozzles. Finned nozzle extensions are used to reduce the wear on the proofing skids during repeated cleaning passes.

Proofing Skids



A proofing skid is used to prove that the pipe is clean in lines where material may remain or that there are be mechanical problems, such as protruding service connections or joint misalignments. This tool passes within an inch of the pipe walls and will usually signal any grease, roots, or other debris that can pose a risk of an SSO. This tool can be used on the first pass to see whether the pipe is clear, but if repeated cleaning passes are needed, it should be changed out for a fin extension before being used again.

1. Nozzle selection for a given pipe cleaning task is up to the operator unless otherwise specified in the work order, and is based on experience and/or known issues with the pipe. Select the nozzle with the best likelihood of cleaning the pipe and mount it on a skid to lift the nozzle in the pipe and avoid premature wear.

2. When cleaning pipes 6”, 8”, 10”, and 15” in diameter, trap the debris to determine the type and amount of material in the pipe and to be able to remove it from any line that demonstrates a material load.

3. In routine cleaning, a proofing tool is required to be used on the last cleaning pass of the pipe. It can be used on the first pass up the line to see whether the line has any materials in it or on the last pass to be sure the pipe has been cleaned. Either way, this tool should be the last tool to touch the pipe during cleaning operation. If the tool makes it to the far manhole and back without any sign of debris in the trap, in the proofing tool, or on the sewer cleaning hose, the line can be considered clean. If the tool stops, write down the footage for referral for inspection by closed-circuit television (CCTV) and note the need for the inspection. Note pipes the tool cannot be inserted due to mechanical issues or where the tool stops which will then require a CCTV inspection.

4. Fill out job paperwork completely. Record any unusual materials or debris found on the forms in the space provided. Accurately record information as requested on the form(s), including manhole condition observations at both the upstream and operating manholes.

Grease Removal

Fats, oils, and grease (FOG) can be difficult to remove unless the proper nozzles, and other types of equipment, as well as appropriate techniques, are used.

1. To remove known grease masses, a crown nozzle or rotating nozzle can be used to reach the sides and crown of the pipe.

2. To better ensure that a blockage will not form during operations, clean the pipe from the downstream side of the grease mass (from the clean pipe area to the area with the heaviest grease deposits).

3. At the downstream manhole, use the debris trap to ensure that large chunks of grease do not pass downstream and that they are removed by scoop, or vacuumed up so as to not cause a line stoppage downstream.

Sand and Debris Removal

To move heavy debris from sanitary lines, use an invert debris-cleaning nozzle (sand nozzle).

1. To protect the hose from flying rocks and other sharp debris typically found in static deposits, use a wire-braid-reinforced leader hose.

2. If the vacuum is not being used as the nozzle moves debris, use a sand trap or other debris-catching device. Keep the trap in the downstream manhole so that debris can be removed with the, trap/scoop, or vacuum.

3. In significant sand/debris deposits, move the nozzle slowly up the pipe about 30 feet, then pull back and gauge the debris. If a large deposit forms in the manhole, repeat until the debris lessens by at least half, then proceed another 10 to 30 feet. Repeat this step cleaning to remove the debris from the pipe. This step-cleaning process can be expanded by increments of 20 to 50 feet or more, depending on how much material is in the pipe.

4. When cleaning static deposits, avoid trying to clean too many feet of pipe in one pass because the hose can be easily buried and become stuck in the pipe.

5. When using the vacuum, maintain an eye on the level indicator and stop vacuum operation when the indicator reads close to full. Water can then be decanted from the debris tank to reduce volume and allow more debris to be captured and stored. Do not transport water in the debris tank for any distances before decanting.

6. When raising the debris body to decant water in the field, be aware of and look for any overhead obstructions or hazards.

3.15 Documentation of Cleaning Results

Cleaning Inspection Daily Recording Log:

The assigned crew shall complete and provide a daily log as provided by the department. This log may be a paper form, book, or electronic data entering device. Each pipe section cleaned will require condition findings and narrative of the pipe condition or any unusual circumstances, including;

- Site address
- Date
- Pipe I.D. number
- Manhole I.D. numbers (if pipe ID not available)
- Pipe material
- Condition findings of the pipe, manhole, and cleaning results
- Flow characteristics of the pipe

This information will also include observational ratings of debris/materials removed during cleaning operations with findings of; clear, light, medium, or heavy used for roots, grease, or sludge/grit debris. Difficult spots to pass in the pipe will also be noted along with places the proofing tool did not pass or had difficulty with.

Quality Assurance:

The department will conduct random CCTV inspection of select pipe sections cleaned by the assigned crews. Based on each televised pipe’s condition findings the department shall require additional follow- up cleaning to be performed on select pipe sections, as determined, to achieve a minimum satisfactory cleaning rating.

The department will provide each cleaning vehicle with GPS portable vehicle tracking device. This device shall be mounted within the front cab area of the cleaning vehicle for the purpose of allowing the City to track the daily performance; travel path and identified fire hydrant fill locations for the purpose of Quality Assurance – Quality Control. The assigned crew shall submit the GPS device at the end of each work day.

3.16 Machine Breakdown

Once cleaning operations are completed in a section of pipe or for the day, take the following steps in closing down the site:

1. Bring the sewer nozzle up to the hose reel and secure it with cord to prevent the hose or nozzle from bouncing off the reel.
2. If the vacuum was in use, adjust the boom so that the vacuum tube(s) can be retrieved from the manhole or lifted out. Before moving the boom, look for any overhead obstructions that may exist and any new obstructions that may have appeared since starting work.
3. Detach the vacuum tube(s) as needed, using care to not move outside the coned-off work area.
4. Move the boom to the travel position and secure the flexible end of the vacuum hose.

3.17 Job Site Breakdown

Use the following protocol in retiring from the job site for traffic control:

- Move the road cones away from the immediate work area, working backwards from the truck;
- If traffic is moderate or high, move the vehicle to the curb or safe parking area.
- Once all equipment has been **accounted for** and stowed, shut down amber lights and arrow board(s).
- Before performing the next job, fill out all report paperwork for the current job.

1. If done for the day, dump the debris tank at the assigned department decanting/dumping station before returning to the yard. For safe transport, decant the debris tank water as needed.
2. If less than a half tank of fuel is anticipated by the end of the day, the truck should be filled early in the morning. If fueling becomes necessary later in the day, contact the Lead.
3. Empty debris buckets and clean cab and truck of trash. Pull lower tank strainer and leave in a tool box to be installed at next use or shift.

4. Once the vehicle is parked at the yard, report any tools or equipment on the Daily Log that needs repair to the supervisor. **Return tools that were removed or borrowed from any other vehicle(s) (to the same vehicle(s).**

5. Secure all tools in locking tool boxes, lock boxes, and chassis doors.

6. Fill out all daily log reports or information that was not done on site, as needed or required.

3.18 Emergency Stoppage Removal

When responding to condition calls, observe the following protocols;

1. During working or off-hours, handle all emergency calls quickly and efficiently. Response time goals are 15 minutes for initial response during working hours and within 30 minutes after hours.

2. When responding, avoid parking on private drives and use caution when on lawns or easements; use care to avoid unnecessary damage to plantings, or property items in the off-road right-of-way.

3. On arrival, check the upstream and downstream manholes to determine if the problem is in the public sewer main or the customer service connection. If the sewer main appears clear, inform property owner the system is clear.

4. Clean the pipe as a courtesy prior to leaving the site.

5. If the stoppage is on the customer side, tell the customer to call a licensed plumber or contractor to take care of the problem. Do not, under any circumstances, recommend a specific plumber or other tradesman. Utility does not provide repair or cleaning services to private sewer lines or connections.

6. If sewage is spilling into the right of way or sidewalk/public areas (Condition 2), contact the water department to shut off water and issue correction notice and fax the form (pink page) to the County Health Department.

7. If the stoppage is determined to be in the public sewer main, follow these protocols:

- Under typical spill response conditions, multiple units will be dispatched to the scene with a field supervisor. If supervisor is non-responding they must be notified via phone or radio.

- Until the supervisor arrives, the first arriving unit is the “incident command”. The incident commander (typically the Senior Operator) determines how the spill will be managed under; contain, control, correct measures.

- When possible, make stoppage relief from the dry, downstream manhole. Do not try to relieve the stoppage from surcharged manhole unless all other options have been exhausted. Attempting stoppage relief from flooded manholes is dangerous; if the nozzle does not enter the sewer pipe, it may exit the manhole and cause equipment damage, serious injury, or death.

- Install a trap so stoppage cause can be identified if possible, at the downstream manhole.

- Once flow is back to normal, clean the section affected by the stoppage including the pipe section above and below the affected pipe. A total of three pipe ID should be documented.

- Follow departmental policy for Failure Analysis CCTV inspection, including post site inspection.

- If debris remains in the manhole wash down the spill manhole if needed.

- If affected property owners ask questions, answer as best able or refer them to the Department Superintendent for further information on claim forms or other matters. Do not, under any circumstance commit to any corrective action(s) with property owners.

- Do not, under any circumstance, enter any private structures alone, wait for your partner or the supervisor if entry is needed for visual documentation.
- On completion of the work, the responding unit to break the stoppage will fill out the event paperwork to document the activity, cause, and specifics of the response. Supervisor will contact State within the mandatory reporting requirements based on the nature of the event and complete the required preliminary paperwork for the event.

4.0 Equipment Field Safety

For more detailed safety information on the equipment, refer to manufacturer's operation manuals. The following are guidelines that should be followed on each job:

1. Always be aware of traffic and safety concerns. When setting up on the street, always follow department practice in traffic cone and sign deployment.
2. Always wear departmental-approved clothing that is appropriate for weather conditions. Such clothing includes foul-weather gear, footwear, reflective safety vests, gloves, and personal protection equipment, per department policy.
3. Check vehicle for proper performance of the air/brake system and verify that all emergency lights work.
4. Inspect the sewer and vacuum hose regularly. Replace the sewer hose as needed; avoid the use of multiple in-line splices, especially in old or worn hose. Adhere to manufacture's requirements.
5. To avoid hose damage and potential nozzle entry into service connections, avoid using the sewer cleaning hose without the tiger tail or other type of hose protection and finned extensions.
6. Do not, under any circumstances, allow anyone to be in the manhole when the machine is in operation.
7. Never leave the machine unattended during operation. An operator should be at or near the control panel in case immediate action is necessary.
8. When using the vacuum system or decanting water, look for and be aware of overhead obstructions such as electric or telephone wires, tree limbs, building structures, piping, and other obstructions.
9. Avoid operating the sewer cleaning hose from a flooded manhole until all other options have been explored. If the nozzle is not in the sewer pipe and exits the manhole under pressure, this practice can be dangerous and can lead to serious injury or death.
10. Use the proper tool for the job. Understand how each nozzle works (refer to the Operator's Guide Manual to Flushing Machines) and when it should be used.
11. Never use nozzles or accessories on the sewer cleaning hose, on the wash-down system, or with the vacuum system which are not specifically designed for that use or approval of the department.

4.1 Maintenance

Perform maintenance of the machine at regular intervals. Many of these requirements are, for the most part, applicable to the combination machines and not to the flush truck(s). Consult the manufacturer's maintenance manual for approximate intervals for the following maintenance tasks:

1. Inspect engine oil, filtration, and oil changes.
2. Inspect system hydraulic fluid and blower fluid levels.
3. Inspect tires (inflation and condition).
4. Inspect all emergency lighting and operational lights on the vehicle.
5. Grease all reel fittings regularly.
6. Oil all counter and control assemblies, which include footage counter rollers and components, control valve stems for pressure, level wind components, and nozzle threads.
7. Check all operation gauges, controls, and linkages at the control panel. Remove rust on control arms and other areas frequently with steel wool and apply engine oil lightly on exposed metal areas to reduce rust build-up.
8. Inspect glycerin-filled gauges for cracks, leaks, or hazing, and replace the gauges if any are found.
9. Check the condition of hydraulic system hoses, especially those exposed to weather. Hoses should be relatively smooth without any major cuts in the surface.
10. Inspect regularly, and clean as necessary, the vacuum fan system and water system strainers.
11. Inspect nozzles routinely, and clean and oil them regularly. Ensure that all orifices are open and working by watching the nozzle in the manhole inverts. A gauging tool can be used to determine wear, and can be obtained through the nozzle manufacturer at bimonthly intervals.
12. Complete and make notes on the Daily Pre-Trip Inspection Report as these items and the ones above are reviewed.

Appendix E4 Lift Station and Force Main Preventative Maintenance Plan

Lift Station and Force Main Preventative Maintenance Plan

City of Santa Barbara

Revised
November 2020

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Section 1 Introduction

This document describes the City’s gravity wastewater collection system Lift Station and force main preventative maintenance plan; specifically, the Wastewater Collection System infrastructure, the overall preventative maintenance plan, the logic for setting preventative maintenance schedules, and the general workflow. The document includes the following sections:

Section 1 – Introduction: Describes the purpose and structure of the document.

Section 2 – Background and Program Plan: Summarizes program improvements, performance measures, and preventative maintenance resources.

Section 3 – Preventative Maintenance Plan: Summarizes preventative maintenance programs, corrective maintenance, staff, condition assessments, and communication.

Section 2 Background and Program Plan

2.1 Background Information

The City operates and maintains approximately 258 miles of collection system gravity sewers, seven lift stations, and the associated force mains that serve a population of approximately 95,000. The El Estero Water Resources (EEWRC) field staff are responsible for the operation and maintenance of the 7 City lift stations. This does not include two Santa Barbara County Lift Stations, force mains, and collection system in the Mission Canyon area which are owned, operated, and maintained by the Santa Barbara County Public Works Department.

The summary Lift Station inventory information is shown in Table 2-1. Detailed inventory information from the City's Sewer System Management Plan (SSMP) is provided in Appendix E7. Five Lift Stations were constructed prior to 1975 with the oldest Lift Station, La Colina, constructed in 1957. Two Lift Stations have been constructed since 1999. The capacity of the City's Lift Stations range from 100 gallons per minute (gpm) to 1,000 gpm. Each Lift Station has one duty and one standby pump, as well as two spare pumps in storage. The City has one backup pump in stock. There are no air release or air vacuum (ARV/AVV) valves on any of the City's seven force mains.

Table 2-1 Lift Station Inventory Information

Lift Station Name	Year Constructed	Capacity (gpm)	Force Main Diameter (in)	Force Main Material	Force Main Length (ft)	Emergency Generator	Note
Braemar	1998	1,000	10	PVC	3,100	Caterpillar 350 kW	Wet well/dry well lift station, new force main in 1994
Braemar (Force Main #2)	2017	1,000	12	HDPE	3,164	NA	New 12" force main
El Camino De La Luz	1975	150	4	DIP	98	Caterpillar 60 kW	Wet well/dry well station with dry well in a "can"
La Colina	1957	400	8	DIP	3,175	Caterpillar 60 kW	Wet well/dry well lift station
La Colina (Force Main #2)	2015	400	8	HDPE	3,293	NA	New 8" force main and new valve vault
Linda Road	2002	150	4	HDPE	555	Caterpillar 60 kW	Submersible lift station with chopper pumps
Skofield	1967	250	6	CIP	471	NA	Wet well/dry well station with dry well in a "can"

Tallant Road	1999	100	2	HDPE	190	NA	Submersible lift station
Via Lucero	1962	400	6	CIP	182	Caterpillar 60 kW	Wet well/dry well station with dry well in a “can”

2.2 Performance Measures

The City uses its Preventative Maintenance program to measure the performance of its Wastewater Collection System (WCS) and the effectiveness of its Lift Stations. The indicators used are:

- Consistency in trends between inspection and Supervisory Control and Data Acquisition (SCADA) data;
- Pumping intervals;
- Voltage;
- Visual Inspection;
- Audio Inspection;
- Condition Assessments; and
- Total number of SSOs (by cause).

2.3 Resources

2.3.1 Equipment

A majority of preventative maintenance tasks are completed by a one- or two-person crew with a combination vacuum and jetter truck or a utility vehicle. Appendix E7, *Wastewater System Equipment List*, identifies the cleaning and utility vehicles the City uses to maintain the collection system. Additional emergency and critical operation equipment is also provided in Appendix E7.

2.3.1.1 Electrical Equipment

The City keeps spare 2000 Honda generators on standby in case of electrical failure at any Lift Station. These generators are used to power lighting, sump pumps, and more.

2.3.1.2 Bypass Pumpers

The City uses bypass pumpers on an as-needed basis to perform routine preventative maintenance, such as wet well cleaning and wet well structural inspections. Bypass pumpers include 2 Godwin Pumps, 1 Power Prime Pump, and 1 Thompson Trash Pump.

Braemar Lift Station is the exception, where a conditioning pump is used primarily to perform routine wet well maintenance. A bypass pumper is used only if the generator does not turn on for any of the 5 stations that have a backup emergency generator.

2.3.1.3 Safety Equipment

Task-specific and general safety equipment is used during all preventative maintenance. Atmospheric monitoring equipment is provided at each lift station and gas detectors are used to determine levels of gases in confined spaces. When “permit required” confined space work is being performed, EEWRC field staff follow CalOSHA confined space procedures, and document all work with a confined space entry permit. EEWRC field staff use standard PPE for all preventative maintenance tasks, such as steel-toed boots, high-visibiity vests, and more.

2.3.2 Additional Resources

SCADA software is used to track data and trends to support the preventative maintenance program. Additionally, the City relies on contractors to augment internal resources when needed.

2.3.2.1 Software

The WCS uses Supervisory Control and Data Acquisition (SCADA) to collect and manage Lift Station data and trends. SCADA data is used to assess the performance of Lift Stations, detect level-sensor alarms, determine if pumps, check valves, or valves need to be cleaned, and verify cleaning results. The software is installed at all Lift Stations maintained by the City. SCADA uses Cox internet, a public communication network with VPNs. The central server is housed at the EEWRC.

2.3.2.2 Contractors

In addition to the cleaning and inspection resources available within the WCS, the City also utilizes contractors to perform wet well cleaning, generator maintenance, electrical maintenance, and motor refurbishment as needed to augment their internal resources during times of increased and/or specialized maintenance and inspection needs. Maintenance and inspection procedures followed by the contractors are consistent with the procedures followed by the City’s field crews.

Section 3 Lift Station and Force Main Preventative Maintenance Plan

The City has distinct preventative maintenance tasks designed to prevent maintenance-related spills and blockages. The four general preventative maintenance tasks and their general frequencies are summarized below and described in detail in this document:

- ***Lift Station Rounds*** are performed twice-weekly to confirm Lift Stations are properly functioning. EEWRC field staff check for warning lights on the annunciator, test alarms, test pumps, check the generator, perform general landscaping, and more.
- ***Force Main Switchovers*** are performed monthly for Braemar and La Colina Lift Stations. These Lift Stations have redundant force mains to improve reliability and reduce risk due to their large service areas. Monthly switchovers limit corrosion and buildup in each force main.
- ***Structural Preventative Maintenance*** is designed to monitor for tears in wet well liners, root intrusion, cracks in cement, and the structural integrity of pipes, doors, apparatuses, and more. It is performed annually.
- ***Electrical Preventative Maintenance*** is used to monitor the functionality of the electrical components of Lift Stations, including generators, contactors, voltage, amp readings, thermography, etc. It is performed annually.

Table 3-1 details the frequency of preventative maintenance tasks by Lift Station. A more detailed list of preventative maintenance tasks for each Lift Station is detailed in Table 1 in Appendix A at the end of this document.

Table 3-1 Preventative Maintenance Task Frequencies by Lift Station

Lift Station	Lift Station Rounds	Force Main Switchover	Structural PM	Electrical PM
Braemar	2x/week	1x/month	1x/year	1x/year
El Camino de la Luz	2x/week		1x/year	1x/year
La Colina	2x/week	1x/month	1x/year	1x/year
Linda	2x/week		1x/year	1x/year
Skofield	2x/week		1x/year	1x/year
Tallant	2x/week		1x/year	1x/year
Via Lucero	2x/week		1x/year	1x/year

3.1 Lift Stations Rounds

Lift station rounds are the primary preventative maintenance tasks used to verify operation as well as identify and address issues. Lift station rounds are conducted twice-weekly rounds and are performed by a one- or two-person crew using a utility truck.

The general process is as follows:

- Check the annunciator for any alarms inside the station main control panel. If alarms are present – troubleshoot and acknowledge;
- Test alarms by allowing water level to reach the “high high” level. Then turn on pumps to let the water level fall to the “low low” level;
- Turn pumps off one at a time to check for functionality;
- Check generator for fuel, oil, water, battery, temperature, and hours;
- Perform landscaping as necessary to ensure clear path to Lift Station and prevent excessive overgrowth around wetwells, doors, pipes, etc.; and
- Check condition of wet well to see if mat has developed or other material has accumulated.

3.2 Force Main Switchovers

Force Main Switchovers are perfomed monthly at Braemar and La Colina Lift Stations. These Lift Stations have redundant force mains to allow flexibility for cleaning and maintenance and reduce risk if one fails. Switching between the two keeps both lines flushed and prevents significant sedimentation within the pipes. Redundancy also allows maintenance to be performed on whichever pipe is not in-service. All measures are in place to support preparedness for an emergency or failure.

Braemar and La Colina Lift Stations have varying processes, but the general process (based off of the Braemar Lift Station Force Main Switchover SOP) is as follows:

- Prior to beginning the scheduled work, contact Control 10 from 7 am to 3:30 pm (805-564-5413) or Control 14 after 3:30 pm (805-936-4286) to make them aware of work to be accomplished and to inform them of any SCADA alarms or potential plant process impacts that may be associated with the work;
- Enter the station and sign-in on the log sheet inside the main control panel;
- Inside the station main control panel, check the annunciator for any alarms – if alarms are present, troubleshoot and acknowledge;
- If the valve is inside a vault, place cones arund the valve vault and open vault cover;
- Test the vault atmosphere with a gas detector;
- Manually pump down the wet well to the low level;
- Turn off both pumps an lock out and tagout (LOTO) according to City hazardous energy control program;
- Station a EEWRC field staff member to monitor the wet well level and ensure communication between valve vault attendant and wet well monitor is visual and auditory;
- The entrant, wearing a safety harness with life line, should enter the valve vault according to non permit confined space entry (both Braemar and La Colina lift station vaults are non permit).

- Slowly open the valve leading to the force main to be opened for that month;
- Slowly close the valve leading to the force main to be closed for that month;
- Monitor water level in surge tank, if applicable;
- Fully open isolation valve leading to the surge tank, if applicable;
- Turn on surge tank using hand switch on control panel inside the electrical room, if applicable;
- Follow surge tank filling method procedures, if applicable;
- Undo LOTO procedures on main pumps and put pumps back into service;
- Cycle station for two full cycles of both pumps;
- Conduct a visual and auditory check of valve vauls to ensure there are no leaks or unusual sounds;
- Notify Control 10 from 7 am to 3:30 pm (805-564-5413) or Control 14 after 3:30 pm (805-936-4286) to make them aware that maintenance is complete and that the equipment is back in service;
- Before leaving the station, complete the log-out sheet, make sure lights are off, door deadbolt and handle are lcoked, and gate combo lock is closed, if applicable; and
- Complete the electronic version of the work order in the CMMS.

3.3 Structural Preventative Maintenance

Structural preventative maintenance is used to confirm that no structural defects that could result in an SSO are present at each Lift Station. Structural defects include tears in wet well liners, root intrusion, cracks in cement, and more. Pipes, doors, and any other structural apparatuses are also monitored for defects.

Under this preventative maintenance, Lift Stations and their apparatuses are inspected annually. Structural integrity of Lift Stations is also monitored informally by EEWRC field staff during routine Lift Station rounds.

3.4 Electrical Preventative Maintenance

Electrical equipment and components are necessary to power Lift Station and provide the ability to communicate signals and alarms. Preventative maintenance maintains the functionality of the electrical components of Lift Stations. These components include, but are not limited to, generators, breaker, contactors, voltage, amp readings, thermography, Programable Logic Controllers (PLCs), and SCADA monitoring systems. Electrical preventative maintenance is performed annually at all Lift Stations. A periodic electrical inspection is also performed every 3 months at Braemar Lift Station.

3.5 Corrective Maintenance

Corrective maintenance is performed in response to defects or failures identified during preventative maintenance or in response to alarms. Depending on the priority of the corrective maintenance, the work order will be scheduled through the computer maintenance management system (CMMS) called Maintenance Connection either before or during the next scheduled Lift Station rounds. There are three levels of corrective maintenance:

- CM5: Routine Priority – A general repair which can be scheduled at the EEWRC field staff discretion. Examples include a light out or a psi gauge reading incorrectly.

- CM7: Urgent Priority – This is a repair that will need to be done soon or it may turn into an emergency. Examples include motor bearings beginning to make noise, a mechanical seal is beginning to leak, an exhaust/supply fan belt is noisy, etc.
- CM9: Emergency Priority – This is a repair that requires immediate attention. Examples include pump/motor failures, high wet well alarms, PLC communication failures, etc.

3.6 Staff

Preventative maintenance tasks are conducted by qualified EEWRC field staff. The general categories of preventative maintenance tasks and respective staff assigned to conduct them are listed below. Table 1 in Appendix A includes a more detailed list of preventative maintenance tasks organized by Lift Station and frequency.

3.6.1 Control System Operator Specialists (CSOSs)

Control System Operator Specialists (CSOSs) are primarily focused on maintenance of electrical systems, substations, motor control centers, Programable Logic Controllers (PLCs), instrumentation, control systems, and SCADA monitoring systems. They perform the following preventative maintenance tasks:

- Thermography Testing;
- Control Systems Fault Findings;
- Monthly GenSet Testing (Level 1);
- Electrical Equipment Maintenance and Testing;
- Level System Calibration;
- PLC Maintenance;
- Ventilation System Maintenance;
- Alarm Fault Finding and Testing;
- Periodic Electrical Inspection;
- Surge Tank Level Probe Maintenance; and
- Gas Analyzer Calibration.

3.6.2 EEWRC Treatment Plant Technicians

EEWRC Treatment Plant Technicians are qualified to perform skilled maintenance, repair, and installation activities for wastewater treatment process equipment. They conduct the following preventative maintenance tasks:

- General Lift Station Rounds;
- Lift Station Backflow Prevention Device Testing;
- Landscape Maintenance;
- Structural Inspection Wet and Dry Well;
- Periodic Maintenance;
- Wet Well Cleaning;
- Force Main Changeover;
- Building Structural Inspection;
- Valve Excercising;
- Vault Structural Inspection; and
- Dehumidifier Preventative Maintenance.

3.6.3 Contractors

The City employs contractors to perform the following generator maintenance tasks:

- GenSet Cooling System (Level 3);
- GenSet Fuel Polishing;
- GenSet Load Test;
- GenSet Maintenance (Level 2); and
- GenSet Maintenance Oil & Filter Change (Level 2).

3.7 Preventative Maintenance Scheduling Strategy and Workflow

The City adopted a dynamic scheduling strategy utilizing the preventative maintenance intervals provided in the Operations and Maintenance manual. Each preventative maintenance task is scheduled using the City's Computerized Maintenance Management System (CMMS), Maintenance Connection.

The following roles are directly involved in completing the preventative maintenance task:

- Wastewater Treatment Superintendent: Manages the QA/QC for preventative maintenance program and reviews Wastewater Treatment Plant Maintenance Planner/Scheduler analysis.
- Treatment Plant Technician Supervisor: Manages the preventative maintenance process from assigning tasks to Field Crew through task completion. Provides thorough QA/QC of task data in the CMMS, Maintenance Connection.
- Wastewater Treatment Plant Maintenance Planner/Scheduler: Creates the preventative maintenance tasks, monitors their frequencies, assigns work orders to craft pools, and orders parts needed to complete tasks.
- Senior EEWRC Field Staff: Assign work orders to field crews of respective craft pools, either Control System Operator Specialist (CSOSs) or EEWRC Treatment Plant Technicians. Oversee assignments, provide field support, and input any inventory updates into the CMMS, Maintenance Connection.
- EEWRC Field Staff: EEWRC Field staff are comprised of CSOSs and EEWRC Treatment Plant Technicians. Complete preventative maintenance and documents findings and labor time directly into the CMMS, Maintenance Connection.

The general scheduling process and workflow is as follows:

- Schedule Preventative Maintenance Task: The Wastewater Treatment Plant Maintenance Planner and Scheduler enters preventative maintenance tasks and their respective frequencies into Maintenance Connection. Once the frequencies are programmed, Maintenance Connection automatically generates preventative maintenance tasks as work orders that are sent to the Wastewater Treatment Plant Maintenance Planner and Scheduler for review and assignment to craft pools.
- Assign task to field crew: Once assigned to craft pools, senior EEWRC field staff then assign the work orders to the appropriate EEWRC field staff, either Technicians or Control Systems Operator Specialists (CSOSs).
- Complete Work Order: After completing the work order, EEWRC field staff document all findings, labor time, and other relevant information for the task directly into Maintenance Connection. If any corrective maintenance is required, EEWRC field staff will create a follow up work order and notify

their senior. Senior EEWRC field staff will review the work order and update equipment inventory as necessary.

- QA/QC: After each preventative maintenance assignment is completed and saved in Maintenance Connection, an initial QA/QC is performed by the Treatment Plant Technician Supervisor. The Treatment Plant Technician Supervisor checks to ensure each work order had the findings documented, inventory updated, and confirms task status is complete. This is also when any task notes from EEWRC field staff are reviewed and addressed.

3.8 Condition Assessments

3.8.1 Formal

In January 2012, the City contracted with Brown and Caldwell (BC) to investigate the City's seven Lift Stations, perform a condition assessment and identify recommended improvements. The scope of work also included a review of available Lift Station force main information and recommendations for additional investigations. The Lift Station and force main investigations were completed in March and April 2012. A five-step process was used to perform the investigations and subsequent condition assessments. The steps used for this assessment are as follows:

- Lift Station Inventory – Lift Station and force main inventory and record drawing information were provided by the City and reviewed by BC.
- Lift Station Maintenance Histories – Lift Station maintenance histories from the City's computerized maintenance management system (CMMS) were provided by the City and reviewed by BC.
- Lift Station Condition Assessment Procedures – A field form and procedures for recording field observations were developed and used during the field investigations of each Lift Station. The form is located in Appendix C.
- Lift Station Field Observations – BC performed field investigations of the Lift Stations. Observations were captured on the field forms and photographs were taken. Photographs and descriptions of work are available in the 2015 Lift Station and Forcemain Condition Asssessment document (Brown & Caldwell, 2015).
- Lift Station Condition Assessment Ratings – Results of the field investigations were evaluated and condition assessment ratings were developed for each Lift Station. Other observations from the field investigations were also noted.

The information gathered from these investigations, along with the Lift Station capacity assessment from the City of Santa Barbara 2010 Wastewater Collection System Master Plan, was used to identify deficiencies and identify improvement projects.

Second and third interviews with City staff were conducted in August 2015 by BC and October 2020 by City staff to identify changes to the operations, new deficiencies, and planned capital improvements for each Lift Station since 2012. A table with the updated condition assessment repair recommendations and future projects can be found in Table 2 in Appendix B at the end of this document.

3.8.2 Informal

Informal condition assessments occur regularly during all Preventative Maintenance tasks. EEWRC field staff observe for any possible defects, whether mechanical, structural, electrical, etc., and issue resulting work orders for corrective maintenance to address any critical faults identified.

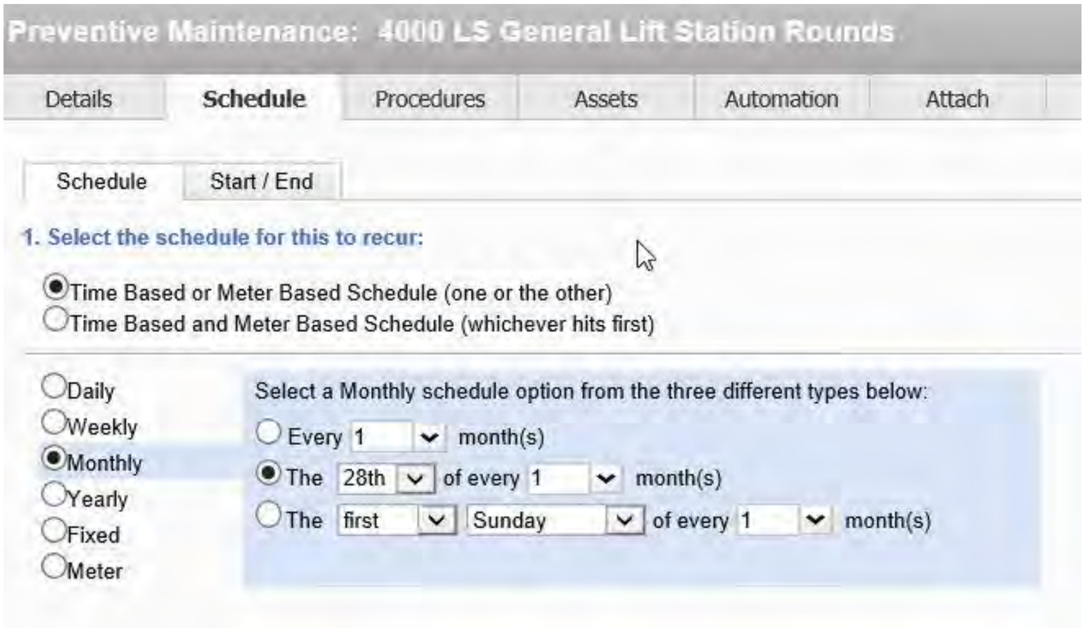
3.9 Communication

This section describes the formal and informal communication that takes place internal to the City related to preventative maintenance activities and expectations. Formal activities include meetings, memoranda, and reports. Informal communications are ad-hoc communication that can take place through conversations, in meetings, by email, or via phone.

3.9.1 Communication between Management and Field Crews

3.9.1.1 Formal Communication

The Wastewater Treatment Superintendent and Treatment Plant Technician Supervisor assign work to the Wastewater Treatment Plant Maintenance Planner/Scheduler, who in turn assigns work electronically through Maintenance Connection. The process involves creating a work order and/or assigning the work order to to a craft pool through the Maintenance Connection interface. Senior EEWRC field staff will then assign the work orders to the appropriate EEWRC field staff. The preventative maintenance task frequencies are based on either time or meter readings. The frequency can be daily, weekly, monthly, yearly, fixed, or meter-based. Once the task is created and saved, it will automatically generate work orders to the Wastewater Maintenance Scheduler and Planner on a regular basis. Figure 3-1 show an example of the task scheduling form.



Preventive Maintenance: 4000 LS General Lift Station Rounds

1. Select the schedule for this to recur:

● Time Based or Meter Based Schedule (one or the other)
○ Time Based and Meter Based Schedule (whichever hits first)

○ Daily
○ Weekly
● Monthly
○ Yearly
○ Fixed
○ Meter

Select a Monthly schedule option from the three different types below:

○ Every 1 month(s)
● The 28th of every 1 month(s)
○ The first Sunday of every 1 month(s)

Figure 3-1 Scheduling a Preventative Maintenance Task Frequency in Maintenance Connection

Other forms of communication for coordination include briefings and meetings between the Treatment Plant Technician Supervisor, WCS Superintendent, Wastewater Maintenance Planner/Scheduler, EEWRC field staff, and senior EEWRC field staff.

An Operations and Maintenance field staff meeting is held weekly following a standard agenda to review previous meeting minutes, status of emergency work orders, formal planning work orders ready for scheduling, urgent CM work orders, and preventative maintenance support required for the following week. The Wastewater Operations and Maintenance Planning Workflow Management Meeting, consisting of the Planner/Scheduler, Senior EEWRC field staff, and Supervisors occurs biweekly to review action items, upcoming jobs, historical work orders, change management and work assignments and discuss future Lift Station projects and wet well cleanings. SCADA meetings are also held biweekly which follow a standard agenda similar to the Operation and Maintenance field staff meeting. Capital Improvement Project (CIP) meetings are held monthly with the Engineering Division and WCS management. A safety meeting is also held every other week with all Treatment, Collection and Laboratory staff. Additionally, the Wastewater Planner/Schedulers (Cleaning and CCTV Programs), CIP Coordinator, SLIP Coordinator, Administrative Specialists, WCS Supervisor, Lead Operator and Wastewater Collection System Superintendent typically hold a weekly meeting to discuss workload and upcoming priorities.

3.9.1.2 Informal Communication

Informal communication takes place on an on-going basis between Field Crews and Management. There are daily informal discussions regarding work plans, to review what has been encountered during preventative maintenance activities and other daily issues. Brief meetings are also conducted on a regular basis between management and supervisory staff to discuss progress and resolve issues. The Superintendent, Treatment Plant Technician Supervisor, and field crews coordinate with each other via radio, telephone, and the City’s email system to obtain and provide information about field conditions, discuss issues encountered, request support, and coordinate activities.

3.9.2 Communication with and the Public and Other Departments regarding Lift Station and Force Main Preventative Maintenance

Public

For normal preventative maintenance, the field crews will periodically make contact with residents or tenants of commercial spaces when they need to gain access to their property via an easement, if street access will be limited throughout the duration of the preventative maintenance task, or if other issues exist generally 72 hours in advance. Contact includes doorhangers and verbal notification. If limiting street access, EEWRC field staff are trained to adhere to CalTrans Manual on Uniform Traffic Control Devices (MUTCD) standards. EEWRC field staff also notify “Control 10” during normal working hours, and “Control 14” after normal working hours, who in turn notify Fire and Police of the activity.

Communication to other Departments

The WCS also informally communicates with other City Departments, Divisions, and Sections including the Engineering Division, the Wastewater Treatment Plant System, the Streets Division, the Creeks Division, and the Building and Safety Division. This communication takes place either through ad-hoc face-to-face meetings, telephone calls, or emails to address specific issues as necessary.

The Wastewater System Manager and the Wastewater Collection System Superintendent meet with select members of the Engineering Division on a monthly basis to discuss ongoing collection system activities. These include replacement, rehabilitation, repairs, system-wide inspections of sewer mains and other activities. Weekly meetings are conducted for specific projects as needed (such as progress meetings for CIP projects) while projects are on-going.

Appendix A: Preventative Maintenance Tasks Varying by Lift Station and Frequency

Table 1: Lift Station Preventative Maintenance Tasks

Lift Station	Preventative Maintenance Task	Frequency
All	Lift Station Backflow Prevention Deivce Testing	Every 1 year(s)
	General Lift Station Rounds	Day 28 of every 1 month(s)
El Camino De La Luz	Thermography Testing	Every 1 year(s)
	Control Systems Fault Finding	Every 1 year(s)
	Landscape Maintenance	Day 15 of every 1 month(s)
	Structural Inspection Wet and Dry Well	Every 1 year(s)
	Genset Cooling Sytem (Level 3)	Every 3 year(s)
	Genset Fuel Polishing	Every 1 year(s)
	GenSet Load Test	Every 3 year(s)
	GenSet Maintenance (Level 2)	Every 1 year(s)
	Monthly GenSet Testing (Level 1)	Day 15 of every 1 month(s)
	Electrical Equipment Maintenance and Testing	Every 1 year(s)
	Level System Calibration	Every 1 year(s)
	Periodic Maintenance	Day 15 of every 1 month(s)
	PLC Maintenance	Every 1 year(s)

	Ventilation System Maintenance	Every 1 year(s)
	Wet Well Cleaning	Every 1 year(s)
Linda	GenSet Load Test	Every 3 year(s)
	Landscape Maintenance	Day 15 of every 1 month(s)
	Pumps' 1 & 2 Periodic Maintenance	Every 1 year(s)
	Genset Cooling Sytem (Level 3)	Every 3 year(s)
	Genset Fuel Polishing	Every 1 year(s)
	GenSet Maintenance (Level 2)	Every 1 year(s)
	Monthly GenSet Testing (Level 1)	Day 15 of every 1 month(s)
	Structural Inspection Wet and Dry Well	Every 1 year(s)
	Alarm Fault Finding and Testing	Every 1 year(s)
	Electrical Equipment Maintenance and Testing	Every 1 year(s)
	Level System Calibration	Every 1 year(s)
	Periodic Maintenance	Day 15 of every 1 month(s)
	PLC Maintenance	Every 1 year(s)
	Thermography Testing	Every 1 year(s)

	Wet Well Cleaning	Every 1 year(s)
Braemar	Force Main Change Over	Every 1 month(s)
	Landscape Maintenance	Day 15 of every 1 month(s)
	Genset Cooling Sytem (Level 3)	Every 3 year(s)
	Genset Fuel Polishing	Every 2 year(s)
	GenSet Load Test	Every 3 year(s)
	GenSet Maintenance	Every 1 year(s)
	Periodic Electrical Inspection	Every 3 month(s)
	Surge Tank Level Probe Maintenance	Every 3 month(s)
	Monthly GenSet Testing (Level 1)	Day 15 of every 1 month(s)
	4003 Braemar LS Structural inspection - Building	Every 1 year(s)
	Structural inspection Wet and Dry Well	Every 1 year(s)
	Periodic Maintenance	Day 15 of every 1 month(s)
	Thermography Testing	Every 1 year(s)
	Alarm Fault Finding and Testing	Every 1 year(s)
	Electrical Equipment Maintenance and Testing	Every 1 year(s)

	Gas Analyzer Calibration	Every 1 year(s)
	Level System Calibration	Every 1 year(s)
	PLC Maintenance	Every 1 year(s)
	Valve Exercising	Day 15 of every 1 month(s)
	Ventilation System Maintenance	Every 1 year(s)
	Wet Well Cleaning	Every 1 year(s)
Tallant	Alarm Fault Finding and Testing	Every 1 year(s)
	Electrical Equipment Maintenance and Testing	Every 1 year(s)
	Level System Calibration	Every 1 year(s)
	Periodic Maintenance	Day 15 of every 1 month(s)
	PLC Maintenance	Every 1 year(s)
	Thermography Testing	Every 1 year(s)
	Wet Well Cleaning	Every 1 year(s)
	Structural Inspection Wet Well and Vault	Every 1 year(s)
La Colina	GenSet Maintenance Oil & Filter Change (Level 2)	Every 1 year(s)
	Landscape Maintenance	Day 15 of every 1 month(s)

	Genset Cooling Sytem (Level 3)	Every 3 year(s)
	Genset Fuel Polishing	Every 1 year(s)
	GenSet Load Test	Every 3 year(s)
	PLC Maintenance	Every 1 year(s)
	Monthly GenSet Testing (Level 1)	Day 15 of every 1 month(s)
	Structural Inspection Wet and Dry Well	Every 1 year(s)
	Alarm Fault Finding and Testing	Every 1 year(s)
	Electrical Equipment Maintenance and Testing	Every 1 year(s)
	Force Main Change Over	Day 15 of every 1 month(s)
	Level System Calibration	Every 1 year(s)
	Periodic Maintenance	Day 15 of every 1 month(s)
	Thermography Testing	Every 1 year(s)
	Ventilation System Maintenance	Every 1 year(s)
	Wet Well Cleaning	Every 6 month(s)
Via Lucero	Alarm Fault Finding and Testing	Every 1 year(s)
	Electrical Equipment Maintenance and Testing	Every 1 year(s)

	Level System Calibration	Every 1 year(s)
	Periodic Maintenance	Day 15 of every 1 month(s)
	PLC Maintenance	Every 1 year(s)
	Structural Inspection Wet and Dry Well	Every 1 year(s)
	Thermography Testing	Every 1 year(s)
	Wet Well Cleaning	Every 1 year(s)
	Landscape Maintenance	Day 15 of every 1 month(s)
	Genset Cooling Sytem (Level 3)	Every 3 year(s)
	Genset Fuel Polishing	Every 1 year(s)
	GenSet Load Test	Every 3 year(s)
	GenSet Maintenance (Level 2) Oil & Filter Change	Every 1 year(s)
	Monthly GenSet Testing (Level 1)	Day 15 of every 1 month(s)
Skofield	Structural Inspection Wet and Dry Well	Every 1 year(s)
	Alarm Fault Finding and Testing	Every 1 year(s)
	Electrical Equipment Maintenance and Testing	Every 1 year(s)
	Level System Calibration	Every 1 year(s)

	Periodic Maintenance	Day 15 of every 1 month(s)
	PLC Maintenance	Every 1 year(s)
	Thermography Testing	Every 1 year(s)
	Wet Well Cleaning	Every 1 year(s)
	Dehumidifier PM	Day 15 of every 1 month(s)
	Landscape Maintenance	Day 15 of every 1 month(s)

Appendix B: Lift Station and Force Main Repair Recommendations and Future Projects Based on Formal and Informal Condition Assessments

Table 2: Lift Station and Force Main Repair Recommendations and Future Projects				
Lift Station	Priority	Scope	Type of Repair (Employee Safety, Operational, or Both)	Planned?
Braemar	U	Replace (E) 3,100 LF DIP of abandoned force main by pipe bursting (redundancy)	O	yes
	U	Remove the ladder in the wet well	S	on hold for funding
	U	Replace valves as planned by City (suction isolation valves for pumps #1 and #2) OFCI	O	yes
	H	Reconfigure force main bypass connection	O	partial - on hold for funding
	L	Bring suction and discharge piping up to Hydraulic Institute Standards	O	on hold for funding
	L	Bring wet well up to Hydraulic Institute Standards	O	on hold for funding
	L	Repair metal appurtances in wet well	S	partial - on hold for funding
	N/A	Remove platform in wet well	S	on hold for funding
	N/A	Line interior of wet well	O	on hold for funding - check V&A report
	N/A	Replace discharge manhole with new lined manhole	O	yes
	AE	Replace isolation valves during the bypass process	O	partial - on hold for funding
	AE	Rehabilitate T-lock liner in wet well	O	in upcoming project
	AE	Replace influent screens with a better design, easier debris removal	S/O	in upcoming project
	M	Braemar overhaul project - convert to VFD	O	in upcoming project

El Camino De La Luz	H	Install new 100 LF of 4" HDPE Force Main OR Upsize force main to 6" as discussed in the B&C report*	O	on hold for funding
	H	Repair damage to floor and sump in wet well	O	on hold for funding
	H	Inspect bypass pipe to determine condition	O	on hold for funding
	L	Eliminate dry well and convert the LS to submersible type	O	on hold for funding
	L	Bring suction and discharge piping up to Hydraulic Institute Standards	O	on hold for funding
	L	Bring wet well up to Hydraulic Institute Standards	O	on hold for funding
	L	Repair exposed aggregate in wet well*	O	on hold for funding
	N/A	Line wet well	O	on hold for funding
	N/A	Install new transition manhole and line	O	yes
	AE	Install new isolation valves during bypass	O	on hold for funding
	AE	Install better lighting around control panel and generator	O/S	yes
	AE	Install better screen, "inlet grating"	O/S	on hold for funding
La Colina	U	Install new 3,200 LF of 8" HDPE (redundancy)	O	yes
	U	Replace the force main discharge manhole with new HDPE lined manhole	O	yes
	U	Remove staircase to avoid perception of non-confined space (Urgent but only for safety reasons, moved to 2020 to package with other upgrades)	S	on hold for funding

	L	Bring suction and discharge piping up to Hydraulic Institute Standards	O	on hold for funding
	L	Bring wet well up to Hydraulic Institute Standards	O	on hold for funding
	L	Repair metal appurtances in wet well	S	on hold for funding
	L	Repair concrete surfaces in wet well*	O	on hold for funding
	N/A	Add additional concrete around entrance to wet well to create flat surface for tripod	S	on hold for funding
	N/A	Line wet well	O	on hold for funding
	N/A	Line four storage manholes in the street	O	on hold for funding
	N/A	Line two gravity collection system manholes in front of lift station	O	on hold for funding
	N/A	Replace isolation valves on bypass line as OFCI	O	yes
	AE	Expand vault for easier access during bypass	S/O	yes
	AE	Install additional lighting	S/O	on hold for funding
	M	convert pumps	O	on hold for funding
	M	remove sluice gate	O	on hold for funding
Linda Road	U	Replace the force main discharge manhole with new HDPE lined manhole	O	on hold for funding
	L	Repair metal appurtances in wet well	S	on hold for funding
	AE	Replace power and signal conduits for pumps in wet well	O	on hold for funding

Skofield	U	Evaluate corrosion potential of force main	O	on hold for funding
	L	Eliminate dry well and convert the LS to submersible type	O	on hold for funding
	L	Bring suction and discharge piping up to Hydraulic Institute Standards	O	on hold for funding
	L	Bring wet well up to Hydraulic Institute Standards	O	on hold for funding
	L	Repair metal appurtances in wet well	S	on hold for funding
	L	Repair concrete surfaces in wet well*	O	on hold for funding
	L	Repair damage to floor and sump in dry well*	O	on hold for funding
	M/H	install generator - 208 V 3-phase	O	on hold for funding
Tallant Road	H	Install ARV or manual valve to vent air from check and isolation valve assembly	O	on hold for funding
	H	Install bollards around electrical enclosure (High to protect equipment, more of a safety concern, moved to 2020 to package up with other concrete work)	O/S	on hold for funding
	L	Repair force main discharge manhole	O	on hold for funding
Via Lucero	U	Reline wet well	O	on hold for funding
	H	Install two new 4" HDPE force mains (redundancy)	O	on hold for funding
	H	Replace isolation sluice gate and shaft in wet well	S/O	yes
	L	Eliminate dry well and convert the LS to submersible type	O	on hold for funding

	L	Bring suction and discharge piping up to Hydraulic Institute Standards	O	on hold for funding
	L	Bring wet well up to Hydraulic Institute Standards	O	on hold for funding
	L	Repair metal appurtances in dry well	S	on hold for funding
	L	Repair concrete surfaces in wet well*	O	on hold for funding
	AE	Repair storage manhole liners, liner failing near rims	O	on hold for funding
	AE	Add additional lighting in the dry well	S	on hold for funding
	AE	Modify bypass connection point in dry well	S	on hold for funding
	AE	Modify piping to allow each pump to be isolated, add extra isolation valve in side-walk	O	on hold for funding

	Priority	**Definition**	**Time Frame**	
	U	Urgent	Within 2 years	
	H	High Priority	2 - 5 years	
	L	Low Priority	5 - 10 years	
	N/A	From Site Visit	when it make sense	
	AE	From Herman's Wish List	when it make sense	
	M	From Lift Station Meeting	when it make sense	

Appendix C: Typical Lift Station Investigation Form

City of Santa Barbara
Pump Station Condition Assessment Form

1. PUMP STATION NAME:____________________________________

2. DATE: __________________________ 3. TIME: __________________

4. CONSULTANT STAFF: ____________________________________

5. DISTRICT STAFF: ____________________________________

Background Information

NOTE: SEE INVENTORY FORM FOR BACKGROUND INFORMATION

Pump Equipment Summary

NOTE: SEE INVENTORY FORM FOR EQUIPMENT NOT LISTED HERE

	Pump 1	Pump 2	Pump 3	Pump 4
Casing Material	6.	7.	8.	9.
Impeller Material	10.	11.	12.	13.

Maintenance Records

	Pump 1	Pump 2	Pump 3	Pump 4
Runtime (hours)	14.	15.	16.	17.
Base Type/Condition Motor Pump	 18. 19. 20.	 21. 22. 23.	 24. 25. 26.	 27. 28. 29.
MTBF (Mean Time Between Failure)	30.	31.	32.	33.
Vibration	34.	35.	36.	37.
Cavitation	38.	39.	40.	41.
Bearing Noise	42.	43.	44.	45.
Bearing Temp.	46.	47.	48.	49.
Most common reason for repair	50.	51.	52.	53.

Other Remarks	54.	55.	56.	57.

Site

NOTE: SEE INVENTORY FORM FOR SITE INFORMATION NOT LISTED HERE

Access

58. General Condition Rating ☐1 ☐2 ☐3 ☐4 ☐5
59. General Functionality Rating ☐1 ☐2 ☐3 ☐4 ☐5

Turf / Landscaping

60. General Condition Rating ☐1 ☐2 ☐3 ☐4 ☐5
61. General Functionality Rating ☐1 ☐2 ☐3 ☐4 ☐5

Future Expansion Area

62. Space available for future expansion ☐ Y ☐ N

Building Structure

Superstructure Building

63. General Condition Rating ☐1 ☐2 ☐3 ☐4 ☐5
64. General Functionality Rating ☐1 ☐2 ☐3 ☐4 ☐5

Criteria		Comments
65. Exterior wall condition	☐1 ☐2 ☐3 ☐4 ☐5☐	
66. Interior wall condition	☐1 ☐2 ☐3 ☐4 ☐5☐	
67. Exterior finish condition	☐1 ☐2 ☐3 ☐4 ☐5☐	
68. Interior finish condition	☐1 ☐2 ☐3 ☐4 ☐5☐	
69. Equipment finish condition	☐1 ☐2 ☐3 ☐4 ☐5☐	
70. Roof condition	☐1 ☐2 ☐3 ☐4 ☐5☐	
71. Door condition	☐1 ☐2 ☐3 ☐4 ☐5☐	
72. Window condition	☐1 ☐2 ☐3 ☐4 ☐5☐	
73. Pipe support condition	☐1 ☐2 ☐3 ☐4 ☐5☐	
74. Grating condition	☐1 ☐2 ☐3 ☐4 ☐5☐	
75. Layout OK for equipment access	☐ Y ☐ N	

Wet Well

76. General Condition Rating ☐1 ☐2 ☐3 ☐4 ☐5
77. General Functionality Rating ☐1 ☐2 ☐3 ☐4 ☐5

Criteria		Comments
78. Top slab condition	☐1 ☐2 ☐3 ☐4 ☐5☐	
79. Interior wall condition	☐1 ☐2 ☐3 ☐4 ☐5☐	
80. Hatchway condition	☐1 ☐2 ☐3 ☐4 ☐5☐	
81. Hatchway accessible	☐ Y ☐ N	

Pumps, Valves and Piping

Suction Piping and Valve(s)

82. General Condition Rating ☐1 ☐2 ☐3 ☐4 ☐5
83. General Functionality Rating ☐1 ☐2 ☐3 ☐4 ☐5

Criteria		Comments
84. Velocity < 8 fps	☐ Y ☐ N	
85. At least 5 pipe diameters straight run to pump from last fitting	☐ Y ☐ N	
86. No air entrainment problems	☐ Y ☐ N	
87. No loss of pump prime	☐ Y ☐ N	

Pump

88. General Condition Rating ☐1 ☐2 ☐3 ☐4 ☐5
89. General Functionality Rating ☐1 ☐2 ☐3 ☐4 ☐5

Criteria		Comments
Pump		
90. Pumps performing near rated capacity	☐ Y ☐ N	
91. Seals functional	☐ Y ☐ N	
92. Seal water system functional	☐ Y ☐ N	
93. Pump parts available	☐ Y ☐ N	
Motor		
94. High efficiency	☐ Y ☐ N	
95. Over-temperature protection	☐ Y ☐ N	

Discharge Piping and Valve(s)

96. General Condition Rating ☐1 ☐2 ☐3 ☐4 ☐5
97. General Functionality Rating ☐1 ☐2 ☐3 ☐4 ☐5

Criteria		Comments
Discharge Valve		
98. Accessible for operation and maintenance	☐ Y ☐ N	
99. Horizontal	☐ Y ☐ N	
Check Valve		
100. Accessible for operation and maintenance	☐ Y ☐ N	
101. Horizontal	☐ Y ☐ N	
Flow Meter		
102. Reliable output	☐ Y ☐ N	
103. Sufficient straight run	☐ Y ☐ N	
Piping		
104. Evidence of corrosion	☐ Y ☐ N	
105. Evidence of leaks	☐ Y ☐ N	
106. Hydraulic transient effects	☐ Y ☐ N	
Pump Connections		
107. Isolation from piping strains	☐ Y ☐ N	
108. Restrained in accordance with Hydraulic Institute standards	☐ Y ☐ N	

Back-up Power

NOTE: SEE INVENTORY FORM FOR BACK-UP POWER INFORMATION NOT LISTED HERE

109. General Condition Rating ☐1 ☐2 ☐3 ☐4 ☐5
110. General Functionality Rating ☐1 ☐2 ☐3 ☐4 ☐5 Comments______________________________

Criteria		Comments
111. Generator size sufficient for pumps and auxiliary equipment	☐ Y ☐ N	
112. Fuel tank sized for 24 hour operation	☐ Y ☐ N	
113. Fuel tank spill containment provisions	☐ Y ☐ N	
114. Outdoor panel location area satisfactory for portable generator	☐ Y ☐ N	
115. Transfer switch condition satisfactory	☐ Y ☐ N	

Electrical – Power

116. General Condition Rating ☐1 ☐2 ☐3 ☐4 ☐5
117. General Functionality Rating ☐1 ☐2 ☐3 ☐4 ☐5 Comments______________________________

Criteria		Comments
MCCs		
118. Condition satisfactory	☐ Y ☐ N	
119. Parts available	☐ Y ☐ N	
Lighting		
120. Suitable for electrical classification	☐ Y ☐ N	

Electrical – Controls

NOTE: SEE INVENTORY FORM FOR CONTROLS INFORMATION NOT LISTED HERE

121. General Condition Rating ☐1 ☐2 ☐3 ☐4 ☐5
122. General Functionality Rating ☐1 ☐2 ☐3 ☐4 ☐5 Comments______________________________

Criteria		Comments
Level Controls		
123. Sensors reliable	☐ Y ☐ N	
124. Parts available	☐ Y ☐ N	
VFDs		
125. Parts available	☐ Y ☐ N	
126. Controls stable	☐ Y ☐ N	
	☐ Y ☐ N	

Heading and Ventilation Equipment

127. General Condition Rating ☐1 ☐2 ☐3 ☐4 ☐5
128. General Functionality Rating ☐1 ☐2 ☐3 ☐4 ☐5 Comments______________________________

Criteria		Comments
Wet Well Ventilation		
129. Mechanical ventilation provided	☐ Y ☐ N	
130. Separate from dry well	☐ Y ☐ N	
Dry Well Ventilation		
131. Mechanical ventilation provided	☐ Y ☐ N	
132. Gas detection equipment	☐ Y ☐ N	
133. Ventilation requirements meet NFPA 820	☐ Y ☐ N	
Dehumidification		
134. Effective	☐ Y ☐ N	
Heating		
135. Effective	☐ Y ☐ N	

Odor Control Facilities

NOTE: SEE INVENTORY FORM FOR CONTROLS INFORMATION NOT LISTED HERE

136. General Condition Rating ☐1 ☐2 ☐3 ☐4 ☐5
137. General Functionality Rating ☐1 ☐2 ☐3 ☐4 ☐5 Comments_____________________________________

Criteria		Comments
138. No objectionable odors	☐ Y ☐ N	
139. Accessible for maintenance	☐ Y ☐ N	
140. Reasonable operational cost	☐ Y ☐ N	

Auxiliary Equipment – Hoists

NOTE: SEE INVENTORY FORM FOR HOIST INFORMATION NOT LISTED HERE

141. General Condition Rating ☐1 ☐2 ☐3 ☐4 ☐5
142. General Functionality Rating ☐1 ☐2 ☐3 ☐4 ☐5

Criteria		Comments
143. Hoist load tested within 10 years	☐ Y ☐ N	
144. Hoists arrangement and location sufficient for required maintenance	☐ Y ☐ N	

Auxiliary Equipment – Bar Screen

NOTE: SEE INVENTORY FORM FOR BAR SCREEN INFORMATION NOT LISTED HERE

145. General Condition Rating ☐1 ☐2 ☐3 ☐4 ☐5
146. General Functionality Rating ☐1 ☐2 ☐3 ☐4 ☐5

Criteria		Comments
147. Pump damage or pipe blockage due to lack of screening	☐ Y ☐ N	
148. Adequate provisions for screenings removal from building	☐ Y ☐ N	

Safety Issues

☐ 149. Materials Handling
☐ 150. Chemical Exposure
☐ 151. Hydrogen Sulfide Exposure
☐ 152. Traffic Control
☐ 153. Confined Space
☐ 154. Other ________________________

155. Other Maintenance Issues:
____
____
____

156. Comments:
____
____
____

Rating Criteria

General Condition Rating

5 Structure or equipment integrity severely compromised by corrosion and wear. Possible imminent failure.
4 Structure or equipment integrity compromised by corrosion and wear.
3 Visible degradation of equipment or structure
2 Well maintained, like-new condition of equipment or structure
1 New or nearly-new structure or equipment

General Functionality Rating

5 Structure or equipment is not currently functioning for its intended use.
4 Structure or equipment is in service but function is highly impaired
3 Structure or equipment is in service but maintenance or operational requirements are excessive
2 Structure or equipment functions as intended

1 Structure or equipment functions better than other similar structures or equipment

Appendix E5 Flow Monitoring Program

Flow Monitoring Program

City of Santa Barbara

Revised
December 2020

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Table of Contents

Section 1: Introduction

1.1 Introduction and Background

This section provides an overview of the City of Santa Barbara’s (City)’s wastewater collection system flow monitoring program, responsibilities for program implementation, and an overview of this document.

1.2 Document Purpose and Structure

This report describes the City’s existing flow monitoring program. It describes the need for program improvements and a description and evaluation of the existing program. The document includes the following sections:

Section 1 – Introduction: Describes the purpose of the document, the related regulatory requirements, the existing program, and the scope and responsibilities for implementing the program.

Section 2 – Flow Monitoring Program Evaluation and Improvements: Discusses the need for program improvements, an evaluation of the existing program, program benchmarking, and a proposed approach for the City’s program.

1.3 Regulatory Overview

Santa Barbara's wastewater collection system management practices must comply with the following regulatory mandates:

- California State Water Resources Control Board adopted Statewide General Waste Discharge Requirements for Wastewater Collection System Agencies (GWDR) on May 2, 2006.
- California State Water Resources Control Board Amendment of Statewide Monitoring and Reporting Program Requirements for Sanitary Sewer Overflows; MRP Order 2013-0058-EXEC effective September 9, 2013.

In regards to collection system flow monitoring, these mandates require that the City develop estimates of peak flows in the collection system for the Capacity Assurance Plan. This work plan incorporates each of these requirements into the City's flow monitoring program.

1.4 Responsibilities for Program Implementation

Responsibility for inspecting and maintaining the wastewater collection system is delegated to the Water Resources Division of the Public Works Department as specified in Titles 14 and 16 of the Santa Barbara Municipal Code. Implementation of inspecting and other operations and maintenance activities is provided by Wastewater Collection Section under Water Resources Division.

1.5 Existing Program

A summary of the City’s existing flow monitoring program is provided in this section.

1.5.1 Work Practices

The City’s flow monitoring program has been in place since 2002. The program, performed by outside contractors and managed by the City, was initiated to evaluate RDI/I in the collection system. The program included the contractor installation of flow monitors on a temporary basis for approximately 14-weeks in typical wet-weather time periods during 2002-2003 at 44 gravity sewer locations throughout the collection system. Monitors were also installed in during a prior monitoring event in 2002, but this data was not utilized due to the absence of rain. Data from this flow monitoring program was used to develop and calibrate the hydraulic model for the 2010 Wastewater Collection System Master Plan (Akel, 2010). This first study identified high levels of RDI/I (> 3 percent of rainfall) in fourteen flow basins. Two basins had excessive RDI/I levels (> 5 percent of rainfall).

In 2009, a contractor began a four year program performing focused flow monitoring in four flow basins previously identified with high RDI/I levels. In conjunction with this monitoring, the City has also performed limited smoke testing in an attempt at identifying inflow sources.

The City has used the results of these past flow monitoring studies to identify flow basins for RDI/I reduction projects. Basins 17 and 26 have had some reduction in flows after partial rehabilitation of the flow basin.

In 2012, the City contracted to install influent flow meters at each of its four trunk mains to monitor flows into the El Estero Wastewater Treatment Plant. Since then, the City in conjunction with Contractor support, has continued to operate and maintain them. These flow meters help Plant operations identify changes, and monitor the collection system by separating out, and characterizing influent streams, including infiltration of seawater, independent of internal Plant recycle streams.

In 2013 the City retained Water Systems Consulting (WSC) to develop an updated computer hydraulic model of the collection system that could be maintained by City staff and updated as new information became available. The key objectives of the project were to develop a model that includes the entire collection system so that hydraulic capacity information would be available for all pipes, not just large diameter pipes, could be used as a planning/management tool to identify potential hydraulic capacity constraints, evaluate potential capital improvements, and to quantify expected flows and evaluate “what-if” scenarios related to new discharges into the system or changes in flow routing. A detailed description of this effort is provided in the Wastewater Collection System Hydraulic Model for the City of Santa Barbara Report – December 2014.

The City does not have flow monitors at any of the seven City-owned lift stations. More information is provided in the Lift Station and Force Main Preventative Maintenance Plan, located in Appendix E4. The City tracks alerts of level sensors during rain events or times of high flow in Supervisory Control and Data Acquisition (SCADA). SCADA keeps a history of alerts that allows Wastewater staff to observe and monitor flow trends.

1.5.2 Resources

The following resources are utilized as part of the existing flow monitoring program.

1.5.2.1 Collection System Maps

The City has a comprehensive GIS that includes the information for its wastewater collection system assets including: gravity line segments, manholes, pumping facilities and pressure pipes (force mains). The GIS data is linked to the City’s CMMS, Cartegraph OMS, so that data can easily be shared and displayed between the two systems.

The GIS is supported by the City’s Information Services Division (ISD) in the Administrative Services Department. The data in the GIS is periodically updated as new facilities are added and existing facilities are rehabilitated or replaced. GIS updates and additions for collection system assets are performed according to the procedures specified in the Collection System Information Technology Governance Document.

1.5.2.2 Flow Monitoring Program Hardware and Software

Flow monitoring program hardware and software are owned and maintained by the contractors performing flow monitoring studies for the City. Due to the temporary nature of the monitor installations, owning hardware and software, and the specialized training and experience required to properly operate the hardware and software, is unnecessary and cost-prohibitive for the City.

1.5.2.3 Personnel

The key roles and responsibilities of Wastewater Collection System staff that carry out the SSMP and various program activities are listed in Volume I of the SSMP, Element 2: Organization.

Section 2: Flow Monitoring Program Evaluation and Improvements

2.1 Introduction

It is the City's desire to assure program compliance with Waste Discharge permit requirements and determine the best course of action for the future flow monitoring program. This section provides some program benchmarking, identifies the need for program improvements, provides an evaluation of the existing program, and outlines recommended changes for the City's flow monitoring program.

2.2 Benchmarking

Benchmarking is a helpful tool to gauge program status and identify potential improvements. In general, most agencies perform collection system flow monitoring to support the following activities:

1. Development of a Capacity Assurance Plan (peak flow development for hydraulic model calibration).
2. Identification of areas with high levels of RDI/I for collection system rehabilitation and subsequent post-rehabilitation monitoring to determine RDI/I reduction levels.
3. Quantification of flow from satellite sewer collection systems for monitoring or billing purposes.

Most agencies perform temporary flow monitoring in support of items 1 and 2 above, much as the City has done over the past ten years. Typically, permanently installed monitors are used to support item 3, as continuous, long-term data is needed to support billing purposes.

2.2.1 Open Channel Gravity Flow Monitoring Technology

Temporary, short duration open channel (gravity) wastewater flow monitoring to support studies is generally performed with an area-velocity (AV) flow monitor. AV flow monitors are equipped with one or more sensors to periodically measure and record both depth and velocity of flow parameters.

Flow depth is commonly measured with a sensor (ultrasonic or hydrostatic pressure, typical) mounted at or near the pipe invert. These types of sensors are commonly referred to as submerged, wetted, or water contacting sensors. Submerged sensors provide a direct measurement of the depth of water in which they are used.

Flow depth is also commonly measured by a non-submerged sensor(s) (ultrasonic, typical) mounted above and suspended over the flow surface. These types of sensors are commonly referred to as non-submerged, dry, or non-contacting sensors. Non-submerged sensors provide an indirect measurement of the depth of water. They measure the distance from the sensor face to the water surface. Depth is then calculated by subtraction of this sensor measured distance from the manually measured sensor face to pipe invert distance.

Velocity is most commonly measured with a direct measurement, submerged sensor. The most common velocity measurement technology used for temporary applications uses continuous wave Doppler (CWD) velocity measurement technology. These sensors are typically mounted at or near the pipe invert. CWD flow sensors transmit and receive acoustic signals. After emitting sound pulses into the flow stream, the sound waves are echoed back (return signal) after they come into contact with particles or air bubbles. The meter measures the difference in frequency between the emitted and return signals (Doppler Shift), which allows the meter to determine the velocities of particles in the flow stream and compute the average velocity of the flow stream.

Non-submerged velocity measurement technologies are available but are used less commonly. Non-submerged velocity sensors measure the velocity of the flow surface. These non-submerged velocity sensors are typically mounted in the manhole above the typical flow surface. Generally, surface velocity technology is considered less accurate because the average flow velocity is determined through an algorithm versus direct measurement with submerged sensors mounted in the flow stream. The technology is limited to application in flows greater than 0.75 feet per second or higher. However, it can be useful in low depth situations where a submerged sensor disrupts the flow, in locations where access is difficult, for industrial (i.e. caustic or high temperature flows), or other select locations.

Due to the nature of solids and debris in wastewater flow any sensor(s) mounted and submerged in the flow stream will require periodic maintenance to clean debris from the sensor(s). Non-submerged sensors may possibly provide a reduction, but not elimination, in maintenance requirements. It should also be noted that surface velocity measurement can be particularly troublesome at flow monitor sites where the pipe can fill and the manhole becomes surcharged during peak (often wet-weather) flows as submergence renders the surface velocity measurement sensor inoperable.

For permanent, long-term wastewater open channel flow monitoring, both area-velocity flow monitors as well as flumes with depth measurement sensors are commonly used.

All technologies installed in a wastewater environment, whether for short or long duration, require periodic maintenance.

2.2.2 Pressure Flow Monitoring Technology

For measuring pressure wastewater flow in a force main, there are a number of technologies available for installation in varying site conditions.

- Electromagnetic flow monitors, otherwise known as magmeters, determine the flow of conductive liquids in pipes by determining a liquid’s velocity using the Faraday principle of electromagnetic induction. A conductor (water) moving through a magnetic field created by the flow meter generates a current that is proportional to the velocity of the conductor.
- Other than magmeters, CWD flow sensors are the most common velocity measurement technology used for wastewater flow measurement. The sensors can be mounted on the exterior or in the interior of the pipeline. When installed on the exterior of the pipe the meter is commonly referred to as a strap-on meter. Sensors may also be mounted to the interior of a pressure pipe. Interior installation is most commonly accomplished by tapping of the pipe and insertion of sensors so that they contact the fluid in the pipeline.

2.2.3 Contracting

Most sewer agencies will outsource temporary flow monitoring services work due to the effort and expense of maintaining an inventory of flow monitors and having a staff expertly trained in their occasional use. For permanent installations, some agencies will perform maintenance in-house, though many will outsource this work as well. The decision to operate and maintain flow monitors in-house is generally determined by the expense of the equipment and the availability of program staff, particularly those with flow monitoring training and experience.

2.3 Need for Program Improvements

The City’s flow monitoring program is in compliance with the State WDR. The City has not expressed a desire to install permanent monitors for billing purposes in the County or Montecito Sanitary District satellite collection systems, nor is this required. In general, program improvements are not required at this time, though there are two instances where continuation and expansion of the existing program could prove beneficial. These instances are described below.

2.3.1 RDI/I Reduction

The Wastewater Collection System Hydraulic Model for the City Of Santa Barbara was prepared by WSC in December 2014. This was a comprehensive model that confirmed the findings in the City's 2010 Wastewater Collection System Master Plan. The Master Plan included a capacity assurance plan that accommodates transport of current and future peak wet weather flow (PWWF). If the City moves forward with implementation of this plan, RDI/I reduction is not needed to meet capacity assurance under the City's 10-year, 24-hour design storm conditions. However, there are other costs and risks associated with high system RDI/I levels. If allowed to remain in the system, the excess storm water that enters the collection system must be treated at the WWTP. Also, high RDI/I levels in the system mean there is an increased risk of an SSO in the event that the design storm rainfall condition is exceeded. Although the City is not required to manage stormwater in excess of a ten year/twenty-four hour rainfall event, the Wastewater Collection System Section has been able to successfully convey increased capacities greater than that of a ten year storm event.

2.3.2 Lift Station and Force Main Monitoring

The City's 2012 Lift Station and Force Main Condition Assessment report identified the need for flow monitoring at the City's seven lift stations. A lift station and force main flow monitoring program would allow the City to measure pump performance and identify potential operational issues in the pumps and force mains.

2.4 Program Evaluation

A review of the program has identified a number of issues and recommendations for program improvements. A summary is provided below.

- The City's current flow monitoring program is largely performed by contractors and is not part of the City's regular collection system maintenance program. Therefore, incorporation of the flow monitoring program into the City's CMMS is not practical or recommended.
- The City's current approach for flow monitoring mini-basins is a typical strategy for identification of areas for RDI/I reduction. However, the City's current approach for rehabilitation and replacement will not likely see a consistent, significant reduction in RDI/I. Industry experience has shown that a basin-wide rehabilitation approach is typically needed to see meaningful reduction in RDI/I. For City-owned assets, this usually means comprehensive rehabilitation of mains, manholes and lower laterals within the right-of-way. Significant additional reduction is also achievable with the rehabilitation or replacement of privately-owned sewer laterals. The City implemented a Sewer Lateral Inspection Program (SLIP) that addresses private sewer laterals, though it was not focused in the high RDI/I basins. If the City plans to continue its current flow monitoring program, it should establish a specific plan with RDI/I reduction goals and objectives including pre-rehabilitation monitoring, comprehensive public and/or private rehabilitation program, and post-rehabilitation monitoring to measure program effectiveness.
- Since 2002, the City has outsourced flow monitoring services and the contractors have used a variety of flow monitor technologies. The technologies used to date have included:
  - The ADS 1500 flow monitor equipped with an independent submerged depth sensor; a submerged CWD velocity sensor; and an independent, non-submerged depth sensor. Continued

  use of this technology is recommended in locations where depths of flow exceed 1- to 2-inches and velocity ranges optimally between 1 and 5 feet per second.

  - The Hach Sigma 930T flow monitor equipped with an independent submerged depth sensor; a submerged CWD velocity sensor; and an independent, non-submerged depth sensor. Continued use of this technology is recommended in locations where depths of flow exceed 1- to 2-inches and velocity ranges optimally between 1 and 5 feet per second.
  - The Hach March-McBirney Flo-Dar flow monitor equipped with an integrated (single multi-sensor housing), non-submerged depth sensor and surface velocity measurement sensor. Continued use of this technology is recommended in locations where depths of flow are less than 1- to 2-inches for substantial periods, backwater does not occur, surcharge does not occur, and velocity never falls below 1 foot per second and velocity optimally ranges between 1 and 5 feet per second.

- It is recommended that the City require its flow service contractors to provide alternate low depth of flow monitor technologies such as the Data Gator, the Eastech Badger cartridge meter, or other similar technologies at flow monitor locations where depths of flow are less than 1- to 2-inches for substantial periods and where the flow monitoring installation location is likely to experience flow velocity less than 1 foot per second or become surcharged.
- None of the City's lift stations currently have flow monitors installed. It is recommended that the City consider installing permanent flow monitors at each of the lift stations to provide input into trouble-shooting pump performance. Flow monitor installation can be prioritized based on a risk-assessment. It is likely that some of the City's smaller lift stations may not immediately need a permanent flow monitor.
- To date the City has elected to outsource services and hire contractors to perform flow monitoring. For temporary flow monitoring, this is thought to be the best value to the City and is recommended for future efforts. If a long-term, permanent monitoring program is established for the lift stations, the City should evaluate the benefits of purchasing equipment and software and obtaining training to perform this work with City staff.

2.5 Proposed Program Improvements

Following a review of the City's current program, the Waste Discharge permit requirements and benchmarking with other agencies, the following program improvements should be initiated.

2.5.1 Collection System Flow Monitoring Program

The City has expended a significant amount of effort in their current flow monitoring program to facilitate RDI/I identification. As part of the CCTV and Repair Rehabilitation and Replacement (R&R) work plan, this information will be used to develop a risk-based, prioritized CCTV inspection program. Basins with high RDI/I levels will have a higher-priority inspection status than those basins with lower RDI/I. The City's R&R program, derived from the CCTV inspection data, will repair, rehabilitate or replace a minimum of 2.6 miles (one percent) of collection system pipe per year.

BC recommends that the City suspend its current annual collection system flow monitoring program until the City is able to rehabilitate more of its system. The City should continue to monitor flows at the WWTP influent flow monitor and perform periodic flow trend evaluations to determine if system-wide RDI/I rates are increasing or decreasing. The City should also continue to monitor its SSO reporting to verify that there are not increasing trends for capacity-related SSOs. Prior to the next collection system master plan update, the City should initiate a new flow monitoring program to measure the effectiveness of its R&R efforts, and to develop updated peak wet weather flows for the hydraulic model.

If the City desires to continue its RDI/I reduction program, it should consider taking the results from the past few years of mini-basin flow monitoring and conduct comprehensive public and/or private collection system improvements in the mini-basins identified with excessive RDI/I. Following R&R in these basins, the City should conduct flow monitoring (at the same monitor locations) to measure the effectiveness of the R&R program at reducing RDI/I.

2.5.2 Lift Station Flow Monitoring Program

The City should perform a lift station flow monitor evaluation to investigate the installation of flow monitors at each of the City's seven lift stations. The program will help the City trouble-shoot pump performance. The flow monitoring evaluation should include a risk assessment to prioritize lift station flow monitor installation and a technology recommendation based on specific lift station characteristics. The program should be implemented over the next five years.

In the near term, the City should continue to conduct a capacity and pump performance analysis of each pump to confirm the pumping capacity. Since none of the lift stations have flow meters; the City should continue to use the temporary flow meters and continue to estimate flows annually from their wet well test, using SCADA data to determine draw down.

References

ADS Environmental Services, *Wastewater Collection System Infiltration and Inflow Study – 2003*, City of Santa Barbara, 2003.

Akel Engineering Group, Inc., *2010 Wastewater Collection System Master Plan*, City of Santa Barbara, 2010.

V&A, *Sanitary Sewer Flow Monitoring and Inflow/Infiltration Study*, City of Santa Barbara, 2009.

V&A, *Sanitary Sewer Flow Monitoring and Inflow/Infiltration Study*, City of Santa Barbara, 2010.

V&A, *Sanitary Sewer Flow Monitoring and Inflow/Infiltration Study – Basin 21*, City of Santa Barbara, 2011

Water Systems Consulting (WSC), Inc., Wastewater Collection System Hydraulic Model, City of Santa Barbara, 2014

Appendix E6 CCTV and Repair, Rehabilitation and Replacement Work Plan

CCTV and Repair, Rehabilitation and Replacement Work Plan

City of Santa Barbara

Revised
December 2020

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Section 1: Introduction and Background

This section provides an overview of the City of Santa Barbara's (City)'s wastewater collection system closed-circuit television (CCTV) inspection and repair, rehabilitation and replacement program, responsibilities for program implementation, and an overview of this document.

1.1 Program Purpose

The Water Resources Division's wastewater management mission statement is:

"Convey wastewater to the City treatment plant reliably and cost efficiently, meet all applicable state and federal requirements, and protect the environment."

To support this program's mission, the City has developed the following goals as adopted by the City's Council as part of the annual Performance Measures and Objectives included in the City's budget.

The City's goals are:

1. To properly manage, operate, and maintain all portions of the City's wastewater collection system.
2. To provide adequate capacity to convey the peak wastewater flows.
3. To minimize the frequency of sewer system overflows (SSOs).
4. To mitigate the impacts that are associated with any SSO that may occur.
5. To meet all applicable regulatory notification and reporting requirements.

1.2 Document Purpose and Structure

This report describes the City's wastewater collection system CCTV pipe inspection and repair, rehabilitation and replacement program. It describes the need for program improvements, the wastewater collection system infrastructure, the overall inspection and condition assessment plan, the logic for prioritizing inspections and recommending improvements, and the general workflow. The document includes the following sections:

Section 1 – Introduction: Describes the purpose of the document, the City's mission statement related to wastewater management, the related regulatory requirements, the existing program, the need for program improvements and the scope and responsibilities for implementing the program.

Section 2 – CCTV Inspection Plan: Discusses CCTV inspection program benchmarking, a proposed approach for the City's program including determination of the initial inspection prioritization and the inspection frequency change following the initial inspection.

Section 3 – Repair, Rehabilitation and Replacement (R&R) Program: Discusses R&R program benchmarking, a proposed approach for the City's program including information derived from CCTV inspection, information derived from other considerations and the capital project prioritization process.

Section 4 – Technical Configuration: Describes how the CMMS and other technology systems will be used to support the CCTV and R&R processes.

1.3 Regulatory Overview

Santa Barbara's wastewater collection system management practices must comply with the following regulatory mandates:

- National Pollutant Discharge Elimination System (NPDES) Permit CA0048143 issued by the Central Coast Regional Water Quality Control Board on February 1, 2020.

- California State Water Resources Control Board adopted Statewide General Waste Discharge Requirements for Wastewater Collection System Agencies (GWDR) on May 2, 2006.
- California State Water Resources Control Board Amendment of Statewide Monitoring and Reporting Program Requirements for Sanitary Sewer Overflows; MRP Order 2013-0058-EXEC effective September 9, 2013.

In regards to collection system inspection, rehabilitation and replacement, these mandates require that the City develop a plan to identify and prioritize system deficiencies and implement short- and long-term rehabilitation actions to address each deficiency. The program should include regular inspections, a system for assessing the pipe condition and scheduling rehabilitation, and the development of a capital improvement plan. This plan incorporates all of these requirements into the City's CCTV and R&R programs.

1.4 Definitions and Acronyms

The various definitions and acronyms used in the report are listed in Volume I of the SSMP.

1.5 Responsibility for Program Implementation

Responsibility for inspecting and maintaining the wastewater collection system is delegated to the Water Resources Division of the Public Works Department as specified in Titles 14 and 16 of the Santa Barbara Municipal Code. Implementation of condition assessment and other operations and maintenance activities is provided by Wastewater Collection Section under Water Resources Division.

The responsibility for planning and implementing most repairs and capital improvements to the collection system is the responsibility of the Engineering Division of the Public Works Department. The Water Resources Division has implemented the system-wide CCTV inspection program and Engineering has developed the annual repair or rehabilitation projects based on the CCTV inspection results.

1.6 Existing Program

A summary of the City’s existing CCTV inspection and R&R program is provided in this section and based on current condition assessment practices and interviews with City Staff.

1.6.1 Work Practices

The City has one CCTV inspection crew to inspect its wastewater collection system facilities. Inspections performed by the City’s single crew are to investigate the causes of stoppages and SSOs, to respond to requests from the sewer cleaning crews, monitor the condition of previously inspected pipes or for quality assurance purposes on pipe rehabilitation projects. The current program is aligned to and has addressed many of the City’s critical pipelines based on institutional knowledge about problem or high risk areas.

According to this SSMP, the goal of the City’s current CCTV program is to proactively inspect all of its wastewater collection system facilities every 10 years, though current staff, funding, and equipment constraints have limited this effort. Due to this, the majority of the efforts for the CCTV inspection crew are spent on reinspections of the City’s most-structurally defective pipes (PACP 5 and 4). In 2012, the City utilized a contractor to inspect its large diameter trunk sewers and has consistently relied on Contractor support through annual CCTV contracts.

In addition to the CCTV program, the City conducts acoustic sounding and nozzle camera inspections to support its condition assessment program. These efforts were initiated in 2013 in order to gain a better understanding of the components of the collection system. In addition, the City conducts inspections of its wastewater collection system facilities during significant storm events. These facilities include known capacity issues, hydraulic constrictions, pump stations, siphons, and creek crossings.

A list of known structural deficiencies have been documented and stored in the CMMS. This list is maintained in priority order. High priority structural deficiencies or pipes with a defect which shows signs of imminent failure are repaired as soon as possible by the City's use of an outside contractor. The City's renewal goal has been to rehabilitate or replace a minimum of 1 percent, or 2.56 miles, of its wastewater collection system per year. Total pipeline renewal mileage is provided in annual reports for performance monitoring.

1.6.2 Resources

The following resources are utilized as part of the CCTV and R&R program.

1.6.2.1 Collection System Maps

The City has a comprehensive GIS that includes the information for its wastewater collection system assets including: gravity line segments, manholes, service laterals, pumping facilities and pressure pipes (force mains). The GIS spatial data is available in the City's CMMS, Cartegraph OMS, so that data can easily be shared and displayed between the two systems. Changes to wastewater collection assets are not automatically refreshed to the CCTV van so GIS maps are periodically uploaded to the City's CCTV inspection software program.

The GIS is supported by the City's Information Services Division (ISD) in the Administrative Services Department. The data in the GIS is periodically updated as new facilities are added and existing facilities are rehabilitated or replaced. GIS updates and additions for collection system assets are performed according to the procedures specified in the *Collection System Information Technology Governance Document*.

1.6.2.2 CCTV Inspection Hardware and Software

The CCTV inspection equipment resides in the CCTV inspection van. The CCTV inspection video and data are collected on a computer system installed in the van. Video and inspection data are transferred from the CCTV inspection van to a centralized server for storage and sharing capabilities.

The City is in the process of upgrading its CCTV Inspection software from POSM Pro to ITPipes. The new ITPipes software will collect and process the video and data, similarly to the previous software, POSM Pro, but using a cloud-based server that is accessible via the web. Video and data are exported from the computer on the van to a cloud-based central repository regularly. City staff attempts to upload inspections daily in order to expedite the review process. POSM data is in the process of being converted into the ITPipes database, where it will be backed up according to City information technology policies. The transition is expected to be complete by January 2021.

The City currently uses the industry standard National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program© (PACP) pipe defect coding system for recording defects identified during CCTV inspection.

1.6.2.3 Personnel

The key roles and responsibilities of Wastewater Collection System staff that carry out the SSMP and various program activities are listed in Volume I – Element 2 of the SSMP.

Currently, the City also utilizes outside CCTV contractors to assess the condition of the City's sewer system, typically through an annual CCTV project.

1.7 CCTV Program Improvements

In 2013, the City identified a need for improvements in the CCTV inspection and R&R program in order to meet their stated goal of completing an initial inspection of the entire system over the next ten years as well as rehabilitating or replacing approximately 2.6 miles (1 percent) of their system each year. The City's previous program was based on meeting reactive needs (e.g. investigating maintenance problems, verifying cleaning results). The City's current program is a more proactive inspection approach in order to support CIP planning and to comprehensively inspect the entire system.

The following items were implemented in 2013 to better align with the City's proactive inspection approach:

- The City now manages all of the CCTV data centrally on a server and provides ready access to the data via a web interface.
- The CCTV inspection program and resulting R&R planning is managed by the Public Works Engineering Division.
- CCTV work scheduling was incorporated into Cartegraph OMS. This process is needed to track year-to-year CCTV work and to determine the upcoming inspection schedule.
- Reactive CCTV inspection to support the sewer cleaning and operations program is still performed by the in-house CCTV crew.
- Improvements have been made to track CCTV work and maintain document control for regulators.

With the changes in the structure of the Wastewater Collection System Organization and the addition of the CCTV Planner/Scheduler and CIP Project Coordinator, changes were made in 2017 to further enhance the CCTV and R&R program. The following items summarize the changes to the CCTV and R&R program:

- The CCTV Planner/Scheduler uses Cartegraph OMS to properly schedule and assign CCTV Inspection tasks to the Field Crew assigned to the CCTV van.
- Staff uses Cartegraph OMS to digitally transfer and track work assignments, prepare reports, and reschedule next inspections based on PACP score.
- With the addition of the CCTV/Planner Scheduler and CIP Coordinator positions and their close working relationship, Wastewater staff resumed the role of developing the list of pipes for the annual Repair, Rehabilitation and Replacement CIP projects. Once the project is scoped, the list is compiled and documented in Cartegraph OMS through Work Orders and then transferred to the Engineering Division for design and construction.
- Operation and Maintenance Projects (Cleaning, CCTV, Root Foaming, etc.) are also being tracked through Work Orders and then assigned to the appropriate WCS program owner for execution.
- Cartegraph OMS has been proposed to be deployed to contractors to share more operational information when completing CCTV and repair, rehabilitation and replacement tasks. It is the goal of the City to have contractors complete the tasks assigned to the contractor directly in OMS, followed by City staff reviewing and documenting QA/QC in the Cartegraph OMS task.

Section 2: CCTV Inspection Process

2.1 Introduction

CCTV inspection is a common technology used for condition assessment of wastewater collection system gravity pipes. In 1999, the American Society of Civil Engineers (ASCE) and the U.S. Environmental Protection Agency (USEPA) produced a report entitled “Optimization of Collection System Maintenance Frequencies and System Performance,” whose goal was to develop an optimized approach for collection system maintenance. This report included the results of a national survey of 42 wastewater agencies on various wastewater collection maintenance practices and performance parameters. In this report, CCTV inspection was identified as the most important collection system inspection tool, and the fourth most important operation and maintenance activity behind cleaning, pump station service and mainline rehabilitation.

The City has developed a more proactive, system-wide CCTV inspection approach to support CIP. System-wide CCTV inspection programs can take a variety of forms. Some agencies approach the task systematically by regularly inspecting their system in logical geographic components (i.e. sewer basin or atlas map page). Other agencies use risk-based approaches, with varying inspection frequencies for different parts of the system depending on an asset’s criticality (likelihood and consequence of failure). This plan has incorporated the benefits of each of these programs so the City’s plan is risk-based, while remaining systematic and cost-effective.

2.2 Inspection Frequency Benchmarking

The ASCE/USEPA report survey discussed above identified that CCTV inspection frequencies vary widely throughout the country, with some agencies inspecting their entire system every five years, while most agencies had inspected less than half of their systems in the previous 20 years.

Another recent USEPA White Paper entitled “Condition Assessment of Wastewater Collection Systems,” discusses a risk-based decision-making processes that can be used to prioritize condition assessment. The report summarizes a number of models and tools available, one of which is a relatively simple matrix approach to establish varying inspection frequencies based on asset risk. In this example, inspection frequencies range from two to 25 years depending on the asset’s condition and its consequence of failure.

A 2004 Water Environment Research Foundation (WERF) study entitled “Development of a Tool to Prioritize Sewer Inspections” also supports the risk-based decision making process.

In general, a ten-year system-wide inspection program is sufficient for inspecting all gravity pipes to identify and address structural or operational problems for utilities that already have an investigative CCTV program in place. As experience dictates, some pipes may require more frequent inspection due to the likelihood or consequence of their failure. For some pipes, the frequency may be longer than ten years. For this reason, a risk-based approach is considered appropriate to identify the inspection frequency of each collection system pipe.

2.3 Current Approach

The current process and prioritization of the City’s system-wide CCTV inspection is based on a risk assessment on each pipe in the City’s service area. Pipes with a high criticality rating are inspected first. After the high priority pipes have been inspected, sewer basins are prioritized for more efficient inspections based on the average pipe criticality rating. Following the initial inspection and assessment, a new inspection priority and schedule is established based on the pipe’s condition (likelihood of failure) and the impacts if the pipe were to fail (consequence of failure).

In addition to the system-wide program, the City has a full-time CCTV inspection crew that supports sewer cleaning and operations. This crew inspects pipes as needed and is not on a permanent schedule. However the City CCTV crew performs their inspections using the same process and defect coding standards that are used in the system-wide program. Therefore, these inspection results are also incorporated into system-wide program to increase efficiency and eliminate duplicate inspections.

The current process relies on the concepts established in the USEPA and WERF documents, while relying on condition assessment data and attribute data within the City's existing GIS and Cartegraph OMS system.

2.4 Initial Inspection Prioritization

The current work flow to develop the initial inspection prioritization is shown in Figure 2-1. In order to develop the prioritized inspection program, each pipe must be assigned an overall criticality rating. The rating is calculated by multiplying the pipe's likelihood of failure (LOF) rating by its consequence of failure (COF) rating.

2.4.1 Risk Assessment Process

The risk assessment process utilizes existing attribute data within the City's GIS and CMMS to assign an LOF and COF for each pipe. Each pipe's LOF or COF rating will be determined using the highest LOF or COF score (unless the pipe has been rehabilitated in the past ten years or CCTV inspected in the past five years, in which case the rating will be one). Pipes that have a criticality rating greater than or equal to 16 are considered the most critical pipes and will be inspected first. Pipes with a criticality rating of less the 16 are considered lower priority and their inspection will be systematic as part of a basin-wide inspection plan. Basins will be prioritized using the average criticality rating for the remaining uninspected pipes within that basin.

The LOF/COF ratings are determined from attribute information within the City's GIS and CMMS. The ratings are as follows:

Likelihood of Failure

- LOF Rating 5: Pipe with high maintenance or SSO history.
- LOF Rating 4: Pipe constructed prior to 1965; pipe material is unlined concrete.
- LOF Rating 3: Pipe diameter is 6-inches in diameter or less.
- LOF Rating 2: Pipe is within a basin identified with high I/I.
- LOF Rating 1: Comprehensive pipe rehabilitation or replacement in the past ten years; pipe inspected in the past five years; all other pipes.

Consequence of Failure

- COF Rating 5: Pipe is located in a sensitive environmental area or area with public health concerns. This includes the coastal zone, or proximity to a stream, storm drain or other receiving water.
- COF Rating 4: Pipe carries high flow volumes ($\geq$ 15 inches in diameter), inverted siphons and creek crossings.
- COF Rating 3: Pipe is located in a high traffic area or an area where service disruption could be problematic (proximity to a school, hospital, fire station, tourist area, freeway or railroad crossing).
- COF Rating 2: Pipe with poor access (easement sewer).
- COF Rating 1: All other pipes.

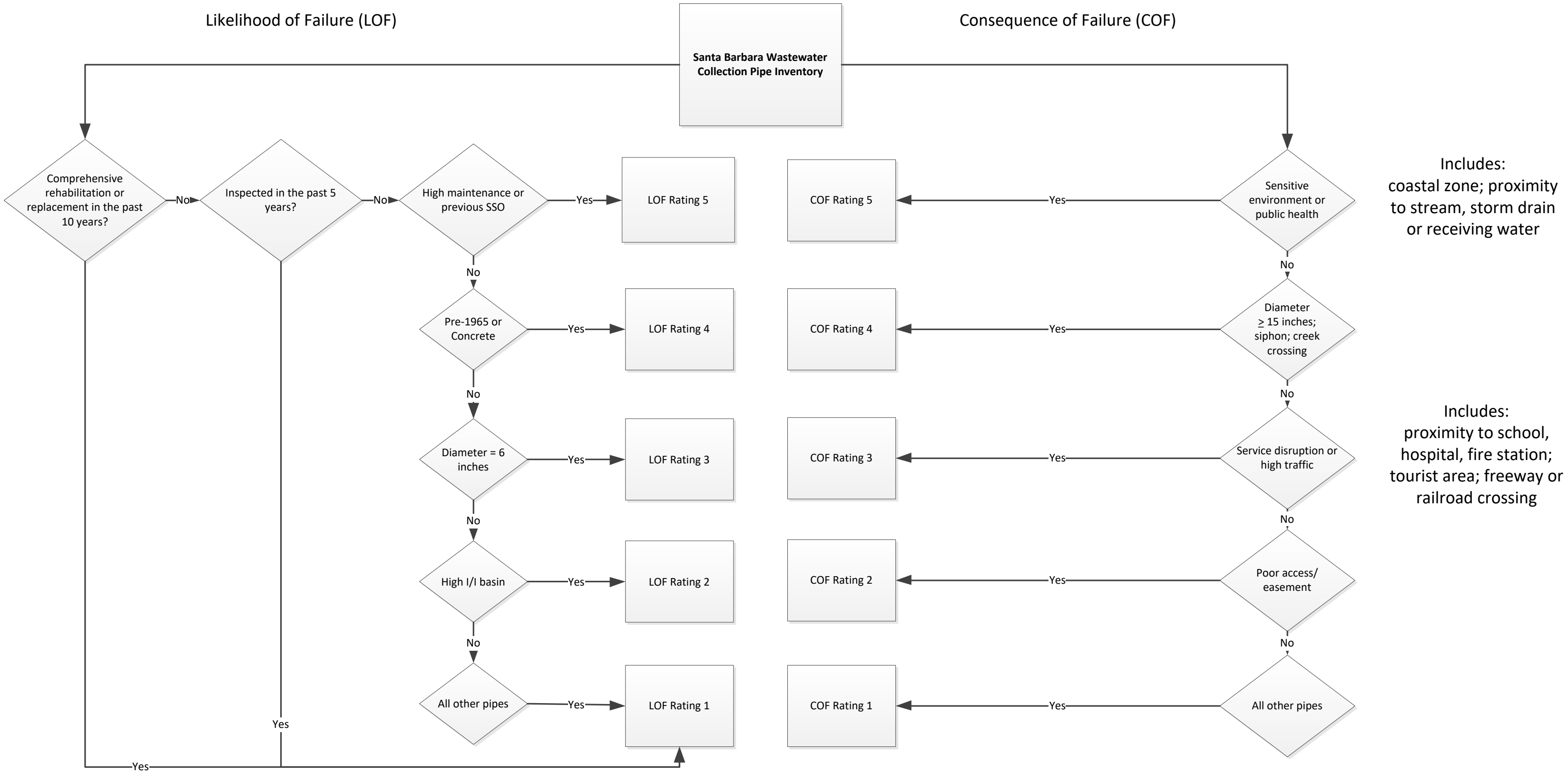
Detailed procedures used for assigning COF and initial LOF values are provided in Appendix A.

2.4.2 Inspection Schedule

The risk assessment prioritization process resulted in establishing an initial inspection date for each pipe segment.Based on these initial inspection dates the City began implementing processes to achieve the goal of inspecting every pipe within the next 10 years.

Figure 2-1 below outlines how pipes were prioritized into Priority 1 and Priority 2. The Priority 1 and Priority 2 CCTV inspection schedules are presented in Appendix A. Priority 1 pipes were inspected during Calendar Years 1 through 4 of the program. Priority 2 pipes were planned to be inspected during Calendar Years 4 through 10 of the 10-year program. These inspections, based on the risk assessment prioritization process described above, were coordinated with the City's Exfiltration Abatement Program. The Exfiltration Abatement Program includes a separate CCTV inspection plan for High Risk Pipes. All High Risk pipes were inspected to address the City's Exfiltration Abatement Program.

The City is still working through inspecting all pipes within the 10-year inspection program, while balancing reinspections necessary to monitor the condition of the previously inspected pipe. Further details regarding the use of the CMMS for planning inspections and recording results can be found in Section 4.



Risk Score = LOF Rating x COF Rating

Risk Score ≥16: Include in Priority 1 Inspection List

Remaining pipes will be inspected by basin with the highest average basin risk score inspected first.

Figure 2-1. Risk-Based Prioritization for Initial CCTV Inspection

2.5 Inspection Frequency Change

Following the initial inspection, pipes are assigned a new inspection frequency based on the NASSCO PACP© structural condition rating determined during the initial inspection and the COF rating. This process is modeled after the Condition Assessment Matrix process described in the USEPA White Paper “Condition Assessment of Wastewater Collection Systems.” The process is presented below in Table 2-1 and in the R&R Work Plan in Section 3. Please note that pipes receiving structural ratings of 4 or 5 will be included in the capital improvement program for rehabilitation or replacement as budget allows or be reinspected to monitor the structural condition.

Beginning in January 2018, the City finished its transition to its new CMMS, Cartegraph OMS. The new system uses a tool called the Preventative Maintenance tool which uses the most recent Structural PACP Quick Score and COF to assign the pipe to a Preventative Maintenance Plan. Using the last CCTV Inspection task’s Actual Start Date, the Plan generates a new CCTV Inspection Task with an Estimated Start Date and a “Projected” status. Once the Estimated Start Date occurs, a Due Date is assigned for 6 months after the Estimated Start Date.

Table 2-1 below shows how the Preventative Maintenance tool in Cartegraph OMS is being used by the City to properly reschedule its CCTV inspections. To simplify the logic, the more conservative or shorter inspection frequency was programmed into the Preventative Maintenance tool in Cartegraph OMS...

Table 2-1. Inspection Frequency Following the Initial Inspection

NASSCO PACP© Structural Rating	COF Rating	Estimated Start Date in Cartegraph OMS (after last CCTV Inspection tasks Actual Start Date)	Due Date in Cartegraph OMS
5	1 to 5	18 months	24 months
4	1 to 5	42 months	48 months
3	1 to 5	54 months	60 months
1 to 2	3 to 5	54months	60 months
	1 to 2	114 months	120 months
0	1 to 5	114 months	120 months

Section 3: Repair, Rehabilitation and Replacement Program

3.1 Introduction

It is the City's goal to rehabilitate or replace a minimum of one percent of its wastewater collection system per year. In order to accomplish this task, a process must ensue to evaluate the CCTV inspection data and, if necessary, make recommendations for repair, rehabilitation, and/or replacement. This section will describe the process to prioritize potential pipes for rehabilitation using NASSCO PACP© algorithms and to incorporate other information such as repair and cleaning history for developing an overall CIP. The City's Public Works Engineering Division uses this information to design capital projects. A standard workflow process is presented in Figure 3-1 that shows the CIP process including Engineering and Collection System roles in the data collection and analysis.

Though not all collection system agencies have proactive CCTV inspection programs, those that do typically have active programs to assess the data they collect and make recommendations for improvements. One common problem that occurs when agencies embark on a more proactive inspection program is how to manage the vast amounts of newly collected data. Often, due to the large amounts of data, this work is outsourced to consultants although some organizations can effectively manage the task using in-house resources.

The Wastewater Collection Group, along with contractor support through CCTV projects, performs the inspection tasks, stores the CCTV data in the centralized repository and Cartegraph OMS, runs an analysis through InfoMaster and provides a list of pipes requiring Engineering Division staff's review for the design of wastewater CIP projects.

3.2 Current Approach for R&R Programming

Typical approaches for R&R programs include evaluation of data and information from a number of different sources, including:

- CCTV and other inspections;
- Operations and maintenance information (areas with roots, grease and or sags that require frequent cleaning);
- Flow monitoring data (high infiltration and inflow (I/I) levels);
- Capacity issues from Master Plan
- Known access issues (difficult to access sewers; easement lines); and
- Other factors (exfiltration, etc.).

The R&R process described in this report will primarily address structural and maintenance defects identified through CCTV inspections. However, some of these other issues and data sources will be incorporated and discussed in the capital improvement planning process.

The current approach includes several steps. This work flow is presented in Figure 3-1. The process is divided into four distinct components:

- CCTV Inspection Quality Assurance;
- CCTV inspection Initial Data Screening;
- Maintenance Review
- Repair/Renewal Prioritization using InfoMaster
- Engineering Review

These components are discussed in more detail in the following sections.

3.2.1 CCTV Inspection Quality Assurance

Once CCTV data is collected, the Wastewater Planner/Scheduler is responsible for performing a quality assurance (QA) review to check a percentage of the pipe data for accuracy. This process is necessary to confirm that the City and/or contracted inspection crews are rating the identified defects according to NASSCO PACP© standards. If needed, revisions can be made to the inspection database prior to performing the initial data screening. If high defect coding error rates become problematic, the City should consider retraining inspectors.

System-wide CCTV inspections are managed as projects each year. Each project utilizes a CCTV contractor to inspect a group of pipes. For each inspection project, the following process is helpful for performing QA reviews and assuring that the final deliverable meets the City's needs. It is beneficial to the contractor (or City staff) performing the work if they know this process prior to initiating work.

1. Following the first week of inspections, the City reviews 100 percent of the work completed to date. The QA review verifies that asset ID and file naming standards are consistent and as specified in the contract, the defect coding is consistent with NASSCO PACP© standards and that the video is good quality. The City provides written feedback to the inspector in a timely fashion so future inspections can be adjusted if needed.
2. As work progresses, the City requests that periodic submittals be provided (approximately weekly deliverables) so the City can continue to monitor the work. For these submittals, the City reviews the inspection information for the same qualities as the initial submittal. The City provides written feedback as reviews are made so that adjustments can be made for the final submittal.
3. The City's contract manager (generally the CCTV Planner/Scheduler) maintains a list of deliverables which failed to be coded correctly. Prior to completion of the project, the contractor is expected to resolve and resubmit all incorrect CCTV inspections, both video and PACP data. Following the complete data submittal at the conclusion of the work, the City reviews the CCTV data as specified in the work plan and notifies the contractor if any anomalies are identified that were missed during the initial and subsequent QA reviews.
4. Cartegraph OMS stores the QAQC information for each CCTV Inspection task. The person's initials, the date of review and any notes regarding the QA/QC performed are noted in the QA/QC By, QA/QC Date and QA/QC Comment fields, respectively.

3.2.2 CCTV Inspection Initial Data Screening and Structural Review

After the CCTV inspection has been completed and saved on the van, the WCS inspection crew records the work has been completed in Cartegraph OMS. The data that is required to be recorded in the CCTV inspection task includes Inspection Date, Inspector, Direction of Survey, PACP Quick Structural Rating, PACP Quick Maintenance Rating, and PACP Quick Overall Rating.

Depending on the results of the inspection, if the Wastewater Collection System Inspection Crew encounters any "worst" defect criteria as outlined below, Cartegraph OMS immediately notifies the appropriate wastewater collection staff in the Maintenance, FOG, SLIP, CCTV or R&R programs via email with a link to the inspection form.

Once the CCTV results are coded into the CCTV database, they are reviewed by the Wastewater Planner Scheduler/ CIP Project Coordinator. The CCTV results are typically reviewed through a web page configured to retrieve the data from the centralized database. This web page provides standard search tools that enable the user to quickly identify and retrieve the desired results based on the pipe ID. Once screening is completed, a defect report will be run in Cartegraph that identifies all pipes meeting the following "worst defect" criteria:

- Maintenance: Worst Defect Score 4 or 5 (From the O&M Quick Rating). Worst Defect Score 3 plus an O&M Pipe Rating Score >9.
- Structural: Worst Defect Score 4 or 5 (From the Structural Quick Rating). Worst Defect Score 3 plus a Structural Pipe Rating Score >9.

While the Wastewater Planner/Scheduler is performing QA/QC, inspections meeting the "worst defect" criteria are reviewed for future maintenance or repair needs, including whether immediate failure is likely. Urgent repairs where immediate failure is likely are immediately referred to the CIP Project Coordinator for resolution. For pipes with high structural scores which are not at risk of immediate failure, Section 3.2.4 below describes the workflow.

3.2.3 Maintenance Review

For Contract work, pipes are cleaned prior to inspections so CCTV inspections rarely identify any urgent maintenance needs. For WCS inspection crews, maintenance defect codes are evaluated along with the last date cleaned in order to determine if immediately follow-up maintenance is warranted.

The maintenance and cleaning history for each specific line segment is evaluated to determine if a capital project is justified to reduce the maintenance requirements. . If a project is not justified for short-term CIP, the City will continue to clean the line as described in the Cleaning Plan. The Wastewater Planner/Scheduler or the WCS Superintendent determines if any adjustments are needed in the current cleaning frequency. These adjustments are then updated in Cartegraph OMS.

CCTV inspection results are also used by WCS staff to identify laterals needing repairs. When maintenance issues with laterals are encountered, the WCS staff member identifying the issue will create a SLIP Case in Cartegraph OMS and assign it to the SLIP Coordinator for his/her review.

3.2.4 Repair/Renewal Prioritization

If WCS staff evaluation determines repairs are needed, the Wastewater CIP Coordinator prioritizes the repairs (in conjunction with the maintenance information above) using a decision logic in Infomaster software by Innovyze. Infomaster is a tool that is used as part of the overall pipe renewal decision-making workflow process. A decision logic in Infomaster leverages CCTV inspections, PACP quick repair scores, and other readily available utility data for gravity sewers in order to recommend a repair, rehabilitation, replacement, or condition assessment action. The tool determines the best course of action for pipe renewal (Appendix B) by outputting pipes into one of four repair categories:

- Priority 1 (Emergency Repair; Risk of SSO): Repair as soon as possible (2 hour/24 hour/ 21 day responses);
- Priority 2 (Severe Defect and/or COF Pipe Score of 3, 4 or 5):
    - If budget and timing allows, repair next FY project; or
    - Add to short term (<5 year) capital repair project lists.
- Priority 3 (Moderate Defect and/or COF Pipe Score of 1 or 2): Attempt to repair next five years; and
- Priority 4 (High maintenance): Repair at City's discretion; continue high maintenance frequency until repair is made.

Priority 1 emergency repairs are performed within 2 hours, 24 hours, or 21 days to mitigate the risk of SSO. Priority 2, 3 and 4 projects are evaluated annually as part of the CIP process. For Priority 4 projects, a business case evaluation may be appropriate to determine if it is more cost-effective to clean the pipe (at a high frequency) rather than repair it. The repair prioritization process presented herein is consistent with the requirements stated in Exhibit A of the City's Consent Decree. A copy of the Consent Decree Exhibit A is included in Appendix B of this report.

The Infomaster tool can be used to coordinate CIP projects with other projects such as street paving under the Streets Operations and Infrastructure Division or bridge construction under the Engineering Division. By prioritizing a pipe's repair or renewal needs, Infomaster can determine if a pipe that is on or near the construction site of the proposed project can be renewed in conjunction with the project.

3.2.5 Engineering Review and Design

Once Infomaster tool has prioritized sewer mains for renewal, the Engineering Division is provided a list to review and develop a project. Project Engineers within the Division will review PACP scores, condition including the severity of any defects and location to schedule it for a future capital improvement program project.

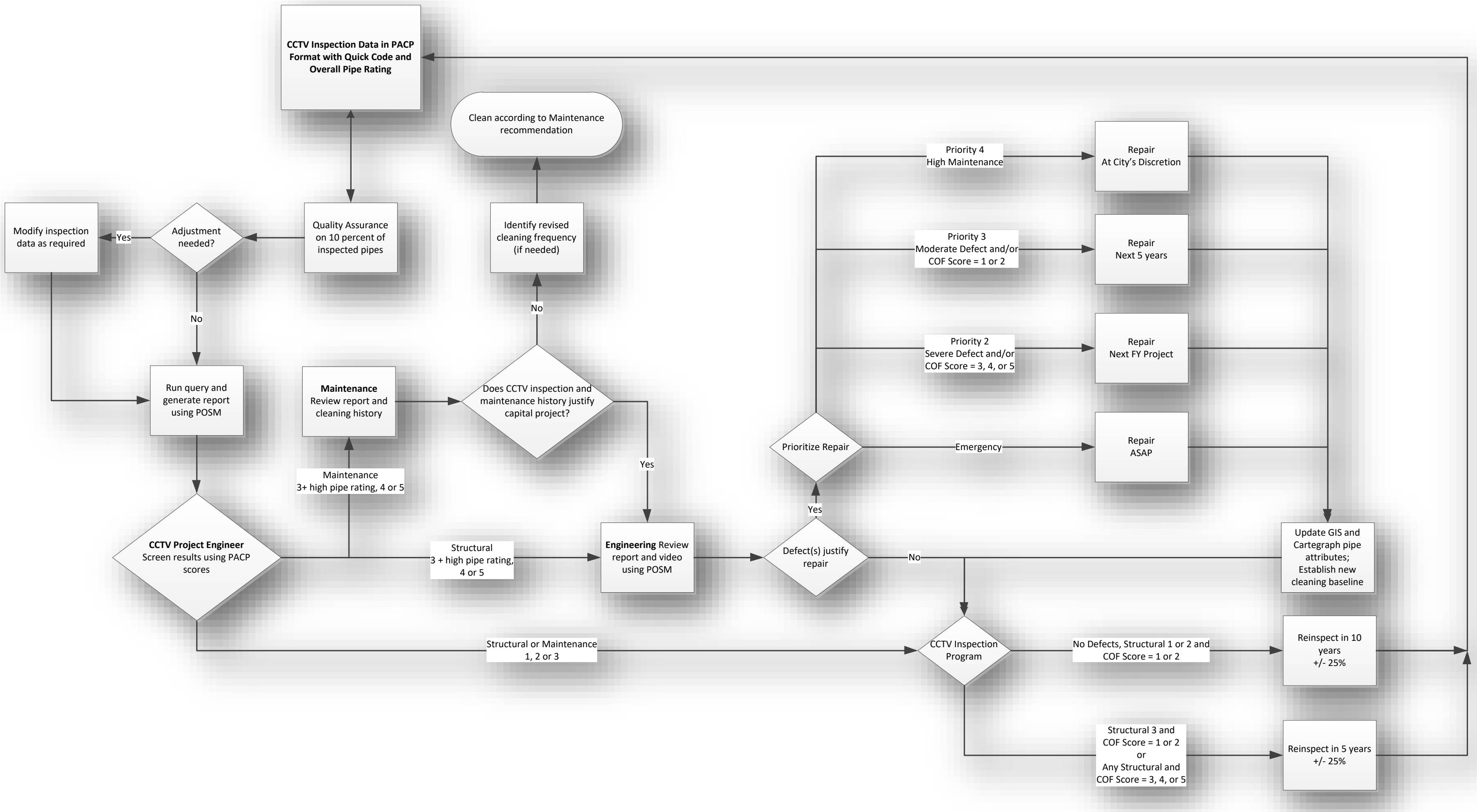


Figure 3-1. Rehabilitation and Replacement Work Plan

3.3 Capital Improvement Program Planning

Capital improvement program planning is the process that occurs when information from all available sources is evaluated and compared to develop logical capital projects that can be completed within the City's annual budget constraints. Recommendations from the CCTV evaluations are considered as well as other system needs such as hydraulic capacity projects, I/I reduction projects, maintenance projects, sewer access improvement projects, and other projects or drivers that may be important to the City (i.e. sewer exfiltration to storm drains or coordination with street overlay program).

GIS and Cartegraph OMS are valuable tools for this planning process as it is helpful to lay out the projects visually. Cartegraph OMS Work Orders are used to associate all repair, rehabilitation or replacement tasks and group them into future fiscal year CIP projects. For example, individual projects can be aggregated geographically into single (larger) projects to take advantage of capital and/or social cost savings for the City. Because this process must consider intangible factors such as social concerns and political issues, each set of projects must be evaluated and prioritized qualitatively as well as quantitatively. Once projects have been identified, preliminary budgets and engineering/construction schedules will be developed to funnel appropriate information into the City's overall CIP process. An overall schematic of this process is illustrated in Figure 3-2.

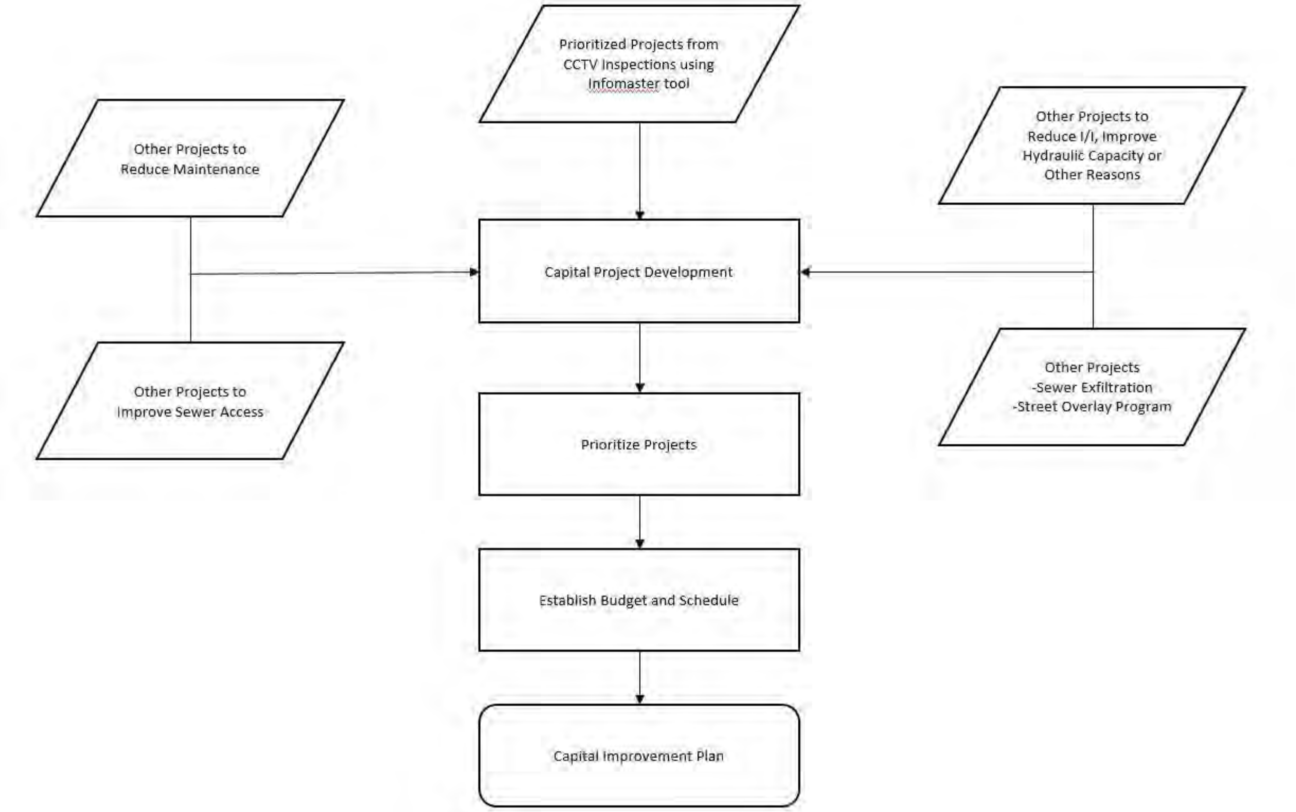


Figure 3-2. Capital Improvement Planning Work Plan

Section 4: Technical Configuration

4.1 Overview

This section describes technology configuration and related workflows that are needed to support the CCTV and R&R programs described in Sections 2 and 3. The goal of the CCTV program is to inspect the entire gravity system in the next 10 years. These inspections will be managed by the Wastewater Planner/Scheduler and performed by CCTV Contractors and City inspection crews. The City's GIS, CMMS, and CCTV inspection systems will be configured to support the following activities to facilitate inspections and plan rehabilitation:

- Planning, Scheduling and managing CCTV inspections;
- Accurately capturing and storing pipe defect data and CCTV inspection data to support R&R planning and operations and maintenance;
- Appropriately scheduling and balancing CCTV workload in Cartegraph OMS ; and
- Monitoring to ensure the CCTV program is operating effectively, supporting the elimination of SSOs, and that the program is successfully achieving its goals.

The roles and descriptions as they specifically pertain to the CCTV program and the conceptual CCTV & RR Program are:

- Wastewater System Manager – Responsible for overall implementation of the cleaning and inspection program.
- Wastewater Collection System Superintendent – – Directly responsible for managing the inspection program and directing wastewater collection system resources.
- Principal Engineer – Manages the Public Works Engineering Staff.
- Supervising Engineer – Responsible for supervising Engineering staff.
- Wastewater Planner Scheduler (CCTV) – Manages the CCTV inspection workload for projects and contractors, produces CCTV inspection work assignments and schedules in Cartegraph OMS.
- Wastewater Capital Improvement Program (CIP) Project Coordinator – Responsible for planning and coordinating all capital work with other City departments to ensure projects are executed successfully and updating wastewater maintenance and assets records. Manages various maintenance contractors and supports operations and maintenance staff when responding to emergencies.
- Wastewater Sewer Lateral Inspection Program (SLIP) Project Coordinator - Initiates SLIP cases, prepares correspondence with commercial and residential property owners, and updates tasks and attributes in Cartegraph OMS.
- CCTV City and Contract Operators – Conducts CCTV inspections and records the defects observed in a PACP© database and enters the findings in Cartegraph OMS.
- Maintenance Operator – Performs cleaning and other maintenance activities. Maintenance operators typically originate CCTV requests and may create and assign CCTV Inspection tasks in Cartegraph OMS to address maintenance issues.

4.2 Overview

The overall CCTV inspection process is:

1. Request or Scheduled CCTV Inspections – Inspections requests or scheduled CCTV inspection tasks are stored in the City's Cartegraph OMS database and a list is generated by the CCTV Planner/Scheduler. The CCTV Planner/Scheduler produces, plans and schedules CCTV inspection work in Cartegraph OMS and assigns tasks to the CCTV City or Contract Operators. For CCTV contracts, the scope of work will be dependent on the CCTV workload, balancing inspection frequency with new inspections.
2. Perform CCTV inspection – The CCTV City and Contract Operators perform the inspections, captures the video and records defects or other observations encountered during the video review. This data is stored in a PACP© database on the inspection vehicle. City and Contract CCTV Operators use Industry standard Inspection software to perform inspections and provide a PACP© compliant defect database that can be successfully loaded into the City's current CCTV server software. Lastly, the City Inspection Crew or Contract CCTV Operator completes the task in Cartegraph OMS, ensuring that the PACP Scores, Inspection Date (Actual Stop Date) and any follow-up issues are entered in the inspection form.
3. Import CCTV results – Once the inspection is completed, the defect database and videos will be loaded onto the City's current Cloud Server, which is the repository for all CCTV data collected for Santa Barbara. This data is initially screened and QA/QC'd by the City's CCTV Wastewater Planner/Scheduler who will pass on any urgent repair actions to the CIP Project Coordinator and any urgent maintenance actions to the Wastewater CIP Coordinator, Wastewater Collection Supervisor or Wastewater Collection Lead Operator.
4. Monitor CCTV programs – The Wastewater Collection System Superintendent and, the CCTV Wastewater Planner/Scheduler will generate reports from the Cartegraph, GIS, and CCTV systems to ensure that the programs are progressing as planned.
5. Reschedule CCTV Inspections – Once the data from the initial inspection has been entered into Cartegraph OMS, the Preventative Maintenance tool will reschedule a future inspection based of the CCTV Inspection task's PACP Structural Score and COF score. The CCTV Planner/Scheduler will then do the QA/QC and correct any coding in ITPipes if need be and also correct the data in Cartegraph OMS. When the data is entered or corrected, the Preventive Maintenance tool will adjust the schedule for future inspections. The rescheduling is determined according to the decision logic described in Section 2, above.

The CCTV process is supported by the Cartegraph OMS, and the City's current Cloud Server. These systems work together to support the activities described. In order for these systems to work in conjunction with one another, it is essential that the asset IDs (pipe ID or manhole ID) are consistent from one system to the next. This facilitates the integration between the inspection results, GIS mapping, and maintenance management activities which enables the City to more effectively plan and implement the CCTV inspection, cleaning, and R&R programs.

Figure 4-1 is a conceptual model that shows how City staff and computer systems interact to support the CCTV and R&R programs. The systems work together to enable the City to manage, collect, store, and evaluate CCTV video and defect data in a central, accessible location.

4.3 Technology Systems

The following computer systems are used to support CCTV inspections.

4.3.1 ITPipes Mobile CCTV Software

ITPipesMobile is the CCTV inspection software installed on the CCTV laptop used by the City for investigative inspections. This software is used to record video and code to PACP© standards to produce a PACP©-database.

4.3.2 ITPipes Cloud Server

The City implemented ITPipes Cloud Server to store CCTV data for all collection system inspections. All CCTV inspection results, whether generated by a contractor or by the City CCTV crew, are stored on this system. It allows users to access its data over the web in order to view CCTV videos, export inspection data, search for assets, etc. To ensure CCTV Inspection data captured by Contractors can be uploaded into ITPipes's cloud-based CCTV server, the City requires Contractors to use any CCTV software that exports as a NASSCO PACP Exchange database.

4.3.3 Cartegraph OMS

Cartegraph OMS is used throughout multiple divisions within the Public Works Department City as a work management system to plan, schedule, manage and track maintenance and repair activities for much of the City's facilities and infrastructure. For the WCS group, this web-based software was implemented at the beginning of 2018 and it allows the CMMS to be deployed using tablets or laptops to allow staff to complete the work and document the findings directly in the Cartegraph OMS.

Cartegraph OMS is used to schedule CCTV inspections, manage the CCTV program workload, record inspection results, and maintain maintenance and inspection histories for each pipe and manhole.

4.3.4 ArcGIS

ArcGIS is the City's geographic information system. It is used throughout the City to spatially manage, analyze, and display information using maps. The WCS layers consist of sewer mains (Private and Public), sewer structures (private and Public), sewer laterals, food service establishments, easements, and lift stations.

Cartegraph OMS references a Wastewater copy of the sewer mains, sewer structures and sewer lateral layers for its mapping feature. Map updates made in Cartegraph OMS are noted in the Wastewater copy of each layer. Periodically, ISD staff will review the proposed changes and after they are accepted, will updated the SDE Default database layers that they manage. Once these changes are accepted, the layer is refreshed and shared throughout the City with other stakeholders.

4.4 System-Wide CCTV Inspection Program

This section discusses the detailed work flows that describe how the technology systems will be used to support the system-wide CCTV inspection and R&R planning programs. The overall workflow is shown in Figure 4-1.

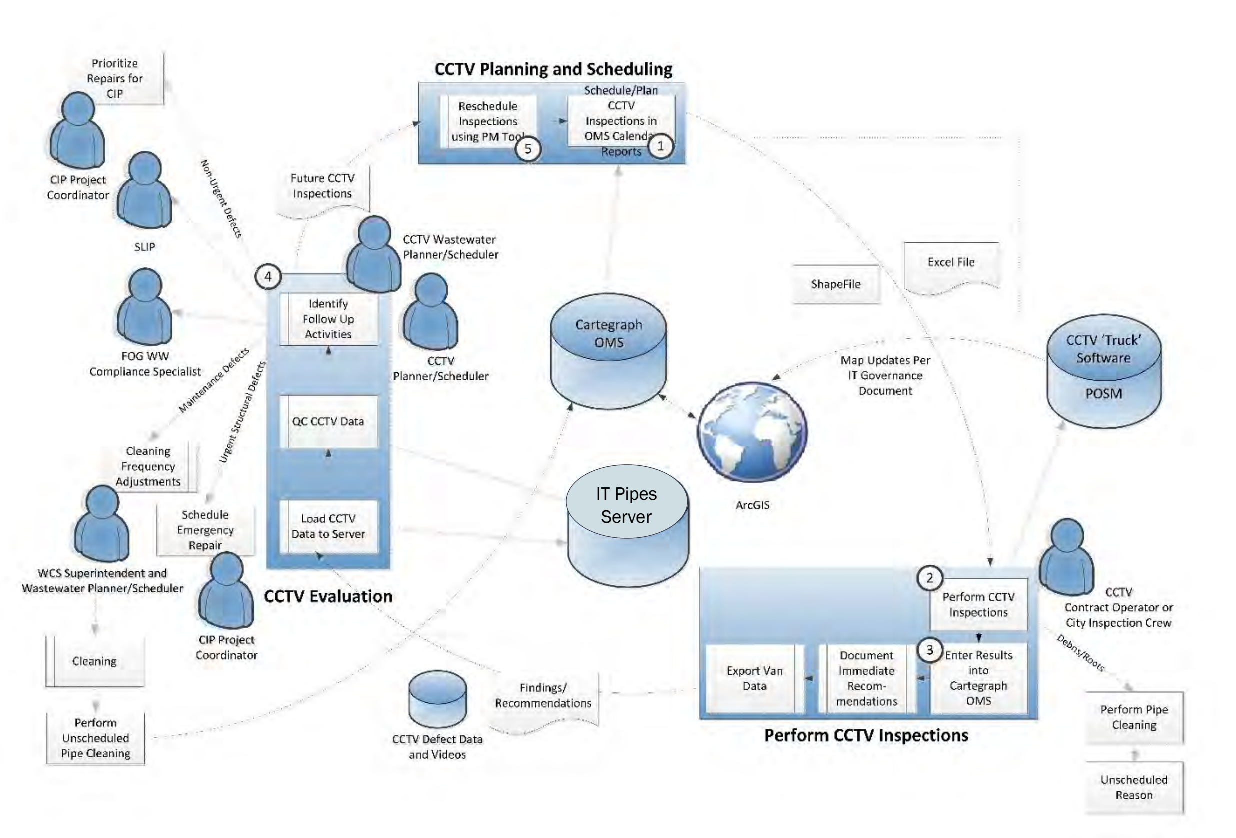


Figure 4-1. Overall System-wide Inspection Workflow

Each number in the figure corresponds to the following workflow steps:

1. CCTV Planning and Scheduling: Using filters based on the Estimated Start Date and Due Date fields to help prioritize inspections, the CCTV Planner/Scheduler plans CCTV Inspection tasks and assigns the upcoming tasks in Cartegraph OMS to either the CCTV Inspection Crew or Contractor.

2. & 3. Perform CCTV Inspections: The CCTV City and Contractor Operators work off the scheduled tasks assigned to them in Cartegraph OMS to perform the assigned CCTV Inspections. Inspection results (i.e. overall inspection findings, planned repairs, update cleaning activities, etc.) are entered into Cartegraph by the City and Contractor Operators. CC. In some cases, the inspection will identify maintenance or cleaning needs and the CCTV Operator will notify the Wastewater Collection Lead Operator or WCS Supervisor that a field crew needs to be deployed to clean the main. Periodically, the PACP inspection data and video will be exported onto a hard drive from the capture system on the vehicle by the operator.

4. CCTV Evaluation: The CCTV Planner/Scheduler or Operator loads the CCTV data into the centralized CCTV Server database. Once there, the CCTV Planner Scheduler performs QA/QC of the most recently uploaded inspections provided by the CCTV City and Contractor Operators and identifies follow-up activities. Urgent structural issues are forwarded to the CIP Project Coordinator or WCS

Superintendent for immediate action. The Wastewater Planner/Scheduler or Wastewater Collection Superintendent will also review the results to identify any necessary changes in cleaning frequency needed based on the City's or Contractor's cleaning and inspection results.

5. CCTV Planning and Scheduling: Each pipe is rescheduled by the Preventative Maintenance tool in Cartegraph OMS. A new CCTV Inspection task in the "Projected" status is created and the process is repeated beginning again at step No. 1.

This overall workflow is described in more detail below.

4.4.1 Perform CCTV Inspection

The overall objective of the Perform CCTV Inspection process is to conduct the field inspection and evaluate the data for quality control, and to make recommendations and provide the results. Figure 4-1 above shows the detailed workflow. The workflow steps are numbered and described below.

1. CCTV City and Contractor Operators receives the CCTV Work task assigned to them in Cartegraph OMS.
2. The CCTV Operator performs an inspection for each pipe that is assigned to them. If the inspection cannot be performed because of debris or other blockage, the pipe will be cleaned by City staff or by contractor.
    a. The inspection is performed and the defects are recorded using ITPipes software.
    b. The CCTV Inspection task is updated and completed in Cartegraph OMS. The Operator fills in the following fields directly into Cartegraph OMS in the field:
        i. Inspection Date;
        ii. Inspected by;
        iii. Full Name;
        iv. Direction of Survey;
        v. The overall scores for each pipe including: PACP Quick Structural Rating, PACP Quick Maintenance Rating and PACP Quick Overall Rating;
        vi. Any notes or other observations encountered;
        vii. Most Severe Structural Rating; and
        viii. Check boxes for:
            1. Maintenance Follow up
            2. SLIP Follow up
            3. FOG Follow up
            4. Recommend Repair; Recommend Rehabilitate; or Recommend Replace; and
            5. Immediate Failure Likely.
    c. If the main requires immediate attention, the CCTV Operator will contact the Supervisor, Lead, CCTV Planner/Scheduler and CIP Project Coordinator to investigate and schedule follow up activities.
3. The video and defect data is exported onto a hard drive and prepared for upload into the City's centralized CCTV database.
4. When all inspection assignments are completed and entered into Cartegraph OMS the inspection data is available to the CCTV Planner/Scheduler for review.

4.4.2 CCTV Evaluation

Once the inspection is completed and uploaded into the City's centralized CCTV server, the CCTV Planner/Scheduler who evaluates a percentage of the results to assess data quality (discussed in Section 3.2.1). Issues with the data or recommendations are resolved with the CCTV City or Contractor Operators. Final results are loaded into the ITPipes Cloud Server. Based on the inspection data, the CCTV Planner/Scheduler will work with the CIP Project Coordinator and WCS Superintendent to determine the appropriate response. The Wastewater Planner/Scheduler or WCS Superintendent will also review the inspection results for cleaning frequency adjustments for specific pipes. All data will be aggregated in the ITPipes Cloud Server database for CIP planning and evaluation.

The detailed steps are as follows:

1. Either the CCTV Planner/Scheduler or City CCTV Inspection Crew uploads the inspections into the City's centralized CCTV server.
2. The CCTV Planner/Scheduler or CIP Project Coordinator reviews the completed CCTV Inspection tasks as noted in Cartegraph OMS and begins QA/QC process.
3. The CCTV Planner Scheduler will perform a 10 percent quality check of the data entered into Cartegraph OMS to verify that the data was entered correctly and completely. Errors or omissions will be provided to the person entering the inspection data for correction. Checks include:
    a. Verify the Cartegraph OMS data entry is complete and the required fields are accurately filled out;
        i. Verifying correct asset IDs were inspected;
        ii. Ensuring that the video is available and referenced correctly;
        iii. Reviewing the defect codes against the CCTV inspection data in the CCTV server.
4. QA/QC checks to be performed on CCTV Inspections in the centralized CCTV server include:
    a. Video quality meets the City's expectations. Verify that defect codes are applied correctly; and
    b. Ensure that all asset IDs are correctly identified and match up to the IDs assigned to the crew.
5. For Contractor completed inspections:
    a. 100% of the first week's work is reviewed for completeness and accuracy
    b. Minimum of 10% of the inspections submitted after the first week are spot checked for accuracy.
    c. If errors or omissions are found, the data will receive another 10 percent quality check once the initial issues are addressed. This process will continue until no errors are found.
    d. The CCTV Planner/Scheduler or CIP Project Coordinator will track and notify the contractor of any inspections that failed the QA/QC process. The Contractor is required to make the necessary corrections and resubmit the data to the CCTV Planner/Scheduler or CIP Project Coordinator.
6. For City Staff, a minimum of 10% of the work is reviewed by the CCTV Planner/Scheduler. Issues with City Operators coding is communicated back to the CCTV Operator.
7. The CCTV database is filtered to identify pipes with high PACP© scores. The CCTV Planner/Scheduler will coordinate with the Wastewater CIP Project Coordinator and WCS Superintendent to address any urgent repairs and other maintenance activities.
8. Once the inspections are loaded into the CCTV database and QA/QC'd, the information can be used to plan and prioritize non-urgent repairs and other CIP activities.

4.4.3 CCTV Planning and Scheduling

Using a combination of filters and reports in Cartegraph OMS, the CCTV Planner/Scheduler can project the CCTV workload. The Preventative Maintenance tool creates the future "Projected" CCTV Inspection tasks in the system, but the CCTV Planner/Scheduler's role is to ensure the required inspections are scheduled appropriately and assigned to an inspection crew, either a Contractor or the City inspection crew. When CCTV Inspection tasks reach the Estimate Start Date, the task will change from "Projected" to "Planned" status and the Due Date will be assigned (generally three months later). The CCTV Planner/Scheduler will use these dates to prioritize and assign the task to an inspection crew. Once it is assigned to a CCTV Inspection Crew, the CCTV Planner/Scheduler monitors the progress and calendar to ensure that inspections are completed prior to their Due Date.

The detailed steps to complete this workflow are:

1. The CCTV Planner/Scheduler produces a report or filter of CCTV inspection tasks which need to be completed by the Due Date or, if the pipe has not been inspected, in the near future.
2. The CCTV Planner/Scheduler assigns the individual CCTV Inspection tasks in Cartegraph OMS to the City Inspection Crew or to a Contractor for a CCTV project (using a Work Order).
3. The CCTV City and Contract Operators perform the inspections as described in Section 4.3.1.
4. The inspection results are uploaded to the centralized server and reviewed by the CCTV Planner/Scheduler as described in Section 4.3.2.
5. Once the inspection results are verified to meet PACP requirements and are entered into Cartegraph OMS, the Preventative Maintenance tool creates the next CCTV Inspection task in a "Projected" status and the rescheduling is completed. The process will start again at Step No. 1.

4.5 Investigative CCTV Inspections

As discussed earlier, the investigative CCTV program is designed to respond to reactive maintenance needs. If a blockage, surcharge, or SSO occur, the City performs CCTV inspections of associated pipe segments to facilitate diagnosis, planning and decision-making. The process for investigative CCTV inspections is similar to the system-wide CCTV process except for the following:

- CCTV inspections are not scheduled ahead of time in Cartegraph. They are ad-hoc inspection requests resulting from other field activities;
- Inspection requests are submitted directly to the City CCTV Planner/Scheduler by a field crew or another WCS staff member entering a CCTV Inspection task into Cartegraph OMS, assigning it to the CCTV Planner/Scheduler, setting a priority and providing a description of why the CCTV Inspection is necessary in the Description field.
- Inspections are performed by the City CCTV Crew using ITPipes software; and
- Investigative inspections may result in the rescheduling of the inspected pipes in the system-wide cleaning program.
- One line segment upstream of the SSO location, the line segment where the blockage occurred and one additional line segment downstream will undergo CCTV inspection immediately following the SSO event to document the condition of the line segment and determine the actual cause of the SSO.

Regardless of which program is being implemented, all CCTV video and results are managed and stored in the centralized CCTV server. All inspections are evaluated according to NASSCO PACP© specifications. The same quality control processes will be followed in both programs.

4.6 Rehabilitation Planning

This section describes how the City's technology systems support the process for pipe and manhole rehabilitation and replacement. As discussed in Section 3, R&R activities will be largely driven by CCTV inspection results and pipe COF rating for each pipe. Depending upon the defects and issues encountered, necessary rehabilitation and replacement actions may change greatly from year to year. Therefore it is essential that the Engineering Division has access to the most recent CCTV inspection results and defect database.

The City has a centralized CCTV database called ITPipes Cloud Server. This database is integrated with the City GIS system and correlated to Cartegraph OMS by asset ID. This way all critical data necessary for prioritizing R&R activities can be consistently provided and processed according to the criteria described in Section 3. Each of the systems support rehabilitation planning as follows:

CCTV Server – This is the main repository for all defects cataloged during CCTV investigations, whether they originate from the system-wide program, the investigative program, or are special studies (e.g. large diameter pipe). This CCTV database provides standard reports for identifying pipes by each category of defect so that the appropriate activities and priorities can be assigned. The pipes in the CCTV database must have the same identifiers as those in the GIS in order for the systems to share data and work together. To optimally support R&R planning, the CCTV database is capable of integrating with ArcGIS to produce maps showing locations, types, and magnitudes of defects encountered along each pipe.

ArcGIS – ArcGIS contains all of the spatial data for the pipes and manholes and allows other inspection information to be displayed on maps. This system is the primary record for asset IDs; other systems must correlate to GIS in order for the systems to work together. The GIS also contains the criticality ratings for each pipe, including COF, LOF, and total criticality score. This information is essential for ranking and prioritizing R&R actions based on defects observed. Other GIS information, (such as pavement maintenance activities) may also be available to help with prioritization and scheduling.

Cartegraph OMS – The Cartegraph OMS system is used for storing overall CCTV inspection results and recording other maintenance activities. This system has mapping capabilities built into the web-based interface and can display maintenance activities and results on maps. Cartegraph OMS is used as a documentation tool to support and assist in R&R prioritization by showing overall defect issues, providing maintenance history and tracking and grouping repair, rehabilitation, and replacement tasks through Work Orders.

InfoMaster – The City combines data from the three systems above into a prioritization software add-on to ArcGIS called InfoMaster. This tool is used as part of the overall pipe renewal decision-making workflow process. A decision logic in Infomaster leverages CCTV inspections, PACP quick repair scores, and other readily available utility data for gravity sewers in order to recommend a repair, rehabilitation, replacement, or condition assessment action. This tool outputs pipes into one of four repair categories, which are detailed in Section 3.2.4 Repair/Renewal Prioritization.

In addition, the integration of these systems helps support other related rehabilitation activities including:

- Identifying pipes that have been rehabilitated or replaced and re-adjusting upcoming cleaning activities; and
- Schedule new CCTV inspections once R&R activities have been completed.

4.7 Program Management and Performance

The City CCTV programs must be monitored and managed to ensure that the inspections are being implemented properly, that the program is on track to meet the City's CCTV and R&R inspection goals, and to identify changes needed to keep the program performing optimally. The City technology systems will produce reports and maps to support program management and performance. These can be reviewed on a regular basis by Management or in conjunction with the other WCS maintenance programs. Key goals and activities of program management are:

1. Manage the overall progress of the system-wide inspection program (determining if the program is on track for inspecting the entire system) and adjusting resources to meet the program objectives.
2. Review CCTV Inspection data and R&R recommendations to verify appropriate prioritization.
3. Monitor the inspection program to ensure that quality standards are being met.
4. Measure program effectiveness in order to have a better understanding of issues and lessons learned, and to make improvements to the program.

The following are examples of reports that can be provided by Cartegraph OMS and/or ArcGIS to support these goals:

- A report that lists pipes that were scheduled for inspection in the past but have no inspection results;
- Lists of high-priority defects identified each month;
- A standard report that lists pipes that do not have a future inspection date;
- A map that shows planned inspection by year;
- A map that shows inspections completed to date;
- A map that plots critical structural and operational defects observed and historical SSOs;
- A report that shows pipes cleaned during the system-wide inspection program and their cleaning history; and
- A report that shows the completion of maintenance and repair activities resulting from CCTV inspections.

4.8 Quality Control

This section summarizes quality control activities that have been described in the inspection workflows in previous sections. These activities should be implemented consistently regardless of which inspection program is being implemented. These are:

1. Verification of asset IDs: Pipe and manhole IDs must be identical within each of the technology systems in order for them to work together for program effectiveness. The CCTV Operator must verify that they have obtained the correct IDs for the pipes that they will inspect and must use these IDs when recording results. The operator can use a pre-loaded shapefile in the ITPipes Viewer to start a new inspection which reduces the chance for entering an asset ID incorrectly.
2. Cartegraph/Inspection Data QC by the CCTV Wastewater Planner/Scheduler: After the data is loaded into the CCTV server and entered in Cartegraph OMS, it must be checked to verify that it is stored accurately. This is accomplished by spot checking the data against the CCTV Operator results. This check includes verifying the accuracy and completeness of the database, and review of the CCTV video to verify that defect codes are appropriately and consistently applied. This is discussed in Section 4.3.3.
3. Inspection, Maintenance, and R&R QC by WCS Management: The Wastewater System Manager or Superintendent can review maintenance and inspection activities in Cartegraph OMS and monitor pipes with high-priority defect codes to verify that the appropriate cleaning and rehabilitation activities are being completed within the required time periods.
4. Program Level QC: Ensure that the overall inspection program is aligning with WCS objectives by reviewing inspection schedules, R&R activities, and progress.

4.9 CCTV Server Data Management Strategy

In order to effectively manage the large amounts of CCTV data, the City has developed the following strategy to manage the costs of cloud storage with the usefulness of the CCTV inspections:

- CCTV Planner/Scheduler periodically audits the ITPipes CCTV server for sewer mains with multiple PACP CCTV inspections.
- The CCTV Planner/Scheduler will always keep the mains first inspection and most recent inspection. If there are more than two inspections, the second most recent inspection will be kept, but any previous inspections will be removed to free up the storage space on the cloud server.
- Any SSO related inspection data will be stored per the State’s SSO record retention schedule.
- Cartegraph OMS inspection records including PACP condition scores will remain so that there is documentation that the work was completed per the inspection schedule in Section 2.4.2 above.

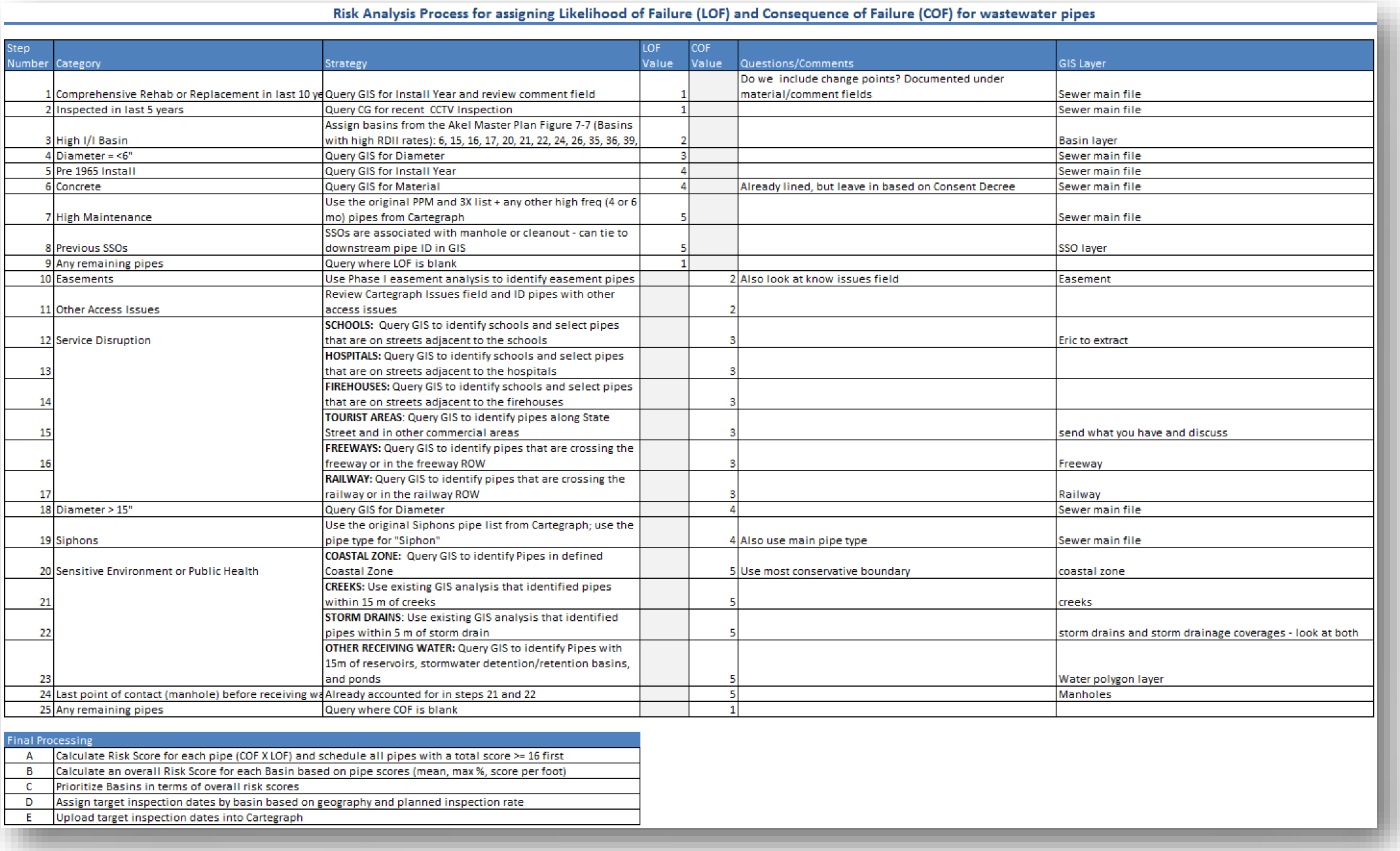
References

Feeney, C.S., Thayer, S., Bonomo, M., Martel, K., White Paper on Condition Assessment of Wastewater Collection Systems, U.S. Environmental Protection Agency, 2009.

Merrill, M.S., Lukas, A., Palmer, R.N., and Hahn, M.A., Development of a Tool to Prioritize Sewer Inspections, Water Environment Research Foundation (WERF), 2004.

Nelson, R.E., Hsuing, P.H., and Witt, A.A., Optimization of Collection System Maintenance Frequencies and System Performance, American Society of Civil Engineers and U.S. Environmental Protection Agency, 1999.

Appendix A: Pipe Risk Assessment Procedures and Inspection Schedule



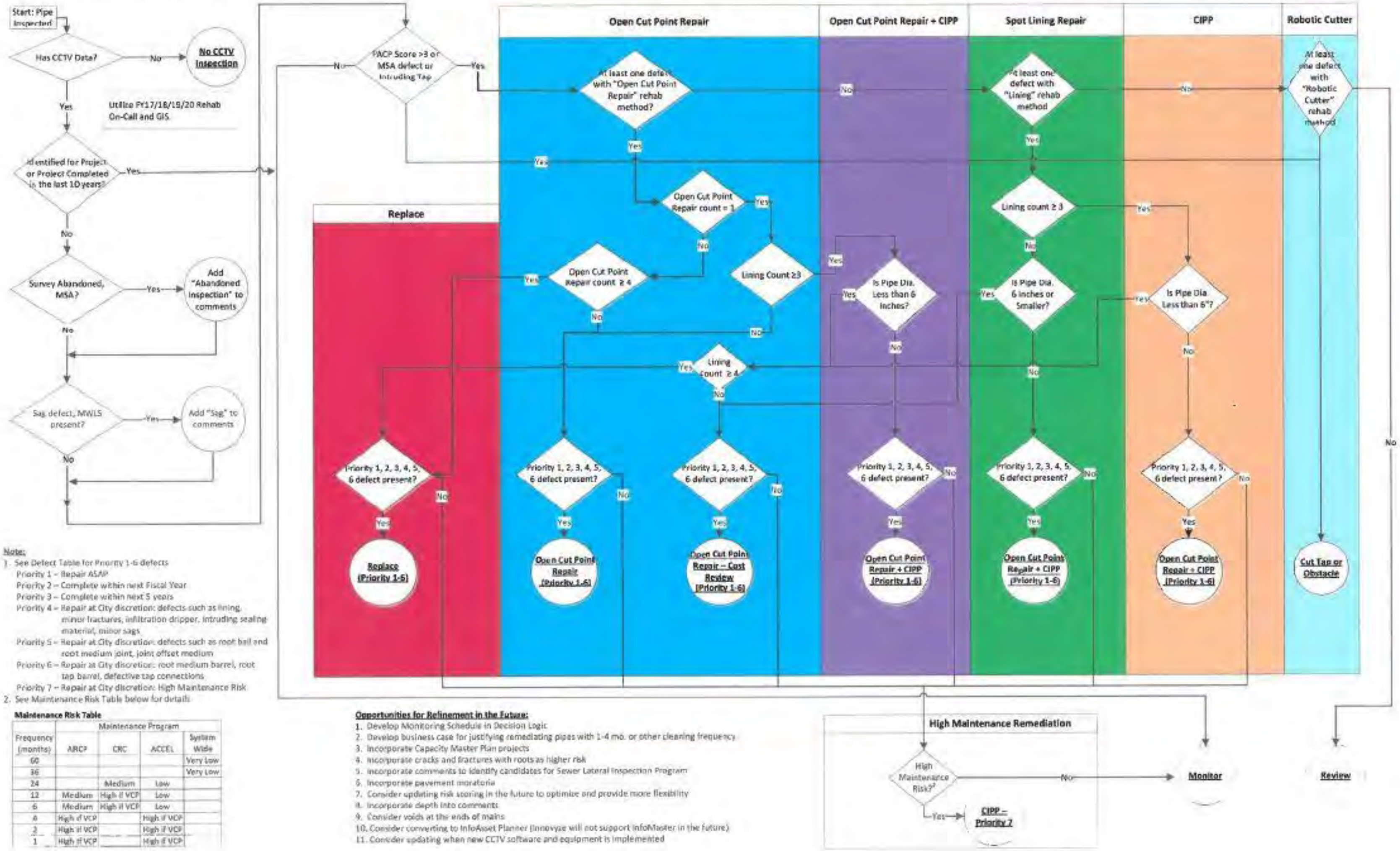
Risk Analysis Process for assigning Likelihood of Failure (LOF) and Consequence of Failure (COF) for wastewater pipes

Step Number	Category	Strategy	LOF Value	COF Value	Questions/Comments	GIS Layer
1	Comprehensive Rehab or Replacement in last 10 ye	Query GIS for Install Year and review comment field	1		Do we include change points? Documented under material/comment fields	Sewer main file
2	Inspected in last 5 years	Query CG for recent CCTV Inspection	1			Sewer main file
3	High I/I Basin	Assign basins from the Akel Master Plan Figure 7-7 (Basins with high RDII rates): 6, 15, 16, 17, 20, 21, 22, 24, 26, 35, 36, 39,	2			Basin layer
4	Diameter = <6"	Query GIS for Diameter	3			Sewer main file
5	Pre 1965 Install	Query GIS for Install Year	4			Sewer main file
6	Concrete	Query GIS for Material	4		Already lined, but leave in based on Consent Decree	Sewer main file
7	High Maintenance	Use the original PPM and 3X list + any other high freq (4 or 6 mo) pipes from Cartegraph	5			Sewer main file
8	Previous SSOs	SSOs are associated with manhole or cleanout - can tie to downstream pipe ID in GIS	5			SSO layer
9	Any remaining pipes	Query where LOF is blank	1			
10	Easements	Use Phase I easement analysis to identify easement pipes		2	Also look at know issues field	Easement
11	Other Access Issues	Review Cartegraph Issues field and ID pipes with other access issues		2		
12	Service Disruption	**SCHOOLS:** Query GIS to identify schools and select pipes that are on streets adjacent to the schools		3		Eric to extract
13		**HOSPITALS:** Query GIS to identify schools and select pipes that are on streets adjacent to the hospitals		3		
14		**FIREHOUSES:** Query GIS to identify schools and select pipes that are on streets adjacent to the firehouses		3		
15		**TOURIST AREAS**: Query GIS to identify pipes along State Street and in other commercial areas		3		send what you have and discuss
16		**FREEWAYS:** Query GIS to identify pipes that are crossing the freeway or in the freeway ROW		3		Freeway
17		**RAILWAY:** Query GIS to identify pipes that are crossing the railway or in the railway ROW		3		Railway
18	Diameter > 15"	Query GIS for Diameter		4		Sewer main file
19	Siphons	Use the original Siphons pipe list from Cartegraph; use the pipe type for "Siphon"		4	Also use main pipe type	Sewer main file
20	Sensitive Environment or Public Health	**COASTAL ZONE:** Query GIS to identify Pipes in defined Coastal Zone		5	Use most conservative boundary	coastal zone
21		**CREEKS:** Use existing GIS analysis that identified pipes within 15 m of creeks		5		creeks
22		**STORM DRAINS**: Use existing GIS analysis that identified pipes within 5 m of storm drain		5		storm drains and storm drainage coverages - look at both
23		**OTHER RECEIVING WATER:** Query GIS to identify Pipes with 15m of reservoirs, stormwater detention/retention basins, and ponds		5		Water polygon layer
24	Last point of contact (manhole) before receiving wa	Already accounted for in steps 21 and 22		5		Manholes
25	Any remaining pipes	Query where COF is blank		1		

Final Processing	
A	Calculate Risk Score for each pipe (COF X LOF) and schedule all pipes with a total score >= 16 first
B	Calculate an overall Risk Score for each Basin based on pipe scores (mean, max %, score per foot)
C	Prioritize Basins in terms of overall risk scores
D	Assign target inspection dates by basin based on geography and planned inspection rate
E	Upload target inspection dates into Cartegraph

Appendix B: Repair Prioritization Requirements

Figure 4 Sewer Main Decision Logic Flow Diagram



Note:

1. See Defect Table for Priority 1-6 defects
   - Priority 1 – Repair ASAP
   - Priority 2 – Complete within next Fiscal Year
   - Priority 3 – Complete within next 5 years
   - Priority 4 – Repair at City discretion: defects such as lining, minor fractures, infiltration dripper, intruding sealing material, minor sags
   - Priority 5 – Repair at City discretion: defects such as root ball and root medium joint, joint offset medium
   - Priority 6 – Repair at City discretion: root medium barrel, root tap barrel, defective tap connections
   - Priority 7 – Repair at City discretion: High Maintenance Risk
2. See Maintenance Risk Table below for details

Maintenance Risk Table

	Maintenance Program			
Frequency (months)	ARCP	CRC	ACCEL	System Wide
60				Very Low
36				Very Low
24		Medium	Low	
12	Medium	High if VCP	Low	
6	Medium	High if VCP	Low	
4	High if VCP		High if VCP	
3	High if VCP		High if VCP	
1	High if VCP		High if VCP	

Opportunities for Refinement in the Future:

1. Develop Monitoring Schedule in Decision Logic
2. Develop business case for justifying remediating pipes with 1-4 mo. or other cleaning frequency
3. Incorporate Capacity Master Plan projects
4. Incorporate cracks and fractures with roots as higher risk
5. Incorporate comments to identify candidates for Sewer Lateral Inspection Program
6. Incorporate pavement moratoria
7. Consider updating risk scoring in the future to optimize and provide more flexibility
8. Incorporate depth into comments
9. Consider voids at the ends of mains
10. Consider converting to InfoAsset Planner (Innovyze will not support InfoMaster in the future)
11. Consider updating when new CCTV software and equipment is implemented

Appendix E7 Wastewater Collection Vehicle and Equipment List

Wastewater Collection Vehicle & Equipment List

Description	Make/Model Description	WW Vehicle Number	Fleet Vehicle Number	Use Case/Purpose
Hydro – combination jetter/vacuum truck	Peterbilt Vactor Truck – Cab-Over	669	2501	Large capacity - production cleaning, and removal of material
Hydro – combination jetter/vacuum truck	Peterbilt Vactor Truck – Standard Cab	668	2601	Large capacity - production cleaning, and removal of material
Hydro – jetter truck	Peterbilt Vactor Jetter Truck	667	2571	Large capacity - production cleaning
Hydro – jetter truck	Peterbilt Vactor Jetter Truck	665	2523	Large capacity - production cleaning
CCTV Van	Mercedes Sprinter Cargo Van	636	2436	CCTV Inspection
¾ ton pickup-F250	Ford F-250	650	2701	Utility vehicle
¾ ton pickup-F250	Ford F-250	635	2709	CCTV follow vehicle
½ ton pickup –F15O	Ford F-150	633	2810	FOG program vehicle
½ ton pickup-F150	Ford F-150	624	2594	Utility vehicle
½ ton pickup-F150	Ford F-150	623	2646	Utility vehicle
½ ton pick-up	Ford F-150	627	3010	Lead utility vehicle
½ ton pick-up	Ford F-150	613	3011	Superintendent vehicle
Bucher Recycler Truck	Bucher Truck	664	3071	Sewer Cleaning
1 ton pickup-F350	Ford-F350	N/A	2178	CSOS Truck
1 ton pickup-F350	Ford-F350	N/A	2590	Fuel Truck
1 ton pickup-F350	Ford-F350	N/A	2591	Crane Truck
¾ ton pickup-F250	Ford F-250	N/A	2710	Shop Truck

Bypass Pump Equipment

The City maintains a fleet of bypass pumpers and other critical equipment for uses at the City's seven sewer lift stations and/or for wastewater collection system bypassing. The list below provides the make/model and size of pumping bypass equipment:

Available Bypass Pumps and Hoses				
Equipment Description	**Size**	**Quantity**	**Asset Number**	**Use**
6” Godwin - Trailer Mounted Bypass Pumper	6-inch	1	1902PMP9155	Lift Stations
6” Godwin - Trailer Mounted Bypass Pumper	6-inch	1	1902PMP9155G	Lift Stations
4” Power Prime - Trailer Mounted Bypass Pumper	4-inch	1	1902PMP9155A	Lift Stations/Localized bypassing
3” Honda - Small, portable sewer bypass pump (aka “Trash Pump”)	3-inch	2	1902PMP9155B	Localized bypassing
Rigid Hose and Lay-flat	6-inch	160 LF 250 LF	N/A	Connection to forcemain discharge or conveying wastewater to discharge location
Rigid Hose and Lay-flat	4-inch	200 LF 60 LF	N/A	Connection to forcemain discharge or conveying wastewater to discharge location
Rigid Hose and Lay-flat	3-inch	100 LF 430 LF	N/A	Conveying wastewater to discharge location

Note: All vehicles and bypass pumps are stored at El Estero Wastewater Treatment Plant Flow rates and total head vary for each pump type.

All Lift Stations can be bypassed using the equipment listed above, with two exceptions: Tallant and Skofield Lift Stations. Tallant Lift Station uses a small pump and hose stored at the Lift Station. In the event that a vactor truck cannot reach Skofield Lift Station, a submersible trash pump with a portable generator can be brought from El Estero to pump down the wet well. The general process for emergency pumping at Tallant and Skofield are included in SSMP Volume II, Appendix G2.

Appendix E8 Critical Replacement Parts List and Inventory Procedure

Wastewater Collection Replacement Parts Inventory

Description	Part Number	Inventory	Location
4” 6” 8” 10” 12” Repair Couplings		4 ea.	Wastewater Treatment Plant
4” 6” 8” 10” 12” PVC Pipe		40 ft. ea.	Wastewater Treatment Plant
4” x 6”, 4” x 8”, 4” x 10”, 6” x 8” PVC Wyes		4 ea.	Wastewater Treatment Plant
3” and 6” H X 24” ID Manhole adjustment rings		4 ea.	Wastewater Treatment Plant
4” and 6” X 24” Manhole frame and covers		4 ea.	Wastewater Treatment Plant
4” and 6” tapping saddles		4 ea.	Wastewater Treatment Plant

Wastewater Collection System

Replacement Parts Inventory Procedure

The City maintains an electronic inventory of equipment, replacement parts and supplies, and adheres to a structured process to ensure up to date inventory accounting principles. The City maintains an adequate list of local vendors (along with their emergency contact numbers) for non-stock items.

The City keeps critical replacement parts available such as the stocking of spare pumps, glands, check valves, plug valves, pipe fittings, couplings etc. The City makes every effort to use the identical model pumps in as many stations as possible to simplify maintenance and replacement.

The City’s Purchasing Department has procedures in place for pre-qualifying vendors, including procedures for sole-source purchases to standardize critical parts and equipment.

Appendix F1 Design Standards

Design and Performance Provisions

1. *Design Flow Standards*

The City's Wastewater Collection System Design Flow Standards are based on the design and peak flows. Table-1 includes standard design flows for land use factors. These flows shall be adjusted for peaking factors for design flow capacity of new and existing sewer infrastructure as shown on Table-2 or Equation-2. When sewer modeling results are complete, these results may adjust the demand and peak flows accordingly and may include variations by location.

Residential peaking factor (PF) will be determined from the ratio shown on Table-2.

Peak daily flows for all other uses shall be based on Equation-1.

Design flow shall be calculated based on Equation-2.

Table -1: Unit Flow Factors of Average Daily Sewer Demands

Land Use Category	Unit	Unit Flow Factor (gpd/unit)
Residential, Single Family	Dwelling Unit	280
Residential, Multiple Family	Dwelling Unit	200
Commercial	Acre	1,750
Commercial, High Density[1]	TBD	Provide water use data and fixture information
Industrial	TBD	Provide water use data and fixture information
School	Student	20
Church	Acre	1,000
Park and Open Space	Acre	170

Note:

1. High density commercial factor is based on 100 gpd/1,000 square feet of office space and 44,000 square feet per acre.

Table -2: Residential Peaking Factor Ratio

Population	Ratio of Peak to Average Flow
Less than 500	3.50
500 to 1,000	2.75
1,000 to 5,000	2.50
Greater than 5,000	2.00

Equation -1: Peak Daily Flow Equation for Non-Residential Areas

$$Q_p = 1.84\ Q_a^{.92}$$

Where Q_p = Peak Flow in cfs and Q_a = Average Flow in cfs

Equation -2: Design Flow Calculation

Design Flow = Average Daily Flow (Table-1) x Peak Flow (Table-2 or Equation 1)

2. *New Gravity Sewer Mains*

Capacity calculation – The capacity of gravity sewers will be determined using Manning's pipe friction formula for peak flow and the following factors:

Pipe roughness coefficient is n = 0.013.

Maximum allowable depth of flow in main sewers (8-12 inches in diameter) is d/D = 0.50.

Maximum allowable depth of flow in trunk sewers (>12 inches in diameter) is d/D = 0.75.

Minimum and maximum design flows, minimum pipe size, and minimum grade (slope) are shown on Table-3. Table-3 will also be used as a guideline for calculating impact of new sewer demands on existing infrastructures. Additional analysis may be required if slopes vary significantly.

Table** Error! No text of specified style in document.**-3: Minimum Design Flows, Pipe Size, Grade for Proposed Sewer Additions and Guideline for Calculating Impact of New Sewer Demands on Existing Infrastructure

Sewer Type	Minimum Design Flow, gpd	Maximum Design Flow, gpd	Pipe Size, inches	Minimum Grade, feet per foot
Main	0	322,999	8	0.0034
	323,000	729,999	10	0.0027
	730,000	999,999	12	0.0020
Trunk	1,000,000	1,580,000	15	0.0015
	1,581,000	2,280,000	18	0.0012
	2,281,000	3,100,999	21	0.00095
	3,101,000	4,050,999	24	0.00080
	4,051,000	5,140,999	27	0.00070
	5,141,000	6,340,999	30	0.00060
	6,341,000	7,670,999	33	0.00055
	7,671,000	9,130,999	36	0.00050

Note:

1. The specific requirements for design flows that exceed 9 mgd will be determined by the City Engineer.

Determination of public vs. private sewer – The City Public Works Engineering staff shall review all development proposals that impact City right-of-way and infrastructure. If an applicant is proposing a new sewer connection, the City will determine the applicability of the connection for future connections, existing capacities, and maintenance of such facilities. Based on reviewing these factors, the City will determine whether any proposal shall be public or private. Private vs. public sewer main requirements are described in the context of this section.

Velocity – The minimum acceptable velocity will be two feet per second.

Pipe diameter – The minimum pipe size for newly constructed main sewers shall be eight inches. Downstream pipe segments shall not be smaller than the next upstream line segment in order to prevent hydraulic constrictions that may cause debris to accumulate. Exceptions require the approval of the City Engineer.

Maximum grade (slope) and changes in grade (delta slope) – The maximum grade (slope) or changes in slope shall not exceed two percent without more detailed review. To avoid creating odor or other problems, the designer shall demonstrate that the proposed design will not result in a hydraulic jump for proposed grades or changes in grade exceeding two percent. Approval of the City Engineer is required for any grade that exceeds two percent. Additional design and construction requirements may apply.

Pipe materials – Acceptable pipe materials for buried main and trunk sewers 24 inches in diameter and smaller are shown in Table-4. Materials for other applications require the approval of the City Engineer.

Table -4: Acceptable Pipe Materials for New Gravity Sewers

Material	Designation	Standard
High Density Polyethylene (HDPE)	EHMW PE 3408 HDPE	ASTM D3350
Polyvinylchloride Pipe (PVC)	SDR-35, C-900 CL200	ASTM D3033 or D3034
Vitrified Clay Pipe (VCP)	Extra Strength	ASTM C700

Pipe bends – No pipe bends shall be permitted, unless otherwise approved by the City Engineer and Wastewater System Manager.

Pipe clearance – The minimum vertical clearance between main and trunk sewers and other buried utilities shall be per City Standard Details 7-003.1, 7.003.1, and 7-040.0. Variations from these criteria require approval of the City Engineer.

Pipe cover – The minimum cover for main and trunk sewers will be four feet in roadways (measured from road sub-grade to top of pipe) and three feet in easements and other right-of-ways (measured from finished grade to top of pipe) where applicable. The maximum cover (depth of burial) will be 20 feet. Pipe covers that do not meet the minimum or maximum cover require approval of the City Engineer. Special cases may have a more shallow depth but will require City approval of pipe upgrade or encasement.

Pipe curvature – Pipe curvature shall be implemented to reduce unnecessary manholes, but shall comply with manufacturer's recommendations.

Pipe joint deflection – The deflection between any two successive joints will not exceed 80% of the maximum deflection recommended in writing by the pipe manufacturer. The minimum pipe length used to construct short radius curves will be two feet.

Private sewers – All private sewer systems shall be governed by and permitted through the Building Department.

Private sewers / Public right-of-way – Any private sewer main in the public right-of-way requires City approval and an encroachment permit. A separate application is required for encroachment permits. In the event that an existing private sewer system is proposed to be converted to a public system, the entire system must be upgraded to meet the public standards as presented in this Design and Performance Provision or as amended.

New public facilities are encouraged to be installed in the public right-of-way and may only be installed on private property with special conditions as identified in City review. All sewers, to the maximum extent practicable, will be installed in the public right-of-way as a public facility and built to City standards.

Private sewer / Private property – Private sewer to be offered as a future public sewer shall be built to City standards and offered on a map or separate easement document. The City may opt to defer acceptance of such facility to a later date.

All sewers proposed to be installed other than in the public right-of-way must be approved by the Land Development Engineer, Water Design Engineer, and Wastewater Collection System Superintendent and will require a minimum 10 foot wide public sewer easement, if the City desires to accept the facility as a public sewer main. Additional easement width may be required by the City Engineer. Such easement shall be shown as a separate instrument or on a subdivision map, if applicable. Where water and sewer mains are in the same easement, the minimum easement shall be 30 feet wide. All easements shall be easily accessible to City's maintenance equipment. If any obstruction restricts the ability for maintenance of a public facility, the owner may be required to relocate the public facility.

Special features and unusual designs – Any situation that varies from the standard conditions outlined above will require additional or specialized design features to ensure reliability, access for maintenance, and economical operation and maintenance. These unusual design conditions require approval from the City Engineer.

3. Manholes and Cleanouts

Cleanouts – Cleanouts may be installed for access to sewer laterals and mains less than eight inches in diameter and per approval of the City.

Drop – Minimum drop through manholes shall be 0.20 feet.

Sewer drop connections – Sewer mains and laterals which are introduced to a sewer manhole at inverts higher than +/- 2 feet elevation above manhole invert, shall be installed per City Standard Detail and as an inside drop where feasible.

Numbering – All manholes shall be numbered on the plans and on the sewer calculations.

Required – Manholes shall be required:

a. At all changes of slope.
b. At all changes of direction.
c. At all intersections of mains – match soffits.
d. At all ends of lines and beginning of lines.

Spacing and location – Manhole spacing shall be 500 feet maximum or as approved by the City Engineer or Wastewater System Manager. For all industrial uses, an inspection manhole shall be provided immediately behind the property line, for all residential uses, a cleanout shall be provided within two feet of the property line.

4. Laterals

Backflow requirements – Any lot with a finish pad elevation lower than the top of the finish street grade where the sewer main is located and services this lot, must install a sewer back flow preventer valve on private property. The property owner shall be responsible for the installation and maintenance of the sewer backflow preventer. The backflow preventer shall be shown on the precise grading and improvement plans.

Inspection manhole – An inspection manhole shall be provided at the property line for industrial projects.

Location – Installation of laterals shall be in accordance with City Standard Detail 5-004.0. Standard location is from the center of lot to five feet above downstream lot line (shown on as-built plans). Services shall not be located in the driveway. Sewer laterals six inches and larger, shall be connected to an existing manhole or a new manhole shall be constructed.

Separation between sewer and water laterals shall be per City Standard Detail 7-003.0.

It is recommended that each parcel, lot, or condominium unit have a separate connection to the public sewer main. If the sewer lateral is not a separate connection, a covenant, condition and restriction recorded on the title of the properties for future private maintenance responsibilities may be conditioned by the City.

Plans – All laterals are to be shown on improvements plans by stationing or a lateral table. On “as-built” plans all laterals shall be shown in plan view to scale and dimensioned from the nearest downstream manhole.

Size – Minimum pipe size for laterals is four inches.

5. New Pump Stations and Force Mains

The City’s goal is to minimize the number of pump stations in its wastewater collection system. Pump stations are to be avoided wherever practicable. Pump stations are to be consolidated wherever practicable. All pump station designs require approval from the City Engineer.

6. Rehabilitated Gravity Sewers

The design of rehabilitated gravity sewers will follow the standards in the City’s Standard Specifications. The design flows and capacity of the proposed rehabilitation method will be verified where the rehabilitation methods will reduce the diameter of the sewer.

7. *Inspection and Testing Standards*

The City's Wastewater Collection System Standards for Construction, Inspection and Testing are:

New Gravity Sewers

Standard Specifications – The Standard Specifications for Public Works Construction, 2003 Edition, as modified by the City's Standard Specifications, will be used as the basis for the construction of gravity sewers.

Inspection during construction – All new gravity sewers will be periodically inspected during construction to ensure that the sewer is constructed using the specified materials and methods. Specific approvals will be required by the inspector prior to backfilling the trench, prior to paving, and prior to acceptance by the City. The contractor will be required to provide survey controls so that the inspector can verify line and grade (slope). Unusual conditions and special features will be recorded for future reference.

Leakage – All new gravity sewers will be tested to verify that they have been properly constructed. Sewers between 8 and 16 inches in diameter will be tested following Standard Specifications for Public Works Construction, Section 306-1.4.4 Air Pressure Test. Sewers larger than 16 inches will be hydrostatically tested following Standard Specifications for Public Works Construction, Section 306-1.4.5 Water Pressure Test. Gravity sewers that fail the test shall be repaired and retested.

Deflection – All flexible pipe will be tested for deflection following backfill and prior to paving following Standard Specifications for Public Works Construction, Section 306-1.2.12 Field Inspection for Plastic Pipe and Fittings. Gravity sewers that fail the test shall be repaired and retested. "Re-rounding" is not allowed.

CCTV inspection – All new gravity sewers and rehabilitated sewers will be inspected using a closed circuit television to verify that the pipe is free from defects/damage, that the joints have been correctly constructed, and that the sewer is free from sags that will cause future operational problems. Gravity sewer shall be cleaned prior to inspection and shall be flushed with water so that defects can be identified. Defects shall be recorded following the NASSCO standards. Sags that exceed one inch in depth shall be repaired.

Warranty inspection – All new gravity sewers will be inspected using CCTV prior to the end of the warranty period to ensure that there are no latent defects. Repairs shall be completed at Contractor's expense.

New Manholes

Inspection during construction – All new manholes will be periodically inspected during construction to ensure that the sewer is constructed using the specified materials and methods. Unusual conditions and special features will be recorded for future reference.

Leakage – All new manholes will be vacuum tested to verify that the joints, connections, and frame/cover are tight. The vacuum test will follow ASTM C1244. The test will be conducted at a 10 inch Hg vacuum. The vacuum loss shall be less than one inch Hg for the time shown in Table-4.

Table -5: Minimum Manhole Vacuum Test Time in Seconds

Depth / Diameter	4 Foot Diameter	5 Foot Diameter	6 Foot Diameter
Depth < 15 feet	50	65	80
Depth = 15 feet or greater	70	105	130

Manholes that fail the vacuum test shall be repaired using materials and methods approved by the City Engineer and retested.

New and Rehabilitated Pump Stations

Inspection during construction – All new and rehabilitated pump stations will be periodically inspected during construction to ensure that they are constructed using the specified materials and methods. Unusual conditions and special features will be recorded for future reference.

Functional test – All systems in new and rehabilitated pump stations will be tested to ensure they function as intended.

Performance test – All new and rehabilitated pump stations will be required to pass an extended performance test to ensure that they are capable of reliably meeting the design performance for a period of at least 120 hours of continuous operation without failure or alarms. The results of these performance tests will be recorded for use as a basis for evaluating future performance evaluations.

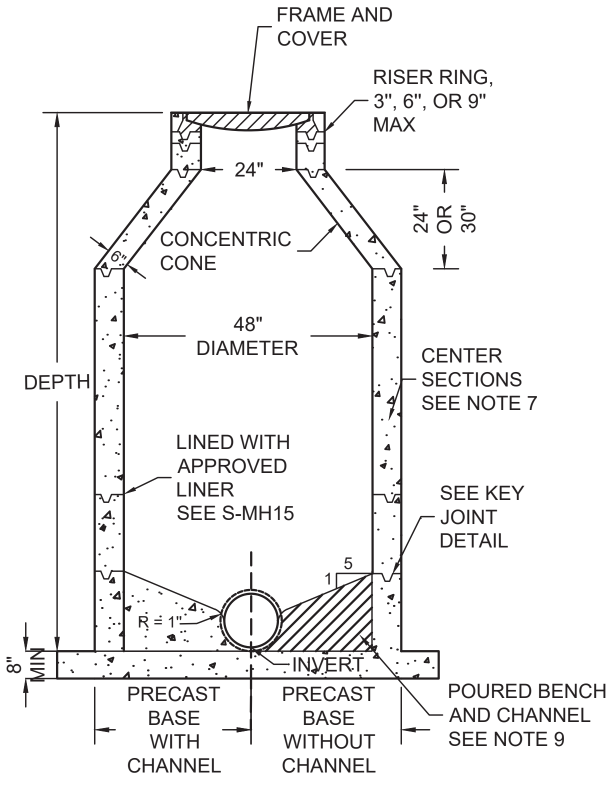
Appendix F2 Construction Standard Details (Sewer)

CITY OF SANTA BARBARA SANITARY SEWER STANDARD DETAILS. TO BE USED WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION 2018 EDITION (STANDARD SPECIFICATION). ALL WORK WHICH REQUIRES PAVEMENT RESTORATION SHALL COMPLY WITH CITY STANDARD DETAILS - UNDERGROUND UTILITIES SECTIONS U-01.1 THROUGH U-03.2. REFER TO APPROVED STANDARD MATERIALS LIST FOR WATER/WASTEWATER FOR MATERIALS SPECIFIED IN THESE STANDARD DETAILS WITHOUT THE ALLOWANCE FOR "OR EQUAL".

SANITARY SEWER STANDARD DETAILS TABLE OF CONTENTS

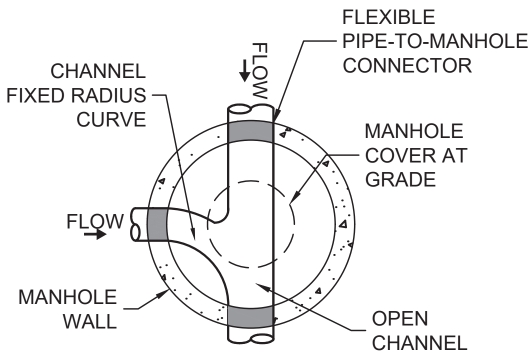
REV. DATE: 06/2020
DETAIL: S-TOC

APPROVED:
Brian D'Auria
CITY ENGINEER
Rebecca J Bjork
PUBLIC WORKS DIRECTOR



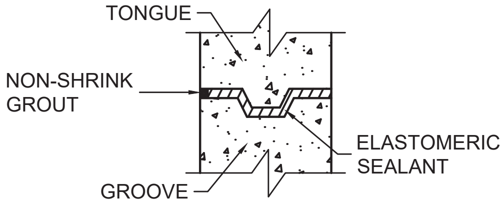
48" MANHOLE

PROFILE



48" MANHOLE

PLAN



KEY JOINT

DETAIL

NOTES:

1. MANHOLE SHALL BE 48" IN DIAMETER IF SEWER MAIN DIAMETER IS SMALLER THAN OR EQUAL TO 15" OR RECEIVES DISCHARGE DIRECTLY FROM A FORCE MAIN (TRANSITION MANHOLE).

MATERIALS:

2. KEY JOINTS SHALL BE TONGUE AND GROOVE PER DETAIL, SET WITH ELASTOMERIC SEALANT. INSIDE OF JOINTS SHALL BE GROUTED WITH NON-SHRINK GROUT.
3. GAPS AND HOLES BETWEEN MANHOLE BASE AND PIPE CONNECTIONS SHALL BE FILLED WITH NON-SHRINK GROUT.
4. PRE-CAST BASE SHALL BE BEDDED ON A MINIMUM OF 6" OF WELL GRADED, $\frac{3}{4}$" ANGULAR CRUSHED ROCK OVER NATIVE MATERIAL THAT IS EITHER UNDISTURBED OR COMPACTED PER GREENBOOK STANDARDS, WITH A RELATIVE COMPACTION ≥ 95%.

CONSTRUCTION:

5. RISERS, CONE, CENTER SECTIONS, AND BASE SHALL CONFORM TO ASTM C-478.
6. CONE SHALL BE CONCENTRIC IF SEWER DEPTH IS LESS THAN 60", ECCENTRIC IF DEPTH IS GREATER THAN 60".
7. MANHOLE SECTIONS SHALL BE PRECAST CONCRETE AND SHALL HAVE 6" MINIMUM WALL THICKNESS WITH MINIMAL REINFORCEMENTS. TYPICAL SECTIONS SHALL BE 12", 16", 24", 32", 36" OR 48" IN HEIGHT.
8. MANHOLE BASE SHALL BE PRE-CAST CONSTRUCTED USING CLASS 560-C-3250 CONCRETE WITH EXTENDED BASE OR POLYMER CONCRETE WITH SIMILAR PROPERTIES. ALL PIPE CONNECTIONS' SIZE, ANGLE, DEPTH AND QUANTITY SHALL BE FIELD VERIFIED AND MEASURED PRIOR TO ORDERING PRECAST BASE. ALL PIPE CONNECTIONS SHALL BE CORED TO FIT FLEXIBLE PIPE-TO-MANHOLE CONNECTORS (KOR-N-SEAL OR EQUAL) EITHER BY MANUFACTURER OR CONTRACTOR USING APPROVED EQUIPMENT.
9. FOR PRE-CAST BASE WITHOUT CHANNEL, BENCH & CHANNEL SHALL BE COMPLETED IN A SINGLE POUR USING CLASS 560-C-3250 CONCRETE WITH STEEL TROWEL FINISH.
10. ANY CHANGE IN DIRECTION SHALL BE A FIXED RADIUS CURVE EXTENDING FROM THE INLET WALL TO THE OUTLET WALL.
11. INSIDE SURFACE OF INVERT AND AREA BETWEEN PIPE CONNECTION AND CHANNEL SHALL BE FREE FROM GAPS, HOLES AND SHARP EDGES.
12. ALL INLETS SHALL BE DESIGNED AND INSTALLED SUCH THAT THE TOP OF PIPE ELEVATIONS MATCH AS MUCH AS POSSIBLE.

REFERENCE:

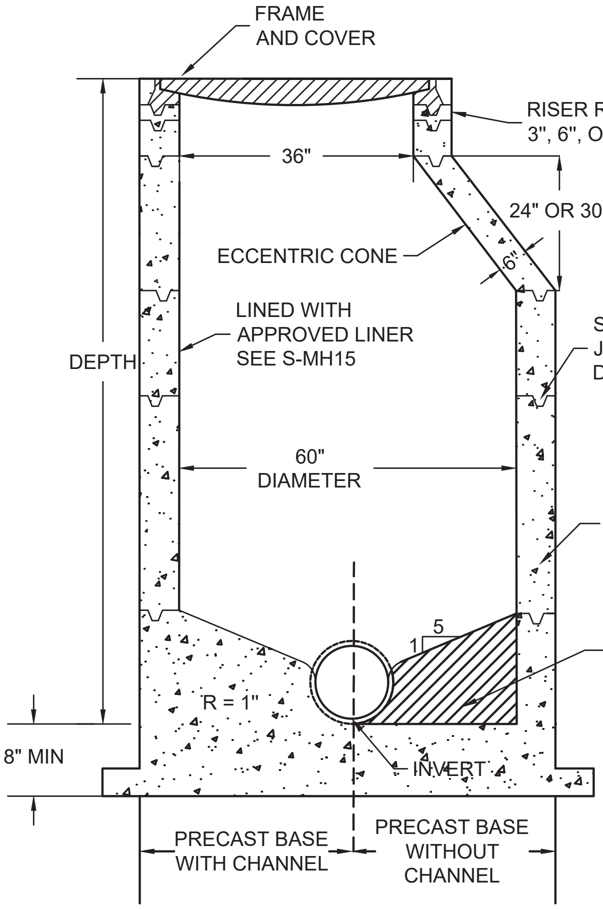
13. COLLAR ADJUSTMENT TO GRADE SHALL BE PER DETAIL S-MH6.
14. STANDARD MANHOLE FRAME AND COVER SHALL BE PER DETAIL S-MH7.

SEAL OF THE CITY OF SANTA BARBARA CALIFORNIA

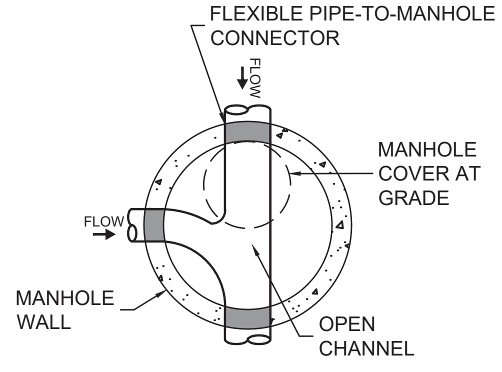
48" STANDARD PRE-CAST MANHOLE

REV. DATE: 06/2020
DETAIL: S-MH1

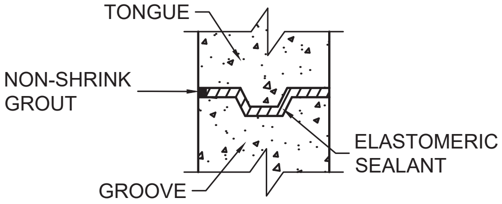
APPROVED:
Brian D'Am
CITY ENGINEER
Rebecca J Bjork
PUBLIC WORKS DIRECTOR



60" MANHOLE
PROFILE



60" MANHOLE
PLAN



KEY JOINT
DETAIL

NOTES:

1. MANHOLE SHALL BE 60" IN DIAMETER IF SEWER MAIN DIAMETER IS LARGER THAN 15" OR RECEIVES DISCHARGE DIRECTLY FROM A FORCE MAIN (TRANSITION MANHOLE).

MATERIALS:

2. KEY JOINTS SHALL BE TONGUE AND GROOVE PER DETAIL, SET WITH ELASTOMERIC SEALANT. INSIDE OF JOINTS SHALL BE GROUTED WITH NON-SHRINK GROUT.
3. GAPS AND HOLES BETWEEN MANHOLE BASE AND PIPE CONNECTIONS SHALL BE FILLED WITH NON-SHRINK GROUT.
4. PRE-CAST BASE SHALL BE BEDDED ON A MINIMUM OF 6" OF WELL GRADED, $\frac{3}{4}$" ANGULAR CRUSHED ROCK OVER NATIVE MATERIAL THAT IS EITHER UNDISTURBED OR COMPACTED PER GREENBOOK STANDARDS, WITH A RELATIVE COMPACTION ≥ 95%.

CONSTRUCTION:

5. RISERS, CONE, CENTER SECTIONS, AND BASE SHALL CONFORM TO ASTM C-478.
6. CONE SHALL BE CONCENTRIC IF DEPTH IS LESS THAN 60" (AS SHOWN ON S-MH1), ECCENTRIC IF DEPTH IS GREATER THAN 60".
7. MANHOLE SECTIONS SHALL BE PRECAST CONCRETE AND SHALL HAVE 6" MINIMUM WALL THICKNESS WITH MINIMAL REINFORCEMENTS. TYPICAL SECTIONS SHALL BE 12", 16", 24", 32", 36" OR 48" IN HEIGHT.
8. MANHOLE BASE SHALL BE PRE-CAST CONSTRUCTED USING CLASS 560-C-3250 CONCRETE WITH EXTENDED BASE OR POLYMER CONCRETE WITH SIMILAR PROPERTIES. ALL PIPE CONNECTIONS' SIZE, ANGLE, DEPTH AND QUANTITY SHALL BE FIELD VERIFIED AND MEASURED PRIOR TO ORDERING PRECAST BASE. ALL PIPE CONNECTIONS SHALL BE CORED TO FIT FLEXIBLE PIPE-TO-MANHOLE CONNECTORS (KOR-N-SEAL OR EQUAL) EITHER BY MANUFACTURER OR CONTRACTOR USING APPROVED EQUIPMENT.
9. FOR PRE-CAST BASE WITHOUT CHANNEL, BENCH AND CHANNEL SHALL BE COMPLETED IN A SINGLE POUR USING CLASS 560-C-3250 CONCRETE WITH STEEL TROWEL FINISH.
10. ANY CHANGE IN DIRECTION SHALL BE A FIXED RADIUS CURVE EXTENDING FROM THE INLET WALL TO THE OUTLET WALL.
11. INSIDE SURFACE OF INVERT AND AREA BETWEEN PIPE CONNECTION AND CHANNEL SHALL BE FREE FROM GAPS, HOLES AND SHARP EDGES.
12. ALL INLETS SHALL BE DESIGNED AND INSTALLED SUCH THAT THE TOP OF PIPE ELEVATIONS MATCH AS MUCH AS POSSIBLE.

REFERENCE:

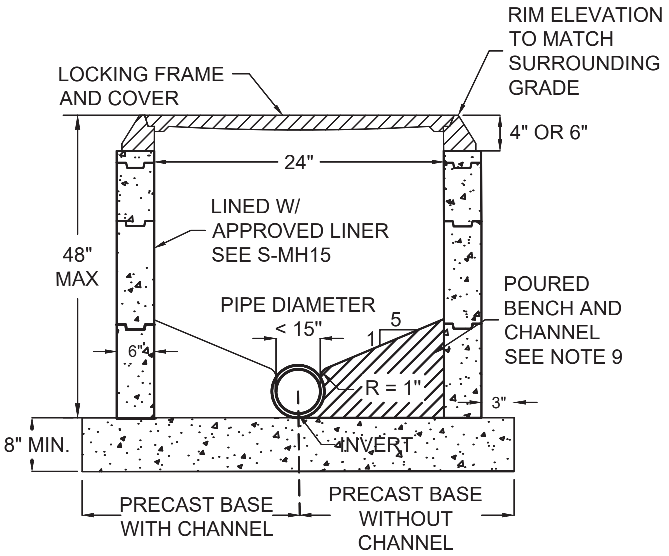
13. COLLAR ADJUSTMENT TO GRADE PER DETAIL S-MH6.
14. STANDARD MANHOLE FRAME AND COVER SHALL BE PER DETAIL S-MH7.

SEAL OF THE CITY OF SANTA BARBARA CALIFORNIA

60" STANDARD PRE-CAST MANHOLE

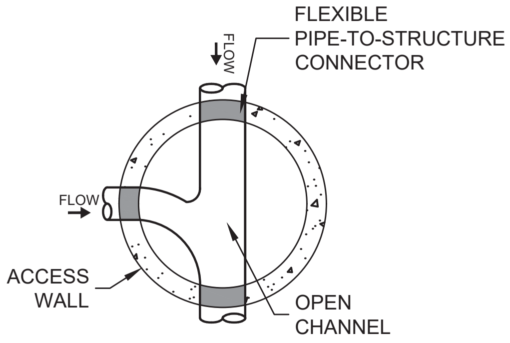
REV. DATE: 06/2020
DETAIL: S-MH2

APPROVED:
Brian D'Amour
CITY ENGINEER
Rebecca J Bjork
PUBLIC WORKS DIRECTOR



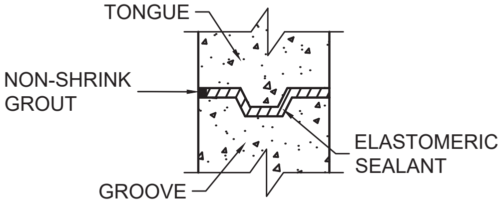
24" DIAMETER PRE-CAST ACCESS STRUCTURE

PROFILE



SHALLOW ACCESS

PLAN



KEYJOINT

DETAIL

NOTES:

1. FOR DEPTH GREATER THAN 48", CONSULT ENGINEER. THIS SHALLOW ACCESS DETAIL TO BE USED IN DRIVABLE AREAS.

MATERIALS:

2. JOINTS SHALL BE TONGUE AND GROOVE KEY JOINTS, SET WITH ELASTOMERIC SEALANT, PER DETAIL. INSIDE OF JOINTS SHALL BE GROUTED WITH NON-SHRINK GROUT.
3. GAPS AND HOLES BETWEEN BASE AND PIPE CONNECTIONS SHALL BE FILLED WITH NON-SHRINK GROUT.
4. THE PRE-CAST BASE SHALL BE BEDDED ON A MINIMUM OF 6" OF WELL GRADED, $\frac{3}{4}$" ANGULAR CRUSHED ROCK OVER NATIVE MATERIAL THAT IS EITHER UNDISTURBED OR COMPACTED PER GREENBOOK STANDARDS, WITH A RELATIVE COMPACTION ≥ 95%.

CONSTRUCTION:

5. RISERS AND BASE SHALL CONFORM TO ASTM C-478.
6. RISER SECTIONS SHALL BE PRE-CAST CONCRETE AND SHALL HAVE 6" MINIMUM WALL THICKNESS WITH MINIMAL REINFORCEMENTS.
7. TYPICAL RISERS SHALL BE 3", 6", 9", OR 12" IN HEIGHT.
8. BASE SHALL BE PRE-CAST CLASS 560-C-3250 CONCRETE WITH EXTENDED BASE. ALL PIPE CONNECTIONS' SIZE, ANGLE, DEPTH AND QUANTITY SHALL BE FIELD VERIFIED AND MEASURED PRIOR TO ORDERING PRECAST BASE. ALL PIPE CONNECTIONS SHALL BE CORED TO FIT FLEXIBLE PIPE-TO-STRUCTURE CONNECTORS (KOR-N-SEAL OR EQUAL) EITHER BY MANUFACTURER OR CONTRACTOR USING APPROVED EQUIPMENT.
9. FOR PRECAST BASE WITHOUT CHANNEL, BENCH & CHANNEL SHALL BE COMPLETED IN A SINGLE POUR USING CLASS 560-C-3250 CONCRETE WITH STEEL TROWEL FINISH.
10. ANY CHANGE IN DIRECTION SHALL BE A FIXED RADIUS CURVE EXTENDING FROM THE INLET WALL TO THE OUTLET WALL.
11. INSIDE SURFACE OF INVERT AND AREA BETWEEN PIPE CONNECTION AND CHANNEL SHALL BE FREE FROM GAPS, HOLES AND SHARP EDGES.
12. ALL INLETS SHALL BE DESIGNED AND INSTALLED SUCH THAT THE TOP OF PIPE ELEVATIONS MATCH AS MUCH AS POSSIBLE.

REFERENCE:

13. COLLAR ADJUSTMENT TO GRADE PER DETAIL S-MH6.
14. STANDARD LOCKING FRAME AND COVER SHALL BE PER DETAIL S-MH8.

SEAL OF THE CITY OF SANTA BARBARA CALIFORNIA

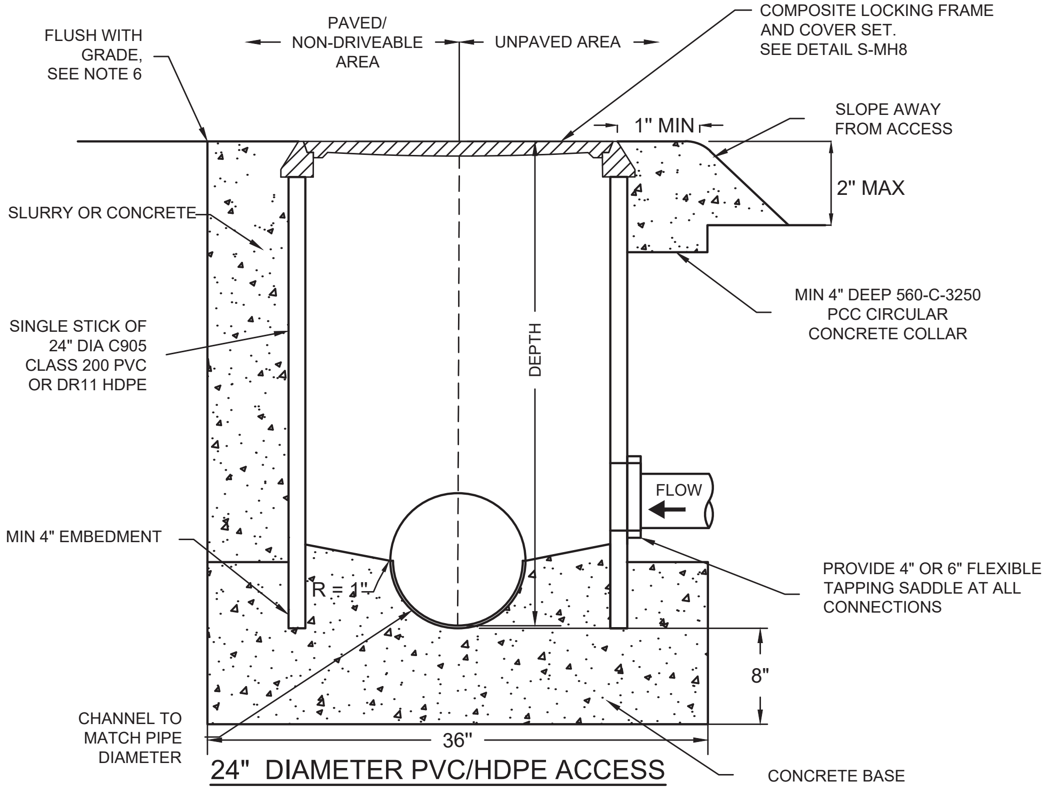
24" DIAMETER PRE-CAST ACCESS STRUCTURE

REV. DATE: 06/2020
DETAIL: S-MH3

APPROVED:

CITY ENGINEER

Rebecca J Bjork
PUBLIC WORKS DIRECTOR



24" DIAMETER PVC/HDPE ACCESS STRUCTURE

PROFILE

NOTES:

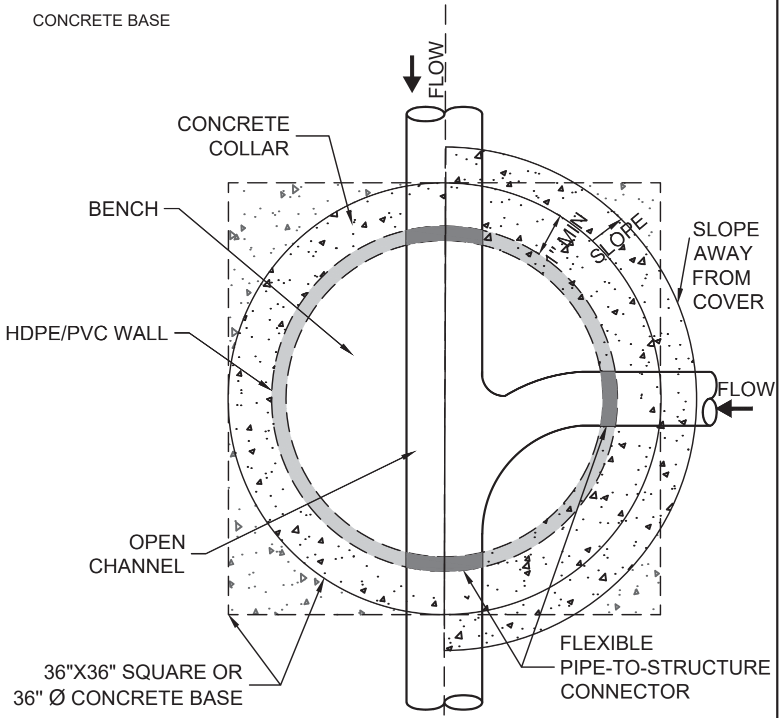
1. FOR DEPTH GREATER THAN 48", CONSULT WITH ENGINEER.
2. FOR SEWER MAIN DIAMETER GREATER THAN 8", CONSULT WITH ENGINEER. THIS DETAIL NOT TO BE USED IN DRIVABLE AREA OR VEHICULAR PATH.

MATERIALS:

3. GAPS AND HOLES BETWEEN BASE AND PIPE CONNECTIONS SHALL BE FILLED WITH NON-SHRINK GROUT.
4. THE BASE SHALL BE BEDDED ON A MINIMUM OF 6" OF WELL GRADED, $\frac{3}{4}$" ANGULAR CRUSHED ROCK OVER NATIVE MATERIAL THAT IS EITHER UNDISTURBED, COMPACTED PER GREENBOOK STANDARDS, OR 95%.
5. LOCKING FRAME AND COVER SHALL BE USED IN BOTH PAVED NON DRIVABLE PATH AND UNPAVED AREAS.

CONSTRUCTION:

6. ELEVATION DIFFERENCE BETWEEN FRAME AND EXISTING GRADE SHALL NOT EXCEED $\frac{1}{4}$" FOR PAVED/NON DRIVEABLE AREAS.
7. BASE SHALL CONFORM TO ASTM C-478.
8. BASE SHALL BE CLASS 560-C-3250 CONCRETE WITH EXTENDED BASE. ALL PIPE CONNECTIONS' SIZE, ANGLE, DEPTH AND QUANTITY SHALL BE FIELD VERIFIED AND MEASURED PRIOR TO ORDERING PRECAST BASE. ALL PIPE CONNECTIONS SHALL BE CORED TO FIT FLEXIBLE PIPE-TO-STRUCTURE CONNECTORS (KOR-N-SEAL OR EQUAL) EITHER BY MANUFACTURER OR CONTRACTOR USING APPROVED EQUIPMENT.
9. ANY CHANGE IN DIRECTION SHALL BE A FIXED RADIUS CURVE EXTENDING FROM THE INLET WALL TO THE OUTLET WALL.
10. INSIDE SURFACE OF THE BENCH AND CHANNEL AND AREA BETWEEN THE PIPE CONNECTION AND CHANNEL SHALL BE FREE FROM GAPS, HOLES AND SHARP EDGES.
11. ALL INLETS SHALL BE DESIGNED AND INSTALLED SUCH THAT THE TOP OF PIPE ELEVATIONS MATCH AS MUCH AS POSSIBLE.



24" DIAMETER ACCESS

PLAN

REFERENCE:

12. COLLAR ADJUSTMENT TO GRADE PER DETAIL S-MH6.
13. STANDARD LOCKING MANHOLE FRAME AND COVER SHALL BE PER DETAIL S-MH8.

SEAL OF THE CITY OF SANTA BARBARA CALIFORNIA

24" DIAMETER PVC/HDPE ACCESS STRUCTURE

REV. DATE: 06/2020

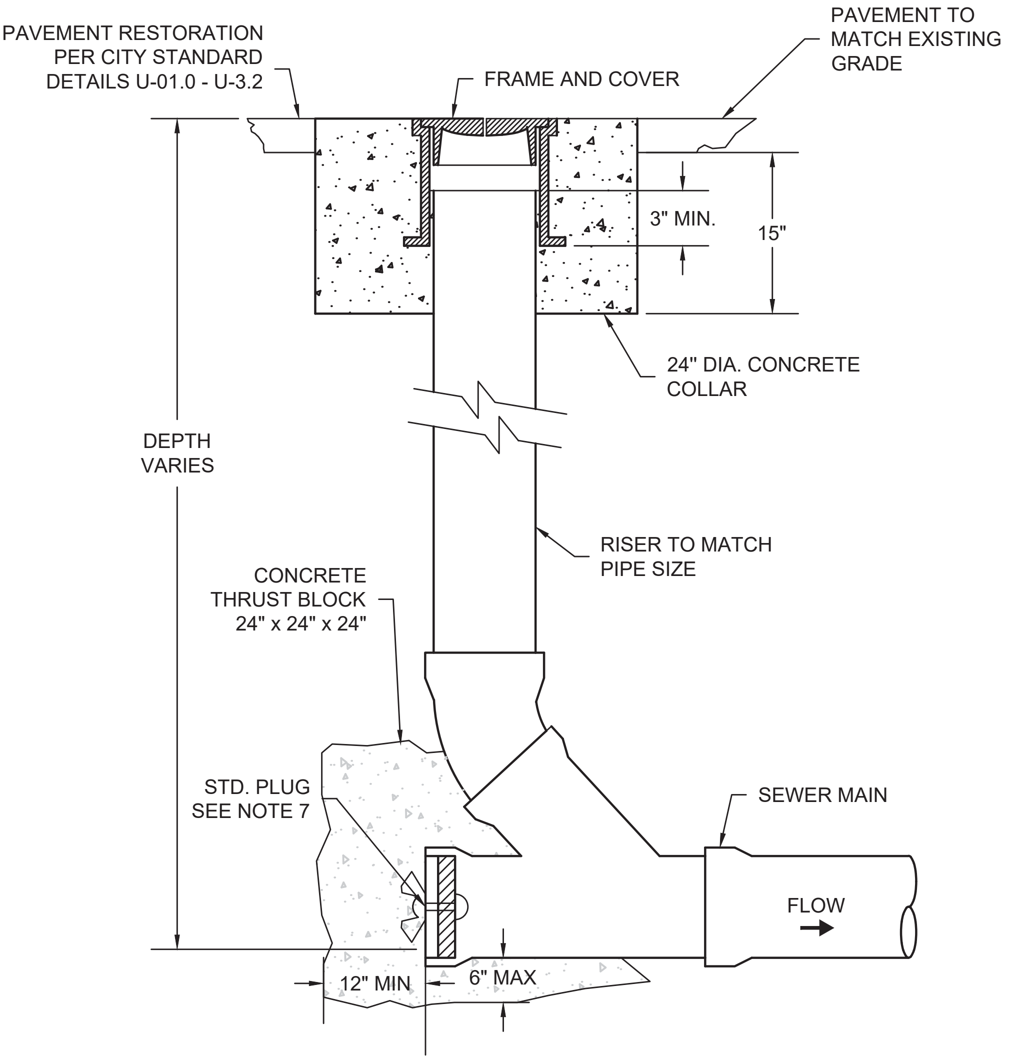
DETAIL: S-MH4

APPROVED:

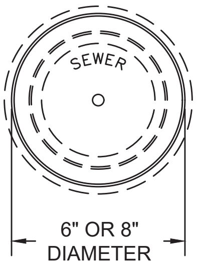
CITY ENGINEER

Rebecca J Bjork

PUBLIC WORKS DIRECTOR



CLEANOUT
SECTION



CLEANOUT COVER
PLAN

NOTES:
1. APPLIES TO CLEANOUT REPLACEMENT AND ADJUSTMENT TO GRADE.
2. CLEANOUT LARGER THAN 8" DIAMETER SHALL BE SUBJECT TO APPROVAL.

MATERIALS
3. FRAME AND COVER IN PAVED AREA OR EASEMENTS SHALL BE SOUTHBAY FOUNDRY SBF-1240 OR EQUAL APPROVED BY THE ENGINEER.
4. ALL PIPE AND FITTINGS SHALL BE PVC SDR-35 PER ASTM 3034.
5. CONCRETE SHALL BE CLASS 520-C-3250.
6. STANDARD PLUG SHALL BE WING NUT STYLE (CHERNE ORIGINAL GRIPPER, OR APPROVED EQUAL).

CONSTRUCTION
7. SET FRAME AND COVER FLUSH WITH PAVEMENT GRADE, NOT TO EXCEED $\frac{1}{4}$" DIFFERENCE.

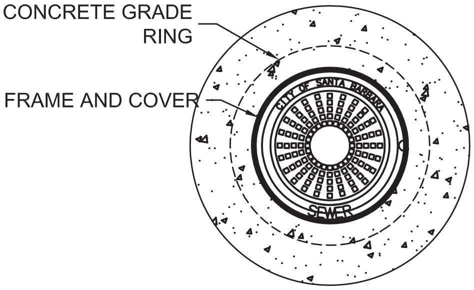
REFERENCE:
8. PAVEMENT RESTORATION SHALL MEET REQUIREMENTS IN CITY STANDARD DETAILS U-01.0 - U-3.2.

SEAL OF THE CITY OF SANTA BARBARA CALIFORNIA

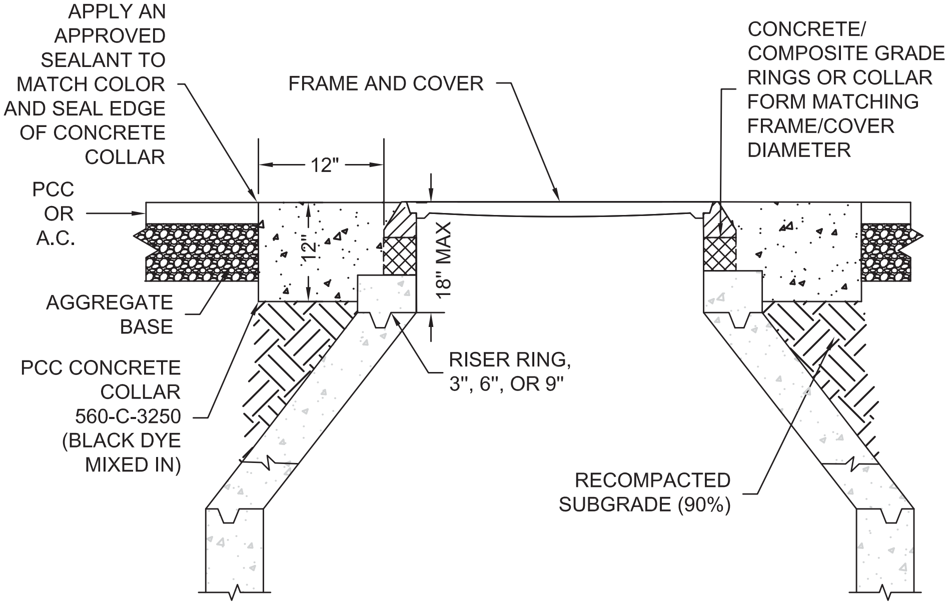
SEWER CLEANOUT

REV. DATE: 06/2020
DETAIL: S-MH5

APPROVED:
Brian D'Amour
CITY ENGINEER
Rebecca J Bjork
PUBLIC WORKS DIRECTOR



COLLAR ADJUSTMENT
PLAN



COLLAR ADJUSTMENT
PROFILE

NOTES:

1. GRADE RINGS SHALL NOT EXCEED A TOTAL MAXIMUM HEIGHT OF 12" FOR STANDARD MANHOLE INSTALLATIONS.

MATERIALS:

2. ALL CONCRETE SHALL BE 560-C-3250.
3. ALL MORTAR SHALL BE CLASS "D" PER SECTION 201.5.1 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
4. SPACER BLOCKS SHALL MATCH MANHOLE'S CONSTRUCTION MATERIALS.
5. A THERMOPLASTIC MANHOLE RISER FORM MAY BE USED IN LIEU OF SPACER BLOCKS AND GRADE RINGS.

CONSTRUCTION:

6. PRIOR TO ANY WORK ON EXISTING SEWER MANHOLES, THE CONTRACTOR SHALL PLACE A TEMPORARY FALSE BOTTOM INSIDE OF THE MANHOLE. IF ONE CANNOT BE INSTALLED, THE CONTRACTOR SHALL NOTIFY THE CITY PRIOR TO COMMENCING WORK.
7. WHEN SPECIFIED, RUNGS SHALL BE REMOVED TO A DEPTH OF 2" BEYOND THE INSIDE FACE OF THE MANHOLE. EXISTING VOIDS LEFT BY THE REMOVAL OF THESE RUNGS SHALL BE FILLED WITH MORTAR OR A PATCHING CEMENT SUCH AS "WATER PLUG", OR EQUAL APPROVED BY THE ENGINEER.
8. FRAME SHALL BE INSTALLED LEVEL OR MATCH SURROUNDING GRADE AND BE SUPPORTED DURING CONCRETE CURING PROCESS.
9. TO RAISE AN EXISTING FRAME AND COVER ON A PRE-CAST CONCRETE SEWER MANHOLE, USE CONCRETE GRADE RINGS, COMPOSITE GRADE RINGS (PRO-RING BY CRETEX OR APPROVED EQUAL), OR A THERMOPLASTIC MANHOLE RISER FORM (MANUFACTURED BY WHIRLYGIG OR APPROVED EQUAL).
10. TO LOWER AN EXISTING FRAME AND COVER ON A PRE-CAST CONCRETE SEWER MANHOLE, REMOVE GRADE RINGS AND/OR RISER SHAFT UNITS. REPLACE THE EXISTING CONE WITH A PRECAST CONCRETE ECCENTRIC CONE UNIT IF THE EXISTING CONE IS EITHER CONCENTRIC, DETERIORATED, OR AS DIRECTED BY THE ENGINEER.
11. TO RAISE AN EXISTING FRAME AND COVER ON AN EXISTING BRICK SEWER MANHOLE, SEE NOTE 4 OR INSTALL A NEW MANHOLE AS DIRECTED BY THE ENGINEER.
12. LOWERING EXISTING BRICK SEWER MANHOLES: TO LOWER AN EXISTING FRAME AND COVER ON A BRICK SEWER MANHOLE, RESET THE FRAME AND COVER ON EXISTING BRICKS WITH MORTAR, REMOVE A SUFFICIENT AMOUNT OF BRICKS TO INSTALL A PRE-CAST CONCRETE ECCENTRIC CONE UNIT, OR INSTALL A NEW SEWER MANHOLE AS DIRECTED BY THE ENGINEER. DIAMETER OF CONE APERTURE SHALL MATCH THE DIAMETER OF THE FRAME AND COVER.
13. WHENEVER PRE-CAST CONCRETE COMPONENTS ARE TO BE PLACED ON ANY PART OF AN EXISTING BRICK MANHOLE, THESE COMPONENTS SHALL BE PLACED AND SECURED BY APPLYING MORTAR. THE DEPTH, WIDTH, AND THICKNESS OF THE MORTAR SHALL BE OF SUFFICIENT DIMENSIONS TO PROPERLY AND ADEQUATELY JOIN AND SECURE THE COMPONENTS.

REFERENCE:

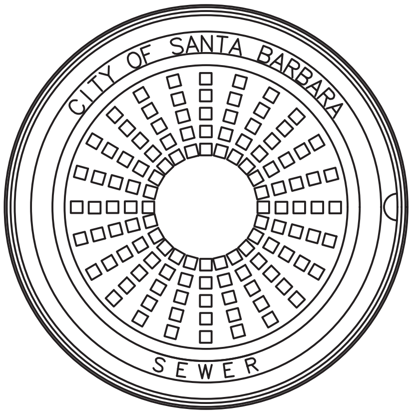
14. STANDARD MANHOLE FRAME AND COVER SHALL BE INSTALLED PER DETAIL S-MH7 UNLESS OTHERWISE DIRECTED.
15. PAVEMENT RESTORATION SHALL MEET REQUIREMENTS IN CITY STANDARD DETAILS U-01.0 - U-3.2.

SEAL OF THE CITY OF SANTA BARBARA CALIFORNIA

MANHOLE COLLAR AND ADJUSTMENT

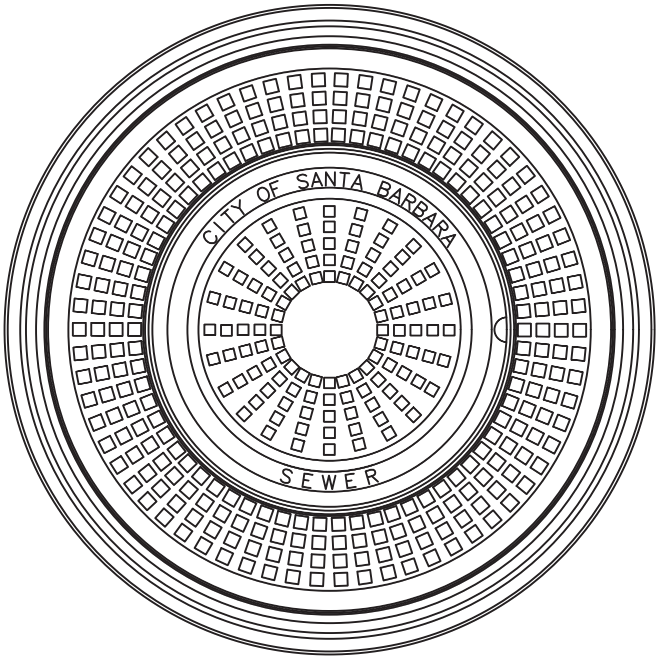
REV. DATE: 06/2020 DETAIL: S-MH6

APPROVED:
Brian D'Amour
CITY ENGINEER
Rebecca J Bjork
PUBLIC WORKS DIRECTOR



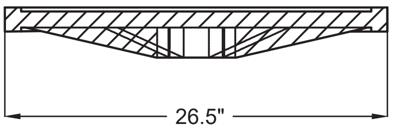
COVER

PLAN



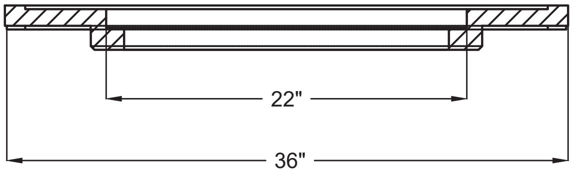
DUAL COVER

PLAN



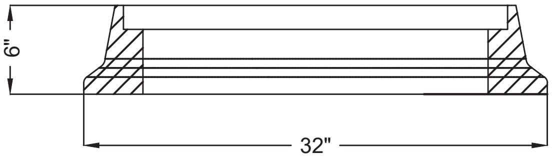
COVER

SECTION



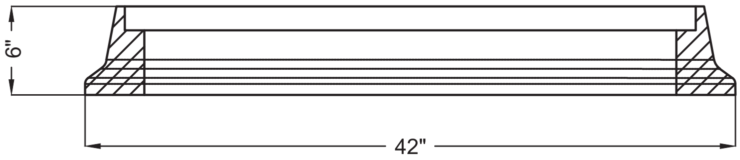
DUAL COVER

SECTION



FRAME

SECTION



DUAL FRAME

SECTION

NOTES:

1. SINGLE 26.5" FRAME AND COVER SHALL BE USED ON 48" DIAMETER MANHOLES.
2. 36" / 22" DUAL FRAME AND COVER SHALL BE USED ON 60" DIAMETER MANHOLES.
3. WHEN ON DRIVABLE SURFACES MINIMUM LOADING SHALL FOLLOW AASHTO H20 STANDARDS. ENGINEER TO DETERMINE IF GREATER LOAD CAPACITY IS NEEDED.

MATERIALS:

4. DUAL OR SINGLE SEWER MANHOLE FRAME AND COVER SHALL BE MANUFACTURED BY SOUTH BAY FOUNDRY (MODEL # SBF 1325 / 1310) OR APPROVED EQUAL.
5. WHEN RIM TO GRADE EXCEEDS 6", A LOCKING COMPOSITE MANHOLE FRAME AND COVER MANUFACTURED BY EJ COMPOSITES OR APPROVED EQUAL MAY BE SPECIFIED AT DISCRETION OF ENGINEER.

CONSTRUCTION:

6. MANHOLE COVERS TO BE DESIGNATED "CITY OF SANTA BARBARA SEWER" IN CASTING OR STAINLESS STEEL IDENTIFYING PLATE

REFERENCE:

7. FOR STANDARD MANHOLE STRUCTURES, SEE S-MH1 AND S-MH2.

MANHOLE FRAMES AND COVERS

REV. DATE: 06/2020

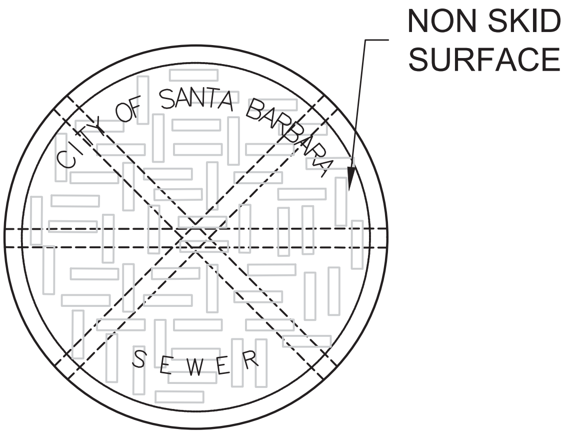
DETAIL: S-MH7

APPROVED:

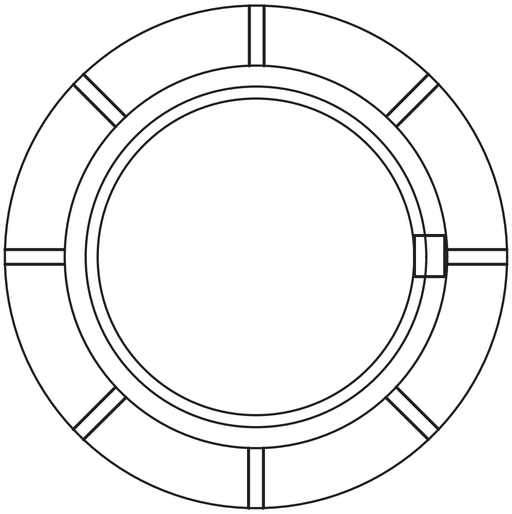
CITY ENGINEER

Rebecca J Bjork

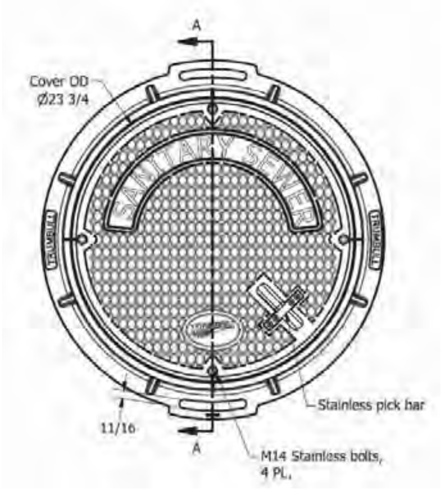
PUBLIC WORKS DIRECTOR



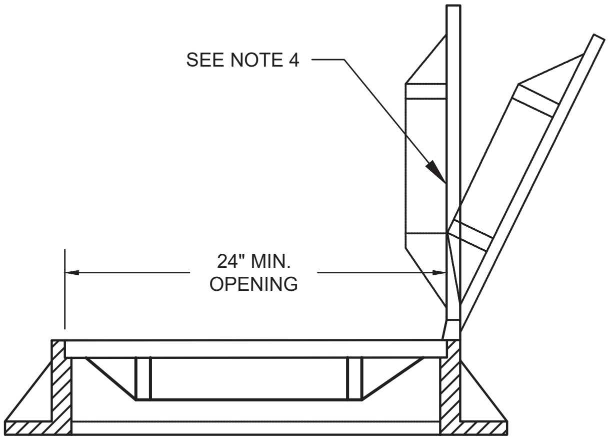
CAST IRON COVER



FRAME
PLAN



COMPOSITE FRAME AND COVER



FRAME & COVER
PROFILE

NOTES:

1. TO BE USED ON 24" DIAMETER ACCESS STRUCTURE (S-MH4) OR MANHOLES IN EASEMENT.
2. WHEN ON DRIVABLE SURFACES MINIMUM LOADING SHALL FOLLOW AASHTO H20 STANDARDS. ENGINEER TO DETERMINE IF GREATER LOAD CAPACITY IS NEEDED.
3. COMPOSITE FRAME AND COVER SET SHALL BE USED WHEN RIM ELEVATION IS ABOVE GRADE.

MATERIALS:

4. CAST IRON LOCKING MANHOLE FRAME AND COVER SHALL BE PAMREX MODEL #CDPA60EHSSE 24" WITH 316 STAINLESS STEEL LOCKING KIT OR APPROVED EQUAL.
5. COMPOSITE LOCKING MANHOLE FRAME AND COVERS SHALL BE TRUMBULL MODEL 367-5790/367-5468, EJ COMPOSITES 2600 SERIES WITH 316 STAINLESS STEEL LOCKING KIT OR APPROVED EQUAL.

CONSTRUCTION:

6. HINGE TO BE LOCATED ON SIDE OF ONCOMING TRAFFIC. OPENS TO 130 DEGREES, BLOCKS AT 90 DEGREES WHEN CLOSING.
7. LOCKING KIT TO BE ACTIVATED BY AN ASYMMETRIC FIVE-SIDED BOLT HEAD OR RANGER LOCK.
8. MANHOLE COVERS TO BE DESIGNATED "CITY OF SANTA BARBARA SEWER" IN CASTING OR APPROVED STAINLESS STEEL IDENTIFYING PLATE.

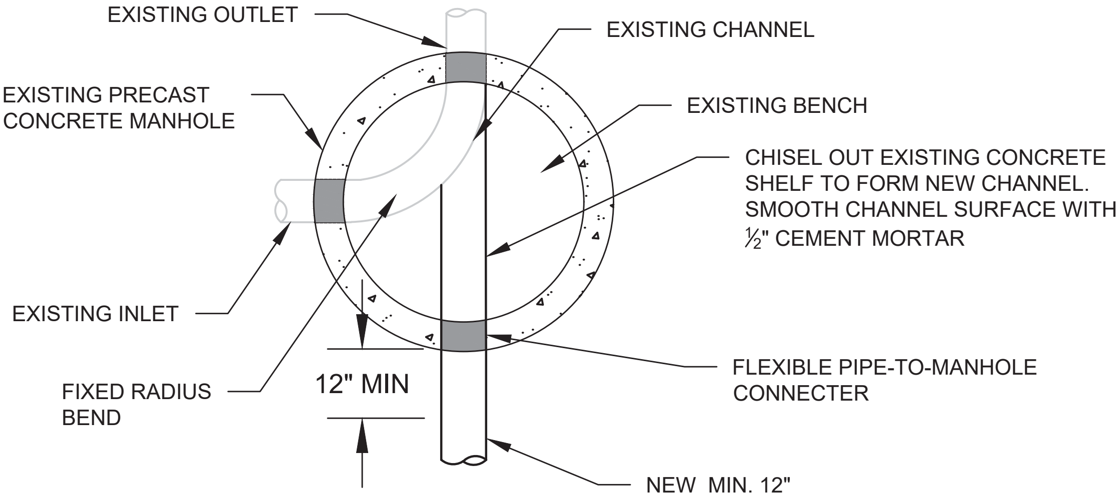
REFERENCE:

9. FOR SHALLOW ACCESS STRUCTURES, SEE S-MH3 AND S-MH4.

LOCKING MANHOLE FRAME AND COVER

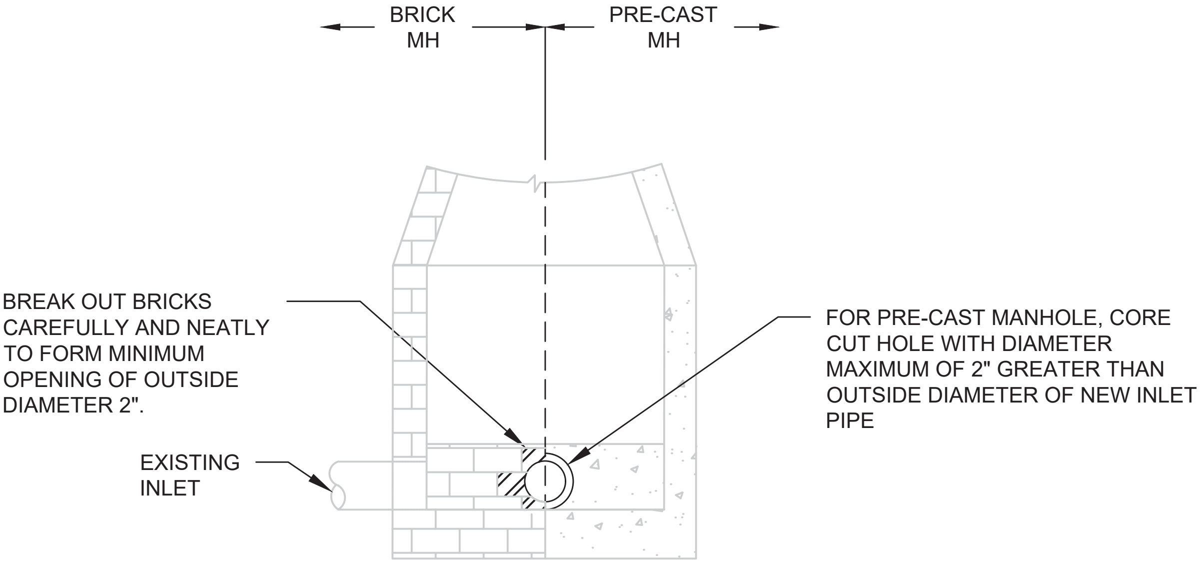
REV. DATE: 06/2020
DETAIL: S-MH8

APPROVED:
Brian D'Am
CITY ENGINEER
Rebecca J Bjork
PUBLIC WORKS DIRECTOR



MANHOLE

PLAN



MANHOLE

PROFILE

NOTES:

1. IF BRICK MANHOLE, BREAK OUT BRICKS REQUIRED TO OPEN CONNECTION.
2. INVERT ELEVATION OF NEW CONNECTION AT THE INSIDE FACE OF MANHOLE TO BE AT LEAST 0.10 FEET HIGHER THAN EXISTING OUTLET INVERT ELEVATION.
3. IF PRE-CAST MANHOLE, MAKE CORE CUT WITH EQUIPMENT SPECIALLY DESIGNED TO CUT A SMOOTH HOLE WITHOUT DAMAGE TO THE REINFORCING STEEL OR STRUCTURE.

MATERIALS:

4. KOR-N-SEAL BOOTS OR APPROVED EQUAL TO BE INSTALLED AROUND PIPE.
5. ALL PIPE AND FITTINGS SHALL BE PVC SDR-35 PER ASTM 3034.

CONSTRUCTION:

6. PIPE STUBS SHALL BE 12" MINIMUM LENGTH FROM OUTSIDE OF MANHOLE WALL, UNLESS OTHERWISE DIRECTED BY THE CITY ENGINEER.

REFERENCE:

7. FOR INTERNAL/EXTERNAL DROPS SEE S-MH13 OR S-MH14

SEAL OF THE CITY OF SANTA BARBARA CALIFORNIA

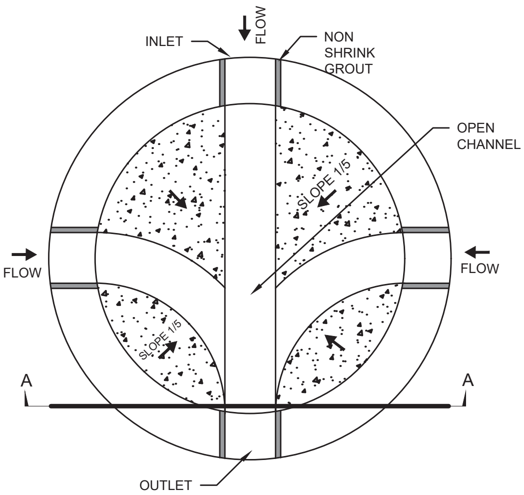
CONNECTION TO EXISTING MANHOLE

REV. DATE: 06/2020
DETAIL: S-MH9

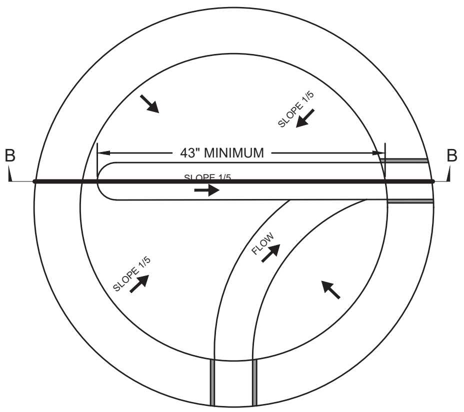
APPROVED:

Brian D'Amour
CITY ENGINEER

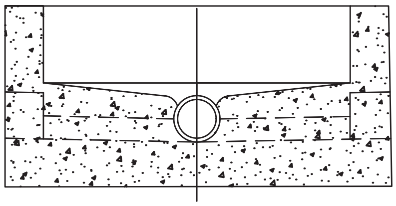
Rebecca J Bjork
PUBLIC WORKS DIRECTOR



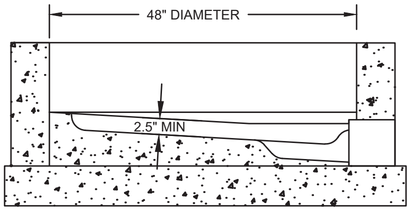
MANHOLE BASE A
PLAN



MANHOLE BASE B
PLAN



MANHOLE BASE A
SECTION A-A



MANHOLE BASE B
SECTION B-B

NOTES:

1. BASE B APPLIES WHEN END OF LINE MANHOLE OR SINGLE INLET/SINGLE OUTLET CONDITION, OTHERWISE BASE A APPLIES.
2. CAMERA CHANNEL REQUIRED FOR ALL 6", 8", AND 10" COLLECTORS FOR OFF-SETS BETWEEN 80 AND 100 DEGREES.

MATERIALS:

3. BASE SHALL BE BEDDED ON A MINIMUM OF 6" OF WELL GRADED, $\frac{3}{4}$" ANGULAR CRUSHED ROCK OVER NATIVE MATERIAL THAT IS EITHER UNDISTURBED OR COMPACTED PER GREENBOOK STANDARDS, WITH A RELATIVE COMPACTION ≥ 95%

CONSTRUCTION:

4. BENCH AND CHANNEL SHALL BE COMPLETED IN A SINGLE POUR USING CLASS 560-C-3250 CONCRETE WITH STEEL TROWEL FINISH.
5. ANY CHANGE IN DIRECTION SHALL BE A FIXED RADIUS CURVE EXTENDING FROM THE INLET WALL TO THE OUTLET WALL.
6. INSIDE SURFACE OF INVERT AND AREA BETWEEN PIPE CONNECTION AND CHANNEL SHALL BE FREE FROM GAPS, HOLES AND SHARP EDGES.
7. ALL INLETS SHALL BE DESIGNED AND INSTALLED SUCH THAT THE TOP OF PIPE ELEVATIONS AND INVERTS MATCH AS MUCH AS POSSIBLE.

REFERENCE:

N/A

SEAL OF THE CITY OF SANTA BARBARA CALIFORNIA

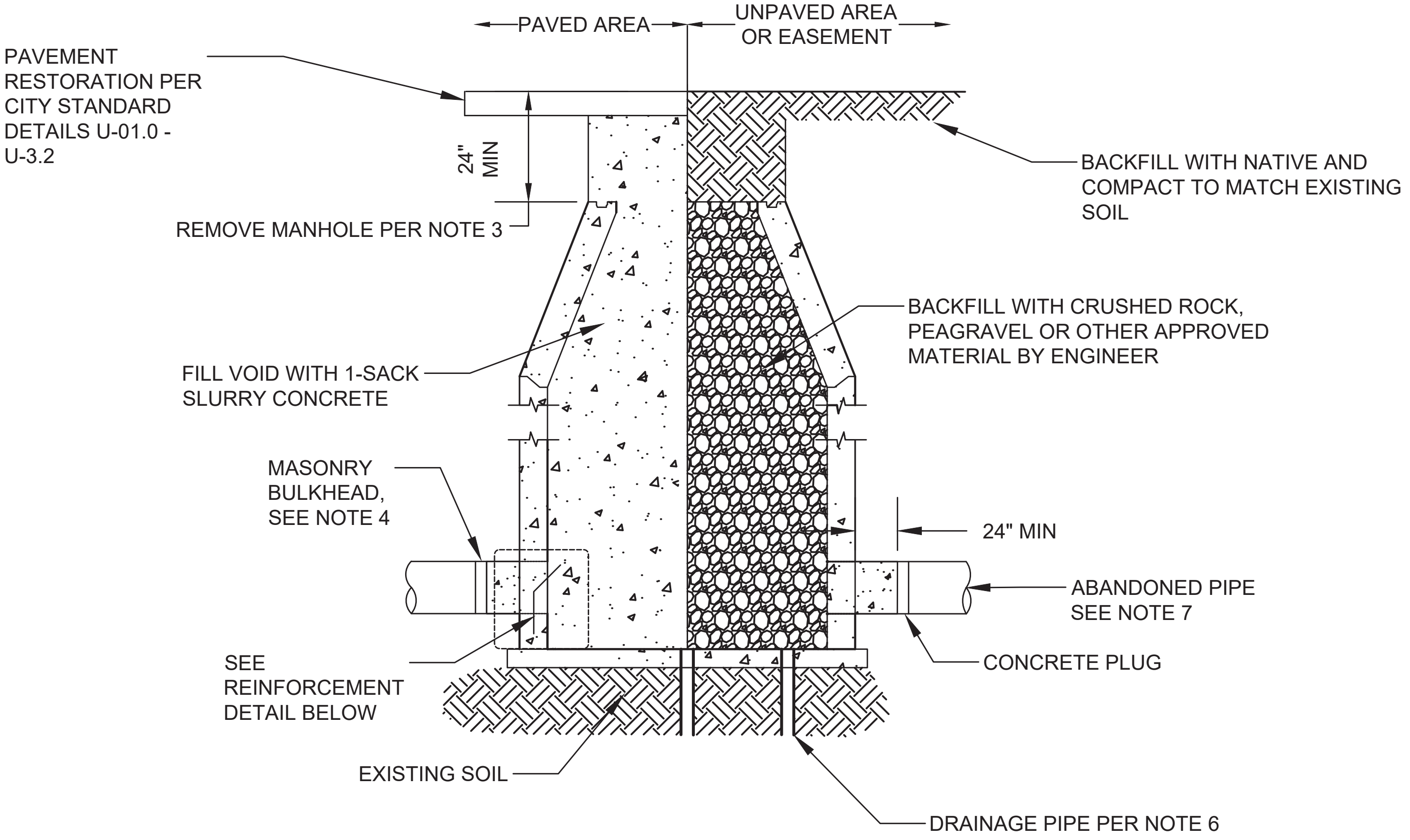
CAST IN PLACE MANHOLE BASE

REV. DATE:06/2020 DETAIL:S-MH10

APPROVED:

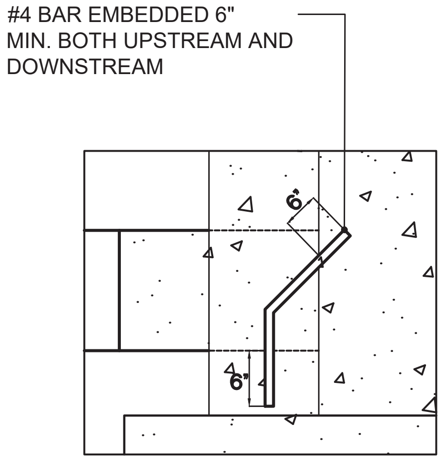
CITY ENGINEER

Rebecca J Bjork
PUBLIC WORKS DIRECTOR



MANHOLE ABANDONMENT

SECTION



REINFORCEMENT

DETAIL

NOTES:
1. N/A

MATERIALS:
2. CONCRETE PLUG SHALL BE CLASS 520-C-3250.

CONSTRUCTION:
3. REMOVE MANHOLE TO MIN. 24" BELOW FINISHED GRADE. SALVAGE FRAME, COVER AND CONCRETE GRADE RINGS AND DELIVER TO THE CITY YARD.
4. FOR SEWERS 18" AND LARGER, PROVIDE MASONRY BULKHEAD IN LIEU OF CONCRETE PLUG.
5. PLUG WITH SUITABLE MATERIAL TO HOLD CONCRETE OR GRAVEL.
6. INSTALL THREE, EQUALLY SPACED, 2" DIAMETER DRAINAGE IN THE CONCRETE BASE WHEN ABANDONING MANHOLE IN UNPAVED AREAS.

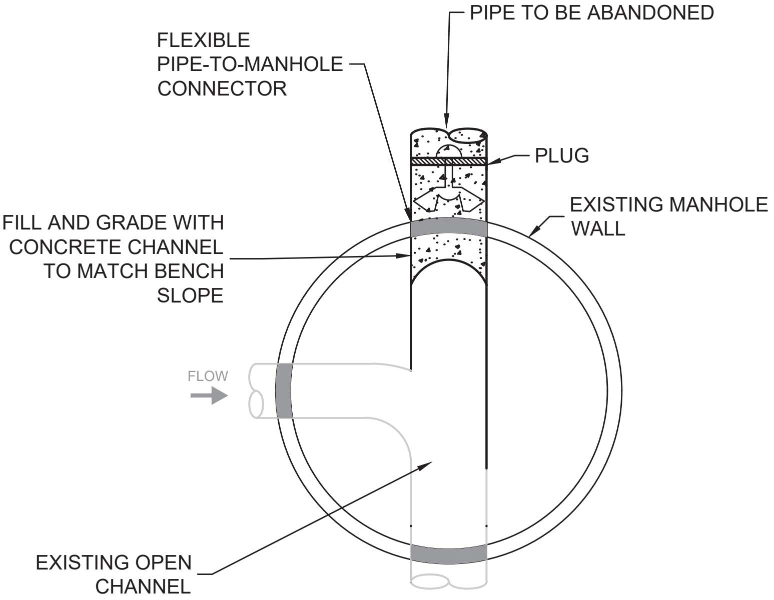
REFERENCE:
7. SEE S-MH12 FOR PIPE ABANDONMENT.
8. PAVEMENT RESTORATION SHALL MEET REQUIREMENTS IN CITY STANDARD DETAILS U-01.0 - U-3.2.

SEAL OF THE CITY OF SANTA BARBARA CALIFORNIA

MANHOLE ABANDONMENT

REV. DATE: 06/2020
DETAIL: S-MH11

APPROVED:
Brian D'Amour
CITY ENGINEER
Rebecca J Bjork
PUBLIC WORKS DIRECTOR



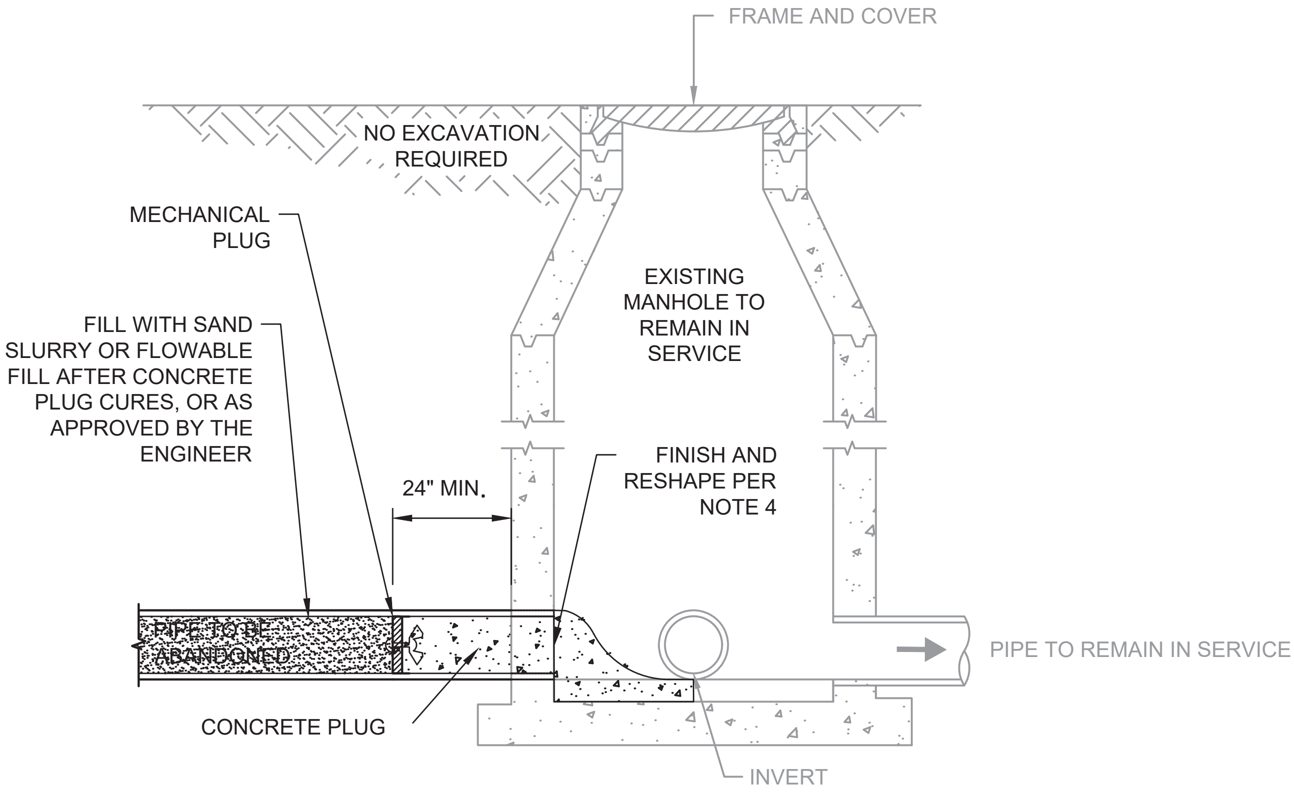
MANHOLE
PLAN

NOTES:
1. FOR SEWERS LESS THAN OR EQUAL TO 15" DIAMETER, ABANDON SEWER AS SHOWN.
2. FOR SEWERS GREATER THAN 15" DIAMETER, CONSULT WITH THE ENGINEER.
3. ENCLOSED OR PARTIALLY ENCLOSED SPACES SHALL BE CITY ENFORCED AND CONSIDERED PERMIT-REQUIRED CONFINED SPACES UNTIL THE PRE-ENTRY PROCEDURES DEMONSTRATE OTHERWISE.

MATERIALS:
4. CONCRETE PLUG SHALL BE CLASS 520-C-2500.

CONSTRUCTION:
5. RESHAPE AND FILL EXISTING CHANNEL TO PROVIDE SMOOTH CONTOUR BETWEEN INCOMING AND OUTGOING PIPES.

REFERENCE:
6. SEE S-MH11 FOR MANHOLE ABANDONMENT.

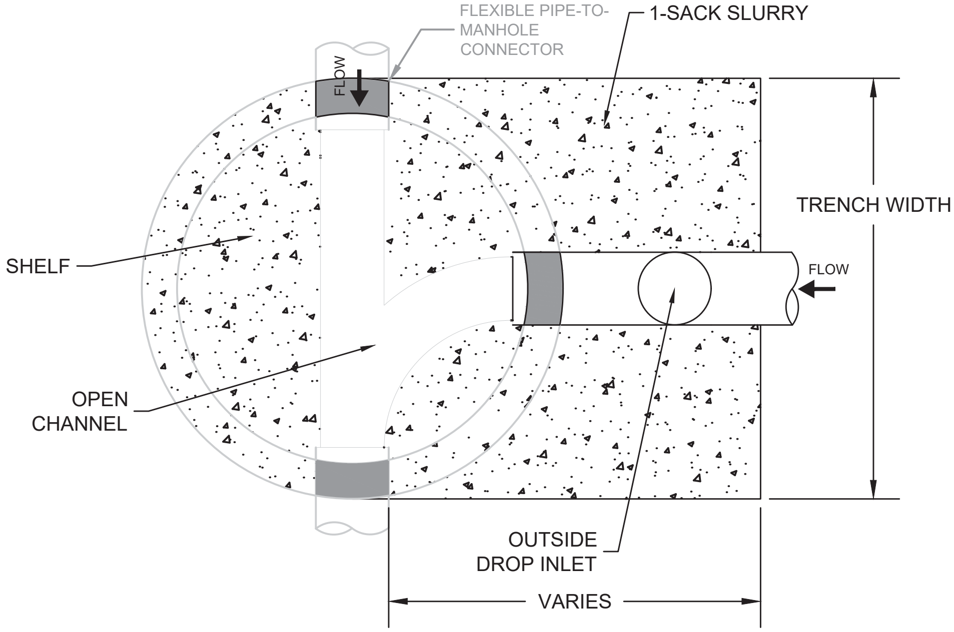


MANHOLE
PROFILE

SEAL OF THE CITY OF SANTA BARBARA CALIFORNIA

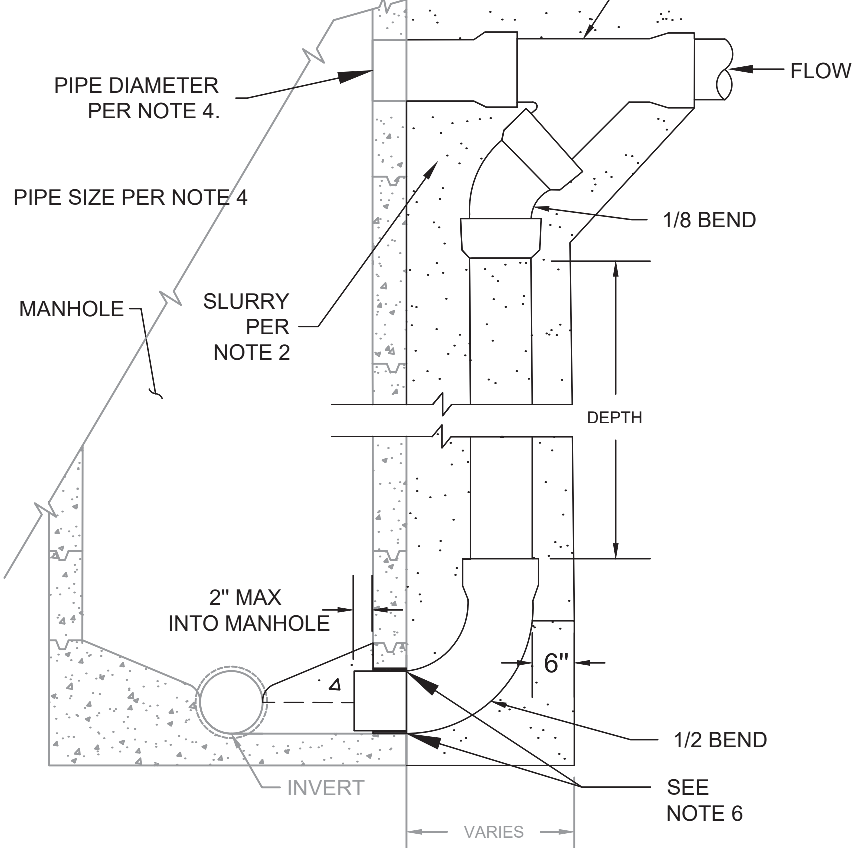
ABANDONMENT OF SEWER PIPE

REV. DATE: 06/2020
DETAIL: S-MH12
APPROVED:
CITY ENGINEER
Rebecca J Bjork
PUBLIC WORKS DIRECTOR



MANHOLE

PLAN



OUTSIDE DROP INLET

SECTION

NOTES:

1. OUTSIDE DROP SEWER CONNECTION TO BE USED AS DETERMINED BY THE ENGINEER.
2. SLURRY TO FINISH FLUSH TO STRUCTURE WALL.

MATERIALS:

3. ALL PIPE AND FITTINGS SHALL BE PVC SDR-35 PER ASTM 3034.

CONSTRUCTION:

4. CONNECTOR PIPE SHALL BE OF SAME DIAMETER AS SEWER PIPE.
5. TO FIT AS CLOSE AS POSSIBLE TO MANHOLE WALL.
6. SEAL DROP PENETRATION WITH NON-SHRINK GROUT OR WATERSTOP.

REFERENCE:

7. EXCEPT AS MODIFIED BY THIS DETAIL, MANHOLE TO CONFORM TO DETAIL S-MH1 OR S-MH2.

SEAL OF THE CITY OF SANTA BARBARA CALIFORNIA

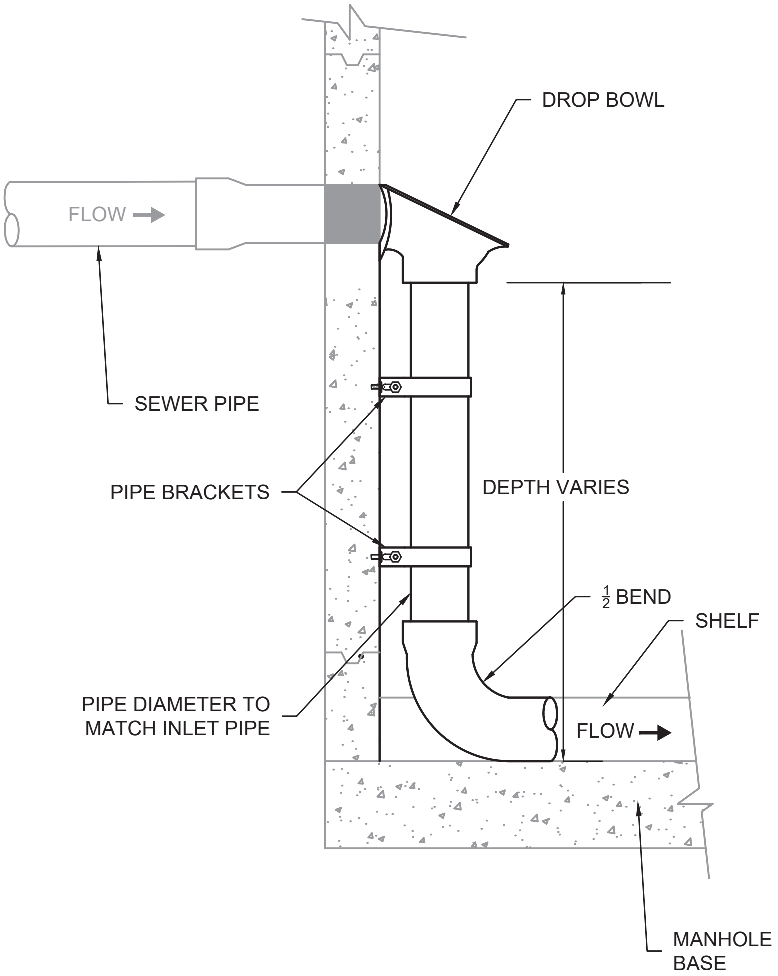
OUTSIDE DROP INLET CONNECTION

REV. DATE: 06/2020
DETAIL: S-MH13

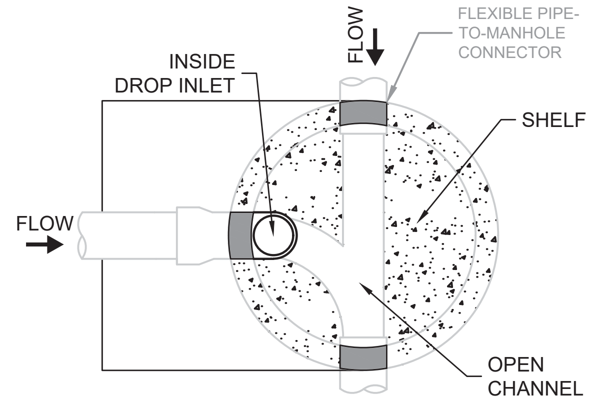
APPROVED:

CITY ENGINEER

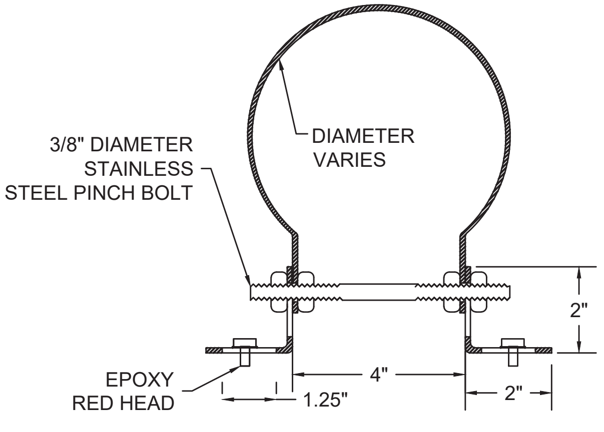
Rebecca J Bjork
PUBLIC WORKS DIRECTOR



INSIDE DROP INLET
PROFILE



MANHOLE
PLAN



PIPE BRACKET
DETAIL

NOTES:

1. TO BE USED ON NEW CONSTRUCTION OR WHEN EXTERNAL DROP IS TO BE ABANDONED.
2. NOT RECOMMENDED FOR USE IN AREAS WITH HIGH HYDROGEN SULFIDE OR HIGH FLOW / VELOCITY.

MATERIALS:

3. CONNECTOR PIPE SHALL BE OF SAME DIAMETER AS SEWER PIPE.
4. ALL PIPE AND FITTINGS SHALL BE PVC SDR-35 PER ASTM 3034.
5. DROP BOWL SHALL BE TYPE "A" OR "B" TO MATCH SEWER PIPE SIZE AND CLAMPING BRACKET SYSTEM AS MANUFACTURED BY RELINER-DURAN, INC. OR APPROVED EQUAL. ALL MECHANICAL COMPONENTS SHALL BE 316 SS.
6. CONSTRUCTION:
7. STANDARD BRACKET SIZES TO FIT 6" AND 8" PVC SEWER PIPE SDR-35 AND SPACED EVERY 4 FEET.

REFERENCE:

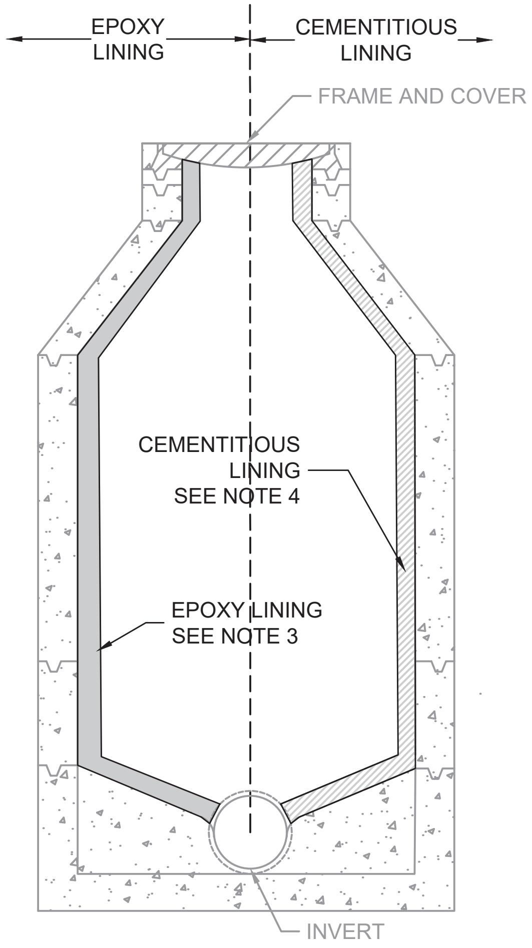
8. SEE S-MH1 AND S-MH2 FOR MANHOLE CONSTRUCTION DETAILS.

SEAL OF THE CITY OF SANTA BARBARA CALIFORNIA

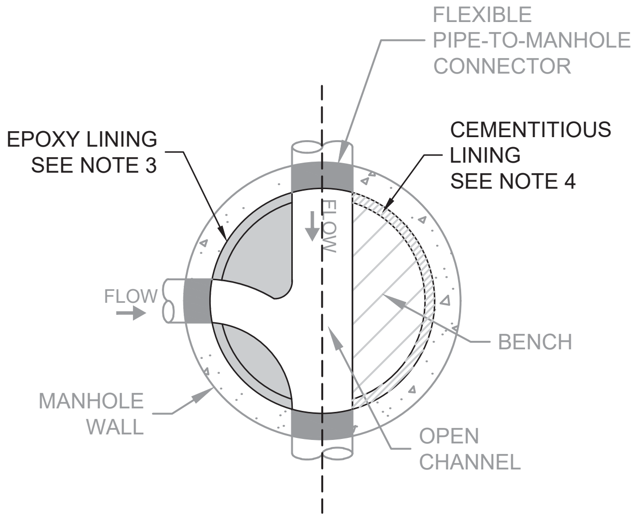
INSIDE DROP INLET CONNECTION

REV. DATE: 06/2020
DETAIL: S-MH14

APPROVED:
Brian D'Am
CITY ENGINEER
Rebecca J Bjork
PUBLIC WORKS DIRECTOR



MANHOLE LINING
PROFILE



MANHOLE LINING
PLAN

NOTES:

1. FOR CALCULATION PURPOSES, ASSUME GROUNDWATER IS AT ROAD/GROUND SURFACE.
2. WHEN SPECIFIED, EPOXY MAY BE REQUIRED IN ADDITION TO CEMENTITIOUS LINING.

MATERIALS:

3. EPOXY LINING MATERIAL PROPERTIES SHALL MEET OR EXCEED 6,000 PSI TENSILE STRENGTH, 10,000 PSI COMPRESSIVE STRENGTH, AND 11,000 PSI FLEXURAL STRENGTH AND SHALL BE WARREN ENVIRONMENTAL OR APPROVED EQUAL.
4. CEMENTITIOUS LINING SHALL BE "ECOCAST" MANUFACTURED BY IPR OR APPROVED EQUAL.

CONSTRUCTION:

5. APPROVED LINING METHOD SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATION AND BY A CERTIFIED INSTALLER.
6. ANY EXISTING LADDER RUNGS SHALL BE GROUND BACK TO 2" PAST FACE OF MANHOLE WALL.
7. REPAIR ANY DAMAGE TO CONCRETE PRIOR TO APPLYING COATING.
8. DURING PREPARATION OF THE STRUCTURE, ANY ACTIVE INFILTRATION SHALL BE PLUGGED USING AN ACRYLIC OR POLYURETHANE GROUT.
9. MANHOLE SHALL BE CLEAN OF ROOTS, GREASE, DEBRIS, PRESSURE WASHED, AND DRY PRIOR TO EPOXY LINING FOR MAXIMUM ADHERENCE TO MANHOLE WALL.
10. IF INTERNAL DROP IS PRESENT IN MANHOLE, REMOVE PRIOR TO LINING AND REINSTALL AFTER LINING IS COMPLETE.
11. EPOXY LINING SHALL BE SPARK AND PULL TESTED PER ASTM D4541 AND REPAIRED 2" PAST EDGE OF SCORE AND RESULTS OF TESTING SHALL BE SUBMITTED TO PUBLIC WORKS INSPECTOR FOR REVIEW.
12. OVERLAP MINIMUM 2" INTO FRAME AND COVER, EXISTING PIPE PENETRATIONS UNLESS OTHERWISE DIRECTED BY ENGINEER.

REFERENCE:

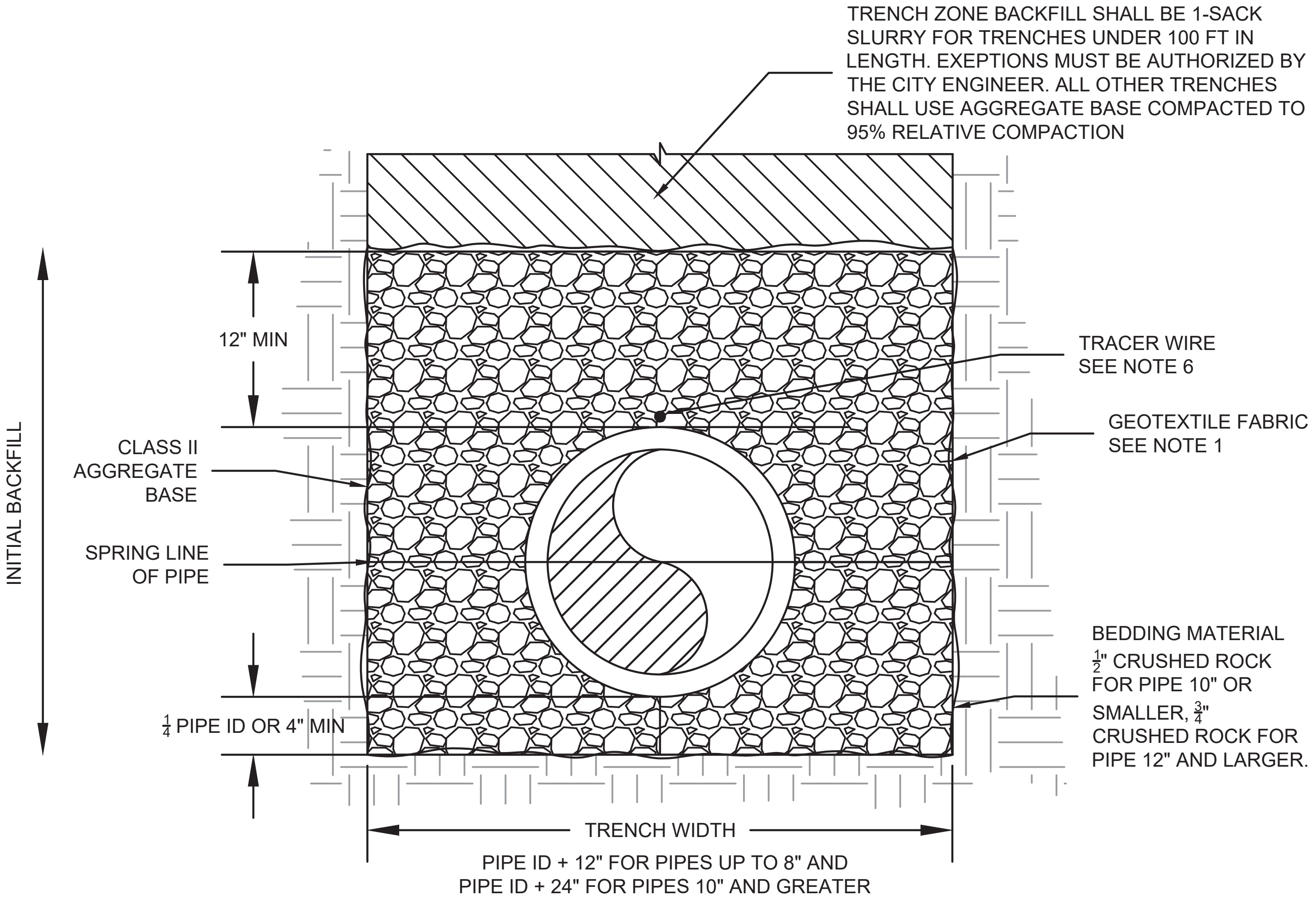
13. MANHOLE SHALL BE CONSTRUCTED PER DETAIL S-MH1, S-MH2, OR S-MH3.
14. STANDARD MANHOLE FRAME AND COVER SHALL BE CONSTRUCTED PER DETAIL S-MH7 OR S-MH8.

SEAL OF THE CITY OF SANTA BARBARA CALIFORNIA

MANHOLE COATING AND LINING SYSTEMS

REV. DATE: 06/2020
DETAIL: S-MH15

APPROVED:
Brian D'Amour
CITY ENGINEER
Rebecca J Bjork
PUBLIC WORKS DIRECTOR



RIGID AND FLEXIBLE SEWER PIPE BEDDING
SECTION

NOTES:

1. IN AREAS WHERE NORMAL GROUNDWATER LEVELS ARE ABOVE CROWN OF PIPE, ENCASE INITIAL BACKFILL WITH GEOTEXTILE FABRIC MIN. 18" OVERLAP.

MATERIALS:

2. BEDDING FOR RIGID PIPES SHALL CONFORM TO ASTM C12-81 OR APPROVED EQUAL. BEDDING FOR FLEXIBLE PIPES SHALL CONFORM TO ASTM D2321-74 OR APPROVED EQUAL.
3. HAUNCHING FOR BOTH RIGID AND FLEXIBLE PIPE MUST BE COMPACTED TO A RELATIVE DENSITY > 70% OF SELECT MATERIAL. HEIGHT OF THE COMPACTED SOIL SHALL BE 0.37 O.D. FOR RIGID PIPE OR 0.7 O.D. FOR FLEXIBLE PIPE.
4. MOST SOILS MAY BE USED UNDER THE BEDDING EXCEPT FOR THOSE WITH ROCK PARTICLES GREATER THAN 18", AND SOILS WITH PEAT OR OTHER ORGANIC MATERIALS.
5. FOR NEW INSTALLATION OF NON-METALIC ONLY SEWER PIPES: A 12 GAUGE INSULATED COPPER TRACER WIRE. WRAP AROUND EACH SERVICE FOR DIRECT CONTACT. SECURE WIRE ON PIPE BY TAPING AROUND PIPE EVERY 10 FEET.

CONSTRUCTION:

6. PROVIDE SUITABLE FOUNDATION AS REQUIRED BY THE ENGINEER IN AREAS OF UNSTABLE TRENCH BOTTOM, WET CONDITIONS, OVER-EXCAVATION, ROCKY TRENCH BOTTOM ELSEWHERE AS DIRECTED BY THE ENGINEER.
7. TRENCH WALL SUPPORT SHALL CONFORM TO CURRENT OSHA REQUIREMENTS.
8. BACKFILL SHALL BE CAREFULLY PLACED TO ENSURE ALL EXCAVATED VOIDS AND HAUNCH AREAS ARE FILLED AND PROVIDE UNIFORM SUPPORT. COMPACT TO 95% RELATIVE COMPACTION.
9. PIPE ZONE COMPACTED TO 95% RELATIVE COMPACTION PER ASTM D1557.
10. DETECTABLE TAPE TO BE PLACED A MINIMUM OF 6" TO A MAXIMUM OF 12" BELOW THE STRUCTURAL ROAD SECTION.

REFERENCE:

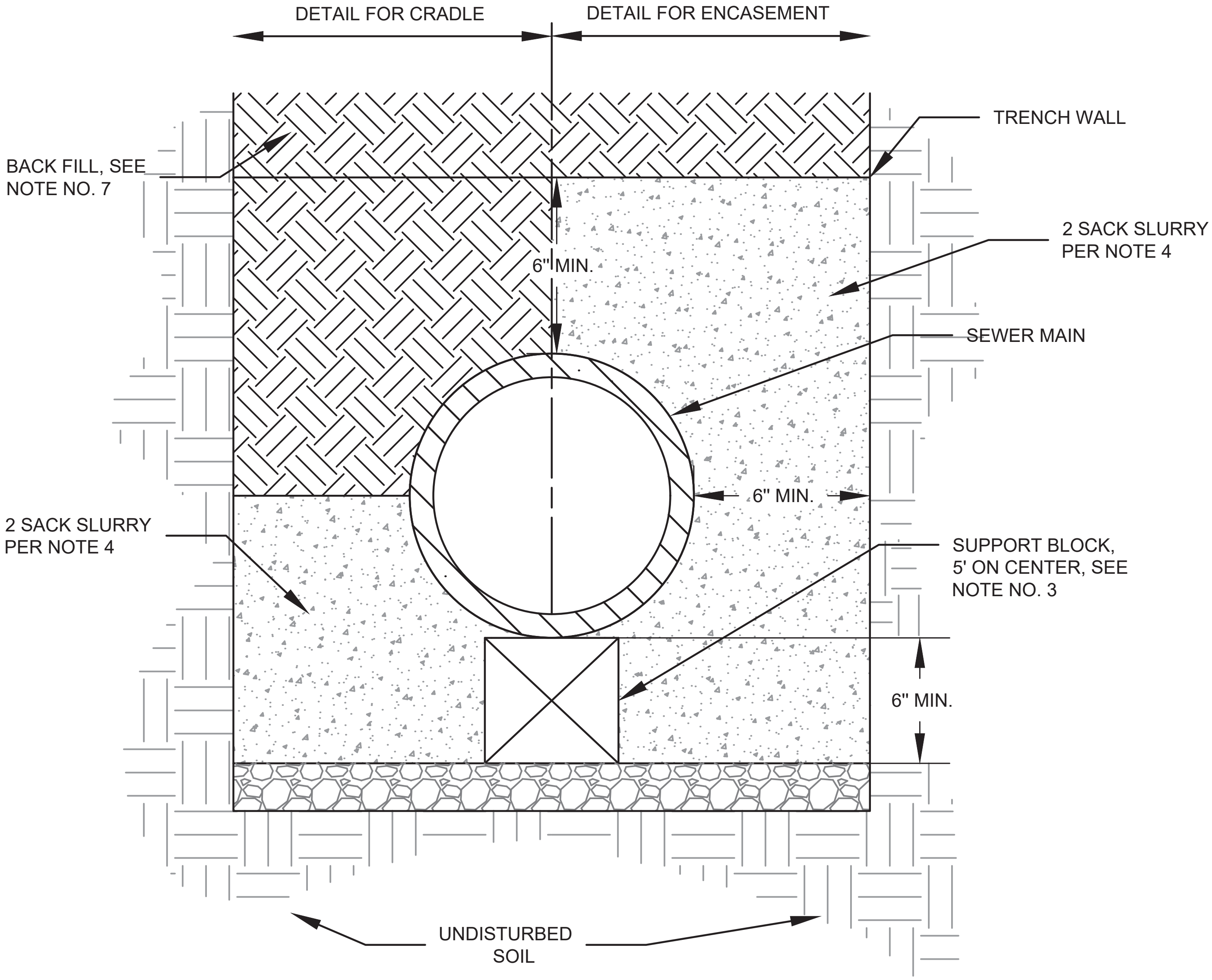
11. SAWCUTTING DETAILS AND TRENCH PAVING SHALL MEET REQUIREMENTS IN CITY STANDARD DETAIL U-3.0 THROUGH 3.2

SEAL OF THE CITY OF SANTA BARBARA CALIFORNIA

SEWER PIPE BEDDING, HAUNCH SUPPORT AND BACKFILL

REV. DATE: 06/2020
DETAIL: S-SP1

APPROVED:
Brian D'Am
CITY ENGINEER
Rebecca J Bjork
PUBLIC WORKS DIRECTOR



MAIN CRADLE AND ENCASEMENT

SECTION

NOTES

1. PIPE SHALL BE ENCASED WITH 2-SACK SLURRY WHEN LESS THAN 36" COVER. CRADLE DETAIL SHALL BE USED AS DIRECTED BY THE ENGINEER WHEN THE TRENCH WIDTH AT THE UPPER LIMIT OF THE PIPE ZONE EXCEEDS THE MAX WIDTH SPECIFIED BY PIPE MANUFACTURER.

MATERIALS:

2. FLEXIBLE PIPE MATERIALS SUCH AS HDPE MAY REQUIRE ENCASEMENT, AS DIRECTED BY THE ENGINEER.
3. SUPPORT BLOCKS MAY BE CONCRETE BLOCK OR BRICK.

CONSTRUCTION:

4. CRADLE AND ENCASEMENT TO BE PLACED ON $\frac{3}{4}$" CRUSHED ROCK, OR AS DIRECTED BY THE ENGINEER.

REFERENCE:

5. REFER TO S-SP1, U-01.0 AND U-01.1 FOR SPECIFICATIONS OF TRENCHING, BACKFILLING AND COMPACTING OF PIPELINE TRENCHES.

SEAL OF THE CITY OF SANTA BARBARA CALIFORNIA

CONCRETE CRADLE AND ENCASEMENT

REV. DATE: 06/2020

DETAIL: S-SP2

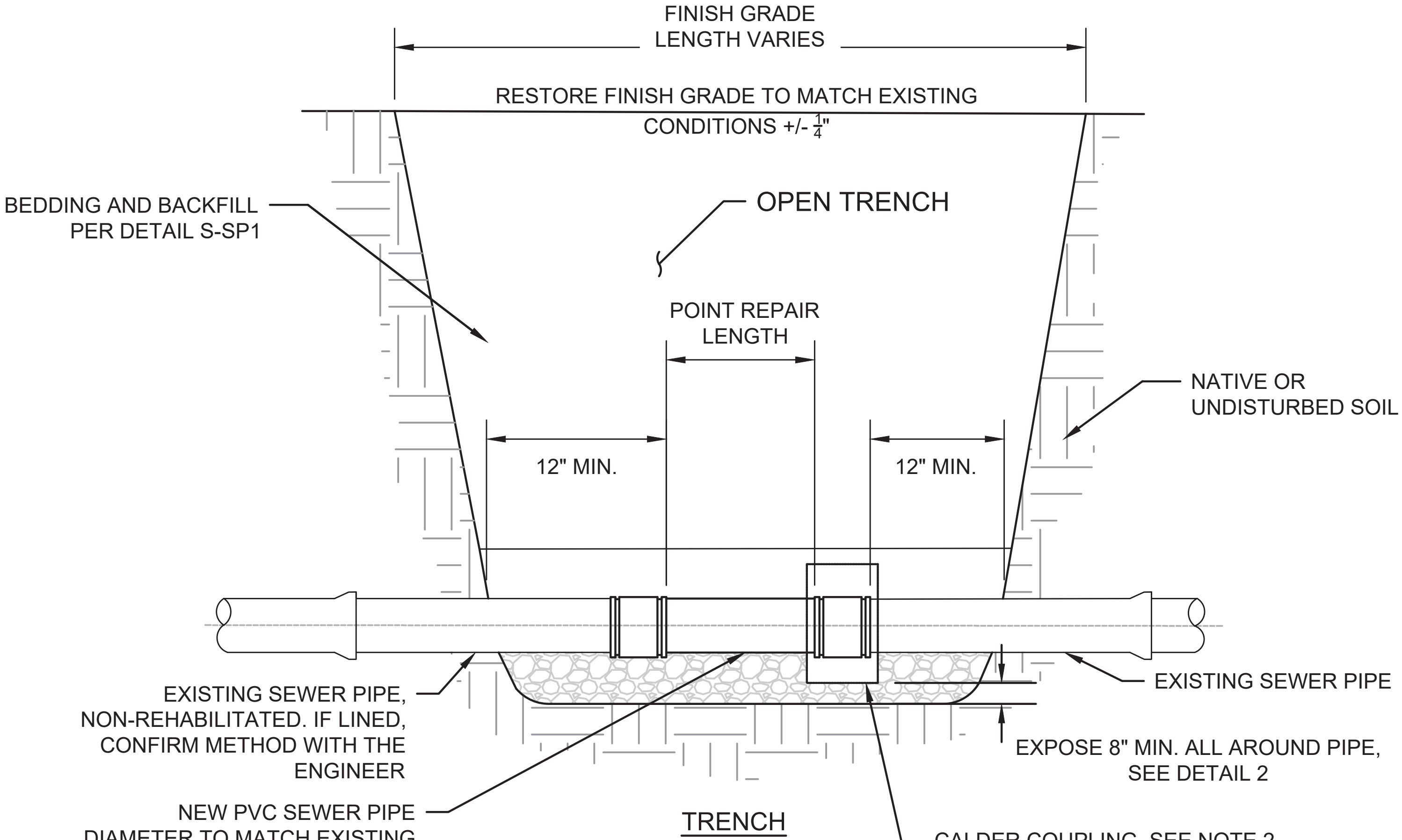
APPROVED:

Brian D'Amour

CITY ENGINEER

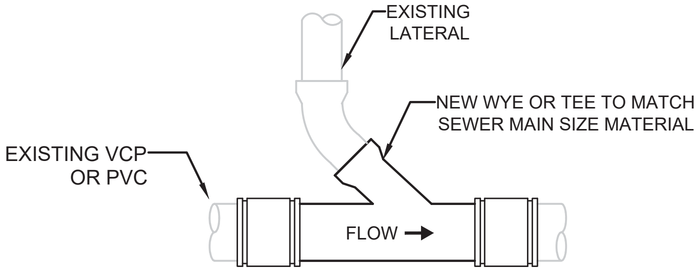
Rebecca J Bjork

PUBLIC WORKS DIRECTOR



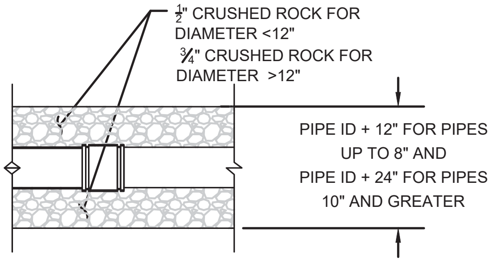
TRENCH

PROFILE



NEW OR REPLACED CONNECTION
(WYE OR TEE)

DETAIL 1



BEDDING AND BACKFILL

DETAIL 2

NOTES

1. ALL LATERAL CONNECTION INSTALLATIONS/REPLACEMENTS REQUIRE A PUBLIC WORKS PERMIT AND MUST BE COMPLETED BY CITY CONTRACTOR. THE STANDARD POINT REPAIR DETAIL SHALL BE USED FOR LATERAL CONNECTION ABANDONMENTS WHEN DIRECTED.

MATERIALS:

2. 316 STAINLESS STEEL COMPRESSION BANDS AND SHEAR RINGS AS MANUFACTURED BY MISSION PRODUCTS, FERNCO JOINTS INC., OR APPROVED EQUAL (TYP. EACH END OF POINT REPAIR). COUPLING TO BE A MINIMUM OF 6" WIDE.
3. ALL PIPE AND FITTINGS SHALL BE PVC SDR-35 PER ASTM 3034.
4. NEW SEWER PIPE TO MATCH EXISTING SEWER PIPE MATERIAL AND DIAMETER.

CONSTRUCTION:

5. CONTRACTOR SHALL EXCAVATE TRENCH SO THAT MIN. 12" ON EITHER SIDE OF REPAIR IS EXPOSED. IF REPAIR INVOLVES A WYE, CONTRACTOR SHALL EXPOSE MIN. 24" ON EITHER SIDE OF WYE.
6. PLACE AND WORK BY HAND OR OTHER APPROVED METHOD TO ENSURE ALL EXCAVATED VOIDS AND HAUNCH AREAS ARE FILLED AND PROVIDE UNIFORM SUPPORT. COMPACT CRUSHED ROCK ALL AROUND EXPOSED PIPE.
7. CONTRACTOR TO INSPECT NEARBY EXISTING SEWER PIPE FOR DEFECTS. IF ANY EXIST, NOTIFY THE CITY IMMEDIATELY.

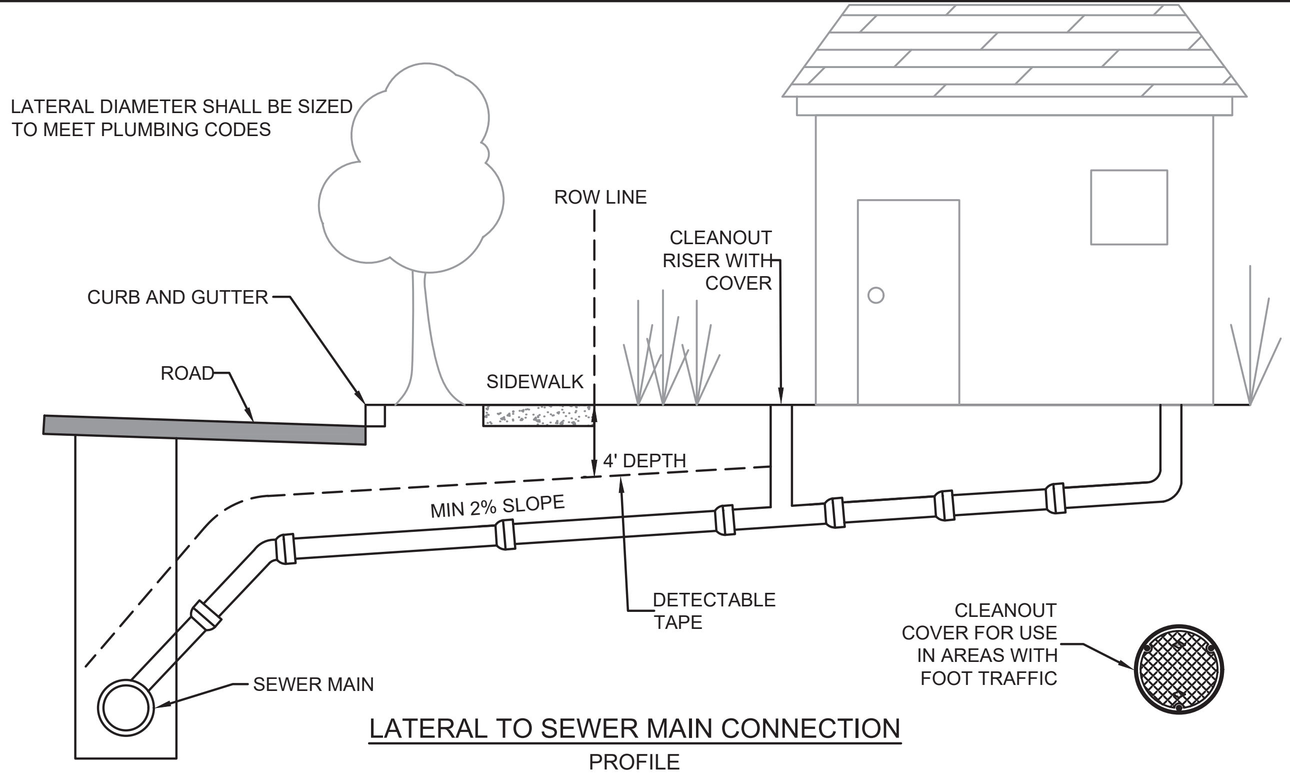
REFERENCE:

8. FOR CONNECTIONS REPLACEMENTS, SEE DETAILS S-SL2 THROUGH S-SL6.
9. SAWCUTTING DETAILS AND TRENCH PAVING SHALL MEET REQUIREMENTS IN CITY STANDARD DETAIL U-3.0 THROUGH 3.2

STANDARD POINT REPAIR

REV. DATE: 06/2020 DETAIL: S-SP3

APPROVED:
Brian D'Amour
CITY ENGINEER
Rebecca J Bjork
PUBLIC WORKS DIRECTOR



LATERAL TO SEWER MAIN CONNECTION

PROFILE

NOTES

1. PER THE MUNICIPAL SECTION 14.44.160, THE PRIVATE SEWER LATERAL, PRIVATE SEWAGE DISPOSAL SYSTEM OR INDUSTRIAL LIQUID WASTE PRE-TREATMENT FACILITY IS THE RESPONSIBILITY OF EACH PROPERTY OWNER WHOSE PROPERTY IS CONNECTED TO THE CITY SEWER SYSTEM.
2. FACTORY-FABRICATED CONNECTION FITTINGS (WYES OR TEES) ARE REQUIRED FOR ALL STANDARD SEWER LATERALS. LATERALS WILL ONLY BE PERMITTED TO TIE INTO MANHOLES WITH PRE-APPROVAL BY WASTEWATER
3. LATERALS SHALL BE CONNECTED TO THE SEWER MAIN DOWNSTREAM OF AN EXISTING MANHOLE.
4. CONTACT THE PUBLIC WORKS PERMIT COUNTER AT 630 GARDEN STREET OR (805) 564-5388 TO OBTAIN PERMITS FOR ALL SEWER LATERAL CONNECTION ("TAP") INSTALLATIONS.
5. ALL SEWER LATERAL IMPROVEMENTS IN THE PUBLIC RIGHT OF WAY AND CONNECTION INSTALLATIONS REGARDLESS OF LOCATION SHALL REQUIRE A PERMIT FROM THE CITY PUBLIC WORKS DEPARTMENT.

MATERIALS:

6. SEWER LATERAL PIPE AND FITTINGS SHALL BE BELL AND SPIGOT SDR-35 PVC, HDPE DR-17 OR AN APPROVED EQUAL BY THE ENGINEER. NON-JOINTED MATERIALS ARE FAVORABLE TO REDUCE THE POTENTIAL FOR INFILTRATION.
7. ALL CAULDER COUPLINGS SHALL BE "STRONG BACKS," A BAND SEAL TYPE COUPLING WITH AN OUTSIDE STAINLESS STEEL SHEAR RING.
8. SEWER LATERAL PIPE SHALL HAVE A MINIMUM DIAMETER OF 4", AND A MINIMUM SLOPE OF 2%. GRADE SHALL BE UNIFORM FROM MAIN TO PROPERTY LINE.
9. FACTORY FABRICATED WYES, TEES OR SADDLES ARE REQUIRED AND SHALL HAVE A MIN. DISTANCE OF 24" BETWEEN SERVICE CONNECTIONS.
10. BEDDING AND BACKFILL FOR LATERALS SHALL MEET THE SAME REQUIREMENTS FOR SEWER MAINS. SEE TRENCH BEDDING AND BACKFILLS STANDARD DETAILS S-01.0 AND S-01.1. NEW WYES SHALL BE SUPPORTED BY $\frac{1}{2}$" CRUSHED ROCK, 4" MIN.
11. FOR PATHWAYS WHERE FOOT TRAFFIC IS LIKELY, LATERAL CLEANOUTS SHALL BE JAY R. SMITH MFG. CO 4810-06PB OR EQUAL.

CONSTRUCTION:

12. ONLY CITY DESIGNATED CONTRACTOR IS PERMITTED TO INSTALL NEW OR REPLACE CONNECTIONS ON EXISTING SEWER MAINS.
13. WYES SHALL POINT DOWNSTREAM AND ENTER MAIN BETWEEN THE 10:00 - 11:00 POSITION OR 1:00 - 2:00 POSITION.
14. WHEN CHANGES IN GRADE ARE NECESSARY, CHANGES IN GRADE OF LATERAL SHALL BE MADE USING LONG-RADIUS BENDS.
15. THE DEPTH OF THE LATERAL AT THE PROPERTY LINE SHALL BE A MINIMUM OF 4 FEET, WITHOUT SPECIAL APPROVAL BY THE ENGINEER.
16. WHEN THE DEPTH OF THE SEWER MAIN IS 12 FEET OR MORE, INSTALL A CHIMNEY SEWER LATERAL PER STANDARD DETAIL S-SL7.
17. FOR NEW INSTALLATIONS, DETECTABLE TAPE OR TRACER WIRE SHALL BE INSTALLED FOR LOCATING SEWER LATERALS. TERMINATE TRACER WIRE INSIDE CLEANOUT. FOR CHIMNEY OR SLOPED LATERAL, SEE S-SL7.
18. IF LATERAL IS REPLACED BY TRENCHING, DETECTABLE TAPE SHALL BE INSTALLED PER S-SP1. IF TRENCHLESS REPLACEMENT, TRACER WIRE WITH AT LEAST ONE END OF TRACER WIRE EXPOSED SHALL BE SECURED TO THE NEW PIPE AS IT IS INSTALLED.

REFERENCE:

19. SEWER LATERAL TO SEWER MAIN CONNECTIONS SHALL BE PER DETAILS S-SL2 THROUGH S-SL8.
20. FOR WATER-SEWER SEPARATION REQUIREMENTS SEE STANDARD DETAIL U-05.0 THROUGH U-05.2 AND U-06.0.
21. SAWCUTTING DETAILS AND TRENCH PAVING SHALL MEET REQUIREMENTS IN CITY STANDARD DETAIL U-03.0 THROUGH U-03.2

STANDARD LATERAL DETAIL AND NOTES

REV. DATE: 06/2020
DETAIL: S-SL1

APPROVED:

CITY ENGINEER

Rebecca J Bjork

PUBLIC WORKS DIRECTOR

I. CONNECTIONS FOR NEW/REPLACE LATERALS TO EXISTING MAINS:

TYPE OF CONNECTION	*STANDARD CONNECTION METHOD*	*STANDARD DETAIL #*
LATERAL TO VCP MAIN	VCP WYE	S-SL3
LATERAL TO EXISTING PVC MAIN	STRAPPED RUBBER SADDLE	S-SL4
LATERAL TO EXISTING HDPE MAIN	ELECTROFUSION SADDLE	S-SL5
LATERAL TO SPIRAL WOUND MAIN	STRAPPED RUBBER SADDLE/INSERTA TEE	S-SL6
LATERAL TO CIPP MAIN	STRAPPED RUBBER SADDLE/INSERTA TEE	S-SL6

II. CONNECTIONS FOR EXISTING / NEW LATERALS TO NEW MAINS:

TYPE OF CONNECTION	*STANDARD CONNECTION METHOD*	*STANDARD DETAIL #*
LATERAL TO NEW PVC MAIN	PVC WYE / SADDLE	S-SL5
HDPE LATERAL TO NEW HDPE MAIN	ELECTROFUSION SADDLE	S-SL4

DEFINITIONS

ID - INSIDE DIAMETER
OD - OUTSIDE DIAMETER
VCP - VITRIFIED CLAY PIPE
PVC - POLYVINYL CHLORIDE PIPE
HDPE - HIGH DENSITY POLYETHYLENE
ROW - RIGHT OF WAY

SEAL OF THE CITY OF SANTA BARBARA CALIFORNIA

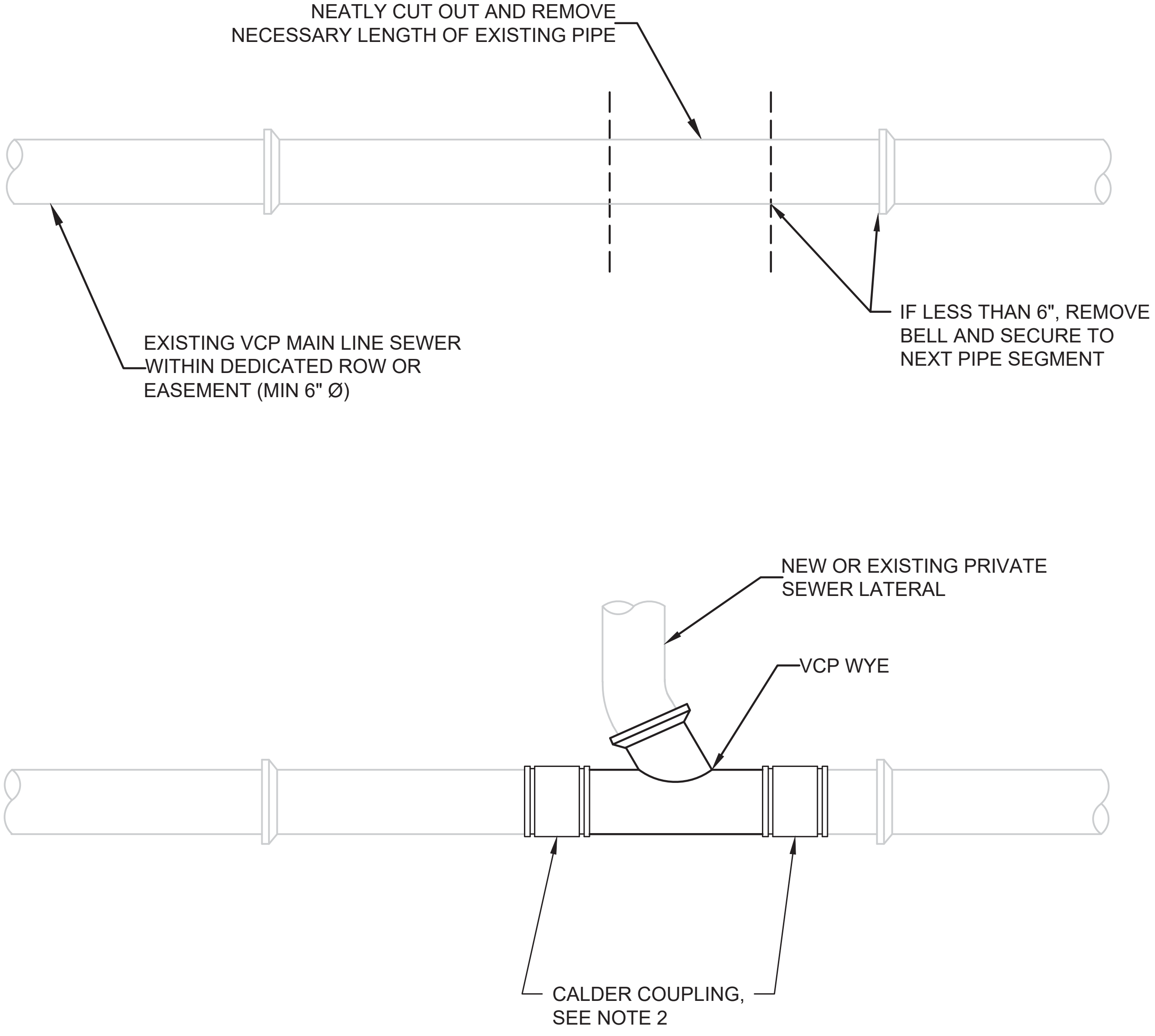
LATERAL CONNECTION MATRIX

REV. DATE: 06/2020
DETAIL: S-SL2

APPROVED:

CITY ENGINEER

Rebecca J Bjork
PUBLIC WORKS DIRECTOR



VCP LATERAL CONNECTION

PROFILE

NOTES
1. DETAIL FOR VITRIFIED CLAY PIPE ONLY.
2. ALL LATERAL CONNECTION INSTALLATIONS/REPLACEMENTS REQUIRE A PUBLIC WORKS PERMIT AND MUST BE COMPLETED BY CITY CONTRACTOR.

MATERIALS:
3. SECURE ENDS WITH CALDER COUPLING WITH 316 STAINLESS STEEL COMPRESSION BANDS AND SHEER RINGS AS MANUFACTURED BY MISSION PRODUCTS, FERNCO JOINTS INC, OR APPROVED EQUAL. COUPLING TO BE MIN 6" WIDE.
4. VCP WYES SHALL BE MISSION CLAY OR APPROVED EQUAL

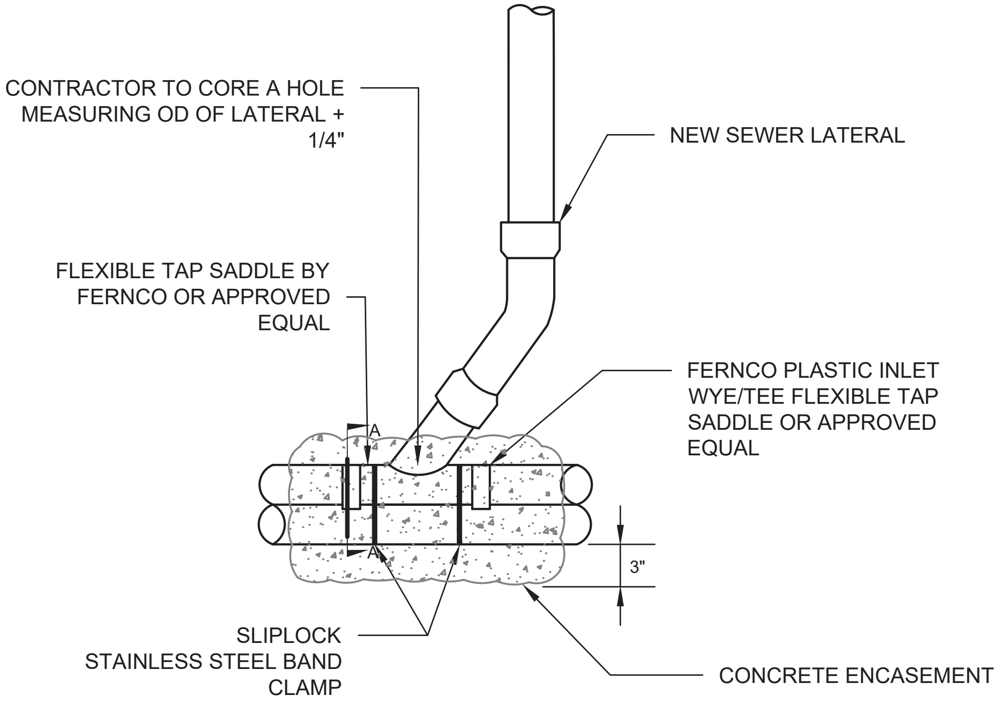
CONSTRUCTION:
5. WHEN INSTALLING A NEW WYE ASSEMBLY TO AN EXISTING CLAY SEWER MAIN, THE MAIN SHALL BE INSPECTED BEFORE AND AFTER INSTALLATION AS DIRECTED BY CITY ENGINEER.

REFERENCE:
N/A

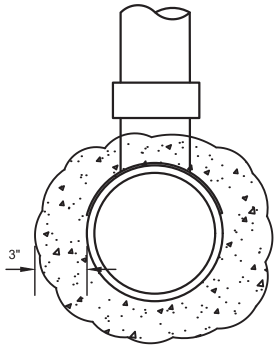
SEAL OF THE CITY OF SANTA BARBARA CALIFORNIA

TYPICAL VCP LATERAL CONNECTION

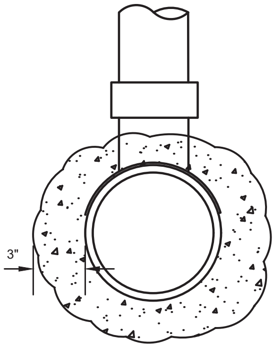
REV. DATE: 06/2020
DETAIL: S-SL3
APPROVED:
CITY ENGINEER
Rebecca J Bjork
PUBLIC WORKS DIRECTOR



NEW LATERAL INTO EXISTING PVC MAIN
PROFILE



SADDLE ENCASEMENT
SECTION A-A



SADDLE CONNECTION
DETAIL

NOTES

1. ALL LATERAL CONNECTION INSTALLATIONS/REPLACEMENTS REQUIRE A PUBLIC WORKS PERMIT AND MUST BE COMPLETED BY CITY CONTRACTOR.

MATERIALS:

2. FLEXIBLE SADDLE (FERNCO OR APPROVED EQUAL) IN WYE OR TEE CONFIGURATION.
3. SLIP LOCK BANDS SHALL BE USED ALONG WITH LIQUID NAILS OR OTHER ADHESIVE TO SECURE FLEXIBLE SADDLE TO PVC.
4. CONCRETE FOR SADDLE ENCASEMENT SHALL BE CLASS 520-C-3250 PER STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.

CONSTRUCTION:

5. CORE HOLE SAME DIAMETER AS ID OF LATERAL + ¼ INCH. IF EXISTING, CLEAN OUT HOLE, MAKE ¼ INCH GREATER THAN ID.

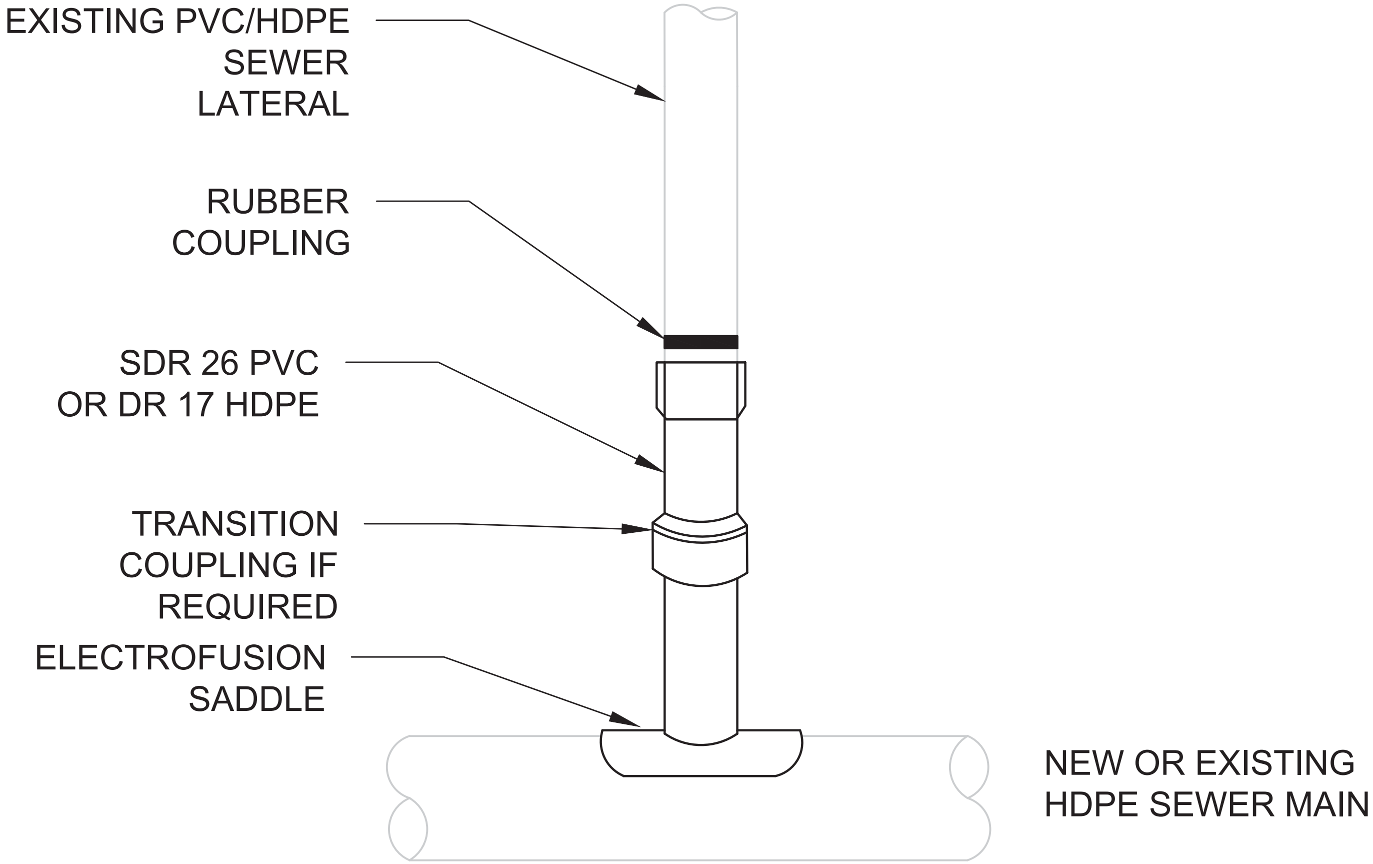
REFERENCE:

N/A

NEW LATERAL TO PVC MAIN

REV. DATE: 06/2020
DETAIL: S-SL4

APPROVED:
Brian D'Amour
CITY ENGINEER
Rebecca J Bjork
PUBLIC WORKS DIRECTOR



HDPE TO HDPE MAIN CONNECTION
PROFILE

NOTES
1. ALL LATERAL CONNECTION INSTALLATIONS/REPLACEMENTS REQUIRE A PUBLIC WORKS PERMIT AND MUST BE COMPLETED BY CITY CONTRACTOR.

MATERIALS:
2. RUBBER COUPLINGS SHALL BE NON-SHEAR TYPE. AND SEALED WITH AN ELASTOMERIC VULCANIZING SEALANT.
3. CHANGES IN PIPE TYPE AND CONNECTIONS ARE NOTED ON THE DRAWINGS.

CONSTRUCTION:
4. IF ADDITIONAL COUPLINGS ARE NEEDED TO MAKE A CONNECTION, THE CONTRACTOR SHALL USE ELECTROFUSION COUPLINGS.

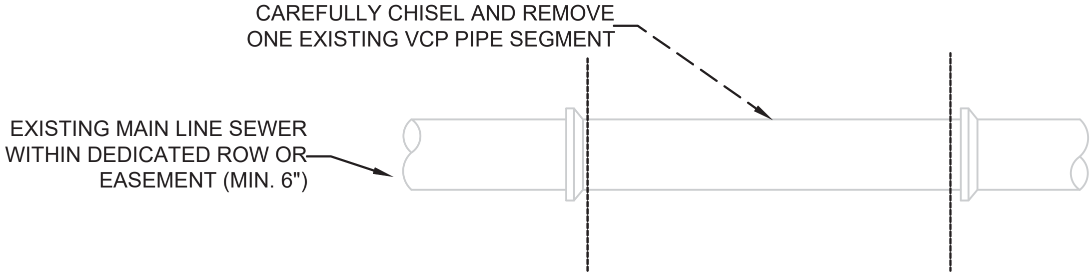
REFERENCE:
N/A

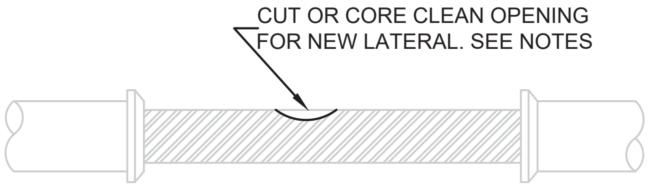
SEAL OF THE CITY OF SANTA BARBARA CALIFORNIA

LATERAL CONNECTION TO HDPE MAIN

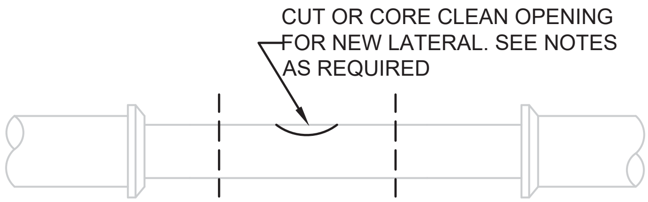
REV. DATE: 06/2020
DETAIL: S-SL5

APPROVED:
Brian D'Amour
CITY ENGINEER
Rebecca J Bjork
PUBLIC WORKS DIRECTOR



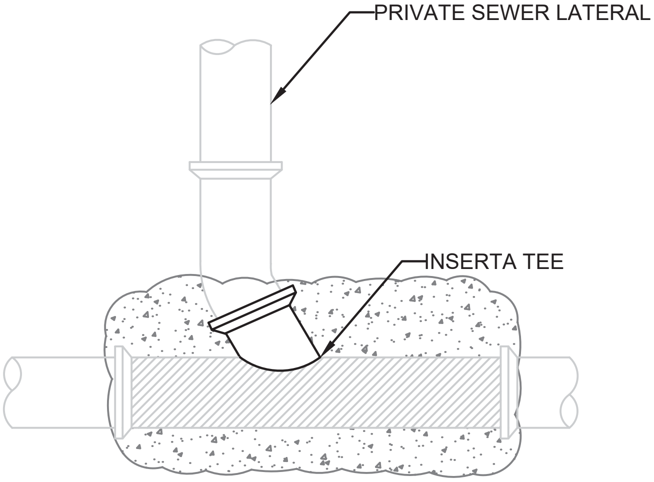


SPIRAL WOUND

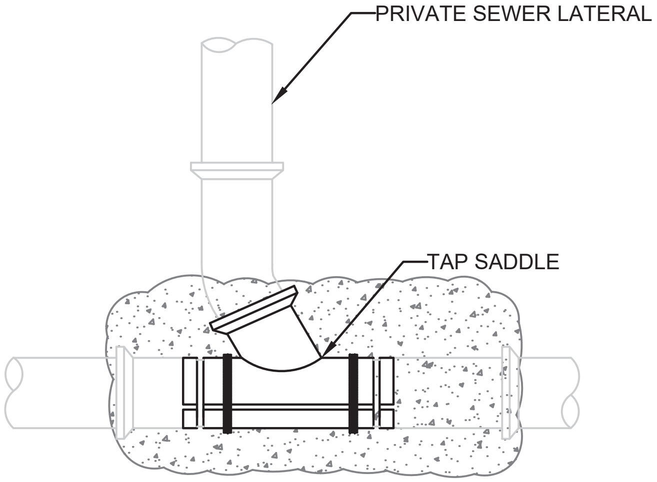


CIPP/PVC FOLD FORMED

CORE AN OPENING FOR THE LATERAL
MEASURING ID OF LATERAL +1/4"



SPIRAL WOUND



CIPP/PVC FOLD FORMED

INSTRUCTION FOR LINED LATERAL CONNECTION

PROFILE

NOTES

1. ALL LATERAL CONNECTION INSTALLATIONS/REPLACEMENTS REQUIRE A PUBLIC WORKS PERMIT AND MUST BE COMPLETED BY CITY CONTRACTOR.

MATERIALS:

2. TYPE OF CONCRETE FOR ENCASEMENT SHALL BE 520-C-3250.
3. INSERTA TEE FITTING OR APPROVED EQUAL SHALL BE USED TO REPLACE OR INSTALL NEW CONNECTION ON SPIRALWOUND SEWER MAINS.
4. TAP SADDLES (TEE OR WYE) SHALL BE FERNCO OR APPROVED EQUAL.

CONSTRUCTION:

5. IF NEW WYE, CORE HOLE SAME DIAMETER AS ID OF LATERAL + ¼ INCH. IF EXISTING, CLEAN OUT HOLE, MAKE ¼ INCH GREATER THAN ID.
6. APPLY EPOXY BASED ADHESIVE BETWEEN RUBBER SADDLE CIPP/PVC FOLD-FORMED LINER PRIOR TO SECURING STAINLESS STEEL BANDS.

REFERENCE:

N/A

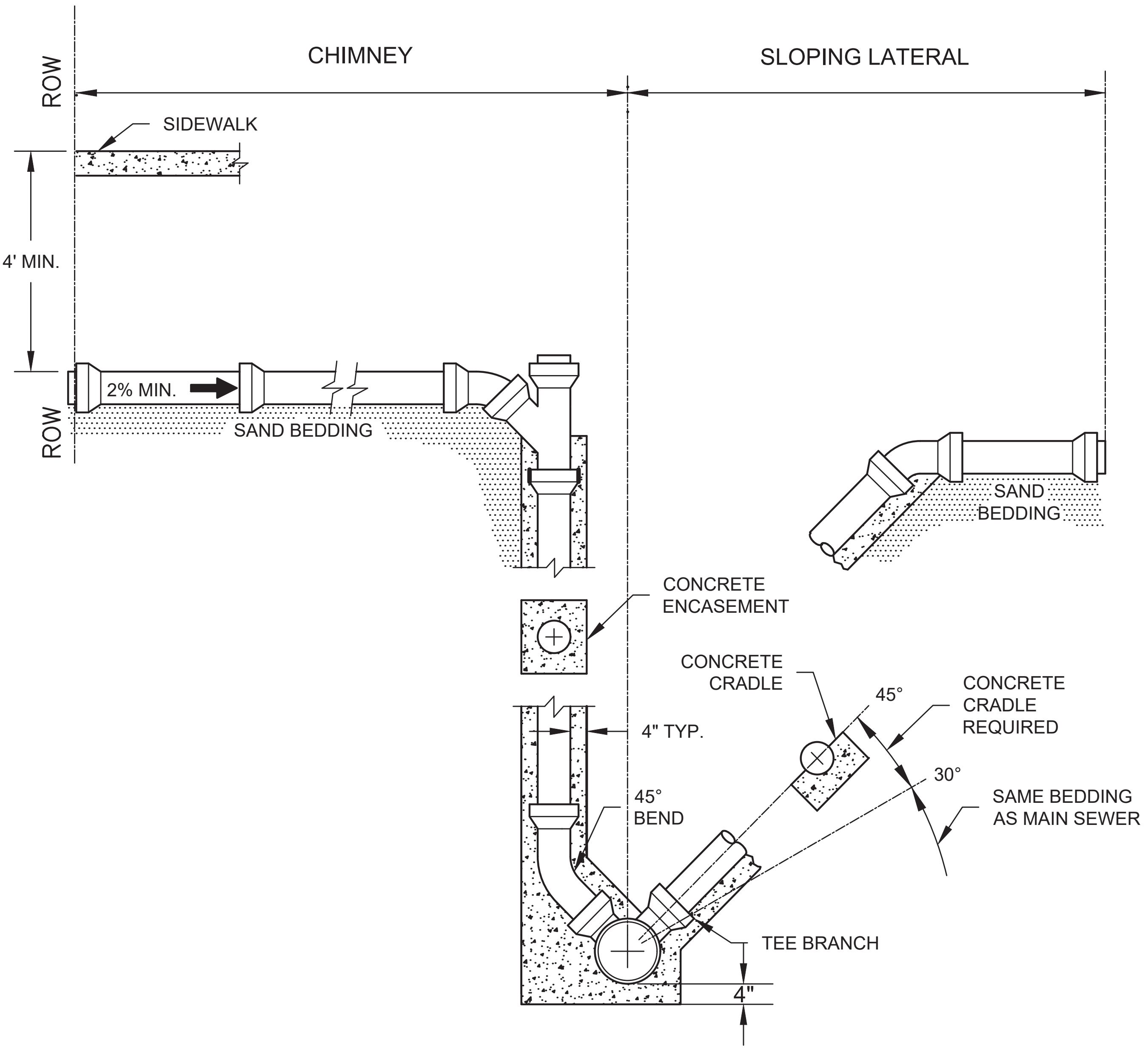
LATERAL CONNECTION TO REHABILITATED MAIN

REV. DATE: 06/2020
DETAIL: S-SL6

APPROVED:

CITY ENGINEER

Rebecca J Bjork
PUBLIC WORKS DIRECTOR



CHIMNEY / SLOPING LATERAL

PROFILE

NOTES

1. CHIMNEY SHALL BE USED WHEN LATERAL SLOPE EXCEEDS 45 DEGREE OR DEPTH OF MAIN SEWER IS 12 FEET OR MORE.
2. CONCRETE CRADLE REQUIRED WHEN LATERAL SLOPE IS BETWEEN 30 AND 45 DEGREES.
3. ALL LATERAL CONNECTION INSTALLATIONS/REPLACEMENTS REQUIRE A PUBLIC WORKS PERMIT AND MUST BE COMPLETED BY CITY CONTRACTOR.

MATERIALS:

4. BEDDING AND BACKFILL FOR LATERALS SHALL BE THE SAME AS FOR SEWER MAINS.
5. CONCRETE FOR CHIMNEY ENCASEMENT OR CRADLE SHALL BE CLASS 520-C-3250 PER STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
6. CHIMNEY SHALL MATCH LATERAL SIZE.
7. UP TO 4 BUILDING DRAINS FOR ONE PARCEL MAY BE CONNECTED PER EACH CHIMNEY AND WYE.

CONSTRUCTION:

8. CHIMNEY MATERIAL SHALL MATCH HOUSE CONNECTION ON MATERIAL.

REFERENCE:

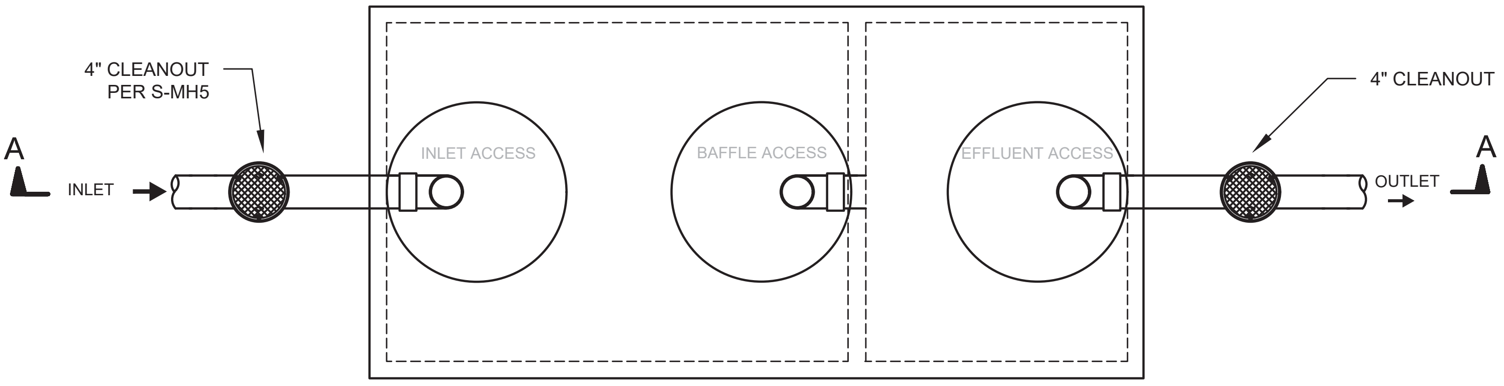
SEAL OF THE CITY OF SANTA BARBARA
CALIFORNIA

CHIMNEY AND SLOPING LATERAL

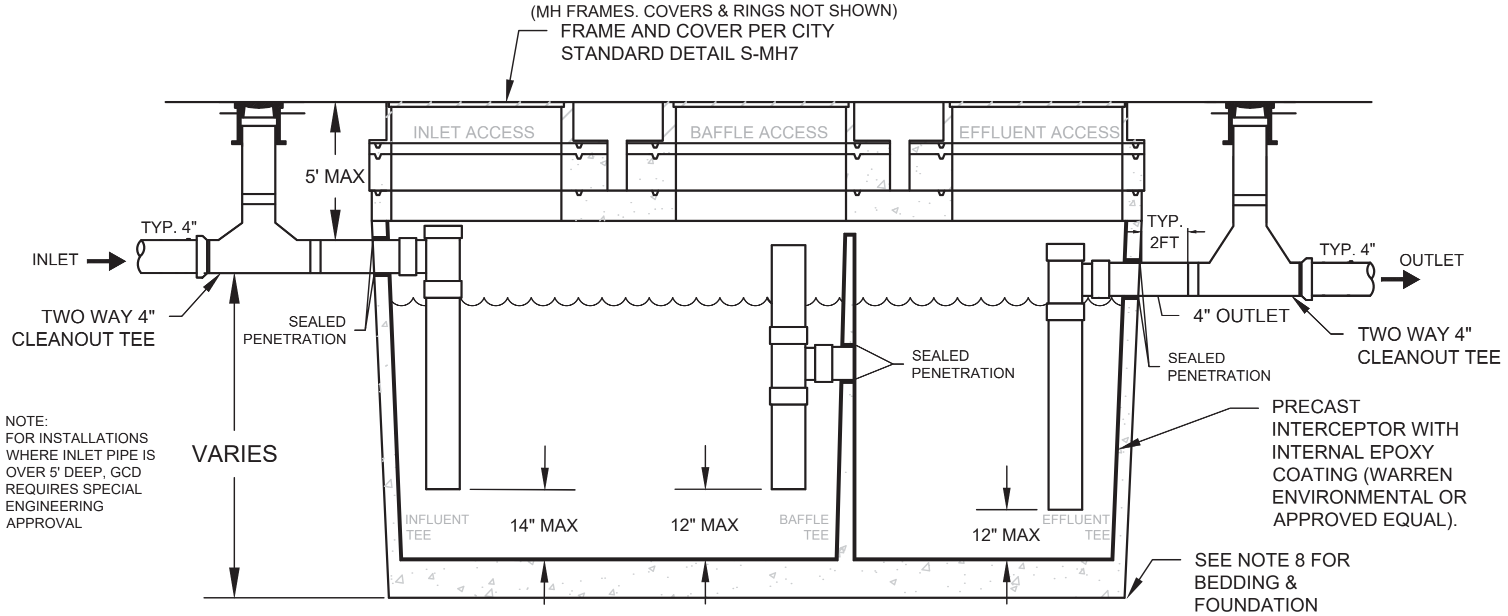
REV. DATE: 06/2020
DETAIL: S-SL7

APPROVED:
Brian D'Amour
CITY ENGINEER
Rebecca J Bjork
PUBLIC WORKS DIRECTOR

GREASE CONTROL DEVICE (GCD)



PLAN VIEW



NOTE:
FOR INSTALLATIONS WHERE INLET PIPE IS OVER 5' DEEP, GCD REQUIRES SPECIAL ENGINEERING APPROVAL

SECTION A-A

NOTES
1. GREASE CONTROL DEVICES (GCD) ARE NOT INTENDED FOR DOMESTIC SEWAGE. LOCATION AND TRIBUTARY DISCHARGE SOURCES SHALL BE APPROVED BY BUILDING & SAFETY PRIOR TO INSTALLATION AND CONNECTION TO CITY SEWER. CONNECTIONS TO GCD SHALL NOT ALLOW INTRODUCTION OF EMULSIFIERS OR CHEMICALS CAUSING PASS THROUGH.
2. EACH GCD SHALL BE INSTALLED ON PRIVATE PROPERTY AND CONNECTED SO THAT IT SHALL BE EASILIY ACCESSIBLE FOR INSPECTION, CLEANING AND REMOVAL OF THE INTERCEPTED GREASE.
3. EACH GCD SHALL BE SIZED TO MEET EXPECTED SOLIDS LOADING TO COMPLY WITH CITY FATS, OILS AND GREASE PROGRAM AND COMPLY WITH HYDRAULIC CAPACITY PER CALIFORNIA PLUMBING CODE SECTION 1014.2.1.

MATERIALS:

4. ALL INTERNAL PIPING SHALL BE 4" OR 6" TO MATCH LATERAL DIAMETER. INTERNAL PIPING MATERIAL SHALL BE HDPE OR PVC. NO METALLIC PIPE WILL BE ALLOWED TO BE USED FOR INTERNAL PIPING FOR THE GCD. CONTRACTOR TO CONNECT LATERAL PIPING TO GCD WITH ALL NECESSARY FITTINGS.
5. INTERCEPTOR LOCATED IN AN AREA SUBJECT TO TRAFFIC MUST BE HS-20 TRAFFIC RATED.
6. FOR NON TRAFFIC LOCATIONS, NON-PRECAST INTERCEPTORS MADE OF POLYPROPELENE(ENDURA XL OR APPROVED EQUAL) IS ACCEPTABLE.
7. ALL PRE-CAST CONCRETE GCDS SHALL BE EPOXY LINED PRIOR TO ENTERING SERVICE USING WARREN ENVIRONMENTAL EPOXY COATING (OR APPROVED EQUAL). MINIMUM LINING THICKNESS SHALL BE 125 MILS.

TESTING:

8. EPOXY LINING SHALL BE PULL TESTED PER ASTM-D4541 AND SECTION 500-2.4.4 IN GREENBOOK. ALL TEST LOCATIONS SHALL BE REPAIRED 2" PAST EDGE OF SCORE. RESULTS SHALL BE SUBMITTED TO WASTEWATER COMPLIANCE SPECIALIST FOR APPROVAL.

BEDDING:

9. INTERCEPTOR SHALL BE PLACED ON A MINIMUM OF 6" TYPE I BEDDING MATERIAL, COMPACTED TO 95% RELATIVE COMPACTION.

SEAL OF THE CITY OF SANTA BARBARA CALIFORNIA

GREASE CONTROL DEVICE
(GCD)

REV. DATE: 06/2020
DETAIL: MISC-FOG
APPROVED:
CITY ENGINEER
Rebecca J Bjork
PUBLIC WORKS DIRECTOR

Appendix G1 Overflow Emergency Response Plan

Overflow Emergency Response Plan

City of Santa Barbara

Revised
December 2020

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Section 1: Introduction

This section provides an overview of the City of Santa Barbara's wastewater collection system Sanitary Sewer Overflow Response program, responsibilities for program implementation, and an overview of this document.

1.1 Purpose

The Water Resources Division's wastewater management mission statement is:

"Convey wastewater to the City treatment plant reliably and cost efficiently, meet all applicable State and federal requirements, and protect the environment."

To support this program's mission, the City has developed the following goals as adopted by the City's Council as part of the annual Performance Measures and Objectives included in the City's budget.

The City's goals are:

1. To properly manage, operate, and maintain all portions of the City's wastewater collection system;
2. To provide adequate capacity to convey the peak wastewater flows;
3. To minimize the frequency of sewer system overflows (SSOs);
4. To mitigate the impacts that are associated with any SSO that may occur; and
5. To meet all applicable regulatory notification and reporting requirements.

1.2 Regulatory Requirements

Santa Barbara's wastewater collection system management practices must comply with the following regulatory mandates:

- National Pollutant Discharge Elimination System (NPDES) Permit CA0048143 issued by the Central Coast Regional Water Quality Control Board effective on February 1, 2020.
- Statewide General Waste Discharge Requirements for Wastewater Collection System Agencies (GWDR), Order No. 2006-0003, issued by the California State Water Resources Control Board on May 2, 2006.
- Amendment of Statewide Monitoring and Reporting Program Requirements for Sanitary Sewer Overflows; MRP Order 2013-0058-EXEC, issued by the California State Water Resources Control Board effective September 9, 2013.

A major focus of these regulatory vehicles is to prohibit sanitary sewer overflows and bypasses.

NPDES Permit Requirement

Section III G. of the NPDES Permit states "The overflow or bypass of wastewater from the Discharger's collection, treatment, or disposal facilities and the subsequent discharge of untreated or partially treated wastewater, except as provide for in Attachment D, Standard Provision I.G.2 (Bypass), is prohibited.

GWDR Requirements

As stated in the GWDR, Section D 13. vi; each Enrollee shall develop and implement an overflow emergency response plan that identifies measures to protect public health and the environment. At a minimum, this plan must include the following:

(a) Proper notification procedures so that the primary responders and regulatory agencies are informed of all SSOs in a timely manner

(b) A program to ensure an appropriate response to all overflows

(c) Procedures to ensure prompt notification to appropriate regulatory agencies and other potentially affected entities (e.g. health agencies, Regional Water Boards, water suppliers, etc.) of all SSOs that potentially affect public health or reach the waters of the State in accordance with the monitoring and reporting program (MRP). All SSOs shall be reported in accordance with this MRP, the California Water Code, other State Law, and other applicable Regional Water Board WDRs or NPDES permit requirements. The City's Sewer System Management Plan (SSMP) should identify the officials who will receive immediate notification.

(d) Procedures to ensure that appropriate staff and contractor personnel are aware of and follow the Emergency Response Plan and are appropriately trained

(e) Procedures to address emergency operations, such as traffic and crowd control and other necessary response activities

(f) A program to ensure that all reasonable steps are taken to contain and prevent the discharge of untreated and partially treated wastewater to waters of the United States and to minimize or correct any adverse impact on the environment resulting from the SSOs, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the discharge.

Other GWDR Requirements met by this Overflow Emergency Response Plan include Sections:

- D.3 – Feasible steps to contain and mitigate impacts of an SSO
- D.4 – Feasible steps to prevent discharge to storm drains
- D.5 – Report all SSOs
- D.6 – OERP supports the City with factors assigned during enforcement
- D.7 – Feasible steps to control volume, terminate discharge, recover volume, cleanup, sample, and notification

1.3 Document Purpose and Structure

This report describes the City's response plan to manage, mitigate, and report on SSO events. The document includes the following sections:

Section 1 – Introduction: Describes the purpose of the document, the City's responsibilities related to SSO regulations and response, and the structure of this report.

Section 2 – Background and Program Plan: Discusses the need for program improvements, SSO event history, the City's performance measures and responsibilities for program implementation.

Section 3 – Overflow Emergency Response Plan: Describes the process and procedures that the City follows to respond to an SSO event, including public and regulatory notification, dispatching and initial response, remedial action, recovery and cleanup, water quality sampling and testing, documentation and investigation, reporting, and training.

In addition, the following appendices are provided:

Appendix A – SSO/PLSD Response and Analysis Report: Example of the forms to be filled out during a public or private overflow event.

Appendix B – Wastewater Collection Personnel Contact Information: Lists the names, titles, and contact information for all Wastewater Collection System personnel.

Appendix C – Correction Notice Form: Example of a correction notice to be provided the owner in the event of a spill event originating on private property.

Appendix D – Methods for Estimating Spill Volume: Provides the accepted methods for estimating the volume of a spill.

Appendix E – Manhole Overflow Flowrate Guide: Provides photographic examples of various flow rates through manholes.

Appendix F – Sample Warning Sign: Example of a warning sign suitable to use for warning the public of an SSO-related health risk.

Appendix G – Wastewater Collection System CIWQS Reporting Guidelines: The State Water Resources Control Board statewide general waste discharge requirements for sanitary sewer systems.

Appendix H – Public Agency Contact Information: Lists the contact information for public agencies.

1.4 Definitions and Acronyms

Cal OES	California Office of Emergency Services
CCTV	Closed Circuit Television
CIWQS	California Integrated Water Quality System
CMMS	Computerized Maintenance Management System. The City uses Cartegraph OMS.
ESW	Emergency Service Worker
GIS	Geographical Information Systems
GPS	Global Positioning System
GWDR	General Waste Discharge Requirements
MRP	Monitoring and Reporting Program
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollution Discharge and Elimination System
O&M	Operations and Maintenance
OERP	Overflow Emergency Response Plan
OES	Office of Emergency Services
PLSD	Private Lateral Sewage Discharge
QA/QC	Quality Assurance and Quality Control
RWQCB	Central Coast Regional Water quality Control Board
SCADA	Supervisory Control and Data Acquisition
SL-RAT	Sewer Line Rapid Assessment Tool (acoustic testing device)
SLIP	Sewer Lateral Inspection Program
SOP	Standard Operating Procedure
SSMP	Sewer System Management Plan
SSO	Sanitary Sewer Overflow (Public)

WCS	Wastewater Collection System
WDR	Waste Discharge Requirements

1.5 References and Related Documents

The following sources contain additional information related to the SSO Response Plan and are referenced as needed throughout the report.

- *City of Santa Barbara Sewer System Management Plan, City of Santa Barbara, 2018.*
- *Cleaning Improvement Plan, City of Santa Barbara, 2018.*
- *Information Technology Governance Plan, City of Santa Barbara, 2018*
- *Wastewater Collection Section SOP 2.0.0 - Combination Machine Cleaning, City of Santa Barbara, 2015.*

Section 2: Background

This Section discusses the need for program improvements, SSO event history and the City's performance measures and responsibilities for program implementation.

2.1 Continual Improvement Strategies

In response to the need to significantly reduce the number of maintenance related SSOs and system stoppages, the City has implemented many improvements in its proactive cleaning program. Key elements include:

- Refocusing on main cleaning objectives;
- Altering cleaning rates to produce more effective results;
- Improving and standardizing the overall cleaning procedures;
- Better performance monitoring activities (e.g. using global positioning system (GPS) units to track location of vehicles and duration on-site) and improved documentation of cleaning activities and findings;
- Better planning strategies; and
- Augmentation by contract cleaning to increase cleaning rates.

These elements have reduced the number of SSOs encountered in the City since 2009. The City desires to continue to improve performance and effectiveness by implementing a system-wide cleaning program that aligns individual pipe cleaning frequencies with previous cleaning results. This approach has many benefits:

- The program continually adjusts to focus on problem areas while not over-cleaning less problematic pipes;
- Every pipe will be cleaned at least once in a 5 year period; and
- Resources will be freed from pipe cleaning to address other maintenance activities such as repairs, inspections, and rehabilitation.

The improved cleaning program coupled with quick and effective response to reports of SSOs, as well as a systematic approach to resolving the causes of overflows should significantly reduce the occurrence of future overflows. The Collection System Cleaning Plan is described in detail in the latest version of the *Cleaning and Inspection Improvement Plan* (2020).

2.2 Performance Measures

The indicators that the City will use to measure the performance of its wastewater collection system and the effectiveness of its cleaning program and response to SSOs are:

- Total number of SSOs;
- Response time for reacting and resolving SSOs;
- Total number of gravity pipe miles cleaned; and
- Number of restaurants inspected for compliance with grease trap requirements.

2.3 Responsibilities for Program Implementation

Responsibility for maintaining the wastewater collection system is delegated to the Water Resources Division of the Public Works Department as specified in Title 14 and 16 of the Santa Barbara Municipal Code.

Operations and Maintenance (O&M) activities, including response and remedial actions associated with reports of SSOs, is provided by the Wastewater Collection Section under the Water Resources Division.

The key roles and responsibilities of Wastewater Collection System staff that carry out the O&M activities are listed in more detail below.

Wastewater System Manager – Overall responsibility for managing the wastewater collection system, staff and the wastewater treatment facilities.

Wastewater Collection System Superintendent – Acts as the agency's Legally Responsible Official and directly responsible for managing the wastewater collection system resources and reporting of SSOs.

Wastewater Collection System Supervisor – Directly responsible for supervising the wastewater collection system field crews and supports reporting of SSOs.

Wastewater Collection System Lead Operator– Manages the day-to-day activities of the crews and may act on the Supervisor's behalf when directing SSO remedial actions and reporting requirements.

Wastewater System Planner/Scheduler (CCTV and Cleaning)– Maintains the data in the computerized maintenance management system (CMMS), generates the weekly cleaning schedules, enters cleaning results, enters remedial actions associated with SSOs and updates collection system asset characteristics.

Wastewater Collection System Field Crew- A two- or three-person crew usually assigned to a cleaning, or a repair vehicle. Responsible for initial response to reports of SSOs and performing remedial actions.

Wastewater Collection System Inspection Crew – Responsible for operating and maintaining the CCTV, acoustic sounding (SL-RAT), and pole camera equipment, performing CCTV inspections, and reviewing the CCTV video to identify structural defects and other O&M issues which may have caused or may cause an SSO.

Water Resources Laboratory – Work group that supports field crews with sampling and analysis for SSOs during business hours.

2.3.1 Equipment

Table 2-2 shows the vehicles that the City owns that support the abatement of SSOs. These are used for the majority of cleaning and inspection tasks, but are also required in response to SSO events. Each vehicle is operated by a two-person crew.

Table 2-2. City Owned Cleaning and Inspection Vehicles

Wastewater Equipment ID	Fleet Vehicle Number	Make/Model Description	Vehicle Capability Description
669	2501	Peterbilt Vactor Truck – Cab-Over	Hydro – combination jetter/vacuum truck
668	2601	Peterbilt Vactor Truck – Standard Cab	Hydro – combination jetter/vacuum truck
667	2571	Peterbilt Vactor Jetter Truck	Hydro – jetter truck
665	2523	Peterbilt Vactor Jetter Truck	Hydro – jetter truck
636	2436	Mercedes Sprinter Cargo Van	CCTV Van
664	3071	Bucher Truck	Bucher Recycler Truck

Jetter Truck – A truck mounted high pressure water jetter sewer cleaning truck not equipped with vacuum unit is required to clear blockages.

Vactor Combo Truck – A flusher/vacuum truck is required to clear blockages in gravity sewers and to vacuum up spilled sewage and wash-down water.

Bucher Recycler Truck – A sewer cleaning unit with a continuous recycling system designed to perform throughout the day without the need to stop and refill the tank with new water.

Closed Circuit Television (CCTV) inspection unit – A portable CCTV inspection unit is utilized to inspect the condition within sewers. CCTV aids in determining the failure cause for SSOs from gravity sewers. CCTV inspection services can also be provided by a contractor.

2.3.1.1.1 Other Equipment

Other equipment used by the City includes the easement machine, nozzle cameras, and other specific equipment needed in response to SSOs.

2.3.1.2 Easement Machine

The City uses an easement machine to clean pipes that cannot be reached by the sewer cleaning trucks. There are approximately 16,000 feet of pipe in the City that are located within easements that are not accessible by road. The easement machine is a cleaning device on tracks designed to mobilize flushing equipment to these locations. The easement machine has a hose designed to reach remote manholes. Cleaning with the easement machine follows the same SOP that is used for the sewer cleaning truck equipment.

2.3.1.3 Nozzle Camera

City crews have access to nozzle cameras, capable of capturing high quality video of the inside of a sewer main. The nozzle uses the pressure from the sewer cleaning truck to propel it along the sewer main, capturing video as is moves along the pipe. The video is catalogued by the Pipe ID and stored alongside PACP inspection data. The information captured by the nozzle camera helps staff analyze the effectiveness of cleaning and identify maintenance issues associated with a pipe.

2.3.1.4 Support Equipment

Ammonia field test kit – An ammonia field test kit is required to determine the extent of the SSO (using ammonia as an indicator of sewage contamination).

Mobile Devices – iPads or iPhones are used by field crews to capture work activities and supporting information like photos and/or videos while at the site.

Portable pumps and hoses – Portable pumps and hoses are required to pump around line failures and lift station failures and to pump spilled sewage and/or contaminated water back into the sewer system.

2.3.2 Contract Cleaning and Inspection

In addition to the cleaning and inspection resources available within the Wastewater Collection Section, the City also utilizes contractors for cleaning, CCTV inspections, acoustic sounding testing, and root control chemicals application as needed to augment their internal resources during times of increased cleaning and inspection needs. These services are procured on short-term contracts for a specified set of pipes. The Wastewater Planner/Schedulers for Cleaning and CCTV Programs ensure that cleaning and inspection procedures performed by the contractors are consistent with the procedures followed by the City's field crews.

Section 3: Overflow Emergency Response Plan

This Section describes the process and procedures that the City follows to respond to an SSO event, including public and regulatory notification, dispatching and initial response, remedial action, recovery and cleanup, water quality sampling and testing, documentation and investigation, reporting, and training

3.1 SSO Response Process Overview

As defined in the GWDR Section D. vi., each enrollee shall develop and implement an overflow emergency response plan that identifies measures to protect public health and the environment.

The City's goals with respect to responding to SSOs are:

- Respond quickly to control the spill and minimize the volume of the SSO;
- Contain the spilled wastewater to the extent feasible;
- Minimize public contact with the spilled wastewater;
- Mitigate the impact of the SSO;
- Correct the cause of the SSO;
- Conduct failure analysis of the SSO; and
- Meet the regulatory reporting requirements.

3.1.1 Notification of a Possible SSO

The City is notified of a possible SSO as a result of an observation by the public, receipt of a pump station alarm through the Supervisory Control and Data Acquisition (SCADA) system, or by the observations of City Staff while performing their normal work. An overflow is known as a "Condition 4" and carries a very high priority for response and resolution.

Public Observation

Public observation is the most common way that the City is notified of blockages, spills, and private sewage system failures. Directions for reporting sewer spills and backups are included on the City's website: www.santabarbaraca.gov on the Water Resources Division homepage. The City contact information for reporting sewer system events is also included in the "Quick City Telephone Reference" on the "Contact Us" page.

Broken Water Main or Sewer Overflow

Before 3:00 p.m.
(805) 564-5413

After 3:00 p.m., Weekends and Holidays
(805) 963-4286

Normal Work Hours

The City's Wastewater System staff's regular working hours are Monday through Friday (City offices closed every other Friday) from 6:30 a.m. to 4:00 p.m., except holidays. The public can call the main telephone number, (805) 564-5413, during regular work hours (prior to 3:00). The calls are typically received by the City through “Control 10”, which is the City’s Call Center.

When a report of a sewer spill or backup is received, the Office Specialist (Dispatcher) who answers the phone obtains the relevant information through a series of pre-scripted questions and communicates it to the Wastewater Collection System Supervisor (WCS Supervisor) or Wastewater Collection System Lead Operator (Lead Operator). The WCS Supervisor or Lead Operator will dispatch the nearest field crew to the spill by cell phone. If either cannot be reached via cell phone, the Dispatcher will attempt to reach the field crew by a radio broadcast. Through a radio broadcast, all active crews will hear the report of a spill and are instructed to mobilize to the location. Control 10 also creates a request in Cartegraph OMS for the event.

After Hours

To report a spill or sewer backup outside of normal business hours, callers are directed to call the after-hours answering service, known as “Control 14”, at (805) 963-4286. The caller is asked to leave their name, address, telephone number, and a description of the problem they are reporting. The answering service then calls the City’s Emergency Service Worker (ESW) who is on call by radio or cell phone. The ESW contacts the Wastewater Collection standby phone and/or Lead Operator while in route to the location. In the event that the standby phone, or Lead Operator cannot be contacted within ten minutes, the call is escalated directly to the WCS Supervisor, and/or the Superintendent.

Receipt of an Alarm

All seven of the pump stations the City is responsible for operating and maintaining are connected to a SCADA system. The SCADA alarms are relayed to the central SCADA located at the El Estero Water Resource Center and maintenance personnel receive alerts via phone. During working hours, Control 10 monitors alarms and notifies the plant maintenance personnel who responds to the pump station alarms. Any after-hours calls to the Control 14 answering service regarding pump station alarms are directed to the on call ESW worker for response to the lift stations. The ESW will contact plant maintenance personnel if the issue cannot be resolved by the ESW. WCS staff will provide assistance with the Vactor Combo Truck if needed.

Observations by City Staff

If any anomalies with the wastewater collection system are noted by City Staff as part of their routine work, the WCS Supervisor or Lead Operator is notified and the appropriate crews are dispatched to address the issue and a task is created in Cartegraph OMS to track the work.

Notification Documentation

The appropriate information must be documented to ensure effective response to the incident and to ensure accurate reporting to the regulatory agency. The information is tracked on the SSO Response and Analysis Report (see Appendix A for an example) and the initial data includes:

- Name of caller (and department, if applicable);
- Address of overflow; and
- Time the report was received.

A significant amount of additional data is documented on the form based on the observations of the field crew, the action taken to resolve the overflow and what notification procedures were undertaken. The collection of field data is discussed in more detail in Section 3.1.3 through Section 3.4.4, below.

3.1.2 Dispatching of Crews

SSO Dispatch Procedures

Sanitary Sewer Overflow calls are considered to be a high priority that demands a prompt response to the location of the problem. The City's goal is to respond to a report of an overflow within 30 minutes during normal working hours and within 60 minutes for after hour's calls when possible. Also it is the goal of the City to stop all SSO events within two hours, realizing that some situations may take longer to correct.

When a report of a sewer spill or backup is received during hours, the Office Specialist (Dispatcher) at Control 10 who answers the phone, obtains the relevant information through a series of pre-scripted questions and communicates it to the WCS Supervisor or Wastewater Collection System Lead Operator (Lead Operator). When a spill is reported to Control 14 after-hours, the information is forwarded onto to the ESW. The ESW contacts the Wastewater Collection standby phone and/or Lead Operator while in route to the location.

As a standard practice, field crews begin to mobilize to the location once notified of the problem. The first crew on site (first responder) or the Lead Operator determines if the remaining crews can abort their response.

If it is determined to be a significant overflow event, either through the information obtained from the caller or based on the observations of the first responder, all available crews will continue to respond to the location to initiate containment procedures, assist in resolving the overflow and assist with the subsequent cleanup activities. It is the responsibility of the crew(s) dispatched to the location to proceed immediately to the location. If for any reason a delay is anticipated, the Lead Operator, WCS Supervisor or Superintendent should be immediately notified.

The response procedure flow chart on the following page, shown as Figure 3-1, outlines the entire procedure for response to a report of an overflow; from receipt of the call to notification of the appropriate outside agencies.

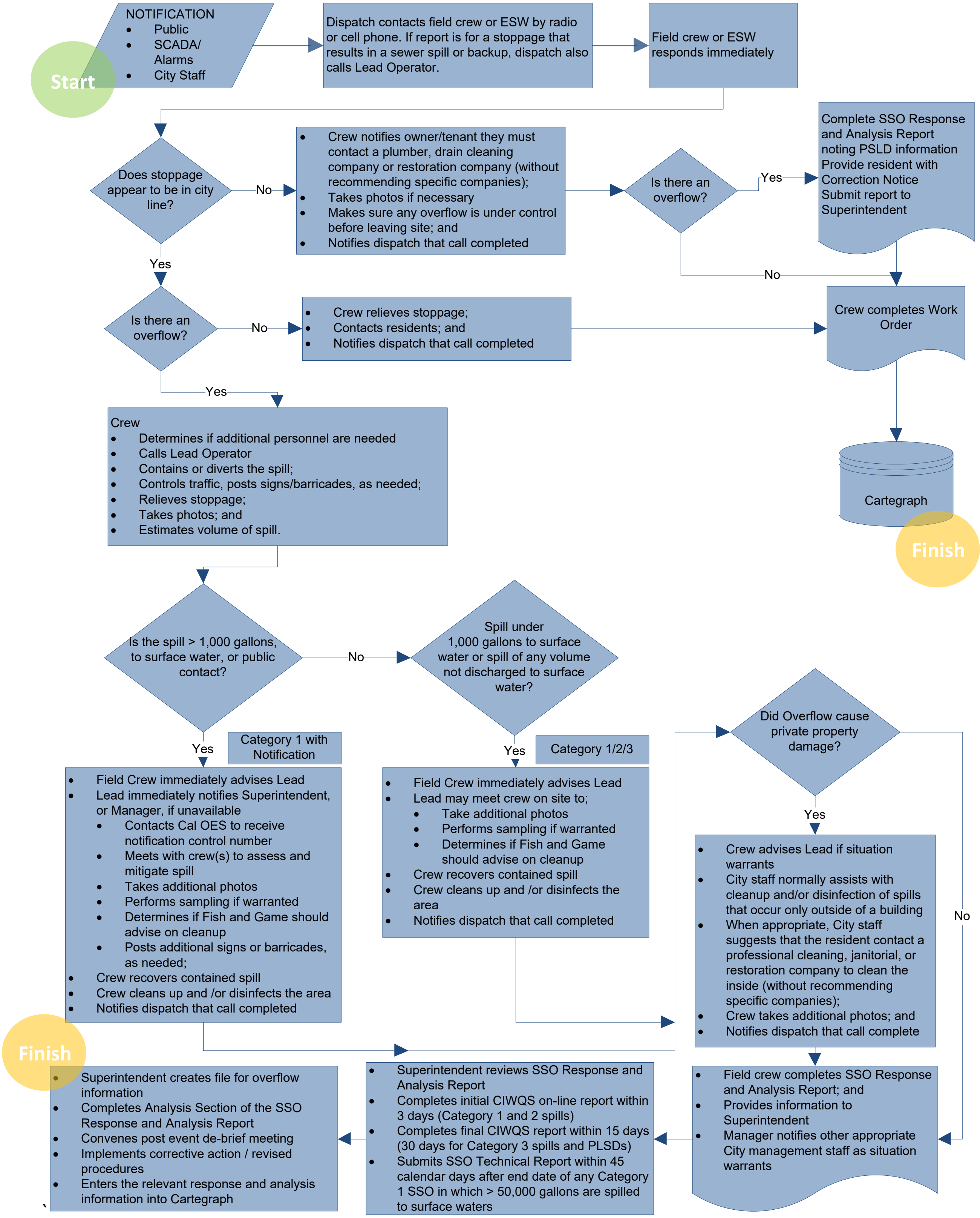


Figure 3-1. SSO Response Process

3.1.3 Initial Response

First Responder Priorities

The first responder's priorities during the initial response are to:

- Follow safe work practices;
- Respond promptly with the appropriate equipment;
- Minimize public access to and contact with the spilled sewage;
- Contain the spill wherever feasible;
- Eliminate the spill as soon as possible;
- Recover as much of the spill as possible;
- Restore the area to its original condition (or as close as possible);
- Properly dispose of the spilled sewage or return it to the sewer system;
- Limit environmental impacts that may be associated with the response and cleanup activities; and
- Properly document their observations, response activities and corrective actions.

Safety

The first responder is responsible for following safety procedures on all jobs. Special safety precautions must be observed when responding to a report of an overflow. Traffic control and limiting access by the public are high priority considerations while still attempting to contain the spill and resolve the cause of the overflow.

There may be times when it is necessary to call in non-Wastewater Collection personnel to assist with a sewer system event. They may not be familiar with potential safety hazards unique to wastewater work. In such cases it is appropriate to take the time to discuss safety issues with them, explain the order of work, and check safety equipment before starting the job.

Initial Response

As stated previously, during normal working hours, all field crews mobilize to a report of an SSO, and the first crew on site is designated as the first responders. The first responders assess whether additional crews or assistance is needed. Outside of normal working hours, the ESW responds to the location and calls the Lead Operator of WCS standby phone while in route to the site.

The first responder must respond to the reported location/lift station site and visually check for potential sewer stoppages or overflows. All reported sewer system issues (including lift station alarms, sewer stoppages, sewer overflows, sewer odors and loose or noisy manhole covers) require a response to the reported location of the event to assess the situation. Sewer system calls should never be handled without an on-site response.

The first responder will:

- Note arrival time on the SSO Response and Analysis Report, document conditions with photographs, and contact caller if time permits;
- Verify the existence of a sewer system spill or backup;
- Determine if the spill is a private lateral sewage discharge (PLSD);
- Identify and assess the affected area and extent of spill (if spill is entering the storm drain system, note if the storm drain system is flowing);

  - If additional help is needed and has not arrived, call a member of the Wastewater Collection Section or have Dispatch call. See Appendix B for Wastewater Collection personnel contact information;
  - The Lead Operator will notify the WCS Supervisor, Superintendent, or Wastewater System Manager, as appropriate, if the spill appears to be large, in a sensitive area, or there is doubt regarding the extent, impact, or how to proceed;
- When feasible, contain the spill to the best of their ability;
  - Due to the high potential of any spill reaching waters of the state, all spills (regardless of size) are to be contained first,
  - Block nearby storm drains using sandbags and liners;
- Deploy signage to minimize public access to and contact with the spilled sewage;
- Determine the potential cause of the blockage or spill; and
- Proceed with clearing the blockage to restore the flow. If multiple crews are on site, the containment of the spill, deployment of signage, and the clearing of the blockage should be performed concurrently. Depending on site considerations, available resources and natural containment measures in place, first responder may attempt to clear blockage to minimize volume of spill.

All relevant information should be documented on the SSO Response and Analysis Report.

3.1.4 Remedial Actions

Initiate Spill Containment Measures

The first responder (or support crews) will attempt to contain any of the spilled sewage using the following steps:

- In the case of a SSO reaching waters of the state, attempt to contain the spilled sewage and follow Section 3.3 Water Quality Monitoring Plan for sampling and analysis of SSO. Determine the immediate destination of the overflowing sewage;
- Review Cartegraph OMS for possible temporary upstream flow diversion, bypass pumping or flow redirection;
- Plug storm drains using air plugs, sandbags, and/or plastic to contain the spill, whenever appropriate;
- Divert spill back into a sewer by building a small berm to change direction of flow. Use dirt, and/or sandbags;
- Divert spill by pumping around overflow and return to the sewer, if appropriate;
- Dike/dam (or sandbag) spill by building a temporary berm to contain spill; and
- If overflowing sewage has entered with the storm drainage system, determine if the drainage system has storm flow, attempt to contain the spilled sewage by plugging the next downstream storm drainage inlet or access point. If that is not possible, attempt to contain the spill at the outlet location.

All relevant information should be documented on the SSO Response and Analysis Report.

Clearing the Blockage

After the spill has been contained and site is controlled, the first responder (or support crews) should proceed with attempting to clear the blockage using standard cleaning practices. The goal of this effort is to relieve the cause of the spill. The specific procedures for cleaning are described in the *Wastewater Collection Section SOP 2.0.0 - Combination Machine Cleaning*. Follow-up inspection is required after the blockage is relieved. Additional cleaning activities may be needed upstream and downstream to remove residual items such as grease and roots, or repair activities may be needed. One line segment upstream of the SSO location, the line segment where the blockage occurred and one additional line segment downstream will undergo CCTV inspection immediately following the SSO event to document the condition of the line segment and determine the actual cause of the SSO.

Correction Notice

If it is determined that a spill is on private property and is caused by a problem in the private sewer lateral a correction notice will be issued to the resident (see Appendix C for a copy of the notice).

3.1.5 Recovery and Cleanup

The recovery and cleanup phase begins when the flow has been restored and the overflow of sewage has been stopped. However, if the additional crews are on site and to minimize the potential of the spill reaching waters of the state, recovery procedures may be initiated prior to the overflow being stopped. The goal is to recover as much of the spill and wash down water as possible for proper disposal. The SSO recovery and cleanup procedures are:

3.1.5.1 Estimation of the Volume of Spilled Sewage

Use the methods outlined in Appendix D, Methods for Estimating Spill Volume, and Appendix E, Manhole Overflow Flowrate Guide, to estimate the volume and/or rate of the spilled sewage. Wherever possible, document the spilled sewage with photos of the site before the recovery operation is initiated.

3.1.5.2 Recovery of Spilled Sewage

Wash, pump, or vacuum the spilled sewage and discharge it back into the sanitary sewer system, if possible.

If the spilled sewage cannot be washed back into the sanitary sewer system (e.g. it is trapped in a low area or storm drain), then vacuum spilled sewage into the combination cleaner or pump it to a nearby sanitary sewer manhole. Any residual physical debris should be raked or swept up and disposed appropriately. Any sewage recovered with the combination cleaner needs to be discharged at an appropriate location.

The volume of sewage recovered also needs to be estimated so it can be entered onto SSO Response and Analysis Report and subtracted from the initial spill volume to estimate the volume that may have reached the surface waters. Care should be taken in estimating how much wash down water was used and subsequently recovered which may be included in the volume recovered.

3.1.5.3 Cleanup and Disinfection

Cleanup and disinfection procedures will be implemented to reduce the potential for human health issues and adverse environmental impacts that are associated with an SSO event. The procedures described are for dry weather conditions and should be modified as required under wet weather conditions.

In the event that an overflow occurs at night, the impacted area will also be inspected the following day to ensure it is adequately cleaned up. The field crew will look for any signs of sewage solids and sewage-related material that may warrant additional cleanup activities.

3.1.5.3.1 Hard Surface Areas

Collect all signs of sewage solids and sewage-related material via a variety of methods. Best practice is by hand (while wearing protective gloves), and the use of rakes, brooms, and shovels or vacuuming up with a combination truck are alternative methods.

Wash down the affected area with clean water until the water in the affected area runs clear. Take reasonable steps to contain and vacuum up the wash down water and dispose of properly.

Disinfect all areas that were contaminated from the overflow using the disinfectant solution on the duty response truck. Apply minimal amounts of the disinfectant solution using a hand sprayer. Only after receipt of specific instructions from the Lead Operator, WCS Supervisor or the Superintendent should significantly higher dosages of disinfectant be applied. Document the type of disinfectant, the volume used and the application method on the SSO Response and Analysis Report.

Allow area to dry. Repeat the process if additional cleaning is required.

Note: No treatment with chlorine bleach (sodium hypochlorite) disinfectant, lime (calcium oxide) or other oxidants shall be applied without the receipt of specific instructions from the appropriate regulatory agency as it has been determined that these could be detrimental to the environment.

3.1.5.3.2 Landscaped and Unimproved Natural Vegetation

Collect all signs of sewage solids and sewage-related material via a variety of methods. Best practice is by hand (while wearing protective gloves), and the use of rakes, brooms, and shovels or vacuuming with a combination truck are alternative methods.

Wash down the affected area with clean water until the water in the affected area runs clear. The flushing volume should be approximately three times the estimated volume of the spill.

Either contain or vacuum up the wash water so that none is released to waterways. Take reasonable steps to contain and vacuum up any ponding water.

Allow the area to dry. Repeat the process if additional cleaning is required.

Dispose of the recovered spill and wash down water appropriately.

3.1.5.3.3 Creeks, Gullies, and Natural Waterways

The Department of Fish and Game should be notified (via Dispatch or Superintendent) in the event a spill impacts or had the potential to impact any creeks, gullies, or natural waterways. The Department of Fish and Game will provide the professional guidance needed to contain and effectively clean up spills that occur in these sensitive environments.

Containment should be implemented to reduce the area that might be affected.

Cleanup should proceed quickly in order to minimize negative impacts. Sewage causes depletion of dissolved oxygen which will kill aquatic life. SSOs that result in a discharge to streams supporting aquatic habitat will be evaluated by the Department of Fish and Game to determine whether additional aeration is needed.

Note: Any water containing chlorine that is used in the cleanup should be de-chlorinated prior to discharge to the waterway (chlorine compounds are toxic to aquatic life). No disinfectant may be used.

All relevant information should be documented on the SSO Response and Analysis Report.

3.2 Public Notification

The public that may be at risk of coming into contact with the spill should be warned that contact with sewage or sewage-contaminated water from an SSO may cause illness.

In any event where public contact is possible, signage warning of a sewer overflow occurrence must be posted in both English and Spanish for a minimum of 72 hours. The warning signs will be checked every day to ensure that they are still in place. A sample warning sign is included in the Appendix F.

If necessary, safety cones, caution tape, or temporary fencing will be used to block access to the contaminated area. WCS Staff is not allowed to remove these until directed by the Lead Operator, WCS Supervisor or the Superintendent.

Creeks, streams, and beaches that have been contaminated as a result of an SSO may require warning notices to be posted at visible access locations until the risk of contamination has been reduced. The County Environmental Services Department, in collaboration with the City, has the final responsibility for determining when to post notices of sewage contamination in creeks, streams or around beaches.

Major spills may warrant a broader public notice. Local media may be notified through the City's Public Works Department when significant areas have the potential of being contaminated by sewage. The Public Works Department maintains the contact information for local media and any special interest organizations that may also need to be notified.

3.3 Water Quality Monitoring Program

All sewage spills to surface waters must be sampled, as long as it safe to do so, to determine the impacts to surface waters and ensure adequate cleanup. To comply with subsection D.7 (v) of the SSS WDRs, the City developed and implemented an SSO Water Quality Monitoring Program to assess impacts from SSOs to surface waters in which 50,000 gallons or greater may have been spilled to surface waters. The Water Quality Monitoring Program is located in Appendix I.

3.4 SSO Investigation and Documentation

3.4.1 SSO Incident File

The City is required to investigate and document all possible or actual SSOs. Public complaints, also referred to as Requests, are logged in the CMMS. These complaint records store the date/time the City was notified, an approximate timeline of the potential or actual SSO, narrative description of the issue, and contact information if the reporting party does not wish to remain anonymous. When staff investigate the potential SSO or conduct response activities, the request number is linked to the Work Order and response activities for future reference.

All SSOs will be thoroughly investigated and documented for use in managing the sewer system and meeting established reporting requirements. The procedures for investigating and documenting SSOs are listed below.

The City currently uses a paper-based process for documenting and analyzing SSOs and uses the Cartegraph OMS and ArcGIS system to capture, analyze, and report on each SSO event. These systems support the investigation and reporting process, including recording the spill event, identifying collection system structures involved, tracking mitigation and control activities, managing post-event evaluation activities (e.g. CCTV inspection), and initiating post-analysis mitigation actions such as repairs, adjustment of cleaning frequencies, or structural improvements. Figure 3-2 shows the overall process of how these systems are used to support data capture, analysis, and reporting.

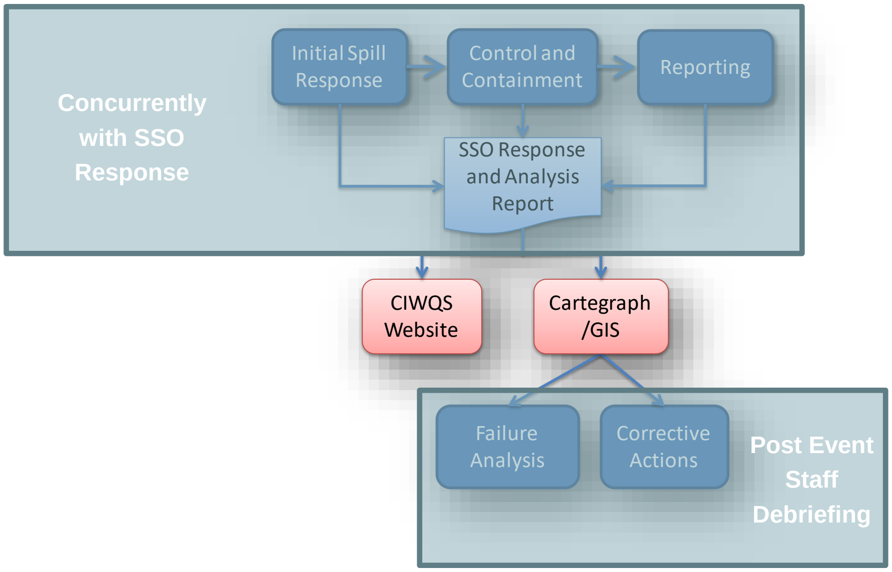


Figure 3-2. SSO Documentation and Reporting Process

When an SSO event occurs, the City dispatches Field Crews to respond as described in previous sections. Once the Field Crews arrive on site, complete the initial response activities, and contain the spill, the Field Crews and/or Lead Operator will collect spill response data and perform visual inspections of the system. Field crews will use an iPad to capture all information needed to report a spill on the CIWQS website and document all activities performed in the field so that an analysis can be done to determine cause, and identify any corrective actions necessary. This data is transferred to a hard copy SSO Response and Analysis Report at a later time, and reviewed with staff to confirm accuracy. The initial report will be provided to the WCS Supervisor or Superintendent who completes the analysis and enters the data into the CIWQS website.

The SSO event will be given an SSO event number and entered into Cartegraph OMS as a work order. All tasks linked to the SSO event will be associated with the work order number and to the sewer assets involved. Additional corrective action tasks (e.g. initiating structural repairs, CCTV inspections, SLIP Cases and other maintenance activities) can be created and linked to the work order, allowing the City to be able to track all related actions and time spent on the SSO event.

The current reporting and analysis activities are described in more detail below.

3.4.2 CIWQS Wastewater Overflow Reporting

The appropriate information must be documented to ensure effective response to the incident and to ensure accurate regulatory reporting. The information is tracked on the SSO Response and Analysis Report and includes at a minimum;

- Name of caller (and department, if applicable);
- Address of overflow;
- Spill appearance point;
- Whether the spill was a private lateral discharge (PLD);
- Time the report was received;
- Arrival time of the crew;

- Time the overflow stopped;
- Estimated volume of overflow;
- The final destination of the spill;
  - Specifically identify the receiving waters of the State;
- The suspected cause of the spill;
- Whether the spill reached surface water, drainage ditch or municipal separate storm sewer system (MS4);
- Identify if the MS4 was flowing during the spill event;
- Record any rainfall occurring during the spill event;
- Indicate if the spill was caused by roots entering main from a lateral;
- Identify if there is flow in the storm system or drainage ditch; and
- A description of what remedial action was taken.

The WCS Supervisor or Superintendent will enter the required information into the CIWQS on-line reporting page (http://ciwqs.waterboards.ca.gov/) within the deadlines listed in 3.5 below, based on categorization of the SSO. Data entry into the CIWQS site requires a username and password.

The WCS Supervisor or Superintendent will print out a hard copy of the completed CIWQS Overflow Report, enter it into the “SSO Events For the Calendar Year” 3-ring binder and retain a PDF copy on the City’s computer network.

3.4.3 SSO Incident File

An Incident SSO file will be created for each individual SSO and include the following items:

- Initial service call information;
- SSO Response and Analysis Report (Field Form)
- Volume estimate (total volume discharged, total volume contained minus total volume recovered);
- Circumstances that caused the spill;
- Appropriate maps showing the spill location and the receiving waters in the area;
- Impact of the spill on public health and the environment;
- Cleanup activities and mitigation measures taken to protect public health and the environment;
- Photographs of spill location;
- Record of rainfall prior to or during the spill;
- Water quality sampling chain of custody and test results; and
- Any other relevant investigation results (see Appendix G, Wastewater Collection System CIWQS Reporting Guidelines).

The WCS Supervisor and Superintendent will ensure that each SSO is also documented in Cartegraph OMS.

3.4.4 Follow up Investigation and Failure Analysis

As a general rule, after each SSO caused by a blockage in the mainline, the City will perform a CCTV inspection. One line segment upstream of the SSO location, the line segment where the blockage occurred and one additional line segment downstream will undergo CCTV inspection immediately following the SSO event to document the condition of the line segment and determine the actual cause of the SSO. It should be noted whether the SSO is suspected to be caused by roots entering the main from laterals. The results of this inspection (videos and logs) will support the failure analysis (to be recorded on the SSO Response and Analysis Report).

Even if the SSO is conclusively determined to be caused by an issue not related to the gravity sewer main (e.g. blockage in a manhole, force main failure, etc.), the line segments in the area of the SSO should still undergo CCTV inspection to document pipe conditions and retained as evidence for future inquiries. If for any reason subsequent CCTV inspection is not performed, the justification must be documented on the SSO Response and Analysis Report.

The objective of the failure analysis is to determine the cause of the SSO, to identify additional investigation activities needed and to identify corrective or preventive action(s) that will reduce or eliminate the potential for an SSO to recur at that location. A secondary goal of this effort is to ensure all relevant data has been collect and reported to the appropriate entities.

The Superintendent along with the WCS Supervisor will perform a failure analysis which includes review of all relevant data to determine the appropriate corrective action(s) for the line segment. The analysis should include:

- Review of the information in the SSO Incident File;
- Review of past maintenance records (including past overflow history, if appropriate);
- Review of available photographs;
- Review of CCTV inspection results, including the video and logs; and
- Interviews with all staff who responded to the spill.
- Initiate SLIP process for private lateral issues.

Based on the outcome of this analysis, it may be determined that a repair is needed, a structural improvement is necessary, or that the frequency or program of cleaning be adjusted to address any recurring maintenance issues. The Superintendent, WCS Supervisor and Lead Operators will initiate any needed cleaning, inspection and repair activities. The Planner/Schedulers (CCTV and Cleaning) will review and document their QAQC for tasks in Cartegraph OMS.

3.4.5 Post Event Debriefing

Every SSO event is an opportunity to thoroughly evaluate the response and reporting procedures. Each overflow event is unique with its own elements and challenges including volume, cause, location, terrain, and other parameters.

As soon as possible after major SSO events, the Superintendent and/or WCS Supervisor will assemble all of the participants, from the person who received the call to the last person to leave the site (also referred to as responding team), to review the procedures used and to discuss what worked well and where improvements could be made in responding to and mitigating future SSO events. The results of the debriefing, along with any proposed corrective actions or improvements, will be recorded and distributed to all staff (via a presentation at a follow-up meeting) that may be likely to respond to an overflow in the future. The goal of this effort is to ensure that the response procedures to future SSOs are augmented and improved based on past experience.

The Post Event Debriefing may be conducted in conjunction with the Failure Analysis interviews mentioned above.

3.5 SSO Reporting Requirements

The current reporting requirements for SSOs that occur in the City wastewater collection system are summarized below. These requirements were updated in September 2013 by SWRCB Order No. WQ 2013-0058-EXEC, and are supported by the CIWQS reporting system.

3.5.1 Internal SSO Reporting Procedures

Category 1 and 2 SSOs

Category 1 SSOs are defined as 1) SSOs of any volume that reach waters of the State; 2) SSOs that reach a drainage channel tributary to a surface water; 3) SSOs that reach a Municipal Separate Storm Sewer System (MS4) and are not fully captured unless the MS4 discharges to a dedicated infiltration basin.

Category 2 SSOs are defined as spills over 1,000 gallons that do not reach surface water, a drainage channel, or a MS4 unless the entire SSO discharged to the storm drain system is fully recovered and disposed of properly.

The field crew will immediately notify the Lead Operator who will then notify the WCS Supervisor and/or Superintendent.

The Lead Operator, WCS Supervisor and/or the Superintendent will meet with field crew(s) at the site of the SSO event to assess the situation, document condition with photos, and direct containment and remedial actions, as well as the recovery and cleanup activities.

In the event of a very large overflow or an overflow to a sensitive area, the Superintendent or Wastewater System Manager should contact the Water Resources Manager, who in turn may notify the Public Works Director.

The Lead Operator and/or field crew will initiate the SSO Response and Analysis Report.

The WCS Supervisor and/or Superintendent will review the SSO Response and Analysis Report, including the laboratory analysis results, along with available information in Cartergraph OMS and complete the Failure Analysis section as soon as CCTV and other inspection information is available. Once complete, the Wastewater System Manager is notified of the cause and the report is complete. Typically this is completed within three days of the SSO event.

The Superintendent and/or WCS Supervisor will enter the information from the SSO Response and Analysis Report into CIWQS. The Superintendent will then certify the report in CIWQS and print out a copy of the final CIWQS Wastewater Overflow Report.

Category 3 SSOs

Category 3 SSOs are any public spills that do not fall into the description of Category 1 or Category 2 above.

The WCS Lead Operator, Supervisor and/or the Superintendent will meet with field crew(s) at the site of the SSO event to assess the situation, document conditions, and direct containment and remedial actions, as well as the recovery and cleanup activities. The field crew and/or Lead will initiate the filling out of the SSO Response and Analysis Report.

The WCS Supervisor and/or Superintendent will review the SSO Response and Analysis Report along with available information in Cartegraph OMS and complete the Failure Analysis section as soon as CCTV and other inspection information is available. Once complete, the Wastewater System Manager is notified of the cause and the report is complete. Typically this is completed within three days of the SSO event.

The Superintendent and/or WCS Supervisor will enter the information from the SSO Response and Analysis Report into CIWQS. The Superintendent will then certify the report in CIWQS and print out a copy of the final CIWQS Wastewater Overflow Report.

Private Lateral Sewage Discharges

Although discharges on private property due to problems in the homeowner's lateral are not the responsibility of the City to resolve, a PLSD form should be filled out and turned into the WCS Supervisor or Lead Operator for their review.

The WCS Supervisor will complete the online reporting through the CIWQS website noting the Category of the spill is a PLSD. A SLIP Case activity will be created for the sewer lateral to assess the condition of the lateral and determine if repairs or replacement are needed.

All SSOs to City Waterfront or Harbor

The Lead Operator, WCS Supervisor, or Superintendent will notify Waterfront's Lead Supervisor, Manager, or Waterfront Director in the event there is an SSO that has the potential of reaching the City Waterfront or Harbor. Contact numbers for the appropriate personnel are included in Appendix B.

Internal Reporting Contact Information

If additional personnel internal to the City need to be notified of a significant SSO event, contact will be made with the relevant program managers. Contact information other departments is available in internal directories such as Outlook.

3.5.2 External SSO Reporting

Reporting Responsibility

External SSO reporting is the responsibility of the Superintendent or their designee.

Verbal Notification

Any Category 1 SSO greater than 1,000 gallons that results or may result in discharge to a surface water of the State must be reported by telephone to the Cal OES (see Appendix H for public agency contact information) to obtain a notification control number, as soon as notification is possible and can be provided without substantially impeding cleanup or other emergency measures, but no later than 2 hours from the time that the City has knowledge of the spill. Typically the call will be made by the Lead Operator, WCS Supervisor or the Superintendent from the site of the spill. Cal OES will ask a series of questions pertaining to the spill.

Unless fully contained and recovered, SSOs to storm drains that are tributary to waters of the State should be reported as discharges to waters of the State.

Written Reports

If no SSOs occurred during a calendar month, the WCS Supervisor or Superintendent shall submit a "No-Spill" certification statement thorough the CIWQS website within 30 days after the end of each month.

Category 1 SSOs: a draft report must be submitted through the CIWQS website within three (3) business days of identification of the spill, and must include all information required by the current General Waste Discharge requirements. The required information is highlighted with an asterisk on the CIWQS entry screen.

The CIWQS website will automatically send email notifications for all Category 1 SSOs and PLSDs to the County Health Officer, Environmental Health Department and Regional Water Board, if they have requested to receive this information. If the CIWQS website is not available, the report shall be faxed to the RWQCB and then entered into the website as soon as practical.

A final certified report shall be submitted through the CIWQS website within fifteen (15) days of the conclusion of the SSO response activities.

Category 1 SSOs ≥ 50,000 gallons: additionally, a SSO Technical Report shall be submitted within 45 calendar days after the end date of any Category 1 SSO in which 50,000 gallons or greater are spilled to surface waters. Technical report requirements are listed in Section C.5. of the SWRCB MRP Order 2013-0058-EXEC.

Category 2 SSOs: a draft report shall be submitted through the CIWQS website within three (3) business days of identification of the spill. A final certified report shall be submitted through the CIWQS website within fifteen (15) days of the conclusion of the SSO response activities.

Category 3 SSOs: a certified report shall be submitted through the CIWQS website within thirty (30) business days after the end of the calendar month in which the SSO occurred.

PLSDs may be voluntarily reported to the CIWQS website. Certification of PLSD reports is not required. After being made aware of a PLSD equal to or greater than 1,000 gallons that has or may result in a discharge to surface water, enrollees are encouraged to provide notification to Cal OES as noted above under the Verbal Notification heading. An example of the City’s PLSD response form is included in Appendix B.

General SSO Information Updates. The City will promptly update, in CIWQS, any new information obtained regarding an SSO event.

3.5.3 External SSO Reporting Information

Contact information for all public agencies is provided in Appendix H.

3.6 Training

3.6.1 Internal Training

This section provides information on the training that is required to support SSO Response.

Initial and Annual Refresher Training

All employees who may have a role in responding to, reporting, and or mitigating a sewer system overflow will receive training. All new employees will receive training before they are placed in a position where they may have to respond. Current employees should receive annual refresher training on this SSO Response Plan and procedures to be followed. The training will review the techniques used to estimate and report on the volume of overflow.

SSO Response Drills

Periodic training drills should be held to ensure that employees are up-to-date on the procedures, the equipment is in working order, and the required materials are readily available. The training drills should cover scenarios typically observed during sewer related emergencies (e.g. mainline blockage, mainline failure, force main failure, lift station failure, and lateral blockages or PLSDs). The results and the observations during performance of the drills should be recorded and action items for improvement should be tracked to ensure completion.

Training Record Keeping

Records should be kept of all training that is provided in support of this plan. The records for all scheduled training courses and for each overflow emergency response training event should include date, time, place, content, name of trainer(s), and names of attendees.

3.6.2 Contractors Working On City Sewer Facilities

All contractors working on City sewer facilities will be required to develop an Overflow Emergency Response Plan (OERP) to follow this SSO Response Plan. All contractor personnel will be required to receive training in the Contractor's OERP, or this plan, and implement the plan in the event that they cause or observe an SSO.

In the event of an SSO, the Contractor shall notify the appropriate parties:

- Business Hours 7:00 am -3:30 pm: Control 10 – *(805) 564-5413*
- After Business Hours: Control 14 – *(805) 963-4286*
- WCS Superintendent
- WCS Supervisor
- WCS Operator Lead

After contact with the appropriate City staff, the following basic steps should be taken while waiting for City staff assistance:

- Implement initial containment measures:
    - Upstream diversion;
    - Block any nearby storm drains with liners and sandbags;
    - Develop a containment area to contain spill and prevent public access; and
    - Divert into containment area or back into sewer.

Appendix A: SSO Response and Analysis Report

SSO – [ ]
BLOCKAGE – [ ]

CITY OF SANTA BARBARA - SSO RESPONSE REPORT

General Information

CIWQS Event ID: | CIWQS Certification ID: | Dept. Report #: | Date:

Spill/Blockage Location Address: | Weather: *Clear* *Fair* *Rain*

Name of Reporting Party: | Phone: | Reporting Party's Address:

Spill Latitude (DMS or DD): | Spill Longitude (DMS or DD):

Date/Time City was notified/discovered spill: | Est. Operator arrival Date/Time:

Spill Details (Not Required if "BLOCKAGE")

Spill Type: *Category 1* *Category 2* *Category 3* | Condition: *1* *2* *3* *4*

Spill Appearance Point (circle all that apply): *Building or Structure* *Pump Station* *Manhole* *Force Main* *Private Cleanout* *Gravity Sewer* *Other:*____________________

Did the spill discharge to a drainage channel? *Yes* *No* | If YES, was it fully captured and returned to sewer system? *Yes* *No*

Did the spill discharge to a storm drain pipe? *Yes* *No* | If YES, was it fully captured and returned to sewer system? *Yes* *No*

Was MS4 flowing during spill? *Yes* *No* | Rainfall amount occurring during spill: Inches

Final Spill Destination: *(circle all that apply)* *Building or Structure* *Street/Curb and Gutter** *Surface Water** *Unpaved Surface* *Storm Drain/Drainage Channel** *Beach* *Paved Surface* *Other:* __________________

Designates MS4 for purposes of Consent Decree

Spill Calculations (Not Required if "BLOCKAGE")

Est. spill volume (gal): | Est. volume recovered (gal):

Est. volume of spill that reached surface water, drainage channel, or not recovered from a storm drain:

Est. spill start date/time: | Est. spill end date/time:

Method of volume est.: *Volume in Truck* *Visual or "Kick the Bucket"* *Other:* ____________
Area: L____ (F / I) x W____ (F / I) x D____ (F / I) *Rate x Duration: ______GPM*

Response

Spill/Blockage Cause: *(circle all that apply)* *Debris* *Flow Exceeded Capacity* *Operator Error* *Vandalism* *Grease* *Pump Station Failure* *Pipe Structural Problem/Failure* *Private Lateral* *Root Intrusion* *Roots from private lateral* *Rainfall Exceeds Design* *** Other:*____________

Size: (inches) | Sewer Material (*circle all that apply*): *VCP* *PVC* *Lined* *CIP* *HDPE* *DIP* *Other:* | Age of Pipe:

Affected Pipe: | Affected MH/CO | US MH ID | DS MH ID

Response completion date/time: | Name of impacted beaches or waterway:____________________

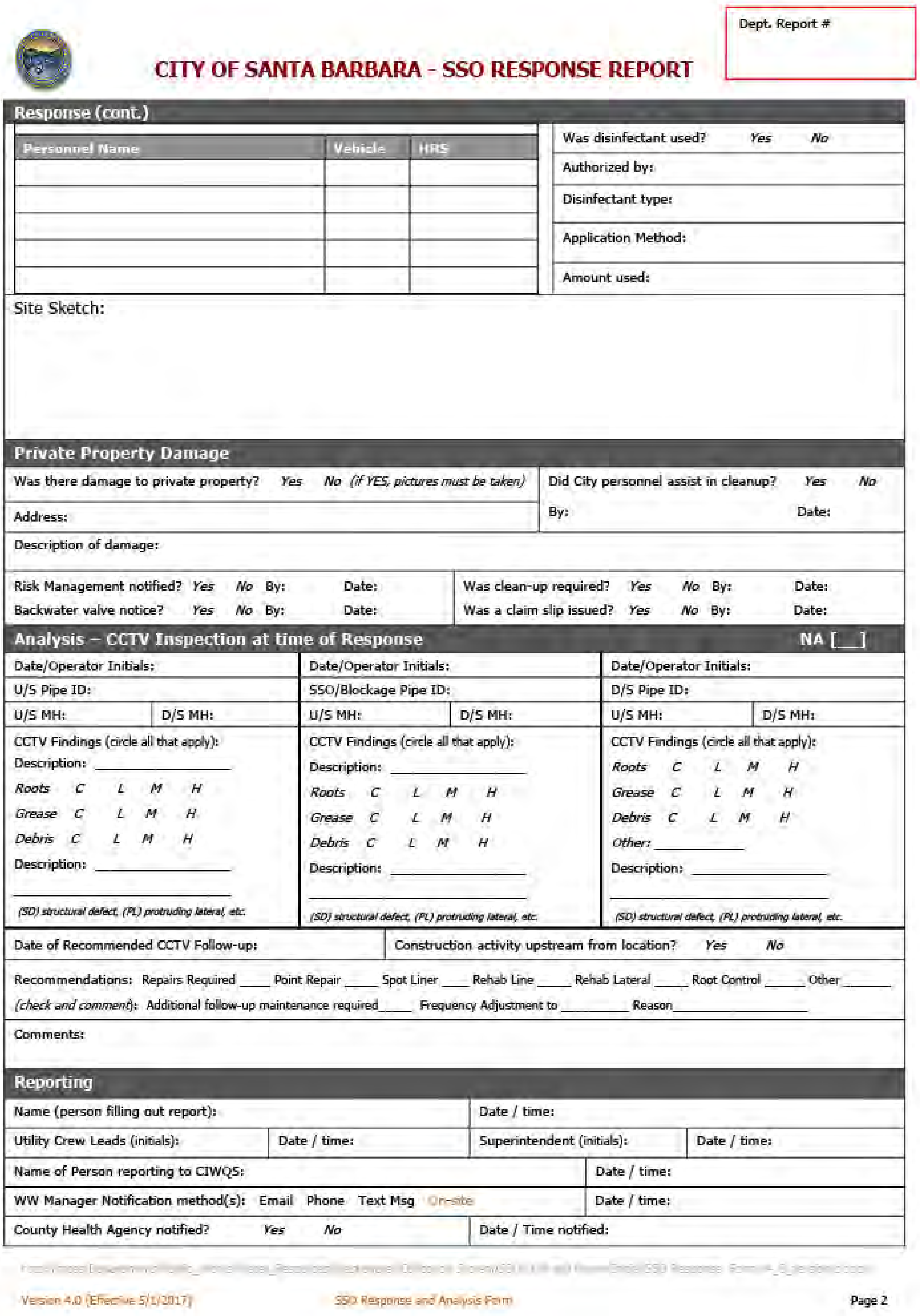
Response Activities (*check all that apply*):
- [ ] *Cleaned up (mitigated effects of spill)*
- [ ] *Restored Flow – Method* __________________
- [ ] *Contained all or portion of spill*
- [ ] *Returned all or portion of spill to sanitary sewer system*
- [ ] *Inspected sewer using CCTV to determine cause*
- [ ] ***Other:*____________________

Water Quality Samples Analyzed for (*check all that apply*):
- [ ] *Not applicable to this spill*
- [ ] *No water quality samples taken*
- [ ] *Dissolved oxygen*
- [ ] *Biological indicators* *Specify:*________________
- [ ] *Other chemical indicators* *Specify:*________________
- [ ] *Other:*____________________

Water Quality Results Reported to (*check all that apply*):
- [ ] *Not applicable to this spill*
- [ ] *No water quality samples taken*
- [ ] *County Health Agency*
- [ ] *RWQCB*
- [ ] *None of the above*
- [ ] *Other:*____________________

Spill Corrective Action Taken (*check all that apply*):
- [ ] *Recommend (circle): repair, rehabilitation, replacement*
- [ ] *SLIP follow-up required; SLIP Letter Sent:* __________ *Date*
- [ ] *Enforcement action against FOG source*
- [ ] *Added sewer main to scheduled cleaning program*
- [ ] *Recommend adjustment of cleaning schedule/method*
- [ ] *Other:*____________________

Comments:



Dept. Report #

CITY OF SANTA BARBARA - SSO RESPONSE REPORT

Response (cont.)

Personnel Name	Vehicle	HRS

Was disinfectant used? *Yes* *No*

Authorized by:

Disinfectant type:

Application Method:

Amount used:

Site Sketch:

Private Property Damage

Was there damage to private property? *Yes* *No* *(if YES, pictures must be taken)*

Did City personnel assist in cleanup? *Yes* *No*

Address:

By: Date:

Description of damage:

Risk Management notified? *Yes* *No* By: Date:

Backwater valve notice? *Yes* *No* By: Date:

Was clean-up required? *Yes* *No* By: Date:

Was a claim slip issued? *Yes* *No* By: Date:

Analysis – CCTV Inspection at time of Response NA [__]

Date/Operator Initials:	Date/Operator Initials:	Date/Operator Initials:
U/S Pipe ID:	SSO/Blockage Pipe ID:	D/S Pipe ID:
U/S MH: D/S MH:	U/S MH: D/S MH:	U/S MH: D/S MH:
CCTV Findings (circle all that apply):	CCTV Findings (circle all that apply):	CCTV Findings (circle all that apply):
Description: ________________	Description: ________________	*Roots* *C* *L* *M* *H*
Roots *C* *L* *M* *H*	*Roots* *C* *L* *M* *H*	*Grease* *C* *L* *M* *H*
Grease *C* *L* *M* *H*	*Grease* *C* *L* *M* *H*	*Debris* *C* *L* *M* *H*
Debris *C* *L* *M* *H*	*Debris* *C* *L* *M* *H*	*Other:* ___________
Description: ________________ ________________	Description: ________________ ________________	Description: ________________ ________________
(SD) structural defect, (PL) protruding lateral, etc.	*(SD) structural defect, (PL) protruding lateral, etc.*	*(SD) structural defect, (PL) protruding lateral, etc.*

Date of Recommended CCTV Follow-up:

Construction activity upstream from location? *Yes* *No*

Recommendations: Repairs Required ____ Point Repair _____ Spot Liner ____ Rehab Line _____ Rehab Lateral _____ Root Control ______ Other _______

(check and comment): Additional follow-up maintenance required____ Frequency Adjustment to _________ Reason_________________

Comments:

Reporting

Name (person filling out report):

Date / time:

Utility Crew Leads (initials):

Date / time:

Superintendent (initials):

Date / time:

Name of Person reporting to CIWQS:

Date / time:

WW Manager Notification method(s): Email Phone Text Msg On-site

Date / time:

County Health Agency notified? *Yes* *No*

Date / Time notified:

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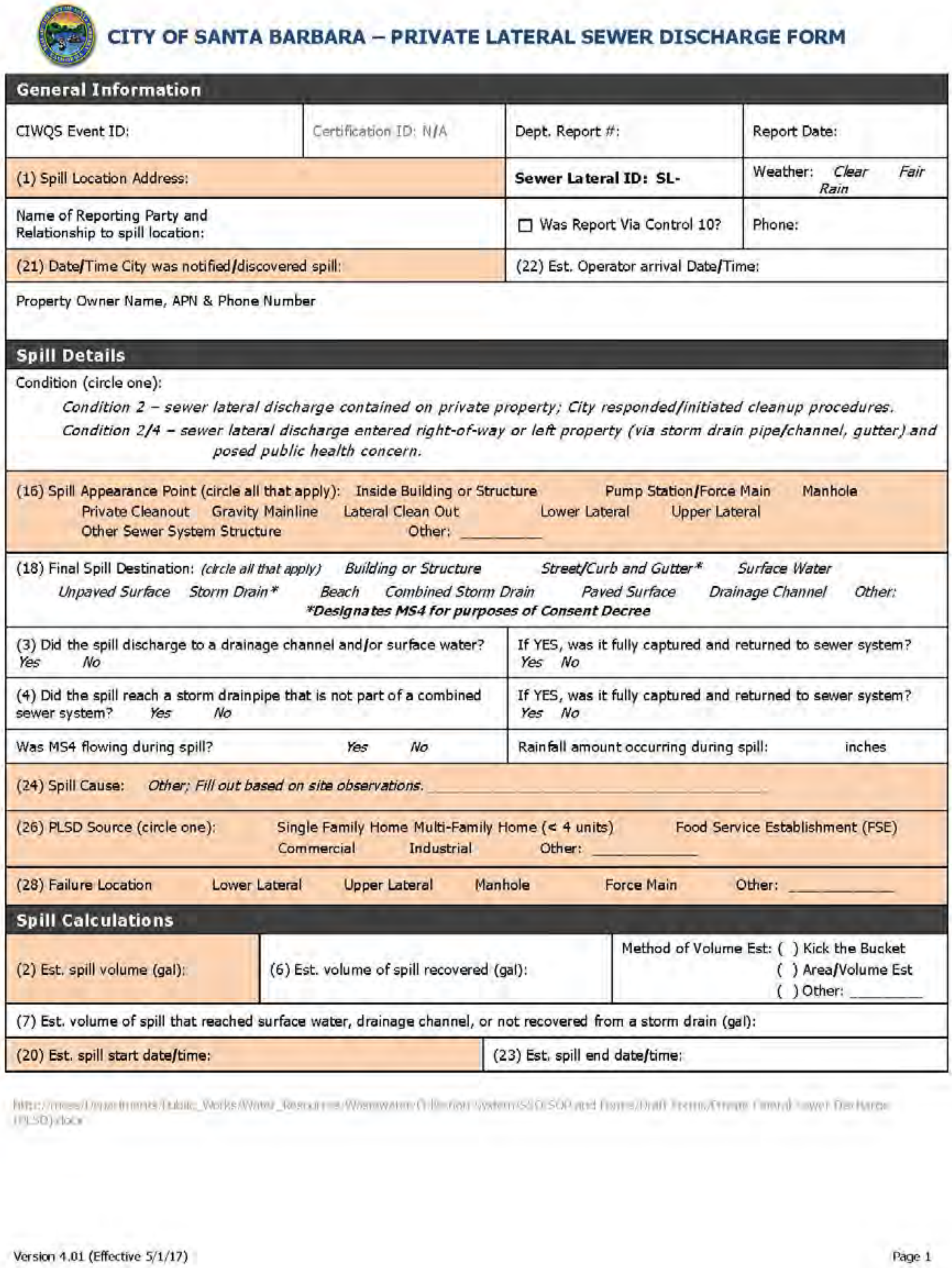
Appendix B: PLSD Response and Analysis Report



CITY OF SANTA BARBARA – PRIVATE LATERAL SEWER DISCHARGE FORM

General Information

CIWQS Event ID:	Certification ID: N/A	Dept. Report #:	Report Date:
(1) Spill Location Address:		**Sewer Lateral ID: SL-**	Weather: *Clear* *Fair* *Rain*
Name of Reporting Party and Relationship to spill location:		☐ Was Report Via Control 10?	Phone:
(21) Date/Time City was notified/discovered spill:		(22) Est. Operator arrival Date/Time:	
Property Owner Name, APN & Phone Number			

Spill Details

Condition (circle one):

Condition 2 – sewer lateral discharge contained on private property; City responded/initiated cleanup procedures.

Condition 2/4 – sewer lateral discharge entered right-of-way or left property (via storm drain pipe/channel, gutter) and posed public health concern.

(16) Spill Appearance Point (circle all that apply): Inside Building or Structure Pump Station/Force Main Manhole Private Cleanout Gravity Mainline Lateral Clean Out Lower Lateral Upper Lateral Other Sewer System Structure Other: ________

(18) Final Spill Destination: *(circle all that apply)* *Building or Structure* *Street/Curb and Gutter** *Surface Water* *Unpaved Surface* *Storm Drain** *Beach* *Combined Storm Drain* *Paved Surface* *Drainage Channel* *Other:*

***Designates MS4 for purposes of Consent Decree**

(3) Did the spill discharge to a drainage channel and/or surface water? *Yes* *No*	If YES, was it fully captured and returned to sewer system? *Yes* *No*
(4) Did the spill reach a storm drainpipe that is not part of a combined sewer system? *Yes* *No*	If YES, was it fully captured and returned to sewer system? *Yes* *No*
Was MS4 flowing during spill? *Yes* *No*	Rainfall amount occurring during spill: inches

(24) Spill Cause: *Other; Fill out based on site observations.* ______________________________

(26) PLSD Source (circle one): Single Family Home Multi-Family Home (< 4 units) Food Service Establishment (FSE) Commercial Industrial Other: __________

(28) Failure Location Lower Lateral Upper Lateral Manhole Force Main Other: __________

Spill Calculations

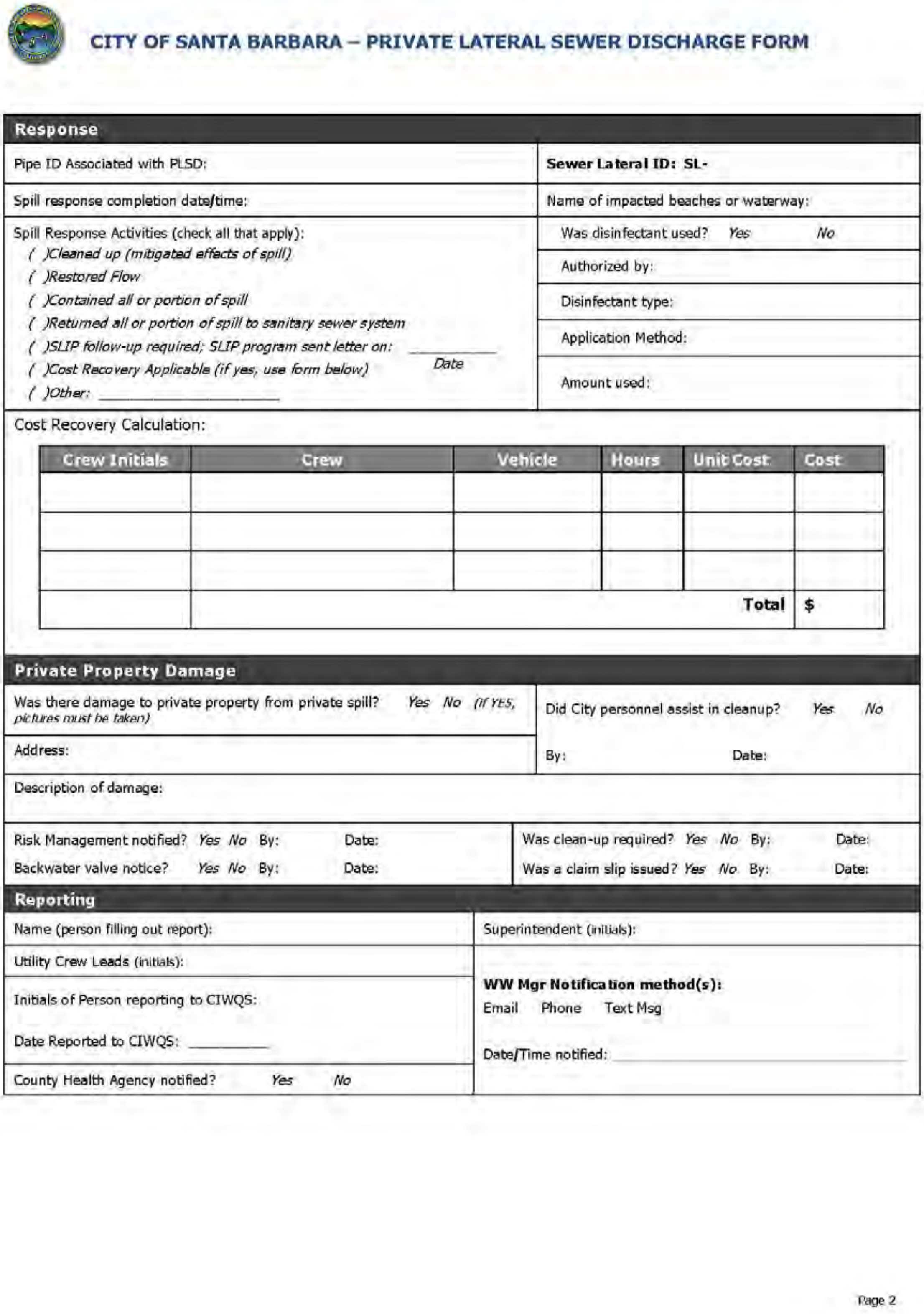
(2) Est. spill volume (gal):	(6) Est. volume of spill recovered (gal):	Method of Volume Est: ( ) Kick the Bucket ( ) Area/Volume Est ( ) Other: ________

(7) Est. volume of spill that reached surface water, drainage channel, or not recovered from a storm drain (gal):

(20) Est. spill start date/time:	(23) Est. spill end date/time:

http://moss/Departments/Public_Works/Water_Resources/Wastewater Collection System/SSO SOP and Forms/Draft Forms/Private Lateral Sewer Discharge (PLSD).docx

Version 4.01 (Effective 5/1/17) Page 1



CITY OF SANTA BARBARA – PRIVATE LATERAL SEWER DISCHARGE FORM

Response

Pipe ID Associated with PLSD:

Sewer Lateral ID: SL-

Spill response completion date/time:

Name of impacted beaches or waterway:

Spill Response Activities (check all that apply):
( )*Cleaned up (mitigated effects of spill)*
( )*Restored Flow*
( )*Contained all or portion of spill*
( )*Returned all or portion of spill to sanitary sewer system*
( )*SLIP follow-up required; SLIP program sent letter on:* ___________ *Date*
( )*Cost Recovery Applicable (if yes, use form below)*
( )*Other:* ____________________

Was disinfectant used? *Yes* *No*

Authorized by:

Disinfectant type:

Application Method:

Amount used:

Cost Recovery Calculation:

Crew Initials	Crew	Vehicle	Hours	Unit Cost	Cost
				Total	**$**

Private Property Damage

Was there damage to private property from private spill? *Yes* *No* *(If YES, pictures must be taken)*

Did City personnel assist in cleanup? *Yes* *No*

Address:

By: Date:

Description of damage:

Risk Management notified? *Yes* *No* By: Date:

Backwater valve notice? *Yes* *No* By: Date:

Was clean-up required? *Yes* *No* By: Date:

Was a claim slip issued? *Yes* *No* By: Date:

Reporting

Name (person filling out report):

Superintendent (initials):

Utility Crew Leads (initials):

Initials of Person reporting to CIWQS:

Date Reported to CIWQS: ___________

WW Mgr Notification method(s):
Email Phone Text Msg

Date/Time notified: ____________________

County Health Agency notified? *Yes* *No*

Page 2

Appendix C: Corrective Notice Form

CORRECTION NOTICE

NAME:____ DATE:_____________________

ADDRESS:____

VIOLATION LOCATION:____

____

____

The following codes are being violated:

- **State of California Health and Safety Code, §5411**

  Prohibits discharge of Wastewater directly onto the ground.

- **City of Santa Barbara Municipal Code, §14.44.160**

  Responsibility of property owner to maintain satisfactory operation of any house/building sewer connection/private sewer disposal system.

You are hereby advised that you must ***IMMEDIATELY*** discontinue dispensing sewage onto the surface of the ground.

If you do not comply with this notice ***IMMEDIATELY***, the City will shutoff your house/building water service and initiate further legal action.

Thank you for your cooperation. If you have any questions, please call (805) 564-5413.

_______________________________________ ___________________________

Authorized Representative Title

ORIGINAL	2ND COPY	3RD COPY	COPY FAXED - DATE__________
OWNER/SITE	BUILDING DEPARTMENT FILE	WATER RESOURCES FILE	COUNTY ENVIRONMENTAL HEALTH

Appendix D: Methods for Estimating Spill Volume

Methods for Estimating Spill Volume

A variety of approaches exist for estimating the volume of a sanitary sewer spill. This appendix documents the three methods that are most often employed. The person preparing the estimate should use the method most appropriate to the sewer overflow in question and use the best information available.

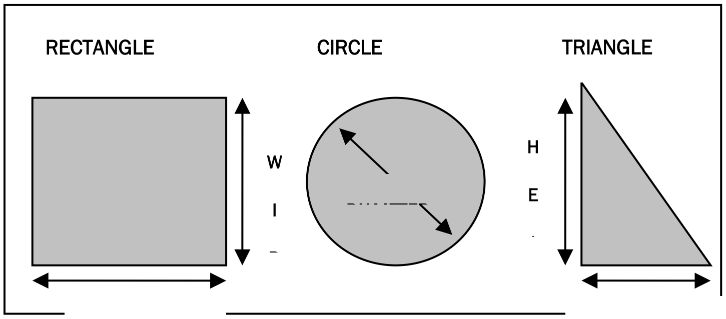
Method 1 Eyeball Estimate

The volume of small spills can be estimated using an "eyeball estimate". To use this method imagine the amount of water that would spill from a bucket or a barrel. A bucket contains 5 gallons and a barrel contains 50 gallons. If the spill is larger than 50 gallons, try to break the standing water into barrels and then multiply by 50 gallons. This method is useful for contained spills up to approximately 200 gallons.

Method 2 Measured Volume

The volume of most small spills that have been contained can be estimated using this method. The shape, dimensions, and the depth of the contained wastewater are needed. The shape and dimensions are used to calculate the area of the spills and the depth is used to calculate the volume.

Figure VII-D–1: Common Shapes and Dimensions



Step 1 Sketch the shape of the contained sewage (see Figure VII-D-1).

Step 2 Measure or pace off the dimensions.

Step 3 Measure the depth at several locations and select an average.

Step 4 Convert the dimensions, including depth, to feet.

Step 5 Calculate the area in square feet using the following formulas:

Rectangle: Area = length (feet) x width (feet)

Circle: Area = diameter (feet) x diameter (feet) x 3.14

Triangle: Area = base (feet) x height (feet) x 0.5

Step 6 Multiply the area (square feet) times the depth (in feet) to obtain the volume in cubic feet.

Step 7 Multiply the volume in cubic feet by 7.5 to convert it to gallons

Method 3 Duration and Flowrate

Calculating the volume of larger spills, where it is difficult or impossible to measure the area and depth, requires a different approach. In this method, separate estimates are made of the duration of the spill and the flowrate. The methods of estimating duration and flowrate are:

Duration: The duration is the elapsed time from the time the spill started to the time that the flow was restored.

Start time: The start time is sometimes difficult to establish. Here are some approaches:

- Local residents can be used to establish start time. Inquire as to their observations. Spills that occur in rights-of-way are usually observed and reported promptly. Spills that occur out of the public view can go on longer. Sometimes observations like odors or sounds (e.g. water running in a normally dry creek bed) can be used to estimate the start time.
- Changes in flow on a downstream flowmeter can be used to establish the start time. Typically the daily flow peaks are "cut off" or flattened by the loss of flow. This can be identified by comparing hourly flow data during the spill event with flow data from prior days.
- Conditions at the spill site change over time. Initially there will be limited deposits of toilet paper and other sewage solids. After a few days to a week, the sewage solids form a light-colored residue. After a few weeks to a month, the sewage solids turn dark. The quantity of toilet paper and other materials of sewage origin increase over time. These observations can be used to estimate the start time in the absence of other information. Taking photographs to document the observations can be helpful if questions arise later in the process.
- It is important to remember that spills may not be continuous. Blockages are not usually complete (some flow continues). In this case the spill would occur during the peak flow periods (typically 10:00 to 12:00 and 13:00 to 16:00 each day). Spills that occur due to peak flows in excess of capacity will occur only during, and for a short period after, heavy rainfall.

End time: The end time is usually much easier to establish. Field crews on-site observe the "blow down" that occurs when the blockage has been removed. The "blow down" can also be observed in downstream flowmeters.

Flow Rate: The flowrate is the average flow that left the sewer system during the time of the spill.

There are three common ways to estimate the flowrate:

- The San Diego Manhole Flowrate Chart: This chart, included as Appendix VII-E, shows sewage flowing from manhole covers at a variety of flowrates. The observations of the field crew can be used to select the appropriate flowrate from the chart. If possible, photographs are useful in documenting basis for the flowrate estimate.
- Flowmeter: Changes in flows in downstream flowmeters can be used to estimate the flowrate during the spill.
- Counting Connections: Once the location of the spill is known, the number of upstream connections can be determined from the sewer maps. Multiply the number of connections by 200 to 250 gallons per day per connection or 8 to 10 gallons per hour per connection.

For example:

22 upstream connections x 9 gallons per hour per connection

= 198 gallons per hour / 60 minutes per hour

= 3.3 gallons per minute

Spill Volume: Once duration and flowrate have been estimated, the volume of the spill is the product of the duration in hours or days and the flowrate in gallons per hour or gallons per day.

For example:

Spill start time = 11:00

Spill end time = 14:00

Spill duration = 3 hours

3.3 gallons per minute X 3 hours X 60 minutes per hour

= 594 gallons

Appendix E: Manhole Overflow Flowrate Guide

Manhole Overflow Flowrate Guide

City of San Diego
Metropolitan Wastewater Department

Reference Sheet for Estimating Sewer Spills from Overflowing Sewer Manholes

All estimates are calculated in gallons per minute (gpm)

Wastewater Collection Division
(619) 654-4160


5 gpm


25 gpm


50 gpm


100 gpm


150 gpm


200 gpm


225 gpm

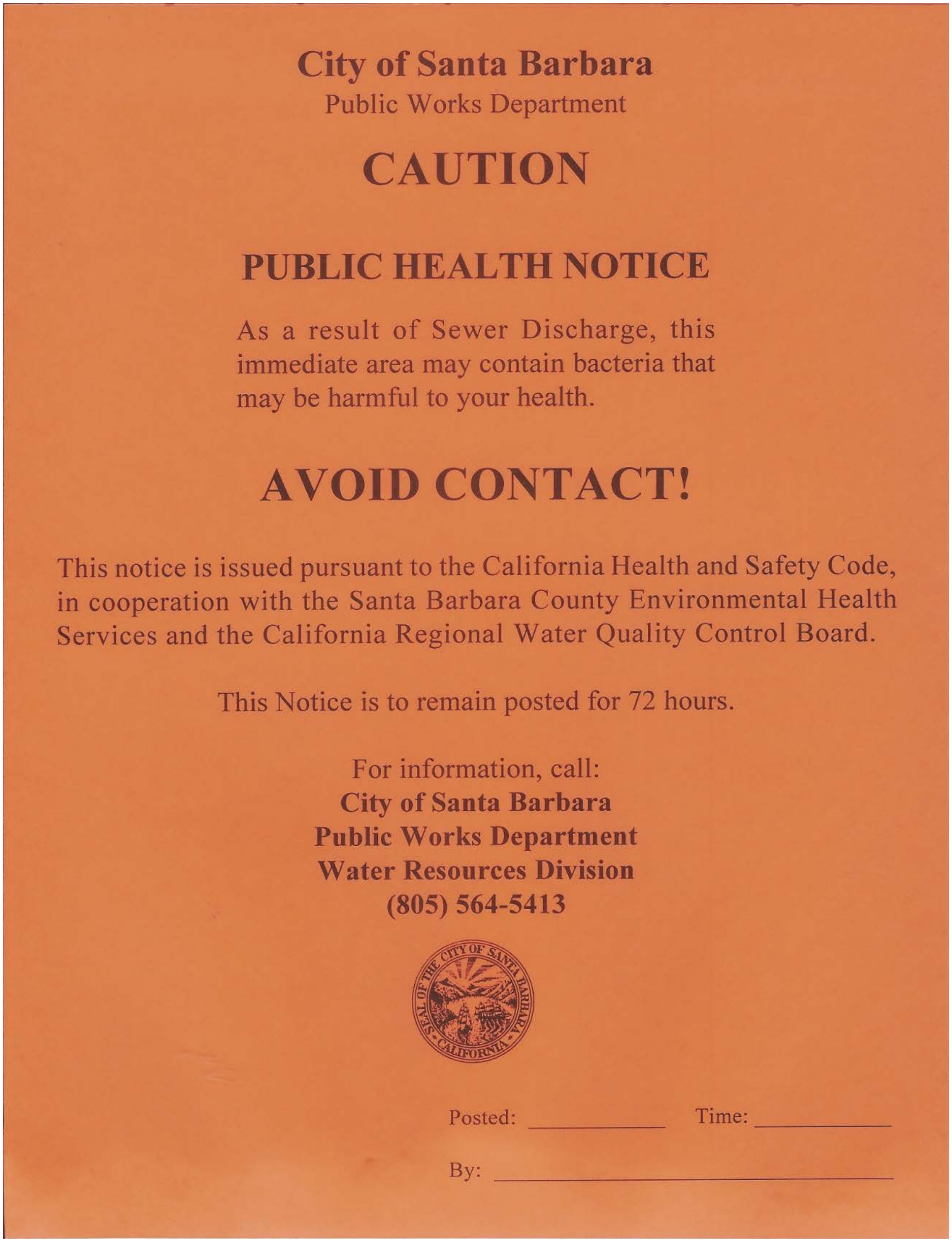

250 gpm


275 gpm

All photos were taken during a demonstration using metered water from a hydrant in cooperation with the City of San Diego's Water Department.

rev. 4/99

Appendix F: Sample Warning Sign



City of Santa Barbara

Public Works Department

CAUTION

PUBLIC HEALTH NOTICE

As a result of Sewer Discharge, this immediate area may contain bacteria that may be harmful to your health.

AVOID CONTACT!

This notice is issued pursuant to the California Health and Safety Code, in cooperation with the Santa Barbara County Environmental Health Services and the California Regional Water Quality Control Board.

This Notice is to remain posted for 72 hours.

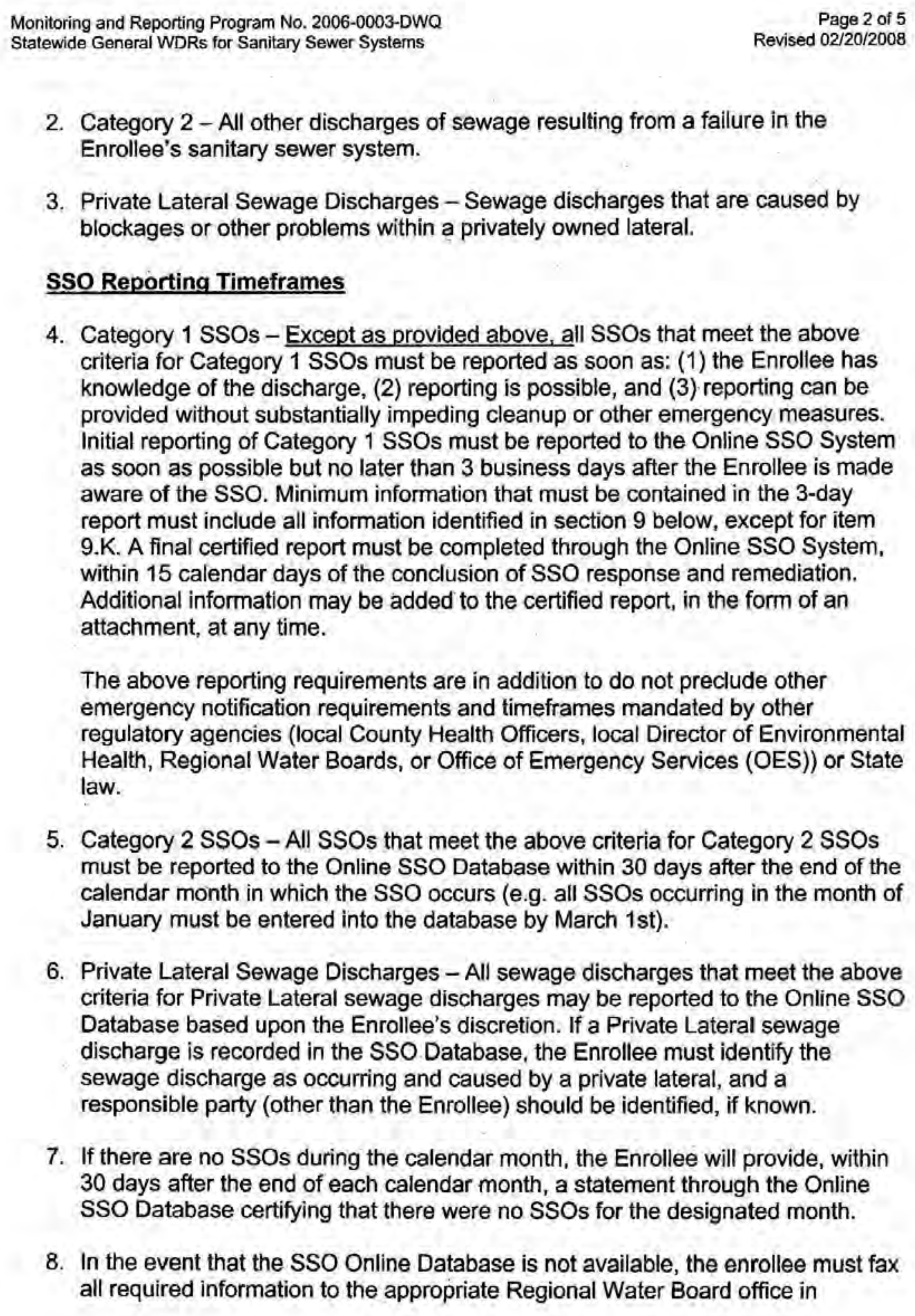
For information, call:
City of Santa Barbara
Public Works Department
Water Resources Division
(805) 564-5413

Posted: ____________ Time: ____________

By: ________________________________

Appendix G: Wastewater Collection System CIWQS Reporting Guidelines

Wastewater Collection System CIWQS Reporting Guidelines



2. Category 2 – All other discharges of sewage resulting from a failure in the Enrollee's sanitary sewer system.

3. Private Lateral Sewage Discharges – Sewage discharges that are caused by blockages or other problems within a privately owned lateral.

SSO Reporting Timeframes

4. Category 1 SSOs – Except as provided above, all SSOs that meet the above criteria for Category 1 SSOs must be reported as soon as: (1) the Enrollee has knowledge of the discharge, (2) reporting is possible, and (3) reporting can be provided without substantially impeding cleanup or other emergency measures. Initial reporting of Category 1 SSOs must be reported to the Online SSO System as soon as possible but no later than 3 business days after the Enrollee is made aware of the SSO. Minimum information that must be contained in the 3-day report must include all information identified in section 9 below, except for item 9.K. A final certified report must be completed through the Online SSO System, within 15 calendar days of the conclusion of SSO response and remediation. Additional information may be added to the certified report, in the form of an attachment, at any time.

   The above reporting requirements are in addition to do not preclude other emergency notification requirements and timeframes mandated by other regulatory agencies (local County Health Officers, local Director of Environmental Health, Regional Water Boards, or Office of Emergency Services (OES)) or State law.

5. Category 2 SSOs – All SSOs that meet the above criteria for Category 2 SSOs must be reported to the Online SSO Database within 30 days after the end of the calendar month in which the SSO occurs (e.g. all SSOs occurring in the month of January must be entered into the database by March 1st).

6. Private Lateral Sewage Discharges – All sewage discharges that meet the above criteria for Private Lateral sewage discharges may be reported to the Online SSO Database based upon the Enrollee's discretion. If a Private Lateral sewage discharge is recorded in the SSO Database, the Enrollee must identify the sewage discharge as occurring and caused by a private lateral, and a responsible party (other than the Enrollee) should be identified, if known.

7. If there are no SSOs during the calendar month, the Enrollee will provide, within 30 days after the end of each calendar month, a statement through the Online SSO Database certifying that there were no SSOs for the designated month.

8. In the event that the SSO Online Database is not available, the enrollee must fax all required information to the appropriate Regional Water Board office in

accordance with the time schedules identified above. In such event, the Enrollee must also enter all required information into the Online SSO Database as soon as practical.

Mandatory Information to be Included in SSO Online Reporting

All Enrollees must obtain SSO Database accounts and receive a "Username" and "Password" by registering through the California Integrated Water Quality System (CIWQS). These accounts will allow controlled and secure entry into the SSO Database. Additionally, within thirty (30) days of receiving an account and prior to recording SSOs into the SSO Database, all Enrollees must complete the "Collection System Questionnaire", which collects pertinent information regarding an Enrollee's collection system. The "Collection System Questionnaire" must be updated at least every 12 months.

At a minimum, the following mandatory information must be included prior to finalizing and certifying an SSO report for each category of SSO:

9. Category 2 SSOs:

    A. Location of SSO by entering GPS coordinates;
    B. Applicable Regional Water Board, i.e. identify the region in which the SSO occurred;
    C. County where SSO occurred;
    D. Whether or not the SSO entered a drainage channel and/or surface water;
    E. Whether or not the SSO was discharged to a storm drain pipe that was not fully captured and returned to the sanitary sewer system;
    F. Estimated SSO volume in gallons;
    G. SSO source (manhole, cleanout, etc.);
    H. SSO cause (mainline blockage, roots, etc.);
    I. Time of SSO notification or discovery;
    J. Estimated operator arrival time;
    K. SSO destination;
    L. Estimated SSO end time; and
    M. SSO Certification. Upon SSO Certification, the SSO Database will issue a Final SSO Identification (ID) Number.

10. Private Lateral Sewage Discharges:

    A. All information listed above (if applicable and known), as well as;
    B. Identification of sewage discharge as a private lateral sewage discharge; and
    C. Responsible party contact information (if known).

11. Category 1 SSOs:

    A. All information listed for Category 2 SSOs, as well as;
    B. Estimated SSO volume that reached surface water, drainage channel, or not recovered from a storm drain;
    C. Estimated SSO amount recovered;
    D. Response and corrective action taken;
    E. If samples were taken, identify which regulatory agencies received sample results (if applicable). If no samples were taken, NA must be selected.
    F. Parameters that samples were analyzed for (if applicable);
    G. Identification of whether or not health warnings were posted;
    H. Beaches impacted (if applicable). If no beach was impacted, NA must be selected;
    I. Whether or not there is an ongoing investigation;
    J. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the overflow and a schedule of major milestones for those steps;
    K. OES control number (if applicable);
    L. Date OES was called (if applicable);
    M. Time OES was called (if applicable);
    N. Identification of whether or not County Health Officers were called;
    O. Date County Health Officer was called (if applicable); and
    P. Time County Health Officer was called (if applicable).

Reporting to Other Regulatory Agencies

These reporting requirements do not preclude an Enrollee from reporting SSOs to other regulatory agencies pursuant California state law. These reporting requirements do not replace other Regional Water Board telephone reporting requirements for SSOs.

1. The Enrollee shall report SSOs to OES, in accordance with California Water Code Section 13271.

   Office of Emergency Services
   Phone (800) 852-7550

2. The Enrollee shall report SSOs to County Health officials in accordance with California Health and Safety Code Section 5410 et seq.

3. The SSO database will automatically generate an e-mail notification with customized information about the SSO upon initial reporting of the SSO and final certification for all Category 1 SSOs. E-mails will be sent to the appropriate County Health Officer and/or Environmental Health Department if the county desires this information, and the appropriate Regional Water Board.

B. Record Keeping

1. Individual SSO records shall be maintained by the Enrollee for a minimum of five years from the date of the SSO. This period may be extended when requested by a Regional Water Board Executive Officer.

[2. Omitted.]

3. All records shall be made available for review upon State or Regional Water Board staff's request.

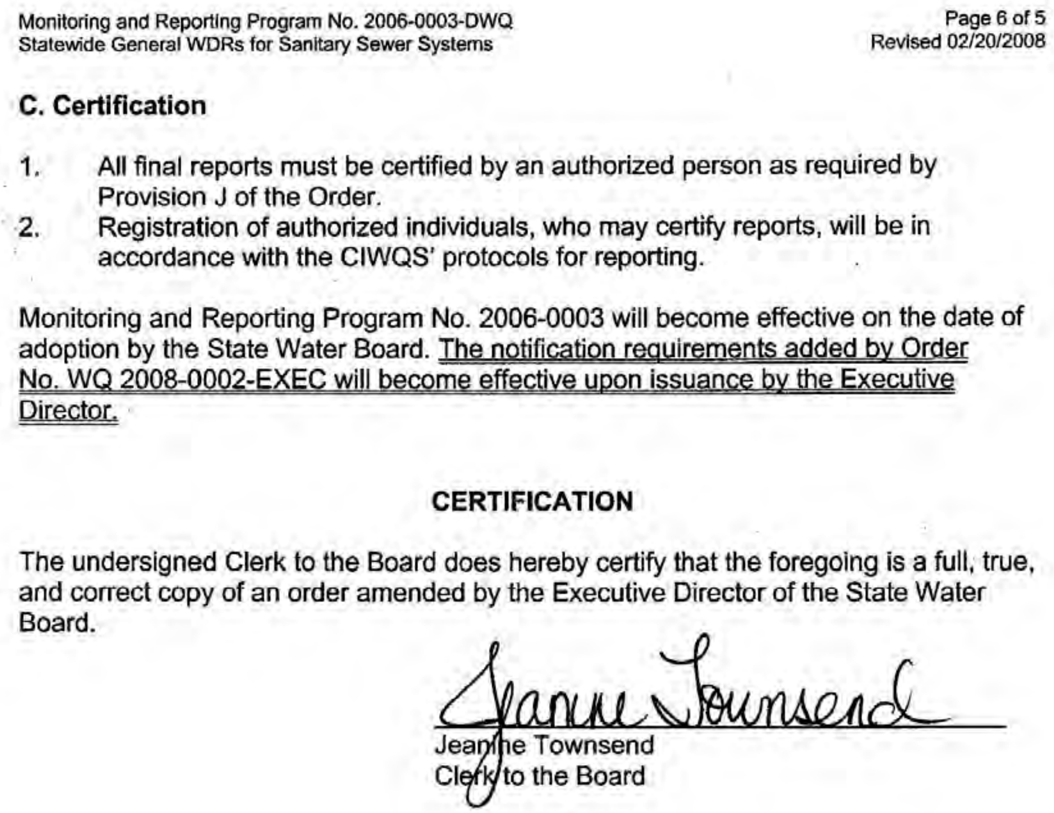
4. All monitoring instruments and devices that are used by the Enrollee to fulfill the prescribed monitoring and reporting program shall be properly maintained and calibrated as necessary to ensure their continued accuracy;

5. The Enrollee shall retain records of all SSOs, such as, but not limited to and when applicable:

   a. Record of Certified report, as submitted to the online SSO database;
   b. All original recordings for continuous monitoring instrumentation;
   c. Service call records and complaint logs of calls received by the Enrollee;
   d. SSO calls;
   e. SSO records;
   f. Steps that have been and will be taken to prevent the SSO from recurring and a schedule to implement those steps.
   g. Work orders, work completed, and any other maintenance records from the previous 5 years which are associated with responses and investigations of system problems related to SSOs;
   h. A list and description of complaints from customers or others from the previous 5 years; and
   i. Documentation of performance and implementation measures for the previous 5 years.

6. If water quality samples are required by an environmental or health regulatory agency or State law, or if voluntary monitoring is conducted by the Enrollee or its agent(s), as a result of any SSO, records of monitoring information shall include:

   a. The date, exact place, and time of sampling or measurements;
   b. The individual(s) who performed the sampling or measurements;
   c. The date(s) analyses were performed;
   d. The individual(s) who performed the analyses;
   e. The analytical technique or method used; and,
   f. The results of such analyses.



C. Certification

1. All final reports must be certified by an authorized person as required by Provision J of the Order.
2. Registration of authorized individuals, who may certify reports, will be in accordance with the CIWQS' protocols for reporting.

Monitoring and Reporting Program No. 2006-0003 will become effective on the date of adoption by the State Water Board. The notification requirements added by Order No. WQ 2008-0002-EXEC will become effective upon issuance by the Executive Director.

CERTIFICATION

The undersigned Clerk to the Board does hereby certify that the foregoing is a full, true, and correct copy of an order amended by the Executive Director of the State Water Board.

Jeanne Townsend

Jeanne Townsend
Clerk to the Board

Appendix H: External Agency Contact

Public Agency Contact Information

Agency	Phone
California Department of Fish and Game	(858) 467-4201 (San Diego office)
California Highway Patrol	(805) 967-1234
California State Office of Emergency Services	(800) 852-7550 or (916) 845-8911
Caltrans	(805) 568-1250
City of Santa Barbara Public Works Control 10 Dispatch Control 14 Dispatch	 (805) 564-5413 (805) 963-4286
Coast Guard	(805) 962-7430
County Environmental Health Services Department 225 Camino Del Remedio Santa Barbara, CA 93110	(805) 681-4900 (805) 681-4901 (fax)
County Flood Control	(805) 568-3440
National Response Center	(800) 424-8802
Police and Fire Dispatch	911 or (805) 897-2410
Regional Water Quality Control Board 895 Aerovista Place, Suite 101 San Luis Obispo, CA 93401	(805) 549-3147 (805) 543-0397 (fax)
Santa Barbara County Office of Emergency Services County Dispatch	(805) 681-5526 * when not in state of emergency 911 or (805) 696-9552 * during state of emergency
City of Santa Barbara Treatment Plant (Wastewater Compliance Specialist)	(805) 568-1005
City of Santa Barbara Water Resources Laboratory	(805) 568-1008

Waterfront Spill Notification Procedure and Contact Information

City of Santa Barbara
Waterfront Department

Memorandum

DATE: August 21, 2015

TO: Harbor Patrol Staff

FROM: Steve McCullough, Captain/Harbor Patrol Supervisor

SUBJECT: Notifications for Sewage and Hazardous Materials spills

---

<u>Notify the following agencies for all **hazardous material** spills:</u>

1. City Dispatch for Fire and/or Police Departments as needed. 897-2410 or 911

2. Cal-EMA-California Emergency Management Agency. *82-1-800-852-7550
   Ask to submit a spill report. Get a Control Number.

3. USCG NRC-National Response Center. Give them the State OES Control Number, so they do not generate an additional control number. They will issue an NRC Report Number.
   * 82-1-800-424-8802

4. Lead, Supervisor, Manager and/or Waterfront Director.

5. USCG LA/LB 24-hr. Operations for Marine Safety Detachment notification. 1-310-521-3800

6. Fish and Game (24-hr. dispatch) Sacramento 1-951-443-2944

<u>Additional notifications for **sewage** spills:</u>

7. Public Works Department for sewage spills from sewer lines and facilities.
   (805) 564-5413 (bus. M-F), or (805) 963-4286 (24-hr. dispatch)
   Public Works completes CIWQS report and Fax to (805) 568-1019 <u>within 2-hours of incident.</u>

8. County Environmental Health for sewage spills. (805) 681-4900 (bus. M-F), or (805) 683-2724 (after hours)

9. Regional Water Quality Control Board (RWQCB) must be <u>notified within 2-hours of sewage spill</u>. (805) 549-3147 (bus.), or (805) 235-8435 (after hours)

Supersedes November 13, 2014, May 6, 2010 and March 5, 2008 memorandums.

Appendix I: Water Quality Monitoring Program

Water Quality Monitoring Plan

This appendix contains the plan used by the City of Santa Barbara Public Works Department as required by Section D of the SWRCB MRP Order No. WQ 2013-0058-EXEC to assess the impacts of SSOs to surface waters during Category 1 spills ≥50,000 gallons or more.

- Public Works Water Resources Lab Certification (Attachment I-1)
- Public Works Water Resources Lab Chain of Custody (Attachment I-2)

Water Quality Monitoring Program

To comply with subsection D.7 (v) of the SSS WDRs, the enrollee shall develop and implement an SSO Water Quality Monitoring Program to assess impacts from SSOs to surface waters in which 50,000 gallons or greater may have been spilled to surface waters. The City may perform water quality monitoring on smaller spills when the full volume is not recovered.

The SSO Water Quality Monitoring Program required by the SSS WDR, shall include, at minimum:

1. Contain protocols for water quality monitoring.
2. Account for spill travel time in the surface water and scenarios where monitoring may not be possible (e.g. safety, access restrictions, etc.).
3. Require water quality analyses for ammonia and bacterial indicators to be performed by an accredited or certified laboratory.
4. Require monitoring instruments and devices used to implement the SSO Water Quality Monitoring Program to be properly maintained and calibrated, including any records to document maintenance and calibration, as necessary, to ensure their continued accuracy.
5. Within 48 hours of the enrollee becoming aware of the SSO, require water quality sampling for, at a minimum, the following constituents:
    - i. Ammonia. The City lab staff perform ammonia testing in the laboratory.
    - ii. Appropriate Bacterial indicator(s) per the applicable Basin Plan water quality objective or Regional Board direction which may include total and fecal coliform, enterococcus, and e-coli. The City performs total coliform, e-coli, and enterococcus in their state-certified laboratory. Additional monitoring may be performed per request by the City's Legally Responsible Official (LRO).

Additionally, for Category 1 SSOs of 50,000 gallons or more, a SSO technical report is required and must be submitted within 45 calendar days from the SSO end date. The SSO Technical Report requirements are described in Section C.5. of the SWRCB MRP Order 2013-0058-EXEC.

Safety

Staff shall be aware and follow all safety precautions in order to comply with this Water Quality Monitoring Program. Therefore, all staff needs to take into account where monitoring will not be possible which may include: heavy rain and/or storm events where access points may be compromised, flooding around low areas, fast moving waters, and if heavy and/or safety equipment is needed to access the area. Staff should evaluate and keep safety first when encountering these scenarios and are encouraged to exercise proper judgment to limit health risk.

Estimation of Spill Travel Time

The following methods are recommended to estimate spill travel direction:

- Method-1; take visual ft/sec measurement from above, based on a floating debris, to estimate the number of feet the debris has traveled in seconds. (Note: If the first measurement is uncertain, this time estimate may be performed three to five times, and the values averaged to determine the estimated travel time. The velocity in the upper portion of the water body can then be calculated by dividing the measured distance by the average time.)

- Method-2; use a general flow meter device to determine the rate of flow in the surface water.

Either method will provide a means to estimate the distance traveled and identify where the SSO may be headed within the waterway.

Water Quality Sampling

The purpose of water quality sampling is to determine the nature and extent of the impact of the SSO. In the event of an SSO, regardless of whether it directly reaches surface waters or a flowing drainage channel tributary to a larger body of water, Water Resources Laboratory or WCS staff should take samples as soon as directed by the WCS Superintendent, and within 48 hours for spills ≥50,000 gallons or more. This sampling plan will apply to Municipal Separate Storm Sewer Systems (MS4) that consistently have stormwater or groundwater in them.

When collecting water samples for examination, the Supervisor should ensure that samples are collected as stipulated in Water Quality Sampling Procedure below. Lab sample procedures and the locations should be recorded on an area map depicting each location of sampling. The samples should be collected as follows:

- First sample at the discharge location.
- Second sample at 500 feet upstream from the discharge location. Sample may be further based on accessibility (terrain, dry creeks, etc.) at the discretion of the WCS Superintendent or WCS Manager.
- Third sample at 500 feet downstream of the discharge location. Sample may be further based on accessibility (terrain, dry creeks, etc.) at the discretion of the WCS Superintendent or WCS Manager. sa
- In impounded areas (e.g. ponds) the water quality samples should be collected near the point of entry of the spilled sewage and every 100 feet along the shore line.

In addition, the City's LRO may impose additional testing requirements and locations of sampling depending on the test results and the receiving water conditions. After collecting the samples as stated in the SOP, staff should deliver the samples to the Water Resources Laboratory for analyses. The Water Resources Laboratory is ELAP certified (certificate #1504) in seven Fields of Testing (FoT) including microbiological analysis of wastewater, recreational water, and drinking water. This sampling and testing should continue until the results from the lab indicates that they are back to baseline levels. Collaboration with the City's LRO should continue until they determine that the sampling is no longer needed.

Water Quality Sampling Equipment

The following guideline describes the equipment and supplies to be stocked and readily available for any water quality sampling event.

a. Sample bottles (1-120 mL sterile and 1-1L HDPE per sample site)

        i. Total of 3-120 mL and 3-1L HDPE bottles per sampling event
    b. Ice chest with ice/blue ice
    c. Chain of custody forms
    d. Ball point pens and sample labels
    e. Sampling pole
    f. Syringes
    g. Gloves
    h. Other PPE (i.e. rubber boots, apron, mask, etc.)

Staff should ensure that there are adequate quantities of sample containers to accommodate a minimum of 3 sample locations including an extra set for unforeseen circumstances. Sampling equipment will be stored in boxes for field crews in two locations: Water Resources Laboratory storage room and WCS Crew's Quarters at El Estero Wastewater Treatment Plant.

<u>Water Quality Sampling Personnel</u>

During Normal Business Hours: Water Resources Laboratory Staff are the primary sampling personnel. The Laboratory Supervisor and Laboratory Analyst Coordinator will coordinate Lab staff to sample the spill according to proper sampling guidelines, and return the samples to the Water Resources Laboratory to be analyzed per ELAP standards. If safety or accessibility issues arise during the sampling event, the WCS staff will assist Lab staff.

After Normal Business Hours: WCS staff are the primary sampling personnel. WCS staff will call the Water Resources Laboratory Supervisor and Laboratory Analyst Coordinator to notify them of the sampling event, how many samples are expected, and the expected time of delivery. If no direct contact is made with Lab staff, WCS staff will leave a voicemail for the Lab staff that includes notification of the sampling event, how many samples are expected, and estimated time of sample delivery.

Water Resources Laboratory Phone Number: (805) 568-1008

<u>Water Quality Sampling Procedure</u>

1. Disposable un-powdered gloves are recommended for sample collection to protect the sampler and to assure the integrity of the samples. Disposable gloves should be changed at each sampling location.

2. Determine the correct location for sample collection.

3. Grab samples should be collected directly into the sample bottles whenever possible, particularly for bacteria/coliform. NOTE: Bottles with preservatives are the exception (see below). Collect the sample directly into the unpreserved container by submerging the container, top first, into the effluent. Point top of the bottle into the flow. After filling, pour out a few milliliters of sample to allow for air space for mixing. If access to the sampling location is restricted, secure the bottle to a pole using a clip or other device and collect the sample directly into the bottle.

    a. Coliform sample collection requires extra care to preserve sodium thiosulfate and follow sterile sampling procedures. Make sure that sodium thiosulfate is not lost during sample collection. Sodium thiosulfate neutralizes chlorine residuals. Perform sterile sampling procedures by ensuring nothing but sample comes into contact with the inside of the bottle or cap.

   b. If collection directly into the bottle is not possible, an intermediate sterile container may be used. The container must be thoroughly cleaned using the same procedures as for other sampling equipment if used for bacteria sampling. The container must be rinsed several times in the sample water. If the container is used for more than one sampling location and no metals and/or organics are being sampled, the container should be rinsed thoroughly with deionized water between sampling points. At the next sampling location, rinse the container several times in the sample water.

   c. Bottles with preservatives should be filled from an intermediate container so none of the preservative will be lost.

4. Label sample bottle with:

   a. Sampling site;

   b. Date and time sampled; and

   c. Sampler initials.

5. Keep the samples individually wrapped in plastic bags and packed on ice for delivery to the laboratory.

6. Deliver all samples to the laboratory within 6 hours of the earliest sample time.

   a. Note – if sampling occurs after normal business hours, and samples are not analyzed within the hold time of 8 hours, the samples will be reported as invalid or discarded and resampled.

   b. Samples should be placed in the laboratory refrigerator labeled #L-140.

   c. If no direct contact is made with Lab staff, WCS staff will leave a voicemail at *(805) 568-1008* for the Lab staff that includes notification of the sampling event, how many samples are expected, and estimated time of sample delivery.

7. Fill out Chain of Custody (COC) with the same information to match the sample bottles. Complete the COC as thoroughly as possible with you and your supervisor's names and phone numbers. Laboratory staff will provide assistance with determining the analysis section on the COC. The original COC always stays with the sample. Relinquish the COC with the sampler's signature, printed name, date, and time.

Water Quality Analysis-Protocols

Laboratory:

All samples will be processed using the EPA approved methods by the City's accredited ELAP certified Water Resources Laboratory (certificate #1504).

Maintenance and Calibration of Monitoring Instruments and Devices:

In order to be accredited and maintain its certification, the Water Resources Laboratory will follow stringent quality assurance and quality control protocols that includes regular monitoring, calibration and maintenance of its equipment. The frequency of monitoring and calibration varies based on equipment type and method requirements. Records of the calibration receipts are kept on file and readily available upon request.

Reporting Requirements

The Wastewater Collection System Superintendent (LRO) is responsible for submitting water quality monitoring information with the certified Category 1 SSO report on CIWQS database within 15 calendar days of the SSO end date.

In the event that a Technical Report is required, the LRO will be responsible for submitting information related to the Technical Report (required per element 6, of the SSMP) in CIWQS database, which must be completed within 45 calendar days of the SSO end date. The SSO Technical Report must include the following water quality monitoring information:

- Description of all water quality sampling activities;
- Analytical results and evaluation of the results; and
- Detailed location maps and photos depicting all water sampling points.

Attachments

I-1 Public Works Water Resources Lab Certification

I-2 Sample Water Resources Laboratory COC

Attachment I-1. Public Works Water Resources Lab Certification

CALIFORNIA
Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

CALIFORNIA STATE

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

CERTIFICATE OF ENVIRONMENTAL ACCREDITATION

Is hereby granted to

Water Resources Laboratory

City of Santa Barbara - Public Works Department

520 East Yanonali Street

Santa Barbara, CA 93103-3200

Scope of the certificate is limited to the
"Fields of Testing"
which accompany this Certificate.

Continued accredited status depends on successful completion of on-site inspection, proficiency testing studies, and payment of applicable fees.

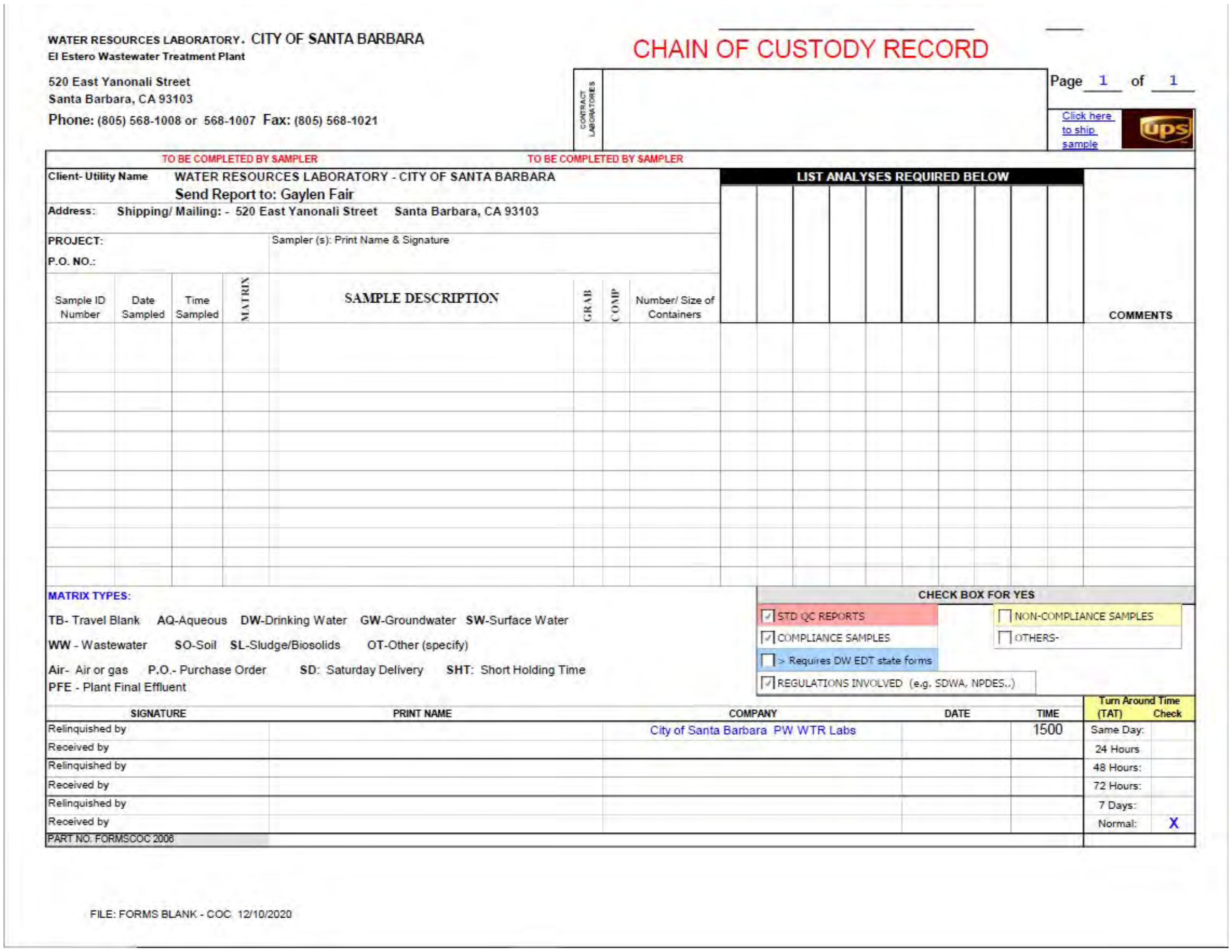
This Certificate is granted in accordance with provisions of Section 100825, et seq. of the Health and Safety Code.

Certificate No.: **1504**
Expiration Date: **4/30/2021**
Effective Date: **5/1/2019**

Sacramento, California
subject to forfeiture or revocation

Christine Sotelo, Chief
Environmental Laboratory Accreditation Program

Attachment I-2. Public Works Water Resources Lab Chain of Custody Form



WATER RESOURCES LABORATORY. CITY OF SANTA BARBARA
El Estero Wastewater Treatment Plant

520 East Yanonali Street
Santa Barbara, CA 93103
Phone: (805) 568-1008 or 568-1007 **Fax:** (805) 568-1021

CHAIN OF CUSTODY RECORD

CONTRACT LABORATORES

Page 1 of 1

Click here to ship sample

TO BE COMPLETED BY SAMPLER TO BE COMPLETED BY SAMPLER

Client- Utility Name WATER RESOURCES LABORATORY - CITY OF SANTA BARBARA
Send Report to: Gaylen Fair

Address: Shipping/ Mailing: - 520 East Yanonali Street Santa Barbara, CA 93103

PROJECT:
P.O. NO.:

Sampler (s): Print Name & Signature

Sample ID Number	Date Sampled	Time Sampled	MATRIX	SAMPLE DESCRIPTION	GRAB	COMP	Number/ Size of Containers	LIST ANALYSES REQUIRED BELOW										COMMENTS

MATRIX TYPES:

TB- Travel Blank AQ-Aqueous **DW**-Drinking Water **GW**-Groundwater **SW**-Surface Water
WW - Wastewater **SO**-Soil **SL**-Sludge/Biosolids **OT**-Other (specify)
Air- Air or gas **P.O.**- Purchase Order **SD**: Saturday Delivery **SHT**: Short Holding Time
PFE - Plant Final Effluent

CHECK BOX FOR YES

☑ STD QC REPORTS
☑ COMPLIANCE SAMPLES
☐ > Requires DW EDT state forms
☑ REGULATIONS INVOLVED (e.g. SDWA, NPDES..)
☐ NON-COMPLIANCE SAMPLES
☐ OTHERS-

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME	Turn Around Time (TAT)	Check
Relinquished by		City of Santa Barbara PW WTR Labs		1500	Same Day:	
Received by					24 Hours	
Relinquished by					48 Hours:	
Received by					72 Hours:	
Relinquished by					7 Days:	
Received by					Normal:	X
PART NO. FORMSCOC 2006						

FILE: FORMS BLANK - COC 12/10/2020

Appendix G2 Lift Station SSO Response Plan

Wastewater Lift Station Emergency Response Plan

City of Santa Barbara

Updated December 2020

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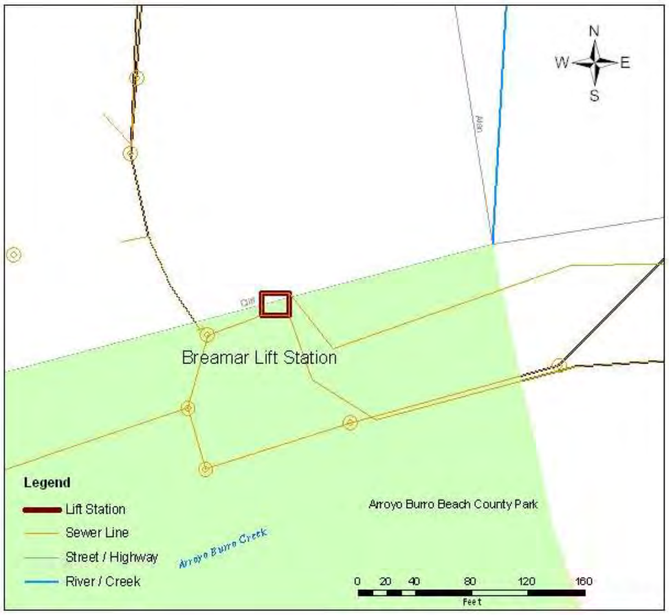
Braemar Lift Station

Location:	1 Alan Road		
Date of construction:	1962		
Number of lots served:	870		
Type of station:	Centrifugal Pumps		
Pump make:	Smith and Loveless		
Pump size:	8”		
Number of Pumps:	2		
Flow rate:	1000 GPM		
Motor:	Marathon Motors 100 HP		
Wet well:	L 15’ x W 8’x H 17’	Volume: 15,259 GAL	
Average Inflow:	368 GPM	Date/Time: 7/31/03 09:00	
Est. Detention time:	42 Min		
Station Control:	SCADA, Ultrasonic Level Sensors, and backup floats		
Emergency generator:	Make: Caterpillar	Size: 350 kW	
Fuel consumption:	200 GAL Tank	Run Time: 7.5 Hrs	
Emergency pump bypass:	yes		
Water way effected by failure:	Arroyo Burro Creek		
Force main #1:	10” Steel Pipe	Length: 3164	Year: 1994
Force main #2:	12” HDPE	Length: 3164	Year: 2018



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Emergency Operating Procedures for Braemar Lift Station

Special reporting requirements: In the event an overflow exceeds 9,000 gallons, see Appendix VII-L for a list of individuals to be contacted.

1. Check station to see if pumps have failed or generator has failed to turn on.
2. Troubleshoot station failure using SCADA alarms or notification from the Emergency Service Worker (ESW) if the station failure occurs after business hours. If troubleshooting is unsuccessful, then the supervisor will make a call to staff to initiate a bypass. Bring the 6" emergency bypass pumper to lift station A.S.A.P.
3. Contact WCS Superintendent, Supervisor or Lead for vactor assistance.
4. Block nearby storm drains using sandbags and liners.
5. Initiate traffic control plan and implementation per 2012 CA MUTCD. This includes but is not limited to placing warning flags 100 ft. away from the Lift Station in each direction, coning off the work area and cross streets, and closing the sidewalk if applicable.
6. Put #1 & #2 pump in the "off" position.
7. The 6" emergency bypass connections are located on the Cliff Drive side of the station. Align pump so right tire touches seam between sidewalk and pavement.
8. Before disconnecting pumper from truck, chock wheels and attach hoses. Facing the camlock fittings on the pumper, suction is on the left and discharge is on the right. Facing the station from Cliff drive, the station suction is on the left and discharge is on the right. Connect pumper suction fitting to station suction fitting, and repeat for discharge. Disconnect bypass pumper from truck.
9. Before entering a confined space, use gas analyzer to sense potentially dangerous atmosphere.
10. Slowly close surge tank valve, slowly close station main valve, and slowly open bypass valve.
11. Start bypass pumper and let it idle until operating temperature is reached.
12. Increase bypass pump speed to just over 1600 RPMs while other staff are positioned at the wet well observing the level. There should be some indication of the pumper function reflected in the wet well level. Adjust pumper RPM until the wet well level is kept constant.
13. Once station is bypassed and running at steady state, notify control 10 or 14 (depending on day and time) and advise of the situation.
14. When time allows, set up a containment area around pumper/camlock interfaces to catch any leaks
15. During bypass, periodically check pumper fuel level and add fuel as necessary.
16. After station function has returned, pump down the wet well and turn off the pumper.
17. Slowly close the bypass valve, slowly open surge tank valve, and slowly open station main valve.
18. Turn both pumps to auto position and confirm that each cycles as expected.
19. Disconnect pumper by attaching lay flat hose to ball valves on station bypass and draining both suction and discharge lines to wet well. Disconnect and rinse hoses.
20. Notify control 10 or 14 that situation has been addressed.

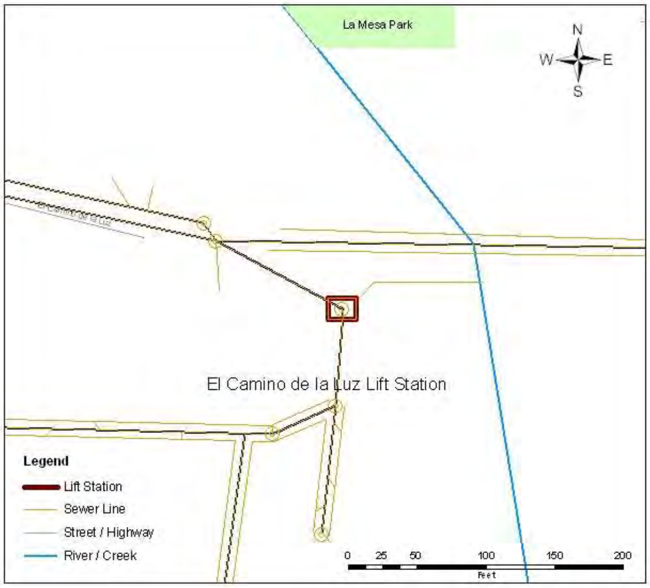
    *WCS staff conducts training annually to review SSO response procedures. This training includes addressing a range of potential failures, as well as those that have occurred in the past.

Equipment needed:

1 – 6" Godwin pumper
4 – 6" of rigid hoses
Lay flat hose

El Camino De La Luz Lift Station

Location:	1901 El Camino De La Luz		
Date of construction:	1975		
Number of lots served:	232		
Type of station:	Centrifugal Pumps		
Pump make:	Flygt		
Pump size:	4”		
Number of pumps	2		
Flow rate:	150 GPM		
Motor:	Make: Marathon	Size: 3.7 HP	
Wet well:	Size: H 15’9”x DIA 5’	Volume: 2,348 GAL	
Average Inflow:	98 GPM	Date/Time: 7/31/03 08:00	
Est. Detention time:	2 Hrs 25 Mins		
Station Control:	SCADA, Ultrasonic Level Sensors, and backup floats		
Emergency generator:	Make: Caterpillar	Size: 60 kW	
Fuel consumption:	105 GAL	Run Time: 19.5 hrs	
Emergency pump bypass:	Yes		
Water way effected by failure:	Lighthouse Creek		
Force main:	Type: 4" D.I.P.	Length: 98’	Year: 1975



Emergency Operating Procedures for El Camino De La Luz Lift Station

1. Check station to see if pumps have failed or generator has failed to turn on.
2. Troubleshoot station failure using SCADA alarms or notification from the Emergency Service Worker (ESW) if the station failure occurs after business hours. If troubleshooting is unsuccessful, then the supervisor will make a call to staff to initiate a bypass and call a vactor truck to the station. Bring the 3" emergency bypass pumper to lift station A.S.A.P.
3. Contact WCS Superintendent, Supervisor or Lead for vactor assistance.
4. Block nearby storm drains using sandbags and liners.
5. Initiate traffic control plan and implementation per 2012 CA MUTCD. This includes but is not limited to placing warning flags 100 ft. away from the Lift Station in each direction, coning off the work area and cross streets, and closing the sidewalk if applicable.
6. Put #1 & #2 pump in the "off" position.
7. Set up bypass pumper next to wet well and chock the wheels. Facing the pumper fittings, the suction is on the left, discharge is on the right.
8. Attach two 10' sections of 3" rigid hose to pumper suction camlock, and direct into wet well for suction
9. Attach 110' section of lay flat hose to the pumper discharge camlock and direct towards manhole located in cul de sac near storm drain. At the end of lay flat, attach two 10' sections of rigid hose and direct into the manhole for discharge.
10. Fill up volute with hose water to prime pumper.
11. Start bypass pumper and let it idle to operating temperature while someone checks that the discharge line is functioning properly and directing water safely into the manhole.
12. Position staff near the wet well and increase RPMs on pumper.
13. There should be some indication of the pumper function reflected in the wet well level. Adjust pumper RPM until the wet well level is kept constant. (If pump is not pumping it may have lost prime, repeat step 8 again).
14. Once station is bypassed and running at steady state, notify control 10 or 14 (depending on day and time) and advise of the situation.
15. When time allows, set up a containment area around pumper/camlock interfaces to catch any leaks.
16. During bypass, periodically check pumper fuel level and add fuel as necessary.
17. After station function has returned, pump down the wet well and turn off the pumper.
18. Turn both station pumps to "auto" position and confirm that each cycles as expected.
19. Disconnect suction hose from pumper, and allow it to drain into the wet well.
20. Move pumper closer to the wet well and disconnect discharge hose from pumper. Allow discharge line to drain into the manhole
21. Rinse hoses before storing
22. Raise lay flat to manhole, then roll. Disconnect suction from pumper and lift up to discharge in wet well.
23. Notify control 10 or 14 that situation has been addressed

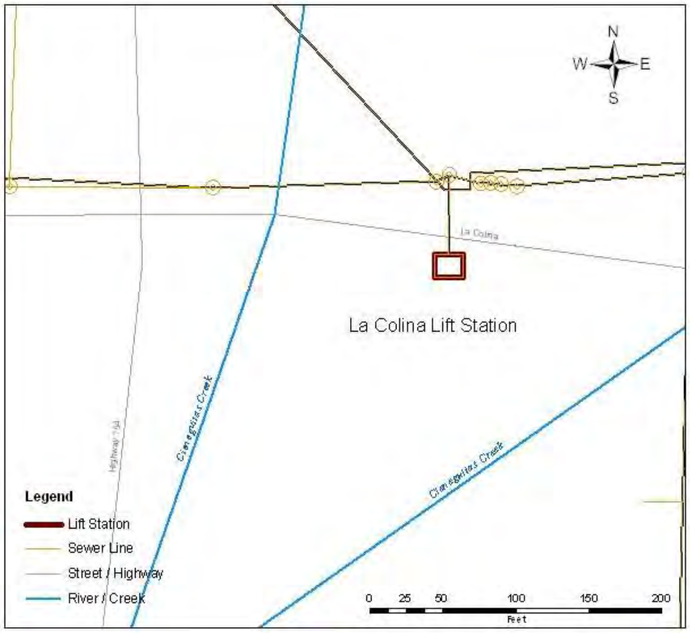
**WCS staff conducts training annually to review SSO response procedures.*

Equipment needed:

1 – 3" Honda pumper
4 – 3" Green rigid hoses
110' of lay flat hose
Or 4" power prime

La Colina Lift Station

Location:	4001 La Colina Road		
Date of construction:	1957		
Number of lots served:	140		
Type of station:	Centrifugal Pumps		
Pump make:	Smith and Loveless		
Pump size:	4'		
Number of Pumps:	2		
Flow rate:	400 GPM		
Motor:	Make: Smith and Loveless		
Wet well:	Size: L 17'9" x W 7' x H 11'	Volume: 10,315 GAL	
Average Inflow: 95 GPM	Rate: 95 GPM	Date/Time: 7/31/03 11:00	
Est. Detention time:	2 Hrs		
Station Control:	SCADA, Ultrasonic Level Sensors, and backup floats		
Emergency generator:	Make: Caterpillar	Size: 60 kW	
Fuel consumption:	105 GAL	Run Time: 19.5 Hrs	
Emergency pump bypass:	Yes		
Water way effected by failure:	Cienquitas Creek		
Force main:	Type: 8" D.I.P.	Length: 3,175'	Year: 1957
Force main #2:	Type: 8" HDPE	Length: 3,293'	2015



Emergency Operating Procedures for La Colina Lift Station

1. Check station to see if pumps have failed or generator has failed to turn on.
2. Troubleshoot station failure using SCADA alarms or notification from the Emergency Service Worker (ESW) if the station failure occurs after business hours. If troubleshooting is unsuccessful, then the supervisor will make a call to staff to initiate a bypass and call a vactor truck to the station. Bring the 6" emergency bypass pumper to lift station A.S.A.P.
3. Contact WCS Superintendent, Supervisor or Lead for vactor assistance.
4. Block nearby storm drains using sandbags and liners.
5. Initiate traffic control plan and implementation per 2012 CA MUTCD. This includes but is not limited to placing warning flags 100 ft. away from the Lift Station in each direction, coning off the work area and cross streets, and closing the sidewalk if applicable. It is important to note that this station is located near a school – this should be taken into consideration when initiating traffic control.
6. Put #1 & #2 pump in the "off" position.
7. Align Godwin pumper alongside the curb next to the lift station. Facing the pumper fittings, the suction is on the left, discharge is on the right.
8. Before entering a confined space, use gas analyzer to sense potentially dangerous atmosphere.
9. Attach two 6" hoses to bypass discharge camlock in valve vault. Attach other end to discharge camlock on pumper.
10. Attach the remaining 6" hoses to the suction camlock of pumper and direct into the wet well for suction.
11. Slowly close station main valve and slowly open lift station bypass valve in the valve vault – follow Lock Out Tag Out (LOTO) procedures.
12. Start pumper and let it idle to operating temperature while staff watches the wet well level.
13. Increase pumper RPMs. There should be some indication of the pumper function reflected in the wet well level. Adjust pumper RPM until the wet well level is kept constant.
14. Once station is bypassed and running at steady state, notify control 10 or 14 (depending on day and time) and advise of the situation.
15. When time allows, set up a containment area around pumper/camlock interfaces to catch any leaks.
16. During bypass, periodically check pumper fuel level and add fuel as necessary.
17. After station function has returned, pump down the wet well and turn off the pumper.
18. Slowly close the bypass valve and slowly open station main valve.
19. Turn both pumps to auto position and confirm that each cycles as expected.
20. Disconnect suction line from pumper and drain line into the wet well.
21. Disconnect discharge line from camlock connection and drain into the valve vault. Use a vactor truck to clean the residual left in valve vault. Rinse bypass lines before storage.
22. Notify control 10 or 14 that situation has been addressed.

**WCS staff conducts training annually to review SSO response procedures.*

Equipment needed:

1 – 6" Godwin pumper
5 – 6" rigid hoses

Linda Road Lift Station

Location:	312 Linda Rd		
Date of construction:	2002		
Number of lots served:	141		
Type of station:	Submersible		
Pump make:	Vaughan		
Pump size:	4”		
Number of Pumps:	2		
Flow rate:	150 GPM		
Motor:	Make: Reliance	Size: 5 HP	
Wet well:	Size: H 15’ x DIA 6’	Volume: 3,382 GAL	
Average Inflow:	Rate: 2.8 GPM	Date/Time: 7/31/03 08:27	
Est. Detention time:	3 Hrs		
Station Control:	SCADA, Ultrasonic Level Sensors, and backup floats		
Emergency generator:	Make: Caterpillar	Size: 60 kW	
Fuel consumption:	Capacity: 105 Gals	Run Time: 19.5 Hrs	
Emergency pump bypass:	Yes		
Water way effected by failure:	Arroyo Burro Creek		
Force main:	Type: 4” H.D.P.E	Length: 555’	Year: 2002

Emergency Operating Procedures for Linda Road Lift Station

1. Check station to see if pumps have failed or generator has failed to turn on.
2. Troubleshoot station failure using SCADA alarms or notification from the Emergency Service Worker (ESW) if the station failure occurs after business hours. If troubleshooting is unsuccessful, then the supervisor will make a call to staff to initiate a bypass and call a vactor truck to the station. Bring the 4" emergency bypass pumper to lift station A.S.A.P.
3. Contact WCS Superintendent, Supervisor or Lead for vactor assistance.
4. Block nearby storm drains using sandbags and liners.
5. Initiate traffic control plan and implementation per 2012 CA MUTCD. This includes but is not limited to placing warning flags 100 ft. away from the Lift Station in each direction, coning off the work area and cross streets, and closing the sidewalk if applicable.
6. Put #1 & #2 pump in the "off" position.
7. Align 4" Power Prime pumper alongside the curb in front of the lift station. Facing the pumper fittings, the suction is on the left, discharge is on the right.
8. Before entering a confined space, use gas analyzer to sense potentially dangerous atmosphere.
9. Attach bypass hoses to bypass discharge camlock in valve vault. Attach other end to discharge camlock on pumper.
10. Attach bypass hoses to suction camlock on pumper and direct other end into wet well for suction.
11. Slowly close station main valve and slowly open lift station bypass valve in the valve vault – follow Lock Out Tag Out (LOTO) procedures.
12. Start pumper and let it idle to operating temperature while staff watches the wet well level.
13. Increase pumper RPMs. There should be some indication of the pumper function reflected in the wet well level. Adjust pumper RPM until the wet well level is kept constant.
14. Once station is bypassed and running at steady state, notify control 10 or 14 (depending on day and time) and advise of the situation.
15. When time allows, set up a containment area around pumper/camlock interfaces to catch any leaks.
16. During bypass, periodically check pumper fuel level and add fuel as necessary.
17. After station function has returned, pump down the wet well and turn off the pumper.
18. Slowly close the bypass valve and slowly open station main valve.
19. Turn both pumps to auto position and confirm that each cycles as expected.
20. Disconnect suction line from pumper and drain line into the wet well.
21. Disconnect discharge line from camlock connection and drain into the valve vault. Use a vactor truck to clean the residual left in valve vault. Rinse bypass lines before storage.
22. Notify control 10 or 14 that situation has been addressed

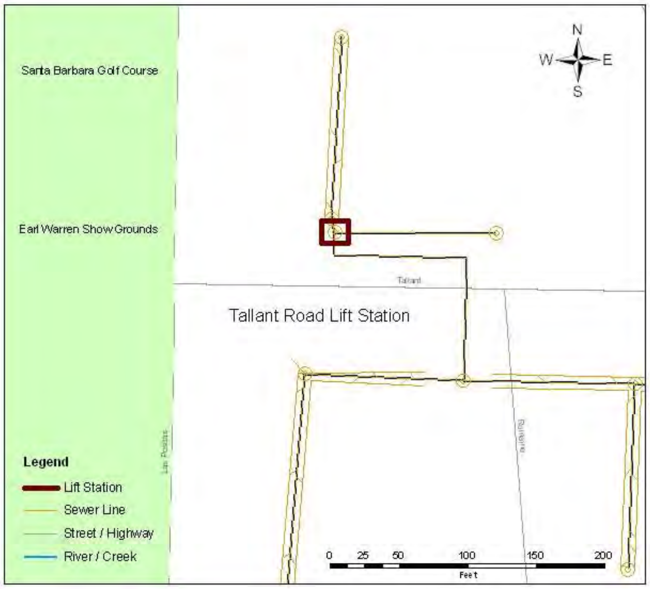
**WCS staff conducts training annually to review SSO response procedures.*

Equipment needed:

1 – 4" Power Prime or Godwin pumper
4 – 4" rigid hoses

Tallant Road Lift Station

Location:	524 Tallant Rd		
Date of construction:	1999		
Number of lots served:	6		
Type of station:	Submersible		
Pump make:	Flyght		
Pump size:	2”		
Number of Pumps:	2		
Flow rate:	100 GPM		
Motor:	Make: Flyght	Size: 1.9 HP	
Wet well:	H 8’ x DIA 4’	Volume: 751 GALS	
Average Inflow:	2.5 GPM	Date/Time: 7/31/03 09:30	
Est. Detention time:	5 Hrs		
Station Control:	SCADA, Ultrasonic Level Sensors, and backup floats		
Emergency generator:	NA		
Fuel consumption:	NA		
Emergency pump bypass:	Yes/Vactor		
Water way effected by failure:	Mission Creek		
Force main:	Type: 2” H.D.P.E.	Length: 190’	Year: 1999



Emergency Operating Procedures for Tallant Road Lift Station

1. Check station to see why pumps have failed.
2. Troubleshoot station failure using SCADA alarms or notification from the Emergency Service Worker (ESW) if the station failure occurs after business hours. If troubleshooting is unsuccessful, then a vactor truck is needed.
3. Contact WCS Superintendent, Supervisor or Lead for vactor assistance.
4. Block nearby storm drains using sandbags and liners.
5. Initiate traffic control plan and implementation per 2012 CA MUTCD. This includes but is not limited to placing warning flags 100 ft. away from the Lift Station in each direction, coning off the work area and cross streets, and closing the sidewalk if applicable.
6. Put #1 & #2 pump in the “off” position.
7. Use vactor truck to vacuum station wet well.
8. In the event a vactor truck is unavailable, use the 2” Godwin portable pumper. Attach 2” hose to 2” connection of Godwin portable pump, then drop portable pump carefully into wet well. Proceed to connect other end of hose to dry well vault bypass fitting/connection. Make sure pumps are on the “off” position, then slowly open bypass ball valve. Turn on portable Honda generator and proceed with bypass.
    a. In the case power or a vactor truck remains unavailable, the wet well will have several hours of detention time before a bypass would need to be performed again.
9. Before entering a confined space, use gas analyzer to sense potentially dangerous atmosphere.
10. Attach bypass hoses to bypass discharge camlock in valve vault. Attach other end to discharge camlock on pumper.
11. Attach bypass hoses to suction camlock on pumper and direct other end into wet well for suction.
12. Slowly close station main valve and slowly open lift station bypass valve in the valve vault – follow Lock Out Tag Out (LOTO) procedures.
13. Start pumper and let it idle to operating temperature while staff watches the wet well level.
14. Increase pumper RPMs. There should be some indication of the pumper function reflected in the wet well level. Adjust pumper RPM until the wet well level is kept constant.
15. Once station is bypassed and running at steady state, notify control 10 or 14 (depending on day and time) and advise of the situation.
16. When time allows, set up a containment area around pumper/camlock interfaces to catch any leaks.
17. During bypass, periodically check pumper fuel level and add fuel as necessary.
18. After station function has returned, pump down the wet well and turn off the pumper.
19. Slowly close the bypass valve and slowly open station main valve.
20. Turn both pumps to auto position and confirm that each cycles as expected.
21. Disconnect suction line from pumper and drain line into the wet well.
22. Disconnect discharge line from camlock connection and drain into the valve vault. Use a vactor truck to clean the residual left in valve vault. Rinse bypass lines before storage.
23. Notify control 10 or 14 (depending on the day and time) and advise of the situation.
24. Continue to vacuum out wet well as needed until station function returns.
25. Turn both pumps to auto position and confirm that each cycles as expected.
26. Notify control 10 or 14 that situation has been addressed.

**WCS staff conducts training annually to review SSO response procedures.*

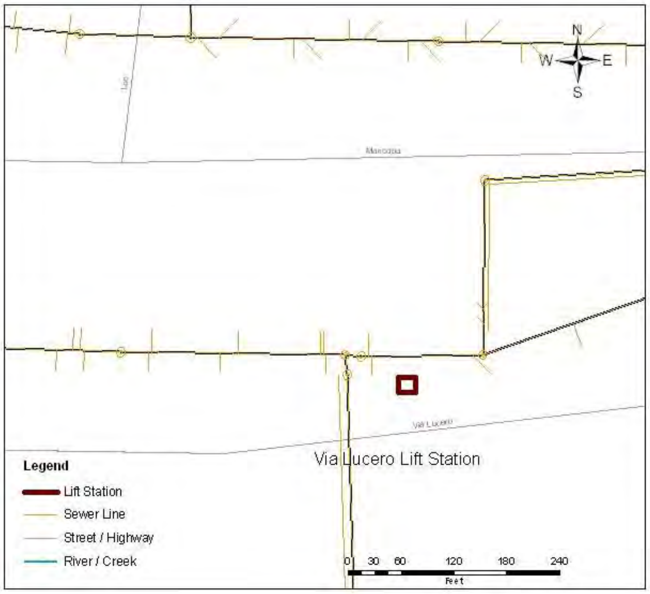
Equipment needed:

2” Godwin portable pumper
1- 2” rigid hose
1 Portable Honda generator
1 can of spare unleaded gas

Note: Godwin portable pump & rigid hose are stored at Tallant lift station. Portable Honda generator is stored inside the utility vehicle storage bin.

Via Lucero Lift Station

Location:	3959 Via Lucero		
Date of construction:	1962		
Number of lots served:	239		
Type of station:	Centrifugal Pumps		
Pump make:	Smith and Loveless		
Pump size:	4”		
Number of Pumps:	2		
Flow rate:	400 GPM		
Motor:	Make: General Electric	Size: 15 HP	
Wet well:	H 13’6”x DIA 8’	Volume: 5,073 GAL	
Average Inflow:	124 GPM	Date/Time: 7/31/03 11:00	
Est. Detention time:	1 Hr		
Station Control:	SCADA, Ultrasonic Level Sensors, and backup floats		
Emergency Generator:	Caterpillar	60 kW	
Fuel consumption:	105 Gal.		
Emergency pump bypass:	Yes		
Water way effected by failure:	San Roque Creek		
Force main:	Type: 6” C.I.P.	Length: 182’	Year: 1962



Emergency Operating Procedures for Via Lucero Lift Station

1. Check station to see if pumps have failed or generator has failed to turn on.
2. Troubleshoot station failure using SCADA alarms or notification from the Emergency Service Worker (ESW) if the station failure occurs after business hours. If troubleshooting is unsuccessful, then the supervisor will make a call to staff to initiate a bypass and call a vactor truck to the station. Bring the 6” emergency bypass pumper to lift station A.S.A.P.
3. Contact WCS Superintendent, Supervisor or Lead for vactor assistance.
4. Block nearby storm drains using sandbags and liners.
5. Initiate traffic control plan and implementation per 2012 CA MUTCD. This includes but is not limited to placing warning flags 100 ft. away from the Lift Station in each direction, coning off the work area and cross streets, and closing the sidewalk if applicable.
6. Put #1 & #2 pump in the “off” position – follow Lock Out Tag Out (LOTO) procedures.
7. Align Godwin pumper alongside the curb next to the lift station. Facing the pumper fittings, the suction is on the left, discharge is on the right.
8. Before entering a confined space, use gas analyzer to sense potentially dangerous atmosphere.
9. Attach two 6” hoses to bypass discharge camlock in dry well. Attach other end to discharge camlock on pumper.
10. Attach the remaining 6” hoses to the suction camlock of pumper and direct into the wet well for suction.
11. Slowly close station main valve and slowly open lift station bypass valve in the valve vault – follow Lock Out Tag Out (LOTO) procedures.
12. Start pumper and let it idle to operating temperature while staff watches the wet well level.
13. Increase pumper RPMs. There should be some indication of the pumper function reflected in the wet well level. Adjust pumper RPM until the wet well level is kept constant.
14. Once station is bypassed and running at steady state, notify control 10 or 14 (depending on day and time) and advise of the situation.
15. When time allows, set up a containment area around pumper/camlock interfaces to catch any leaks.
16. During bypass, periodically check pumper fuel level and add fuel as necessary.
17. After station function has returned, pump down the wet well and turn off the pumper.
18. Slowly close the bypass valve and slowly open station main valve.
19. Turn both pumps to auto position and confirm that each cycles as expected.
20. Disconnect suction line from pumper and drain line into the wet well.
21. Disconnect discharge line from camlock connection and drain into the dry well. Use the existing sump pump within the dry well to move residual from discharge line back to wet well.
22. Notify control 10 or 14 that situation has been addressed.

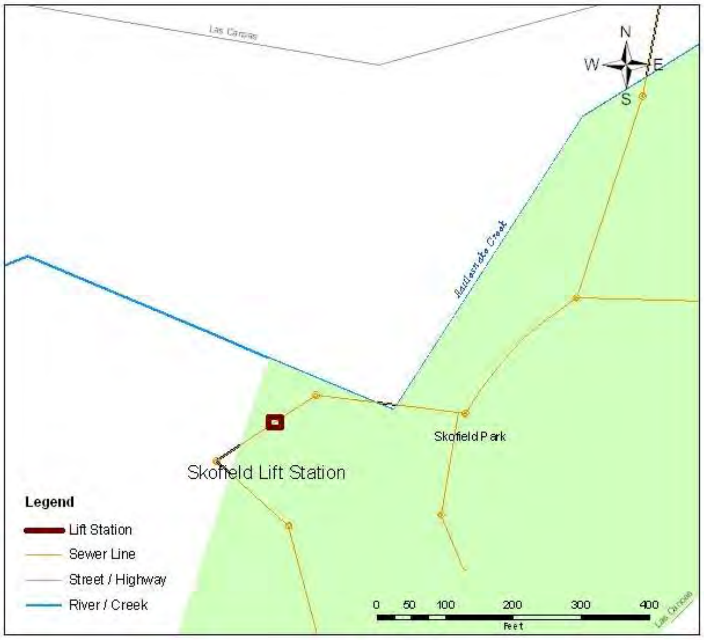
**WCS staff conducts training annually to review SSO response procedures.*

Equipment needed:

1 – 6” Godwin pumper
4 – 4” rigid hoses

Skofield Lift Station

Location:	1819 Las Canoas Road		
Date of construction:	1967		
Number of lots served:	7		
Type of station:	Centrifugal Pumps		
Pump make:	Fairbanks and Morse		
Pump size:	4”		
Number of Pumps:	2		
Flow rate:	250 GPM		
Motor:	Make: U.S. Motor	Size: 30 HP	
Wet well:	H 9’5” x DIA 5’	Volume: 1,379 GAL	
Average Inflow:	12 GPM	Date/Time: 7/30/03 09:00	
Est. Detention time:	1.9 Hrs		
Station Control:	SCADA, Ultrasonic Level Sensors, and backup floats		
Emergency generator:	NA		
Fuel consumption:	NA		
Emergency pump bypass:	No- Vactor		
Water way effected by failure:	Mission Creek		
Force main:	Type: 6” C.I.P.	Length: 471’	Year: 1967



Emergency Operating Procedures for Skofield Lift Station

1. Check station to see why pumps have failed.
2. Troubleshoot station failure using SCADA alarms or notification from the Emergency Service Worker (ESW) if the station failure occurs after business hours. If troubleshooting is unsuccessful, then a vactor truck is needed.
3. Contact WCS Superintendent, Supervisor or Lead for vactor assistance.
    a. Special personnel needs will be present during night-shift and emergency situations (e.g. fire season) due to tree branches hitting the top and sides of truck. Extra personnel may be needed to assist truck to get close to wet well.
4. Block nearby storm drains using sandbags and liners.
5. Initiate traffic control plan and implementation per 2012 CA MUTCD. This includes but is not limited to placing warning flags 100 ft. away from the Lift Station in each direction, coning off the work area and cross streets, and closing the sidewalk if applicable.
6. Put #1 & #2 pump in the “off” position.
7. Use vactor truck to vacuum station wet well.
8. Notify control 10 or 14 (depending on the day and time) and advise of the situation.
9. Continue to vacuum out wet well as needed until station function returns.
10. If vactor truck isn’t available, use the following procedures:
    a. Bring submersible trash pump, discharge hoses, generator, and spare unleaded fuel can (these should be kept on the truck). It is recommended to bring a spare submersible pump.
    b. Test run generator before leaving the plant.
    c. Grab a tote from the back of the plant (located near the fire station training ground). A spare tote should always be kept in reserve. *Note: make sure drain valve is closed. It will most likely be left open to dry.* Upon arrival to the station, set up pump and start pumping into the tote. Make sure valve is shut on the tote.
    d. When power has been restored, pump tote back into wet well or use a mh at the plant. Clean/disinfect the tote.
11. Turn both pumps to auto position and confirm that each cycles as expected.
12. Notify control 10 or 14 that situation has been addressed.

**WCS staff conducts training annually to review SSO response procedures.*

Equipment needed:

1 – Submersible trash pump (2) w/ 1-1/2” camlock fitting
1 – Discharge hose 1-1/2” w/camlock fitting (at least 30 ft)
1 – Portable Honda generator
1 – Spare unleaded fuel can
Empty tote

Appendix G3 Waterfront Department SSO Response Plan

City of Santa Barbara
Waterfront Department

Memorandum

DATE: February 10, 2021

TO: Harbor Patrol Officers

FROM: Monica Broumand, Lieutenant/Harbor Patrol Supervisor

SUBJECT: **Notifications for Sewage and Hazardous Materials spills**

Notify the following agencies for all **hazardous material** spills:

1. City Dispatch for Fire and/or Police Departments as needed. (805)882-8900 or 911

2. Cal-OES-California Emergency Management Agency. *82-1-800-852-7550
Ask to submit a spill report. Get a Control Number.

3. USCG NRC-National Response Center. Give them the State OES Control Number, so they do not generate an additional control number. They will issue an NRC Report Number.
*82-1-800-424-8802, Press 1.

4. Lead, Supervisor, Manager and/or Waterfront Director.

5. USCG LA/LB 24-hr. Operations for Marine Safety Detachment notification. 1-310-521-3801. SB MSD cell: 805-896-6794. SB MSD office: 805-962-7430, dial 220 or 0.

6. Fish and Game (24-hr. dispatch) Riverside 1-951-443-2944

Additional notifications for **sewage** spills:

7. Public Works Department for sewage spills from sewer lines and facilities.
(805)564-5413 (bus. M-F), or (805)963-4286 (24-hr. dispatch)
Public Works completes CIWQS report within 2-hours of incident.

8. County Environmental Health for sewage spills. 681-4900 (bus. M-F), or 683-2724 (after hours)

9. Regional Water Quality Control Board (RWQCB) must be notified within 2-hours of sewage spill. 549-3147 (bus.), or 235-8435 (after hours). Public Works Water Resources staff is responsible for making notification to the RWQCB.

Supersedes August 9, 2018, August 21, 2015, November 13, 2014, May 6, 2010 and March 5, 2008 memorandums.

Appendix H1 Fats, Oils, and Grease (FOG) Program

Fats, Oils and Grease (FOG) Program Work Plan

City of Santa Barbara

Revised
December 2020

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Table of Contents

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Section 1: Introduction and Background

This section provides an overview of the City's wastewater collection system fats, oils and grease (FOG) program, responsibilities for program implementation, and an overview of this document. The document includes the following sections:

Section 1 – Introduction: Describes the purpose of the document, related regulatory requirements, the existing program, and the scope and responsibilities for implementing the program.

Section 2 – FOG Program Evaluation and Improvements: Discusses the need for program improvements, an evaluation of the existing program, FOG program benchmarking, and a proposed approach for the City's program.

Section 3 – Technical Configuration: Describes how the CMMS and other technology systems will be used to support the FOG inspection process.

1.1 Regulatory Overview

Santa Barbara's wastewater collection system management practices must comply with the following regulatory mandates:

- National Pollutant Discharge Elimination System (NPDES) Permit CA0048143 issued by the Central Coast Regional Water Quality Control Board on May 13, 2010. This permit has been administratively extended by the Regional Board until a reissued NPDES permit is adopted.
- California State Water Resources Control Board adopted Statewide General Waste Discharge Requirements for Wastewater Collection System Agencies (GWDR) on May 2, 2006.
- California State Water Resources Control Board Amendment of Statewide Monitoring and Reporting Program Requirements for Sanitary Sewer Overflows; MRP Order 2013-0058-EXEC effective September 9, 2013.

In regards to collection system FOG management, these mandates require that, if needed, the City develop a plan to reduce the amount of these substances discharged to the collection system. The program should include public education and outreach, the legal authority to prohibit FOG discharges, a list of acceptable FOG disposal facilities, requirements for grease removal devices, authority to inspect FOG producing facilities, identification of staff responsible for inspections, identification of sewer pipes subject to FOG blockages, and development of source control measures. This work plan incorporates each of these requirements into the City's FOG program.

1.2 Definitions and Acronyms

The various definitions and acronyms used in the report are listed in Volume I of the SSMP.

1.3 Existing Program

A summary of the City's existing FOG program is provided in this section. Information about the program was gathered through a review of the City's Sewer System Management Plan (SSMP), FOG program documents provided by the City, and through interviews with City staff.

1.3.1 Work Practices

The City has one full time equivalent (FTE) employee responsible for inspection of the FOG-producing facilities. The position is handled by one inspector. The City has identified approximately 470 FSE, in addition to 50 low grease-producing restaurants with FOG variances for inclusion in the program.

Inspections of industrial users are the responsibility of the City Wastewater Treatment Plant (WWTP) laboratory and are not included in this program. There are twelve industrial facilities that are under the industrial program.

The restaurants are inspected on a maximum frequency of two years. For Fiscal Year 2017, the program goal was to inspect approximately 225 restaurants. Occasionally inspections are scheduled around a grease hauler visit in order to get a complete view of a GCD. When pumping, the City also conducts unplanned inspections of facilities in the event of an SSO caused by FOG to determine if a restaurant has some responsibility in the blockage. The restaurants are required to keep grease records which are subject to review during inspections. The restaurant passes the inspection if the grease and solids layer(s) are less than 25 percent of the total liquid depth and a properly working GCD.

Inspections often require multiple visits if a problem is identified. A correction notice is issued for a restaurant and a date is set for a reinspection. This process repeats if necessary. For non-compliant food service establishments (FSEs), the City has a documented Correction Notice procedure, where up to three notices are provided prior to submitting the case to the City Attorney. The City has not needed to refer any cases to the City Attorney in recent history. A copy of the Correction Notice procedure is provided in Appendix A. The City is currently working on developing a violation letter notice.

The FOG program requires coordination with multiple outside agencies: County Health Department; Building/Safety and Land Development (City); and the City Creeks Division (floor mat rinsing). The County Health will notify the City FOG program inspector if they see an issue.

Information on restaurants doing business in Santa Barbara is collected from online resources. This allows the City to track new restaurants for inclusion in the FOG program. For new restaurants, a 100 pound retention capacity grease trap or a 750 gallon interceptor is required. Often there is not enough room for the installation of an interceptor, especially in the older parts of town. When a new restaurant is constructed, there is often some coordination between the City building plumbing inspector (Building and Safety) and the Wastewater Compliance Specialist (Public Works – Wastewater Collection Section).

Grease interceptor variances are allowed for inadequate slope or inadequate space. Grease trap variances are allowed as long as the food service establishments does not prep or cook food on site. This would include businesses like convenience stores and tasting rooms. Other low grease-generating restaurants can request a variance for the installation of grease control devices. Variances are approved through the WCS Superintendent. A copy of the City’s Grease Interceptor/Trap Conditional Variance Application is provided in Appendix B.

The data and inspection information associated with the FOG inspection program is entered and stored in Cartegraph OMS and other paper inspection reports. Cartegraph OMS reports with the next inspection date assist the Wastewater Compliance Specialist manage the inspection schedule. A sample FOG inspection form is provided in Appendix A.

1.3.2 Resources

The following resources are utilized as part of the existing FOG program.

1.3.2.1 Collection System Maps

The City has a comprehensive Geographical Information System (GIS) that includes the information for its wastewater collection system assets including: gravity line segments, manholes, pumping facilities and pressure pipes (force mains). The GIS also includes a data layer for the restaurants included in the FOG program, though this feature is not used in the current inspection program for scheduling inspections or storing inspection data. The GCD layer in the City's Cartegraph OMS system is maintained and updated by the Wastewater Compliance Specialist and includes locator and spatial data through its mapping feature.

The GIS is supported by the City's Information Services Division (ISD) in the Administrative Services Department. The data in the GIS is periodically updated by ISD when FSEs are added to Cartegraph OMS and existing facilities are rehabilitated or replaced. GIS updates and additions for collection system assets are performed according to the procedures specified in the *Collection System Information Technology Governance Document*.

1.3.2.2 CCTV Inspection Hardware and Software

The City utilizes its CCTV inspection equipment for identification of structural and maintenance defects in the collection system. FOG issues identified in the collection system are documented in Cartegraph OMS and the Wastewater Compliance Specialist is notified via email for additional review and inspection.

The City currently uses the industry standard National Association of Sewer Service Companies (NASSCO) PACP® pipe defect coding system for recording structural and maintenance defects identified during CCTV inspection.

1.3.2.3 Personnel

The key roles and responsibilities of Wastewater Collection System staff that carry out the SSMP and various program activities are listed in Volume I – Element 2 of the SSMP.

Section 2: FOG Control Program Evaluation and Improvements

2.1 Introduction

It is the City's goal to improve upon its existing FOG control program in order to reduce FOG-related SSOs, comply with Waste Discharge permit requirements, operate more efficiently and improve reporting capabilities. This section identifies the need for program improvements, provides some program benchmarking, provides an evaluation of the existing program, and outlines recommended improvements for the City's FOG control program.

2.2 Need for Program Improvements

A key performance indicator (KPI) often used to evaluate the effectiveness of FOG programs is SSO frequency. Historically, approximately 10 percent of the City's SSOs were attributed to FOG. This equates to an average of four SSOs per year. However, in 2014 the City hired a consultant to manage and make changes to the program. Currently, City staff manage the FOG program and have been highly successful in performing FSE inspections. A qualitative analysis between FSE inspections and SSO events was conducted in early 2018, and demonstrates the FOG program's effectiveness at reducing FOG related SSOs.

2.3 Benchmarking

Benchmarking is a helpful tool to gauge program status and identify potential improvements. In 2010, Brown and Caldwell (BC) conducted a FOG program evaluation as part of a project for another sewer agency in California. This project included a review of seven FOG control programs in Northern and Southern California. The number of FSEs in each program reviewed ranged from 133 to over 5,000. The following information was determined from this agency review:

- Inspection frequency ranged from annual to every 5 years; more frequent inspection occurs in areas upstream of a grease hot spot or for non-compliance.
- Inspections typically included review of kitchen best management practices (BMPs) and grease control device (GCD) inspection.
- The minimum mandatory pumping frequency for GCDs was typically monthly for grease traps and quarterly for grease interceptors.
- Wastewater Compliance Specialist could typically inspect 3-5 GCDs per day.
- Three out of the seven agencies required a permit; only one had a permit fee.
- Most agencies used a database or spreadsheet to track inspections.

2.4 Program Evaluation

A review of the City's current FOG program has reduced the number of outstanding issues and makes regular recommendations for program improvements. A summary is provided below.

- Some restaurants have out-of-state owners making coordination difficult. The process takes time and is an educational process. Restaurant managers change frequently making the educational process even more difficult. Letters generally go to the property owner and not the lessee. The City may notify the property owner as well as the lessee (restaurant manager), depending on the severity of the violation, to keep all parties apprised of the FOG inspection process.
- The City currently provides hand-out type educational materials that have been developed in-house. The City has developed, and is improving upon a standardized education program in addition to a FOG program

website with information for restaurants as well as the general public. The information for the FOG program is accessible on the City's website.

- The City desires to optimize the inspector time by focusing on FSEs that are not in compliance and to minimize the time to inspect restaurants that typically do not have compliance issues. Based on the benchmark information provided above, the City has decided to decrease from a 3 to 2-year inspection schedule for all FSEs. The additional time saved through administrative improvements will allow the Wastewater Compliance Specialist to spend more time with follow-up inspections of non-compliant FSEs.
- Currently, FOG program participation is not handled by City permit due to the relatively low occurrence of FOG-related SSOs. When a new restaurant is constructed, there is some coordination with the building plumbing inspector and the Engineering Land Development staff. Occasionally, the Wastewater Compliance Specialist will review building plans and perform site visits to ensure proper connections. The City Engineering Land Development Team is involved at an earlier stage and will involve the Wastewater Compliance Specialist at the early stage of design when needed.

2.5 Program Characteristics

Following a review of the City's current program, the following program improvements should be initiated. Based on the review, all other permit requirements not included below are currently being met through existing programs and municipal code regulations.

2.5.1 Business Process

The City's current business process includes scheduling inspections and recording inspection results in Cartegraph OMS. This work flow process is shown in Figure 2-1. Reactive or ad-hoc inspections are documented using the standard inspection form and then entered into Cartegraph OMS when complete. Once the Wastewater Compliance Specialist completes an inspection, the next inspection is determined and entered into Cartegraph OMS.

The City has reports within Cartegraph OMS that allow for program progress communication with other internal staff and regulatory reports for other agencies such as the County Health Department. The Wastewater Compliance Specialist can also generate reports of the monthly inspection schedule as needed.

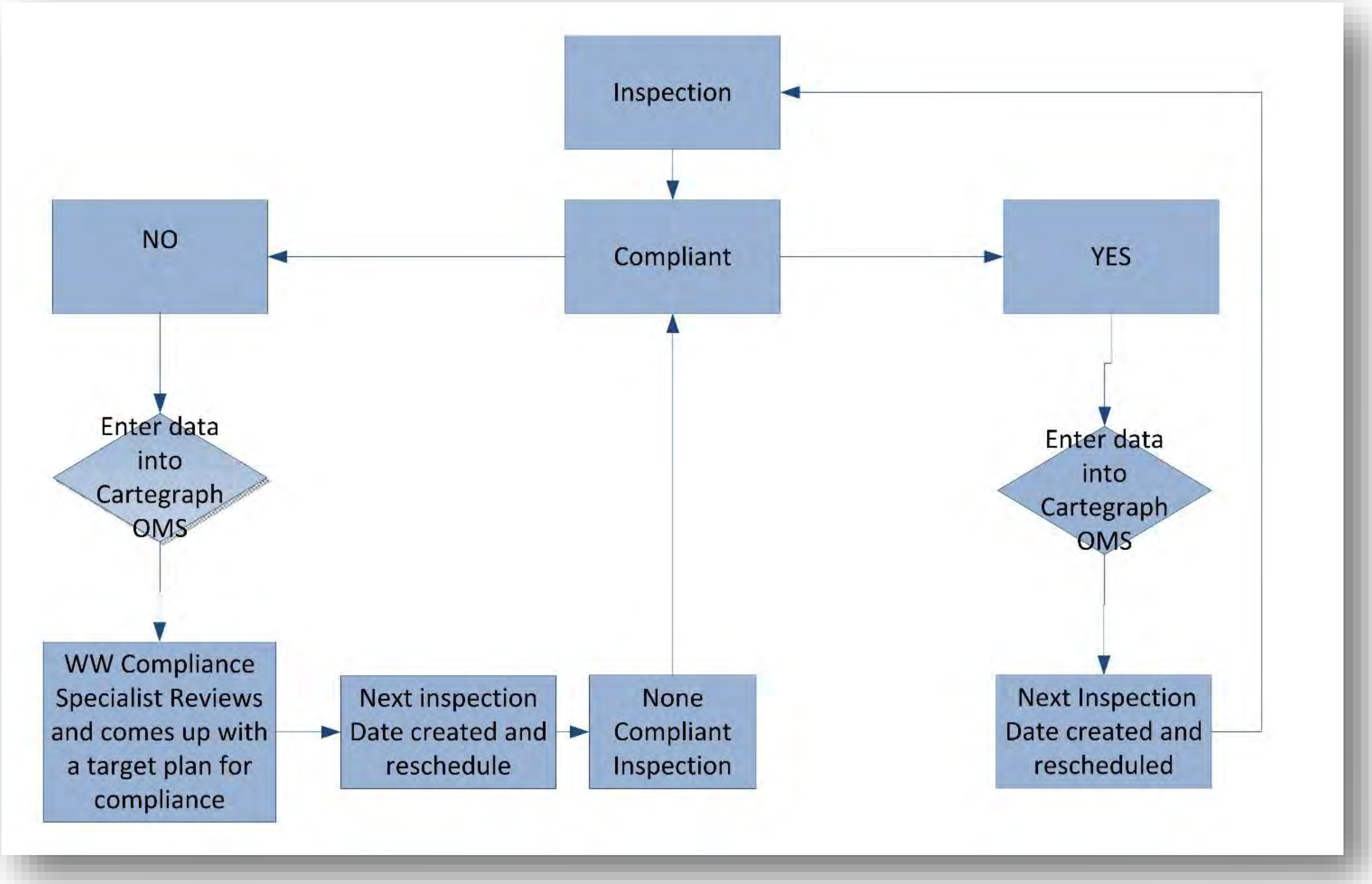


Figure 2-1. FOG Inspection and Compliance Determination Workflow

2.5.2 FSE Inspections

The City maintains its current two year inspection cycle for restaurants. Appendix A provides an example of the typical, hard-copy inspection form used during FSE inspections. The results of the inspection and photos are documented in Cartegraph OMS.

If a FOG related SSO occurs, the City performs an analysis to determine if there are any patterns of SSO locations reoccurring upstream of a FSE or if there are any FSEs that are non-compliant and could have contributed to the cause of spill.

The City's one FTE Wastewater Compliance Specialist should be able to inspect approximately three to five FSEs per day on average. With strategic scheduling, this allows adequate time for follow-up with non-compliant establishments that require more attention. If non-compliance persists, Notices of Violation (NOV) or other enforcement action are issued. Non-compliant establishments should be inspected as needed until compliance is achieved. FSE inspections are unannounced to observe typical operating conditions. The Wastewater Compliance Specialist is trained and capable of opening and inspecting the GCD to confirm proper installation according to the Standard Detail (Appendix D). The Standard Detail was established to provide clear standards for FSE owners to follow that ensure proper installation of GCDs and related connections, minimizing pass-through.

2.5.3 Permitting

The City does not issue FOG permits because there are minimal SSOs caused by FOG. The Wastewater Compliance Specialist is successfully educating owners on the importance of BMPs. The FSEs are staying in compliance and, in return, keeping FOG out of the City sewer.

2.5.4 Education

The City developed a formal FOG education program including a website and handouts for FSEs. There are numerous examples available, some from national sewer organizations such as the Water Environment Federation (www.wef.org) and from other established programs such as Cal Fog (http://calfog.org/PubEd.html). Educational material distribution should include the property owner as well as the resident/lessee.

2.5.5 Collaboration

FOG program staff currently work closely with the City Building Department and, to a limited extent, with the County Health Department. They also work closely with the Engineering and Land Development Section for new construction projects that involve restaurants. Occasionally, the Heath Department contacts the Wastewater Compliance Specialist to share information about GCD locations. It would also be helpful to have staff involved in plan review for new FSE building permits. Getting involved at this stage would prevent potential building issues (e.g. improper GCD connections) as well as allow the inspector to be in a better and more familiar position when they begin their inspections.

2.5.6 Program Improvements

In 2014, the City utilized an outside consultant to help improve the existing FOG program. The consultant established a standard set of work processes and managed the program during the year. The City took the program back over in 2015. Currently, the City has one FTE who is responsible for coordinating and executing the inspections. Furthermore, the City has created a standard for GCD applications and installations.

2.5.7 Semi-Annual Program Review

At a minimum, the City reviews the results of their FOG program every six months. In addition, the Wastewater Compliance Specialist and Superintendent meet more frequently to review FOG related issues or the progress of any outstanding FOG related issues at FSEs. This includes a review of SSO reports to identify if FOG-related SSOs are trending up or down. If FOG-related SSOs remain static or rise, the City makes adjustments to the FOG program including additional inspections.

2.5.8 Overall FOG Inspection Process

Figure 3-1 below is an overview of the steps necessary to plan, issue, and complete FOG inspections. Also shown are the technology systems and how they support the process, as well as the resource roles required to support the work process.

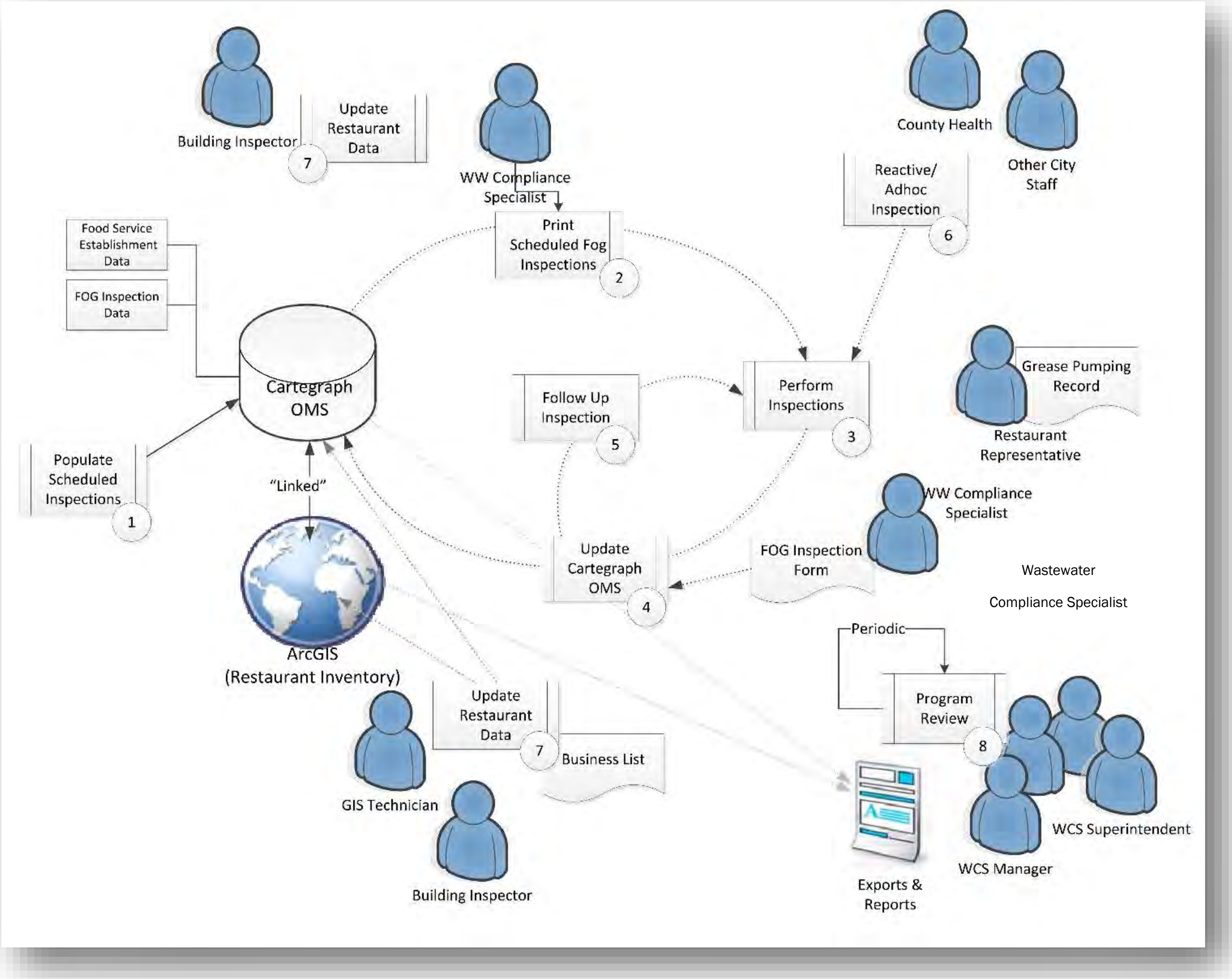


Figure 2-1. FOG Inspection Workflow

The process is based on the plan discussed in Section 2, above. The WCS staff roles and their specific duties as it pertains to the FOG Inspection Workflow are:

- **Wastewater Compliance Specialist:** Performs FOG inspections and manages inspection schedules/data.
- **WCS Manager:** Ensures the program's effectiveness by reviewing program metrics.
- **WCS Superintendent:** Responsible for overall implementation of the program. Ensures the program effectiveness by reviewing program metrics, identifies coordination with other maintenance activities.

Other roles involved in the process are:

- **Building Inspector:** City employee who performs inspections for new establishments, communicates with the Wastewater Compliance Specialist about new FSE locations.
- **GIS Technician:** Information System Division staff who manages spatial data associated with FSEs.
- **Restaurant Representative:** The primary contact for the Food Service Establishment. Responsible for FOG compliance.
- **County Health, "Other City Staff":** Other staff/organizations that may request a FOG Inspection.

The general steps for the inspection process are shown as numbered boxes in Figure 2-1, above. These steps are:

- **Populate Scheduled Inspections** – This was a one-time process of loading the existing inspection database into Cartegraph OMS. The initial tasks for the next scheduled inspection will be prepared.
- **Print Scheduled FOG Inspections** – Periodically (e.g. once a month), the Wastewater Compliance Specialist will print out a report listing the upcoming scheduled FOG inspections with contact information for the FSEs.
- **Perform Inspections** – The Wastewater Compliance Specialist visits the FSE and meets with the Restaurant Representative. The inspection is completed and the findings are recorded on a paper FOG Inspection Form. During the inspection, the Wastewater Compliance Specialist will perform several inspection activities including reviewing service/maintenance records, inspect GCDs, and training documentation. The Wastewater Compliance Specialist may leave additional literature, take photographs of noteworthy observations, and/or schedule follow up inspections. In addition the Wastewater Compliance Specialist provides the FSE a copy of the form documenting the inspection findings.
- **Update Inspection Task in Cartegraph OMS** –The Wastewater Compliance Specialist will access and update the inspection task in Cartegraph OMS with any pictures or other documentation obtained during the inspection. A next inspection date is entered into the Next Inspection Date field in Cartegraph OMS in which automation set up in Cartegraph OMS, automatically creates a future inspection task for the FSE (with a new Estimated Start Date). At this point, the Wastewater Compliance Specialist has made a determination on whether or not the FSE is in compliance with the FOG Inspection Program. The compliance status is documented in the FOG Status field in Cartegraph OMS. Each inspection results in one of the two following FOG Status (compliance) categories:
    - **Compliant** – the FSE meets the requirements of Title 16 and the FSE does not pose a significant concern to discharging fats, oils or grease to the collection system.
    - **In-Progress** – one or more violations were observed during the inspection and the Wastewater Compliance Specialist will be monitoring the violation during future inspections and working with the FSE Representative to correct the deficiencies documented under the Correction Notice section on the Inspection Form.
- **Notice of Violation (NOV) and Follow-up Inspection** – If issues were identified that require a NOV and follow-up inspection, the Wastewater Compliance Specialist will select a follow-up inspection date sooner than if the FSE was in compliance in order to ensure the issues were resolved (e.g. if the grease trap needs maintenance, the Inspector may re-inspect to verify that the maintenance was completed). The follow-up inspection will be scheduled within Cartegraph OMS. Any related correspondence is be attached to the FSEs file to maintain a complete set of documentation. If follow-up activities have not been completed, the FSE remains in the In-Progress status in Cartegraph OMS so that these activities can be tracked to final

resolution. The City's FOG inspection process allows for three Notices of Violation prior to case referral to the City Attorney where a fine or other penalties can be levied.

- **Reactive and Ad-Hoc Inspections** – Sometimes an unscheduled inspection is requested by an outside party such as the County Health Department or "Other City Staff". These requests are sent directly to the Wastewater Compliance Specialist. In these situations the Wastewater Compliance Specialist will perform the inspection using a blank inspection form. The inspection process will follow the steps described above. When the inspection is entered into Cartegraph OMS, the Wastewater Compliance Specialist will enter a next inspection date which will create a future inspection task.
- **Update Restaurant Data** –The Wastewater Compliance Specialist uses a variety of resources such as websites, tenant improvements on building plans and "word of mouth" to determine if any new restaurants have opened, closed or changed ownership. The FSE records in Cartegraph OMS are updated with new information about the owner, contact, etc. The GIS Technician may support the data update if the new restaurant is not already in the FSE GIS data layer. New FSEs will be followed up with an "Educational Visit" to instruct the new tenants of the FOG Inspection Program.
- **Program Review** – The WCS Management and other program stakeholders will conduct periodic meetings to review FOG Inspection Program metrics and reports. The goals of these meetings are to ensure the overall success of the program and coordinate FOG issues and findings with other strategic objectives at the City.

2.5.9 Wastewater Compliance Specialist Role

This section describes the Wastewater Compliance Specialist's role during the building review process to ensure proper installation of GCDs in new FSEs occurs.

2.5.9.1 New FSE Establishment

The Wastewater Compliance Specialist becomes aware of new FSEs through two methods: the City Business License List and notification from the Building and Safety Division.

The City Business License List is updated monthly by the City's business license office, and contains all new businesses applying for business licenses in the City of Santa Barbara. The Wastewater Compliance Specialist regularly reviews this list for any new FSEs.

The Building and Safety Division notifies the Wastewater Compliance Specialist when a building plan enters a comment period. The Wastewater Compliance Specialist adds comments relative to the FSE's compliance status and success with the FOG program in Accela, the City's permitting and plan check software, .

2.6 Communication

This section describes the formal and informal communication that takes place related to FOG inspection activities. Formal activities include meetings, memoranda, and reports. Informal communications are ad-hoc communication that can take place through conversations, in meetings, or by email.

2.6.1 Communication to Management

Formal communication occurs primarily through the documentation of inspections via standard reports. Inspection tasks are generated and stored in Cartegraph OMS which record inspection results, violations, and follow-up activities. Inspection results are then presented in standard reports that management can use to assess progress, monitor non-compliance, and plan future inspections. In addition, the Wastewater Compliance Specialist may initiate a request for a CCTV inspection of the sewer main based on inspection results.

Informal communication takes place on an on-going basis between the Wastewater Compliance Specialist and the Superintendent. Discussions take place regarding inspection activities, future scheduling, and ongoing issues. In addition, informal communication takes place using the City's email system. Ad-hoc meetings are also conducted on a regular basis between management and supervisory staff to discuss progress and resolve issues.

2.6.2 Communication to Food Service Establishments

There are several methods of communication between the Wastewater Compliance Specialist and the FSE. When a new FSE is established, the Wastewater Compliance Specialist will conduct an initial visit to the establishment to review the current conditions, identify compliance requirements and educate the FSE representative on FOG issues. The Wastewater Compliance Specialist may leave formal literature with the FSE representative.

During a regular inspection, the Wastewater Compliance Specialist will discuss compliance activities with the FSE representative. Once the inspection is complete, the Inspector leaves a copy of the inspection that notifies the FSE representative of findings. If the FSE in not in compliance, the Wastewater Compliance Specialist will determine what corrective actions need to take place and define these on the inspection form.

2.6.3 Communication to Other Departments and Agencies

Communication with other City Departments and other agencies takes place though ad-hoc inspection requests and communication of inspection results. Inspection requests may come from outside WCS directly to the Wastewater Compliance Specialist. Inspection results are can be communicated to other agencies as well. Specific interactions are:

- **Other City Organizations** – Other City organizations may request a FOG inspection resulting from independent observation or event. These requests are communicated directly to the Wastewater Compliance Specialist.
- **City Creeks Division** – Inspection findings on kitchen floor mat washing are coordinated with the Creeks Division.
- **City Finance Department** – The Finance Department may notify the Wastewater Compliance Specialist of new restaurant facilities that are opening and require inspection.
- **County Health Department** – The Health Department may request a FOG Inspection based on their own inspection activities. In addition, inspection findings may be forwarded to the Department once inspections are completed.

2.7 Progress Measurement and Reporting

Progress measurement and reporting is accomplished through a series of standard reports and maps. When assessing progress and effectiveness, it is important to measure both the results and the performance. These reports and maps are designed to provide information on both. These reports and maps can show where things are breaking down and can be used for further investigation of root causes and identification of adjustments to improve the program effectiveness. Table 2-1 shows the reports available to evaluate the FOG program:

Table 2-1. Reports Used to Evaluate the FOG Program

Quarterly Inspection Report	Report	This report provides provide total number of inspections for a particular user-provided date range. It lists all completed inspections including the FSE ID and name, location, compliance status, and next inspection date. This report can be used to determine if the FOG inspection program is on track to meet the annual inspection goals.
Inspections Map	Map	A map of the total inspections by inspection status can be displayed in ArcGIS or Cartegraph OMS. The map can show each completed inspection and whether the facility is in violation.
Planned Inspection Report	Report	This report can produce a listing of inspections (including location name and address, inspection status, and type of inspection) for a user-provided date range and status filter. This report enables the Wastewater Compliance Specialist to print reports of upcoming scheduled inspections.
Compliance Issues Report	Report	This report can provide a list of FSEs with outstanding compliance issues, and provides additional inspection date and FSE data including last inspection date, FSE contact information, inspection notes regarding on-going follow-up activities, etc.

2.8 Quality Assurance and Quality Control

The FOG program must implement quality assurance and quality control (QA/QC) activities to ensure that the inspection program is achieving its overall objectives, confirm that FOG management requirements are being followed, and to make sure that accurate and complete data are being entered into the CMMS. The FOG management program success relies on the ability to consistently monitor and inspect FSEs and to ensure that all follow-up activities are completed.

2.8.1 Monitoring the Overall FOG Management Program Quality

The overall goal of the FOG program is to reduce or eliminate FOG-related SSOs by reducing the fats, oils, and grease entering the collection system. One of the key indicators of the program's effectiveness is tracking the number of FOG-related SSOs that occur over time. The number of SSOs by cause are reported annually by the City. Monitoring increases in the percentage of FOG-related SSOs can indicate procedural or quality issues in the FOG Inspection program. The City's standard SSO failure analysis process to determine the primary cause of the SSO can be used in conjunction with the inspection history of nearby FSEs to indicate potential inspection or compliance issues not identified during area FOG Inspection activities. This information should be used to identify any changes necessary in the inspection program as well as the need for additional training of the Wastewater Compliance Specialist.

Quality assurance activities are used to determine that the proper inspection processes and procedures are being followed. The key quality assurance activities for the FOG program are:

- **Training:** All Wastewater Compliance Specialists will be trained on the proper inspection. Training records will be documented by management to ensure that procedures are consistently and effectively performed.
- **Audit and observation:** The Superintendent will conduct random, periodic field audits to ensure that the Wastewater Compliance Specialist is following procedures.
- **Standard reports:** Standard reports and maps (discussed above) are available in Cartegraph OMS to monitor the FOG program. Through the standard reports and maps, the WCS Manager or Superintendent can determine if the program is on track to meet the inspection targets and can verify that inspections and follow-up tasks are being completed.

Quality control activities will be used to evaluate the inspection results. Individual inspections should be periodically reviewed by Management to verify that the information is accurate and complete.

2.8.2 Information Quality Assurance and Quality Control

In order to ensure that the quality data are being entered into the CMMS and that the inspection process is being completed in a timely manner, each inspection task will follow a lifecycle process that allows the City to perform QA/QC on the data from scheduling the inspection through completion. This inspection task lifecycle will have three phases, and specific criteria will need to be met at the end of each phase in order for a task to move to the next phase. Each inspection task will be tracked by assigning it a status related to where it is in the overall lifecycle. The task statuses are:

- **Planned** – An inspection task will have a status of "Planned" when it has been scheduled and given an Estimated Start Date. The Wastewater Compliance Specialist will periodically check the database to verify that every FSE has a "Planned" inspection task within the next two years.
- **In-Progress** – Wastewater Compliance Specialist is on site completing the inspection task, documenting findings and educating the FSE representative.
- **Completed** – The inspection task's status is changed to "Completed" once the actual inspection is completed and the Wastewater Compliance Specialist enters the inspection results into Cartegraph OMS. The Next Inspection Date field is populated by the Wastewater Compliance Specialist based on the inspection findings, follow-up maintenance activities and compliance status.

Once the inspections are completed and the record in Cartegraph OMS is updated, the Wastewater Compliance Specialist's process for that FSE is complete until the next inspection date. The Superintendent periodically reviews the data entry in Cartegraph OMS for completeness and if there are gaps or discrepancies in the data, resolve any issues directly with the Wastewater Compliance Specialist.

Cartegraph OMS will display the estimated start date, actual inspection date and FOG Status for each inspection so that the work process can be monitored to ensure that it is being scheduled and completed in a timely manner. Any bottlenecks in the process can be addressed by adding additional resources or rescheduled if necessary provided that the overall annual target is not affected.

Appendix A: FOG Program Inspection Form

City of Santa Barbara
Public Works Department
FOOD SERVICE ESTABLISHMENT INSPECTION REPORT

Date of Inspection:		Facility Name:	
Facility Address:			Permit #:
APN#:	Basin #:	Inspection Type (Circle):	Routine Required Scheduled
Facility Owner:			Phone:
Facility Manager:			Phone:
Trap Y N	Size _____ lbs	Interceptor Y N	Size _____ gals. Location:

Pumper/Service Provider:		Date of last Service:
Frequency of Cleaning:	Flow Restrictor? Y N	Floor Mats? Y N

	Correction Notice (See items checked "Violation")	**No Violation**	**Violation**	**Not Applicable**
1	Trap or interceptor required *SBMC 16.04.080*	☐	☐	☐
2	General condition of Trap *(Baffles, lid, proper maintenance, and proper connections). SBMC 16.04.080*	☐	☐	☐
3	General condition of Interceptor *(Influent/Crossover/Effluent Ts, Baffle, Manhole Lids, Internal Structure). SBMC 16.04.080*	☐	☐	☐
4	FOG buildup *(< 25% of liquid depth with discharge pipe clear of FOG). SBMC 16.04.080*	☐	☐	☐
5	FOG buildup in Inspection Port or Sample Box *SBMC 16.04.080*	☐	☐	☐
6	Is there a Garbage Disposal *SBMC 16.04.070*	☐	☐	☐
7	Grease Barrel *(Disposed by Licensed Hauler, Barrel Properly Maintained) SBMC 16.08.050*	☐	☐	☐
8	BMPs in place and training provided for Yellow Grease Management and Spill Response *SBMC 16.04.010*	☐	☐	☐
9	Interceptor/Trap pumping and maintenance records available for review *SBMC 16.04.080*	☐	☐	☐
10	Emulsifiers in use *(Degreasers, Enzymes, Bacteria) SBMC 16.04.010*	☐	☐	☐
11	Cost Recovery Charge shall apply *SBMC 16.14.030*	☐	☐	☐

CORRECTION NOTICE (To Be Completed Within :______________________________Days) Re-inspect:_______ days.

Comments:____

____

Failure to comply with the provisions of Santa Barbara Municipal Code, Title 16, may result in a fine and/or other penalties.

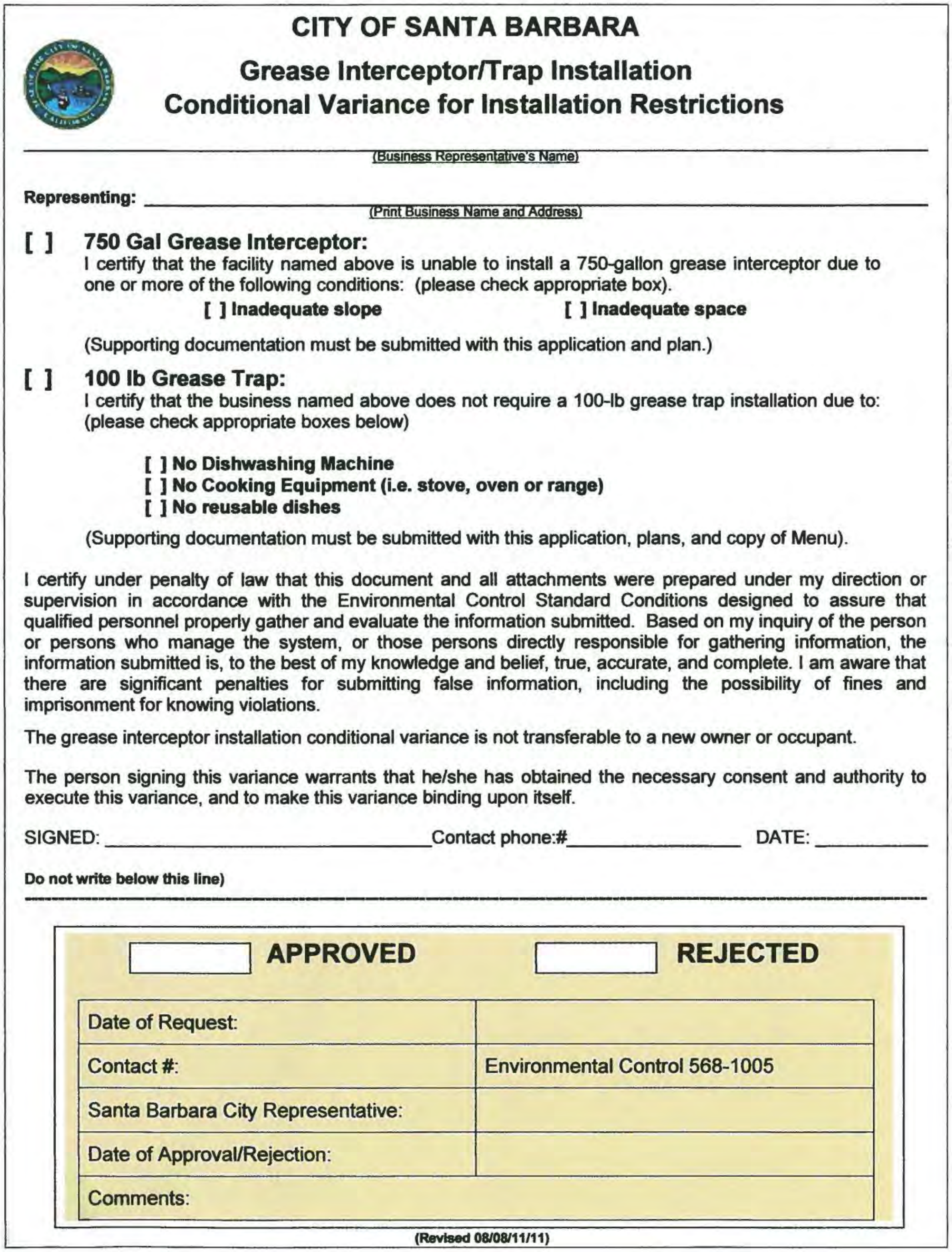
City Representative Signature:___________________________ Facility Representative Signature: _________________________

Printed Name: ______________________________ Printed Name: ________________________________

Phone Number: (805) 568-1005

City of Santa Barbara 12/16 Page _____ of _____

Appendix B: Grease Interceptor/Trap Conditional Variance Application



CITY OF SANTA BARBARA

Grease Interceptor/Trap Installation
Conditional Variance for Installation Restrictions

____
(Business Representative's Name)

Representing: ____
(Print Business Name and Address)

[ ] 750 Gal Grease Interceptor:
I certify that the facility named above is unable to install a 750-gallon grease interceptor due to one or more of the following conditions: (please check appropriate box).

[ ] Inadequate slope **[ ] Inadequate space**

(Supporting documentation must be submitted with this application and plan.)

[ ] 100 lb Grease Trap:
I certify that the business named above does not require a 100-lb grease trap installation due to: (please check appropriate boxes below)

[ ] No Dishwashing Machine
[ ] No Cooking Equipment (i.e. stove, oven or range)
[ ] No reusable dishes

(Supporting documentation must be submitted with this application, plans, and copy of Menu).

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with the Environmental Control Standard Conditions designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

The grease interceptor installation conditional variance is not transferable to a new owner or occupant.

The person signing this variance warrants that he/she has obtained the necessary consent and authority to execute this variance, and to make this variance binding upon itself.

SIGNED: ______________________ Contact phone:# ______________ DATE: __________

Do not write below this line)

☐ **APPROVED** ☐ **REJECTED**

Date of Request:	
Contact #:	Environmental Control 568-1005
Santa Barbara City Representative:	
Date of Approval/Rejection:	
Comments:	

(Revised 08/08/11/11)

Appendix C: FOG Public Outreach

1. City Of Santa Barbara Fats Oils and Grease Control Program: Guide for Kitchen Best Management Practices (BMPs)
2. Door Hangers (English/Spanish)

City Of Santa Barbara Fats Oils and Grease Control Program: Guide for Kitchen Best Management Practices (BMPs)

The following is a list of Best Management Practices (BMPs) which is provided as a guide to assist Food Service Establishments (FSEs) to minimize the effects of Fats Oils and Grease (FOG) on plumbing fixtures and the City Sewer System.

Grease Traps and Interceptors

- Clean traps and interceptors regularly always maintain FOG levels <25% of total liquid depth.
- Keep all records for cleaning and maintenance in a FOG binder and maintain records for 3 years.
- Inspect Traps and Interceptors regularly to make sure all internal and external components are in place and functioning as designed.

Grease Container Usage

- Pour all liquid oil and grease from pots, pans, and fryers into a waste grease container and empty scrap baskets from grill tops into a container.
- Prior to washing, scrape solidified fats, oils, and grease from pots, pans, fryers, utensils, screens and mats into container.
- Use recycling barrels or bins with covers and secondary containment for onsite collection of grease and oil.
- Used oil and grease generated from fryers and other cooking equipment must be recycled through a rendering and recycling company.

Sinks and Drains

- Drain screens are required to be installed in all drains with openings between 1/8" and 3/16".
- Should be removable for easy cleaning and frequently cleaned (dispose of screened solids in trash).

Dishwashing

- Use rubber scrapers, squeegees, or towels to remove food and all visible fats, oils, and grease from cookware and dishes prior to dishwashing.
- Dry wipe remaining food and fats, oils, and grease into trash prior to dishwashing.

Spill Prevention and Clean-up

Proactive Spill Prevention and Clean-Up Procedures

- Develop and Post spill procedures for kitchen staff, as well as train employees on spill prevention and clean-up.
- Designate a key employee to monitor the management and clean-up of grease barrel/container.

Spill Prevention BMPs

- Empty containers before they are full to prevent accidental spills.
- Provide a proper portable container with a cover to transport materials without spilling.

Spill Clean-Up BMPs

- Block off sink and floor drains near the spill and clean spills with towels or absorbent materials.
- Use wet cleaning methods only after area is 99% clean to remove trace residues.
- Clean spills or drippings immediately as they occur.

Absorbent Materials and Towel Usage

- Use disposable absorbent materials to clean areas where oils and grease may be spilled or dripped.
- Use absorbent materials under colanders in sink when draining excess meat fat.

Employee Education

- Implement an education program on BMPs consisting of the following:
    - New Employee Training Program
    - Regular training for existing kitchen staff
    - Posting of BMPs in kitchen area

URGENTE!!

Equipos de la ciudad identificaron GRASA en el drenaje publico de la ciudad y en su vecindario; ayude prevenir que esto vuelva a suceder! La acumulación de gordura, aceites y grasas (FOG) en la tubería de sus alcantarillas provocan bloqueos que llevan a la alcantarilla a derramarse. Bloqueos relacionados con la gordura y grasa causan la alcantarilla a que se derraman por sus calles y en sus propiedades causando daño al medio ambiente.

Gordura Aceite & Grasa

¿Cual es el problema?

Cuando usted desecha la gordura, el aceite y la grasa, también conocido como FOGs, en la coladera en su casa, esto puede causar muchos problemas en el drenaje. Grasa y gordura de productos lácteos como la mantequilla, aceites para cocinar, carne y aderezos para ensaladas se pueden solidificar y formar un tapón en la tubería del drenaje, algo parecido como el colesterol en el cuerpo humano. Tapones en el sistema del drenaje pueden causar derrames dentro de su casa resultando en un costo muy alto para limpiar y reparación de la tubería. Los tapones pueden ser la causa de derrames o obstruir el flujo de aguas negras causando derrames en las calles, mas podría causar un problema de salud para la comunidad y el medio ambiente

¿Como Puedo Ayudar?

Aquí están unos consejos de como puede prevenir derrames de drenaje, restricciones en el flujo, y reparaciones costosas:

- Ponga una canasta o una coladera en la coladera del fregador (sink) para que atrape todas las partículas de comida y otros sólidos, luego tire el contenido de la canasta en la basura.
- Ponga todos los aceites y gordura de cocinar que se vayan a solidificar por ejemplo la grasa de carne, póngala en una lata o un pomo con tapadera y deséchelo a la basura.
- Limpie las cazuelas y sartenes de cocinar antes de lavarlos o meterlos a la lavadora luego tire a la basura lo que uso para limpiar.
- Remueva y ponga la grasa y desperdicios de comida en el bote de basura no en el Molino del fregador.
- Hable con sus amigos y dígales como mantener la grasa fuera del sistema del drenaje.

Para reportar derrames de aguas negras u otra emergencia, favor de llamar al 564-5413.

Para más información del programa del FOG, por favor llame a la Oficina de Medio Ambiente al 568-1010.

City of Santa Barbara
Departamento de Obras Públicas

URGENT!!

City Crews identified GREASE in the public sewer mains within your neighborhood; help prevent it from happening again! Build up of FATS, OILS, and GREASE (FOG) in your sewers pipes causes blockages which lead to sewer spills. FOG blockages cause the sewer to backup and overflow onto your streets and into your home damaging properties and the environment.

Fats, Oil & Grease

What is the Problem?

When you allow fats, oils, and grease, also known as FOGs, to go down the drains in your home, this can cause many problems. Grease and fat from products such as butter, dairy products, cooking oils, meat, and salad dressing can harden and clog the sewer system, very much like a human artery. Blockages in the system may result in a sewage backup into your home, resulting in expensive cleanup costs and repairs to your sewer pipes, home, and belongings. Blockages may also trigger an overflow or back up of sewage onto the streets or into waterways, creating the potential of a public health risk, and threatening the environment.

How can I Help?

Here are a few tips on how to prevent sanitary sewer overflows, backups, and costly repairs:

- Place a basket or strainer in the sink drain to catch food scraps and other solids, then dispose of them in the garbage.
- Pour all cooled cooking oils or grease that will harden, such as meat drippings, into an old container with a lid and dispose of it in the garbage.
- Wipe down greasy pots, pans, or dishes with a disposable cloth before washing or placing them in the dishwasher; then dispose of the cloth in the garbage.
- Remove and place all greasy food scraps from pots, pans, or dishes in the garbage; and not in the garbage disposal.
- Speak with your friends about preventative methods to keep oil and grease out of the sanitary sewer system.

To report a sewer spill or other emergency, please call 564-5413.

For more information about the FOG program, please call Environmental Control at 568-1010.

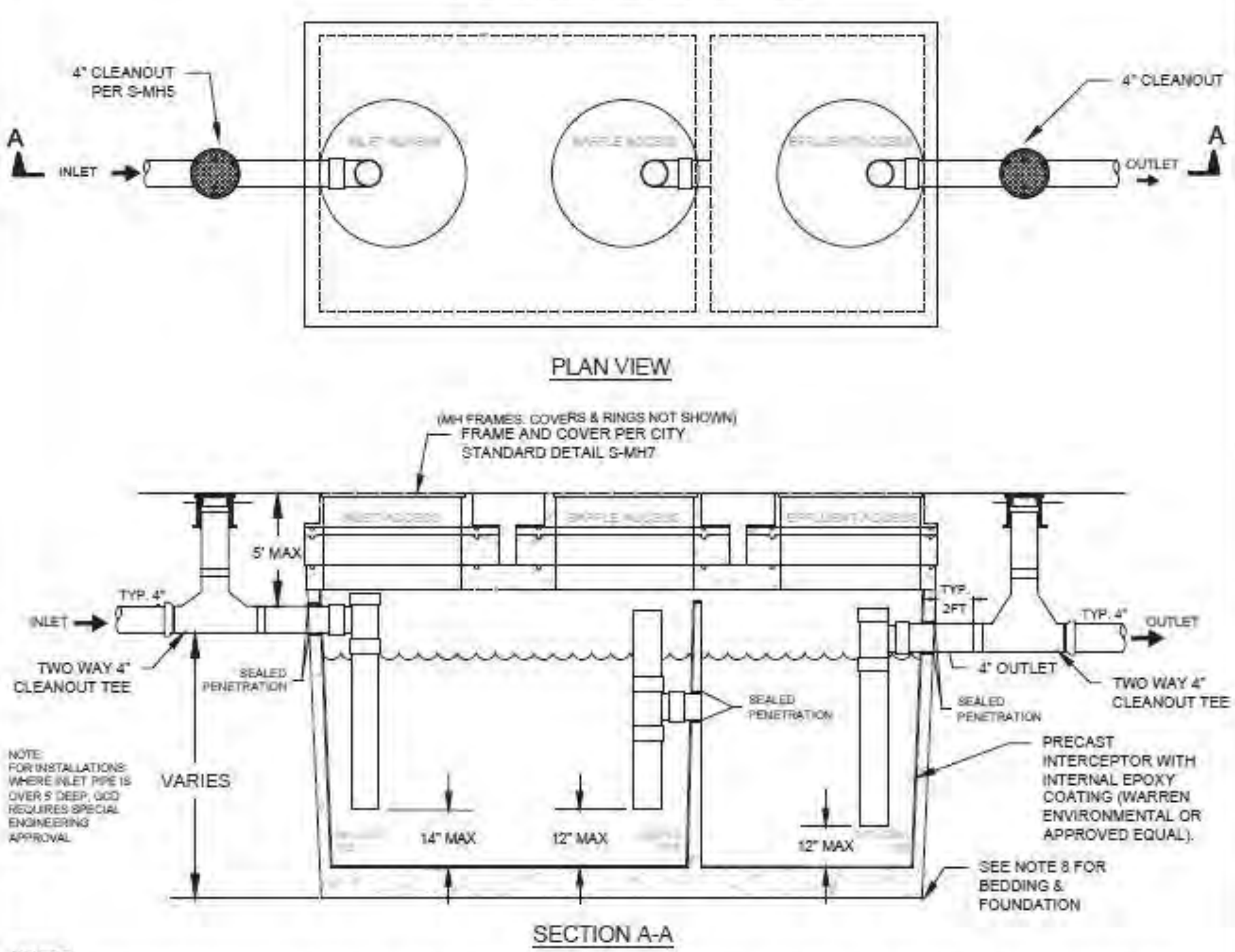
City of Santa Barbara
Public Works Department

City of Santa Barbara
FOG Program Work Plan

December 2020

Appendix D: Standard Detail

GREASE CONTROL DEVICE (GCD)



NOTES

1. GREASE CONTROL DEVICES (GCD) ARE NOT INTENDED FOR DOMESTIC SEWAGE. LOCATION AND TRIBUTARY DISCHARGE SOURCES SHALL BE APPROVED BY BUILDING & SAFETY PRIOR TO INSTALLATION AND CONNECTION TO CITY SEWER. CONNECTIONS TO GCD SHALL NOT ALLOW INTRODUCTION OF EMULSIFIERS OR CHEMICALS CAUSING PASS THROUGH.
2. EACH GCD SHALL BE INSTALLED ON PRIVATE PROPERTY AND CONNECTED SO THAT IT SHALL BE EASILIY ACCESSIBLE FOR INSPECTION, CLEANING AND REMOVAL OF THE INTERCEPTED GREASE.
3. EACH GCD SHALL BE SIZED TO MEET EXPECTED SOLIDS LOADING TO COMPLY WITH CITY FATS, OILS AND GREASE PROGRAM AND COMPLY WITH HYDRAULIC CAPACITY PER CALIFORNIA PLUMBING CODE SECTION 1014.2.1.

MATERIALS:

4. ALL INTERNAL PIPING SHALL BE 4" OR 6" TO MATCH LATERAL DIAMETER. INTERNAL PIPING MATERIAL SHALL BE HDPE OR PVC. NO METALLIC PIPE WILL BE ALLOWED TO BE USED FOR INTERNAL PIPING FOR THE GCD. CONTRACTOR TO CONNECT LATERAL PIPING TO GCD WITH ALL NECESSARY FITTINGS.
5. INTERCEPTOR LOCATED IN AN AREA SUBJECT TO TRAFFIC MUST BE HS-20 TRAFFIC RATED.
6. FOR NON TRAFFIC LOCATIONS, NON-PRECAST INTERCEPTORS MADE OF POLYPROPELENE(ENDURA XL OR APPROVED EQUAL) IS ACCEPTABLE.
7. ALL PRE-CAST CONCRETE GCDS SHALL BE EPOXY LINED PRIOR TO ENTERING SERVICE USING WARREN ENVIRONMENTAL EPOXY COATING (OR APPROVED EQUAL). MINIMUM LINING THICKNESS SHALL BE 125 MILS.

TESTING:

8. EPOXY LINING SHALL BE PULL TESTED PER ASTM-D4541 AND SECTION 500-2.4.4 IN GREENBOOK. ALL TEST LOCATIONS SHALL BE REPAIRED 2" PAST EDGE OF SCORE. RESULTS SHALL BE SUBMITTED TO WASTEWATER COMPLIANCE SPECIALIST FOR APPROVAL.

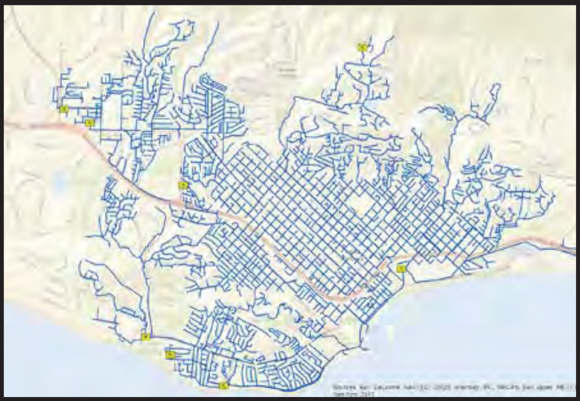
BEDDING:

9. INTERCEPTOR SHALL BE PLACED ON A MINIMUM OF 6" TYPE I BEDDING MATERIAL, COMPACTED TO 95% RELATIVE COMPACTION.

GREASE CONTROL DEVICE
(GCD)

REV. DATE: 06/2020
DETAIL: MISC-FOG
APPROVED:
CITY ENGINEER
PUBLIC WORKS DIRECTOR

Appendix I1 Wastewater Collection System Master Plan



Wastewater Collection System
Hydraulic Model
for the
City of Santa Barbara

• December 2014 •

WSC
Water Systems Consulting, Inc.

City of Santa Barbara

Wastewater Collection System Hydraulic Model

Prepared Under the Responsible Charge of:

Jeroen Olthof

California R.C.E. No. 58597, Expires 12/31/2016

December 2014

WSC
WATER SYSTEMS CONSULTING, INC.

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1 INTRODUCTION

The City of Santa Barbara (City) owns and operates a wastewater collection system that conveys flow to the El Estero Wastewater Treatment Plant (WWTP). The collection system includes approximately 254 miles of gravity sewer, eight lift stations (including the influent pump station at the El Estero WWTP), and approximately 2 miles of force main. The system is designed to convey all wastewater to the El Estero WWTP, where the wastewater is treated and either distributed as recycled water or discharged to the Pacific Ocean through an ocean outfall.

In 2013 the City retained Water Systems Consulting (WSC) to develop an updated computer hydraulic model of the collection system. The key objectives of the project were to develop a model that:

- includes the entire collection system so that hydraulic capacity information would be available for all pipes (the City's previous hydraulic model had been skeletonized to include only the larger diameter pipes)
- was calibrated to observed flows throughout the collection system and at the El Estero WWTP
- could be used as a planning tool to identify potential hydraulic capacity constraints and evaluate potential capital improvements
- could be used as a management tool to quantify expected flows and evaluate "what-if" scenarios related to new discharges into the system or changes in flow routing
- could be maintained by City staff and updated as new information became available

This report is intended to document the development of the updated hydraulic model and provide a resource for City staff who will maintain the model. The report includes the following chapters:

1. Introduction
2. Modeling Software
3. Collection System Infrastructure
4. Flow Assignment
5. Model Calibration
6. System Analysis
7. Recommendations

2 MODELING SOFTWARE

Prior to this project, the City's most recent collection system hydraulic model had been developed to support the 2012 Wastewater Collection System Master Plan. That model was provided to WSC by the City and, since it had last been updated in 2012, is referred to in this report as the 2012 model.

The 2012 model was developed using H2OMap Sewer, a modeling software package marketed by Innovyze. Innovyze is one of the leading software providers for water and wastewater infrastructure modeling, and the City's potable water distribution model was also developed using an Innovyze product (H2OMap Water). In discussions with City staff it was determined that the City preferred to develop and maintain the updated model using Innovyze software. In addition to H2OMap Sewer, Innovyze offers additional modeling platforms for wastewater collection systems. These packages are summarized in Table 1.

Table 1. Innovyze Collection System Modeling Platforms

Name	User Interface	Calculation Engine for Hydraulic Simulations
H2OMap Sewer	Stand-alone	Innovyze "Sewer"
InfoSewer	ArcGIS	Innovyze "Sewer"
H2OMap SWMM	Stand-alone	SWMM
InfoSWMM	ArcGIS	SWMM
InfoWorks CS	Stand-alone	Wallingford

Innovyze provides extensive information about each of these packages on its web site (www.innovyze.com). For this project, the City expressed a preference for a software package that integrates well with its Geographic Information System (GIS) database. While all the packages can share information with a GIS database, the InfoSewer and InfoSWMM packages run as extensions within ArcGIS and allow the full use of GIS tools in model development and maintenance. The difference between InfoSewer and InfoSWMM lies in the hydraulic engine used for system analysis. The SWMM engine (originally based on the Storm Water Management Model) is categorized as a "fully-dynamic" engine because it solves the full Saint-Venant equations for dynamic flow conditions. The Innovyze Sewer hydraulic engine is categorized as a "semi-dynamic" engine that allows the simulation of varying flows through the collection system.

The Sewer engine was developed by Innovyze in 2000 as a simpler alternative to the SWMM engine. The Sewer engine uses a modified Muskingum Cunge solution instead of the full Saint-Venant equations, and it typically requires less effort for model development and model maintenance. InfoSWMM requires more effort to develop and calibrate a model, and in return it can provide more accurate simulation of special conditions such as backwater or surcharging. Maintaining an InfoSWMM model is likely to require more time and training for City staff than an InfoSewer model, with the potential benefit being a more accurate representation of high-flow events.

For the City, backwater effects are important to a certain extent. During major storm events, collection system operators restrict flow into the El Estero WWTP to about 34 million gallons per day (mgd) to protect the treatment process. Flow restriction allows wastewater to back into the collection system, often surcharging manholes. This backwater effect can impact the flow split at the manholes where two pipes flow out of the manhole. An InfoSWMM model would calculate the time-varying impact of backwater on this flow split. In an InfoSewer model, the modeler can assign a rating curve or a constant flow split percentage to allocate the flow between the two pipes leaving the manhole. By reviewing these flow split assumptions with City staff and comparing model results with observed flows, the team is still able to accurately estimate hydraulic conditions using an InfoSewer model.

Most of the City's future use of this model will be for relatively straight-forward analyses, such as modeling the impact of a new development or determining the bypass pumping requirement for a Capital Improvement Plan (CIP) project. An InfoSewer model would be well-suited for these tasks and would not require as much training and staff time for operating and maintaining the model as an InfoSWMM model. Based on the City's overall needs, WSC and the City elected to develop the new model in InfoSewer. If at some point in the future the City identifies a need for using the SWMM hydraulic engine, the InfoSewer model can be exported to InfoSWMM for additional analysis.

After selecting the InfoSewer platform, the team proceeded with development of the updated hydraulic model. The required input data was divided into two categories: an accurate representation of the collection system infrastructure; and a flow assignment process to assign wastewater flows around the collection system. The next two chapters address these areas.

3 COLLECTION SYSTEM INFRASTRUCTURE

The City maintains an inventory of its collection system in a GIS database. The GIS database includes data layers for sewer mains, laterals, lift stations, fittings, and structures (including manholes). The City continuously updates the GIS database as new infrastructure is installed or new information becomes available. WSC therefore used the GIS database as the primary source for infrastructure information. The 2012 model was used as an additional reference to provide supplemental information about diversion structures, pump stations, and other model-specific information.

The City provided a copy of the GIS database to WSC in December of 2013 for initial model development and provided an updated copy in May of 2014.

3.1 PIPES AND MANHOLES

WSC imported the Mains and Structures layers from the City's GIS database into a new InfoSewer model. Each main was assigned a Link ID using the City's atlas map numbering system (e.g., H10-74). Additional attributes that were imported from the GIS into the model include the material, length, diameter, and the upstream and downstream manholes (identified in the City's atlas number system, e.g., MH-D07-010). WSC also imported fields from the GIS that could be used to help develop the model network, such as the Type (Gravity or Force Main), the Status (Live or Abandoned) and the Owner (City, County, Private, Goleta, or Montecito). The model was developed to include only infrastructure owned by the City. Flows from areas outside the City are included in the model when necessary, but they were assigned at the first City-owned manhole on the downstream flow path.

The manhole structures were imported into the model as nodes and were identified with a Node ID in the City's atlas map numbering system, e.g. MH-D07-010. Additional attributes that were imported for each manhole included the rim elevation, invert elevation, and manhole depth.

In the hydraulic model, each pipe segment must have a manhole or other model node at the upstream and downstream end. WSC used model development tools within InfoSewer to construct the model network. During this process, WSC made adjustments and additions to the data that had come from the City's GIS. These changes included:

- Populating the upstream and downstream manhole identifier for some pipe segments that did not have those attributes populated in the GIS
- Reversing the direction of some pipe segments that had been drawn in a direction opposite of flow in the GIS
- Splitting some pipe segments into two separate segments at a point where a manhole had been added to the GIS
- Adding model nodes where the GIS showed two pipes meeting but no structure. These model nodes were assigned a special ID (starting with "XX") to identify them as model nodes that had been added to maintain network connectivity.

WSC maintained a log of these changes and provided the log to the City. City staff subsequently reviewed the log and made updates as appropriate to the GIS database to more closely align the GIS database and the model database.

There were some pipe segments in the GIS that did not have an identified manhole at the upstream end. For this project WSC did not include these segments in the model unless they were needed for network connectivity. These segments are typically at the upstream end of the system and carry relatively little flow. Leaving them out of the model will simplify the long-term maintenance of the model without affecting the City's ability to identify hydraulic capacity constraints.

Some manholes in the City's system have two pipes flowing out. InfoSewer allows the user to define a flow split at any location where two pipes leave a manhole. The City provided information about 24 locations where a plug is used to restrict flow in one direction. At these locations, the flow split definition was used to direct all flow down one pipe and restrict any flow from going down the pipe with the plug. At other flow split locations, the City has not specified whether flow is directed down one pipe or another. In these locations WSC used the model's capability to calculate a flow split definition based on the pipe slopes and elevations.

Initial roughness values were assigned to each pipeline. An initial value of 0.013 for Manning's roughness was entered for gravity pipelines. Although laboratory tests with newer pipe materials may yield lower roughness values, 0.013 is a typical value used for system analysis to account for offset joints, roots, debris, and other factors that may occur over the life of a sewer pipe. For force mains, an initial Hazen-Williams coefficient was assigned based on pipe material, using the values in Table 2.

Table 2. Hazen-Williams Coefficients for Force Mains

Pipe Material	Hazen-Williams Coefficient
CIP	100
DIP	120
HDPE	130
PVC	130
Steel	110

Manhole rim elevations were imported from the GIS database. For manholes that did not have a rim elevation in the GIS database, a rim elevation was estimated from the ground surface contour lines provided by the City. InfoSewer requires that each manhole have a diameter to be used during the hydraulic calculations. Most manholes in the City's GIS database do not have a diameter assigned. A default value of 4 feet was used to populate missing manhole diameters. Some manholes in the GIS database have a depth and invert elevation assigned; these values were imported into the model to help populate missing pipe invert elevations.

To calculate hydraulic capacity, InfoSewer uses an upstream and downstream invert elevation for each pipe. In the GIS database provided by the City, less than 30 percent of the sewer mains had an upstream invert elevation and downstream invert elevation populated. However, for some pipe segments it was possible to estimate an elevation by looking at the invert elevations associated with the connected manhole or by looking at pipe segments upstream and downstream. The GIS database also includes slopes for some pipe segments that could be used to calculate invert elevations. In addition, the 2012 model included invert elevations for some pipe segments. Elevations that were populated in this manner were flagged so that they can be distinguished from elevations imported directly from the GIS database.

For pipes that were missing invert elevations after other sources had been exhausted, elevations were interpolated by assuming a pipe slope that approximated the ground slope (as determined from the rim elevations populated using the ground contours provided by the City). These elevations were flagged in the model database as being assumed values. If necessary, the model results can be used to prioritize areas requiring additional record drawing research or field survey to verify invert elevations.

3.2 LIFT STATIONS

The City maintains a total of 11 wastewater pump stations. Three of these stations (Andante, Vista Elevada, and San Marcos) are in areas where the surrounding wastewater infrastructure is not owned by the City. Therefore, these three stations were not included in the hydraulic model. The flows from areas served by these facilities were routed downstream and added to the model at the first City-owned manhole.

The lift stations included in the hydraulic model are shown in Table 3. Information about the pumps and the wet well dimensions was obtained from the 2012 model and pump station information provided by the City. The City also provided run-time records from its Supervisory Control and Data Acquisition (SCADA) system for use in model development and calibration. The City's SCADA system records information at a total of nine pump stations: the seven collection system stations in Table 3, and the Andante and Vista Elevada pump stations (which were not included in the model because the surrounding infrastructure is not owned by the City).

Table 3. Modeled Lift Stations

Lift Station Name	Wet Well Bottom Elevation	Maximum Wet Well Level (ft)	Pump Number	Design Head (ft)	Design Flow (gpm)	On Level (ft)	Off Level (ft)
Braemar	3	17	1	180	1041	6	5
			2	180	1041	7	6
El Camino De La Luz	110	15.75	1	9	149	7	6
			2	9	149	9	8
El Estero WWTP	-11	6	Modeled as one fixed-capacity pump of 25,000 gpm				
La Colina	150.8	11	1	60	402	3	2
			2	60	418	4	3
Linda Road	143	15	1	18	98	6	5
			2	18	213	7	6
Skofield	780	9.5	1	150	250	4	3
			2	150	250	6	5
Tallant Road	182	8	1	17	43	4	3
			2	17	43	6	5
Via Lucero	163	13.5	1	60	400	7	6
			2	60	400	9	8

3.3 TRIBUTARY AREAS

As part of a flow monitoring study completed in 2003, the City divided its service area into basins. Each basin was tributary to a manhole that had been used for temporary flow monitoring. For the 2003 study, approximately 45 basins were defined, each labeled with an identifying code (ID) consisting of "SB" and a unique number.

For this project, WSC updated the basin boundaries. The boundaries were adjusted to more closely follow parcel boundaries. This adjustment meant that dry weather flows could be allocated to parcels, and the corresponding flows would be captured in the correct basin. WSC prepared maps of each basin showing the updated boundaries and held a review session with City operators to confirm the basin boundaries.

To more accurately assign flows, the updated basins were then sub-divided into sub-basins. WSC used tools in InfoSewer to generate Theissen polygons around each manhole to identify the tributary area for that manhole. Each sub-basin was identified by the manhole ID where the tributary flow was assigned to the model. A layer of approximately 5,800 sub-basins was defined that completely covered the service area. Each sub-basin retained the name and ID of its parent basin. In this way certain flow parameters (such as diurnal flow patterns or rainfall response factors) that applied to a basin could be easily applied to the sub-basins within that basin. WSC also calculated the tributary area for each sub-basin. That tributary area was assigned to the appropriate manhole for wet weather flow assignment. The total tributary area is approximately 11,000 acres.

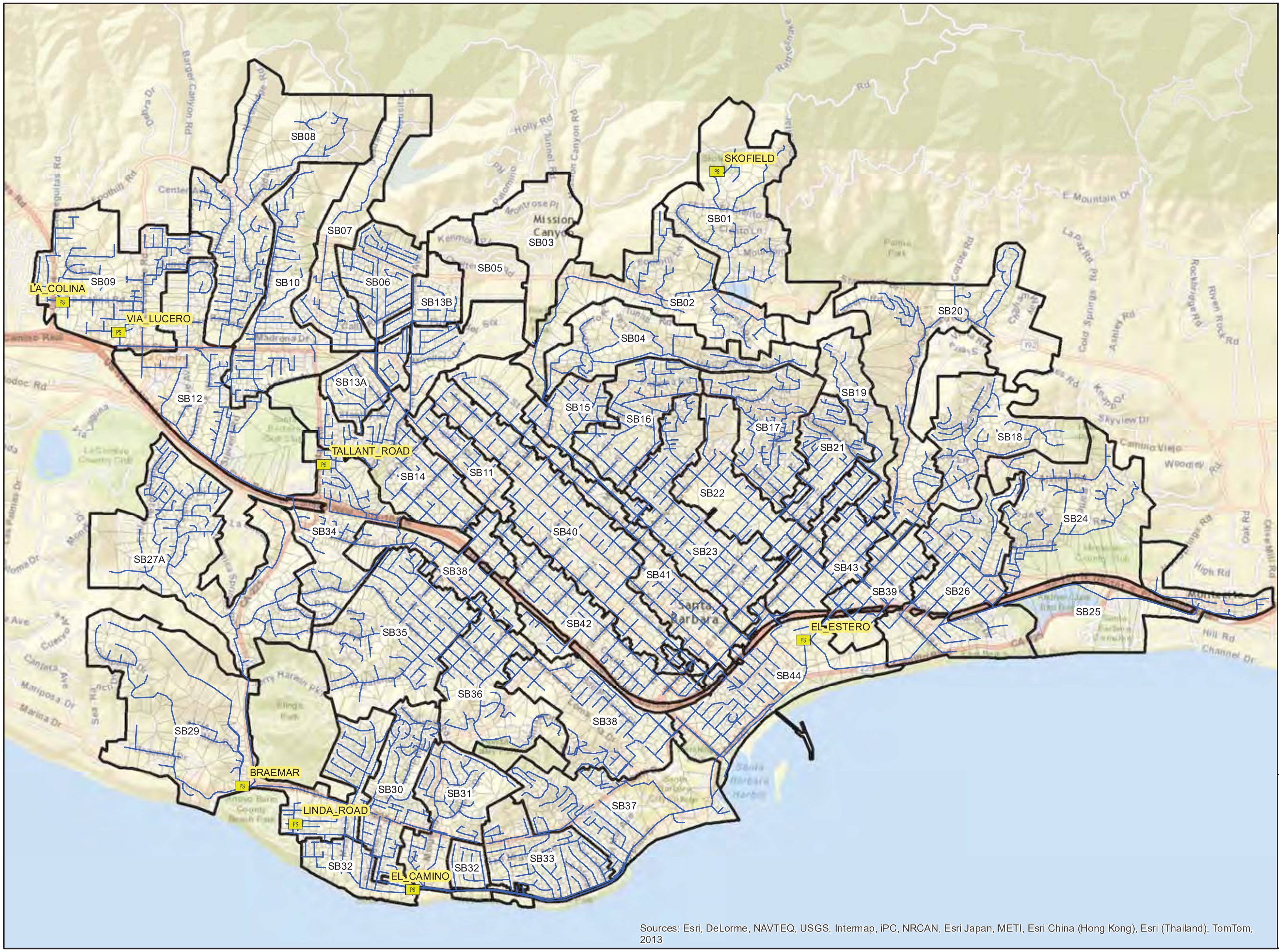
The tributary areas are shown in Figure 1. To assist the model review and calibration process, WSC developed an updated schematic view of how the basins are connected to the El Estero WWWTP. This schematic view is shown in Figure 2. The dotted line from basin SB22 to basin SB43 indicates the potential flow split at manhole H08-075, at the intersection of Quarantina Street and Haley Street.

A figure of the modeled collection system and the tributary areas is shown in Figure 3.

City of Santa Barbara

Wastewater Collection
System Hydraulic Model

Figure 1.
Tributary Areas



Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013

N
W E
S

0 1,000 2,000 4,000
Feet

Legend

PS	Model Pump Stations
—	Model Pipes - Existing
☐	Sub-Basins
▭	Basins

WSC
Water Systems Consulting, Inc.

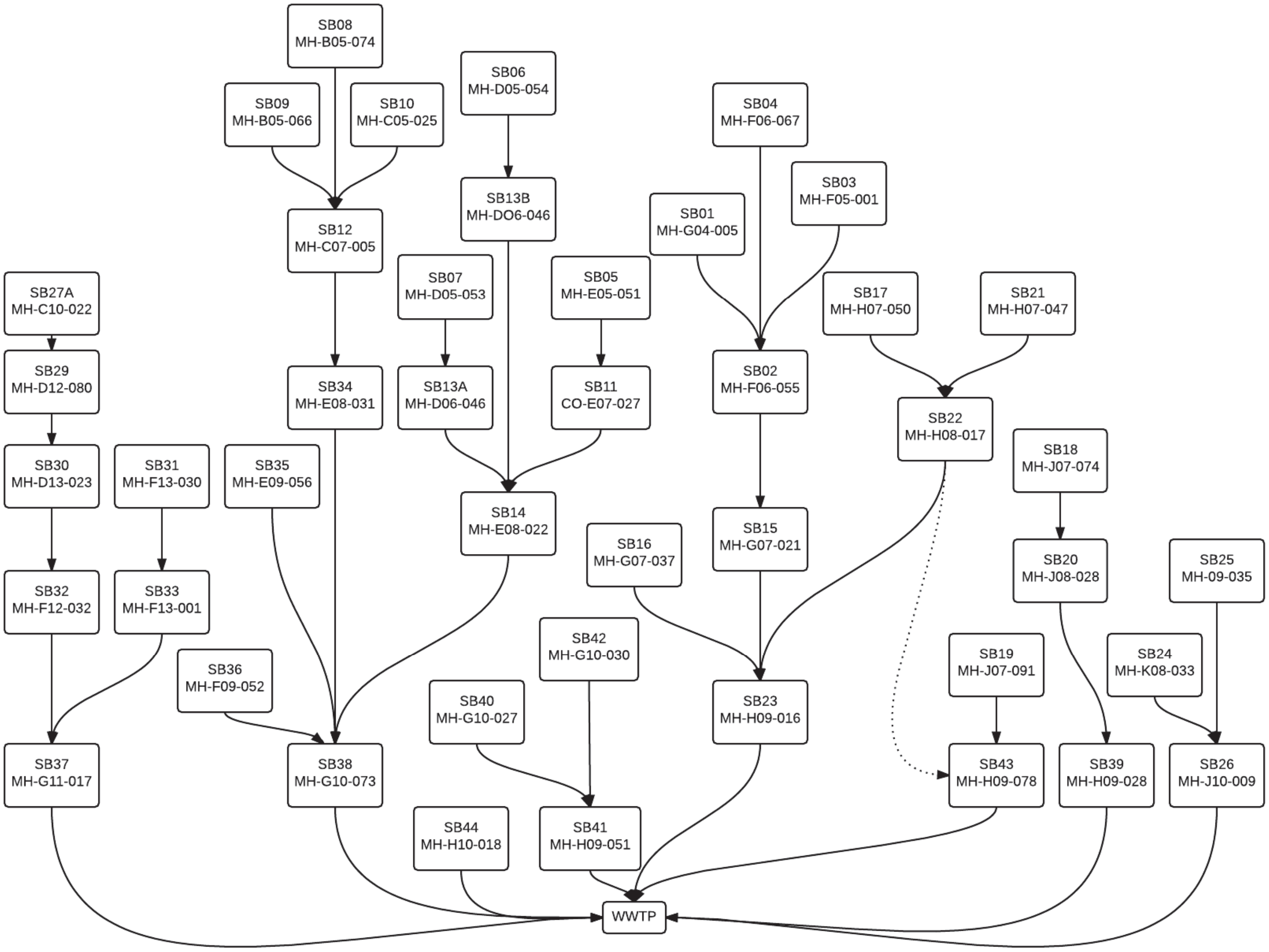
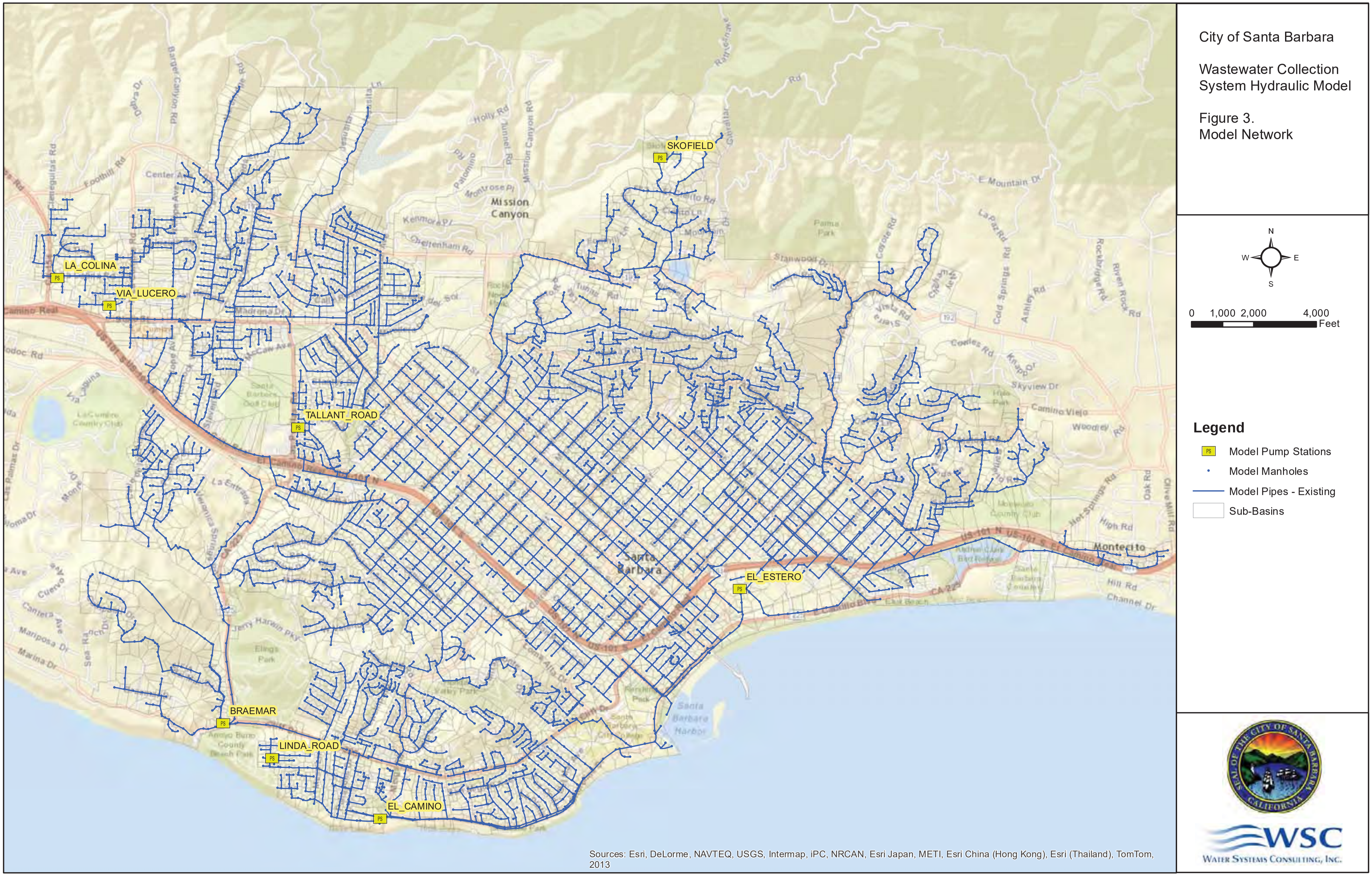


Figure 2. Basin Schematic

City of Santa Barbara

Wastewater Collection
System Hydraulic Model

Figure 3.
Model Network



Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013

WSC
Water Systems Consulting, Inc.

4 FLOW ASSIGNMENT

This chapter describes the process of adding wastewater flows to the InfoSewer model. The flow assignment is typically performed separately for dry weather conditions (representing sanitary wastewater flow from residential, industrial, and commercial customers) and wet weather conditions (which include rainfall-derived inflow and infiltration, or RDII, that makes its way into the collection system). For this project, the flow assignment was performed in three steps:

1. Current Dry Weather. Dry weather flows were assigned using two years of water consumption data and the observed record of dry weather flows coming to the El Estero WWTP.
2. Wet Weather. Wet weather flow parameters were assigned to each basin and then transferred to each sub-basin.
3. Future Development. Information about areas of future development was used to estimate the additional flow expected to occur due to new development.

4.1 CURRENT DRY WEATHER FLOWS

To develop current dry weather flows, WSC used water consumption records to estimate average wastewater production throughout the system. WSC then assigned diurnal patterns to each load to simulate the variation in flow during a 24-hour period.

4.1.1 Average Sanitary Flow

The City's wastewater system receives flow from more than 24,000 customer connections, and the wastewater flow from individual customers is typically not metered. However, the City maintains meters for its water customers that record monthly consumption. Since a significant portion of water use eventually becomes wastewater flow, metered water consumption can be used to geographically allocate wastewater production around the collection system and assign it to the hydraulic model.

The City provided water consumption records for the purpose of estimating wastewater production. The water consumption data included monthly consumption in hundred cubic feet (HCF) for each account for two fiscal years (FY), from July 2011 through June 2013. Data were provided for a total of 27,110 accounts. The total consumption is shown in Figure 4.

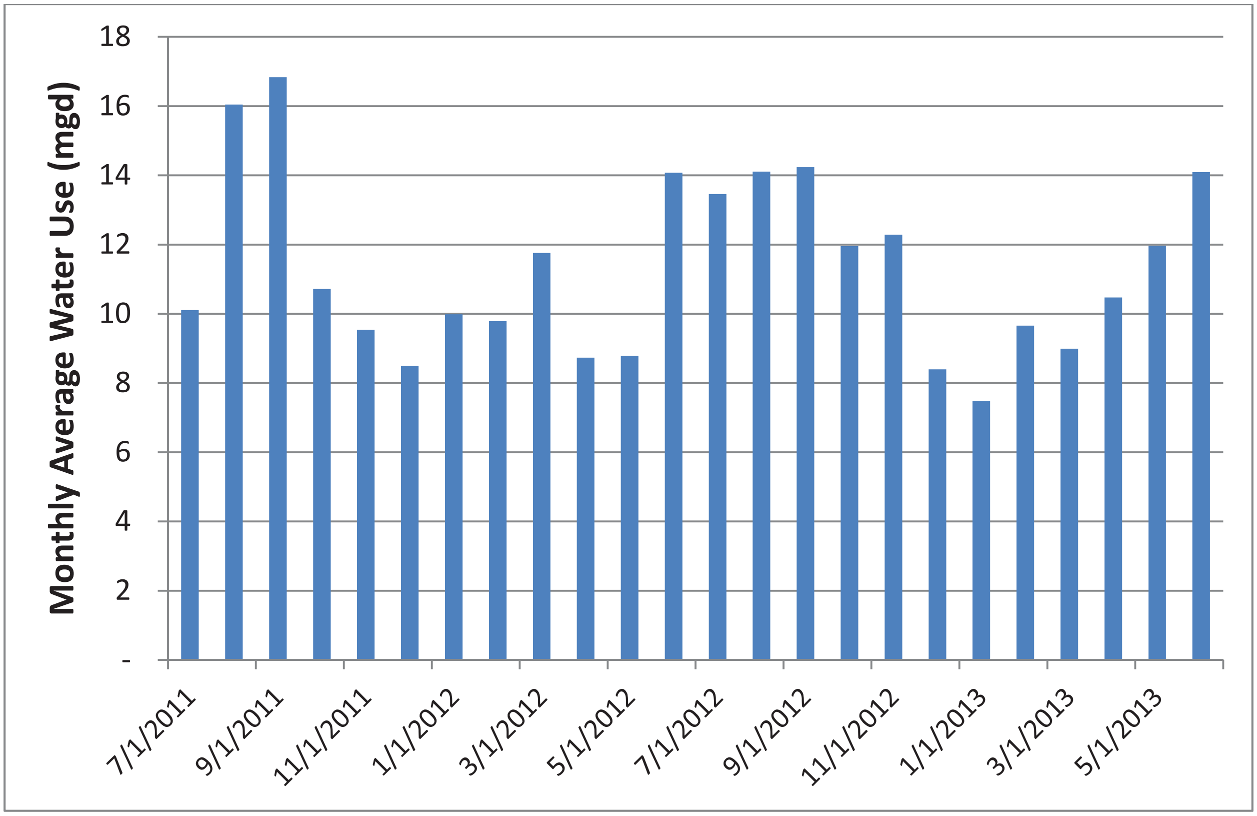


Figure 4. Monthly Average Water Use for FY 2012 & FY 2013

The consumption data included the number of residential dwelling units and an assessor parcel number (APN) for each billed account. WSC used the APN to link each billing account to a parcel and land use category. WSC matched 26,806 out of 27,111, or 99%, of billed accounts to a parcel based on APN. The remaining accounts that could not be matched to a parcel accounted for 0.28% and 0.55% of total water use in FY12 and FY 13 respectively. This level of matching was considered accurate enough for loading the sewer model.

Winter water use is typically more closely related to sanitary wastewater flow than summer water use, which can include a significant outdoor use component. WSC reviewed the monthly consumption data, rainfall data, and influent flow data to the El Estero WWTP and selected the period from December through February to represent indoor water use. The average winter water use during FY 2012 and FY 2013 was 8.99 million gallons per day (mgd) for all accounts.

Not all of the water accounts in the consumption database are expected to contribute wastewater flow. Each of the accounts is identified with a Water Code, and some of the accounts have a Water Code that identifies them as irrigation use or as recycled water (which is used for irrigation). The water consumption for these accounts was assumed to not contribute to wastewater flow. The winter water use for the remaining accounts was 8.51 mgd.

The parcels can be used to associate the water use and expected wastewater flow with a geographic location, and the InfoSewer flow allocation tools can be used to assign the flow to a wastewater pipeline. Therefore, the centroid of each parcel is proposed as a geographic location for allocating flow to the collection system. The estimated wastewater flow from each connected parcel would then be assigned to the closest sewer pipe in the model.

The consumption from the remaining accounts was then assigned to a geographic location. Using the APN, each account could be linked to a parcel in the City's GIS layer of parcels. Since each water consumption point was associated with a parcel, WSC used the centroid of each parcel as the sanitary flow contribution point. If multiple water meters were associated with a parcel, the consumption was aggregated at the parcel centroid. WSC then exported these parcel centroids to be used as a GIS layer of sanitary flow contribution points. Each flow contribution point retained key attributes including the APN and the winter water use expected to lead to wastewater flow. Each load point was also assigned a land use category, based on the land use of the underlying parcel.

Although each of these parcels receives water from the City, some of them have a septic tank and are not connected to the sewer system. The City provided a spreadsheet that had been prepared during the 2012 Master Plan that identified parcels connected to a septic tank. This information was joined to the sewer load point layer, using the APN. A total of 774 load points were located on parcels with a septic tank. For the existing flow analysis, the flow from these load points was assumed to not reach the El Estero WWTP. The winter water use from the septic parcels was 0.24 mgd. When this flow was excluded from the 8.51 mgd of winter water use, the remaining winter water use was 8.27 mgd. For the ultimate future system analysis, the team will be able to model the impact of connecting these parcels to the sewer system.

In order to characterize the flow that reaches the El Estero WWTP, the City provided four years of daily values for influent flow at the plant. The data provided by the City included the daily average confluent flow, the daily maximum confluent flow, and an adjusted influent value based on observed effluent flows and recycled water production. These data are shown in Figure 5.

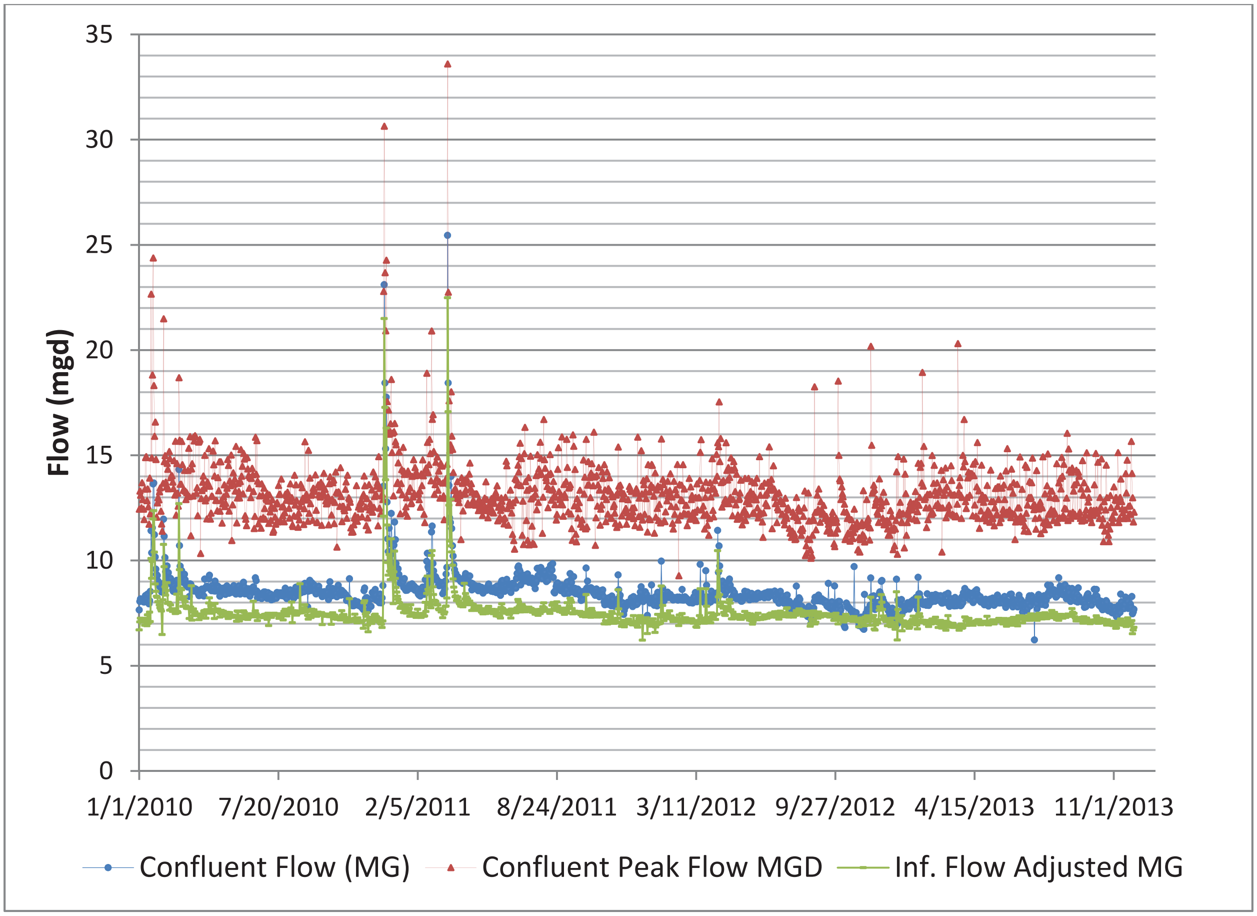


Figure 5. Flows to El Estero WWTP, 2010 - 2013

The confluent flow includes flows recycled from within the WWTP and is higher than the influent from the collection system. Therefore, the adjusted influent values were used for this analysis. The adjusted influent values are shown by calendar year in Figure 6.

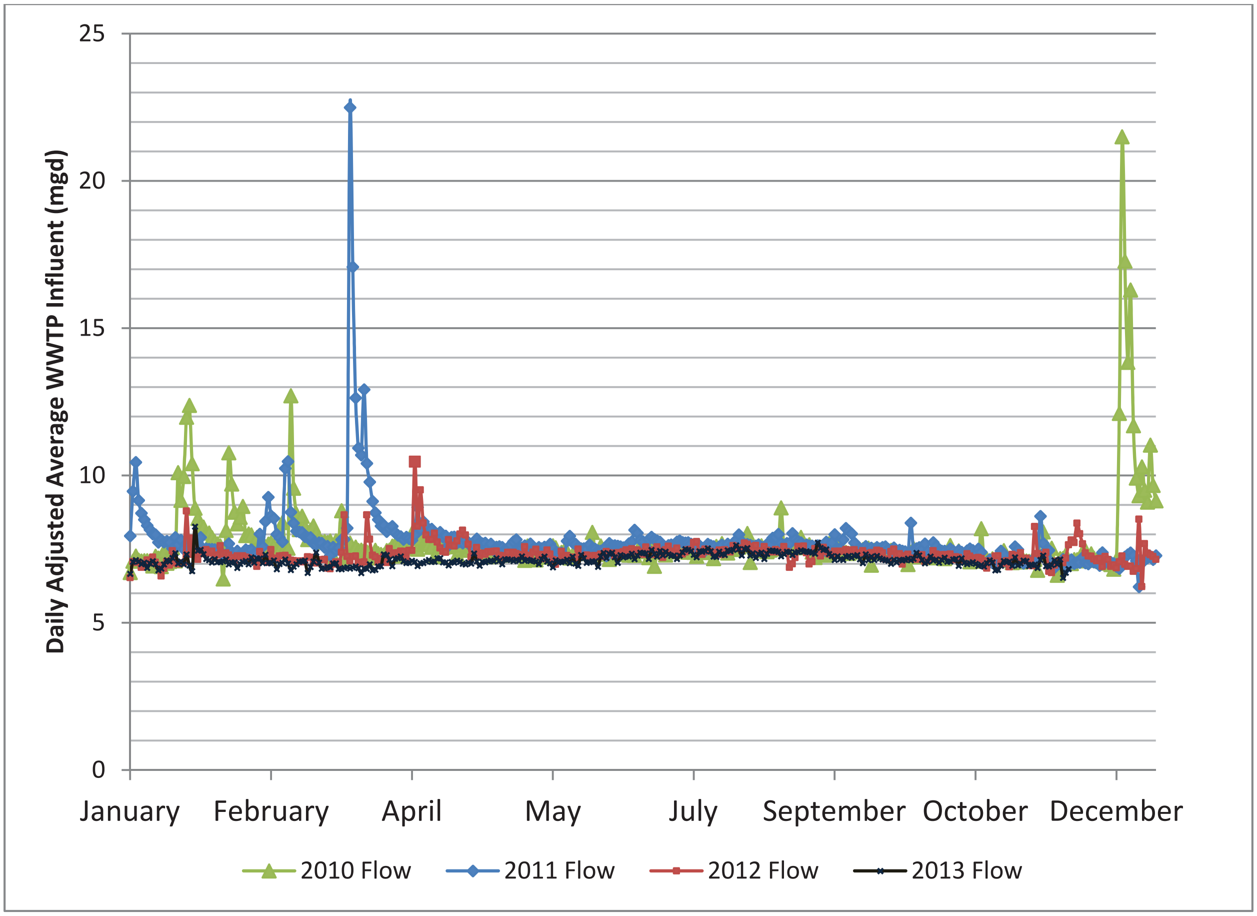


Figure 6. El Estero Adjusted Influent Flows 2010 - 2013

The data show that the minimum flows to the WWTP are typically close to 7 mgd. This value was considered representative of sanitary flow with little or no RDII. The value of 7 mgd represents 85 percent of the 8.27 mgd of connected winter water use identified from the water consumption data. On average, approximately 85 percent of winter water use at accounts connected to the sewer becomes wastewater flow.

While the system-wide average was calculated as 85 percent, the relationship between water use and wastewater production typically varies by land use category. The parcel data provided by the City included an assigned land use category for each parcel, with a total of 78 different land use categories. For this analysis each of the 78 categories was assigned to one of six consolidated categories. The relationship between the specific land use categories and the consolidated categories is shown in Table 4.

Table 4. Land Use Categories and Consolidated Categories

Consolidated Category	Land Use Categories		
Single-Family Residential	MOBILE HOME PARKS	MOBILE HOMES	RANCHO ESTATES (RURAL HOME SITES)
	SINGLE FAMILY RESIDENCE		
Multi-Family Residential	APARTMENTS, 5 OR MORE UNITS	BED AND BREAKFAST	CONDOS,COMMUNITY APT PROJS
	HOTELS	MIXED USE-COMMERCIAL/RESIDENTIAL	RESIDENTIAL INCOME, 2-4 UNITS
	REST HOMES		
Commercial	AUTO SALES, REPAIR, STORAGE, CAR WASH, ETC	BANKS, S&LS	BOWLING ALLEYS
	COMMERCIAL (MISC)	COMMERCIAL AND OFFICE CONDOS,PUDS	DEPARTMENT STORES
	DRIVE-IN THEATRES	OFFICE BUILDINGS, MULTI-STORY	OFFICE BUILDINGS, SINGLE STORY
	OTHER FOOD PROCESSING, BAKERIES	PROFESSIONAL BUILDINGS	RESTAURANTS,BARS
	RETAIL STORES, SINGLE STORY	SERVICE STATIONS	SHOPPING CENTERS (NEIGHBORHOOD)
	SHOPPING CENTERS (REGIONAL)	STORE AND OFFICE COMBINATION	SUPERMARKETS
	WHOLESALE LAUNDRY		
Industrial	HEAVY INDUSTRY	INDUSTRIAL CONDOS,PUDS	INDUSTRIAL, MISC
	LIGHT MANUFACTURING	LUMBER YARDS, MILLS	MINERAL PROCESSING
	OPEN STORAGE, BULK PLANT	PACKING PLANTS	WAREHOUSING
Institutional	AUDITORIUMS, STADIUMS	CHURCHES, RECTORY	CLUBS, LODGE HALLS
	COLLEGES	DANCE HALLS	DAY CARE
	HOSPITALS	INSTITUTIONAL (MISC)	MISCELLANEOUS
	MORTUARIES,CEMETERIES, MAUSOLEUMS	PUBLIC BLDGS, FIREHOUSES,MUSEUMS, POST OFFICES,ETC	SCHOOLS
	UTILITY,WATER COMPANY		
Open Space	BEACHES, SAND DUNES	DRY FARMS (MISC)	FIELD CROPS-IRRIGATED
	GOLF COURSES	HIGHWAYS AND STREETS	HORSES
	IRRIGATED FARMS, MISC	NURSERIES,GREENHOUSES	ORCHARDS
	ORCHARDS, IRRIGATED	PARKS	PARKING LOTS
	PASTURE OF GRAZING, DRY	PASTURE-IRRIGATED	PIPELINES,CANALS
	RACE TRACKS, RIDING STABLES	RECREATION	RECREATIONAL OPEN (MISC)
	RIGHTS OF WAY,SEWER,LAND FILLS,ETC	RIVERS AND LAKES	TREE FARMS
	VACANT	VINES AND BUSH FRUIT-IRRIGATED	WASTE
	WATER RIGHTS,PUMPS		

For each consolidated category, WSC estimated a water-to-sewer factor to represent the portion of winter water use that becomes wastewater flow. These values were adjusted so that the system-wide estimate of wastewater generation equaled approximately 7 mgd. After the initial model development, WSC compared the dry-weather flow model results to the measured values at each flow monitoring location. The review showed that in the northern and eastern parts of the service area, the model was predicting higher flows than were measured during the flow monitoring studies. These areas have a large number of single-family residences, with parcel sizes larger than the average for the service area. It appears that in these areas, some water is used for landscape irrigation even during the winter months. Therefore, estimating wastewater production strictly as a percentage of water use was generating flows higher than observed.

WSC elected to place a cap on the wastewater production from single family residential accounts. The wastewater production from single family residential accounts was assumed to be 95 percent of winter water use, with a maximum wastewater production of 300 gallons per day (gpd). For all other land use categories, a cap was not used; wastewater production was assumed to be a percentage of winter water use, with no maximum. The water to sewer factors are shown in Table 5.

Table 5. Water to Sewer Factors

Consolidated Category	Wastewater Flow : Water Demand	Maximum Wastewater Production (gpd)
Single Family Residential	95%	300
Multiple Family Residential	95%	N/A
Commercial	90%	N/A
Industrial	95%	N/A
Institutional	90%	N/A
Open Space	10%	N/A

As an additional source of information for estimating flows, the City provided information about industrial dischargers to the collection system. The City provided information including the discharger's name, address, and average flow rate. At least some of the flow from these facilities is likely already included in the flow estimates that were calculated based on water use, unless they have another source of water than a City water meter. For each parcel, WSC identified the flow contribution already being calculated from the winter water use. This amount was subtracted from the estimated total industrial flow, and the remaining amount was assigned as a point load. The information for industrial point loads is summarized in Table 6.

An additional sanitary point load was created to represent a portion of the Montecito Sanitary District that drains into the City's system along Sycamore Canyon Road. The City provided a count of 163 single-family residences that contribute flow at this point. To estimate the sanitary point load, WSC multiplied the single family residential cap of 300 gpd by 163 units for an estimate of 49,000 gpd.

Table 6. Sanitary Point Loads

Name	Location	Parcel	Average Flow (gpd)	Flow Estimate from Winter Water use (gpd)	Additional Load Assigned (gpd)	Load Manhole
Mission Linen #1	712 E Montecito Street	017-041-002	50,000	30,000	20,000	MH-H08-062
Mission Linen #4	725 E. Montecito Street	017-041-002	18,500	0	18,500	MH-H08-062
Ortega Groundwater Treatment Plant	220 E. Ortega Street	031-152-033	32,000	8	32,000	MH-G08-017
Cottage Hospital	400 W. Pueblo Street	025-100-001	101,500	25,000	76,500	MH-E07-076
MarBorg Industries, Inc.	23 N. Quarantina Street	017-030-006	12,000	1,200	10,800	MH-J09-015
Harbor Marineworks	122 Harbor Way	045-250-011	200	1,400	0	MH-G12-004
Montecito Sanitary District	2000 Sycamore Canyon Road	Multiple	49,000	0	49,000	MH-K05-003

With the addition of these sanitary point loads, the total dry weather flow assigned to the system was approximately 7.1 mgd.

4.1.2 Diurnal Patterns

The updated model is capable of running in extended period simulation mode to simulate the time-varying flow at various points in the collection system. Diurnal patterns can be used to simulate the variation in flow over the course of a typical 24-hour period. The 2012 Master Plan included a series of diurnal patterns to approximate the diurnal variation of wastewater production during a typical 24-hour period. A separate diurnal pattern was developed for each flow monitoring basin and calibrated to the observed flows in that basin.

WSC assigned these diurnal patterns to the sub-basins in the updated model. The patterns are included in the Appendix to show the variation in expected diurnal patterns across the system.

4.2 WET WEATHER FLOW

Like many collection systems, the City's system experiences elevated flows during storm events. These elevated flows are typically the critical condition for analyzing hydraulic capacity in the collection system.

For the updated model, WSC entered a set of rainfall events into the InfoSewer model. These events included observed storms and a 24-hour design storm. WSC then developed a set of response factors for each basin that characterized how rainfall turns into RDII.

4.2.1 Response Factors

InfoSewer offers a variety of methods for assigning response factors to simulate the process of rainfall becoming wet-weather sewer flow. For this project the team developed sets of response factors for each basin using the three-triangle R-T-K method. This method involves creating a synthetic unit hydrograph based on the summation of three triangles. Each triangle is defined by three variables:

- R is the percentage of rainfall that becomes RDII
- T is the time from when the rain falls to the peak of the RDII
- K is a lag coefficient that describes how long RDII continues to enter the system. The time from the peak RDII until the end of the RDII is equal to K * T

An illustration of a synthetic unit hydrograph derived from three triangles is shown in Figure 7.

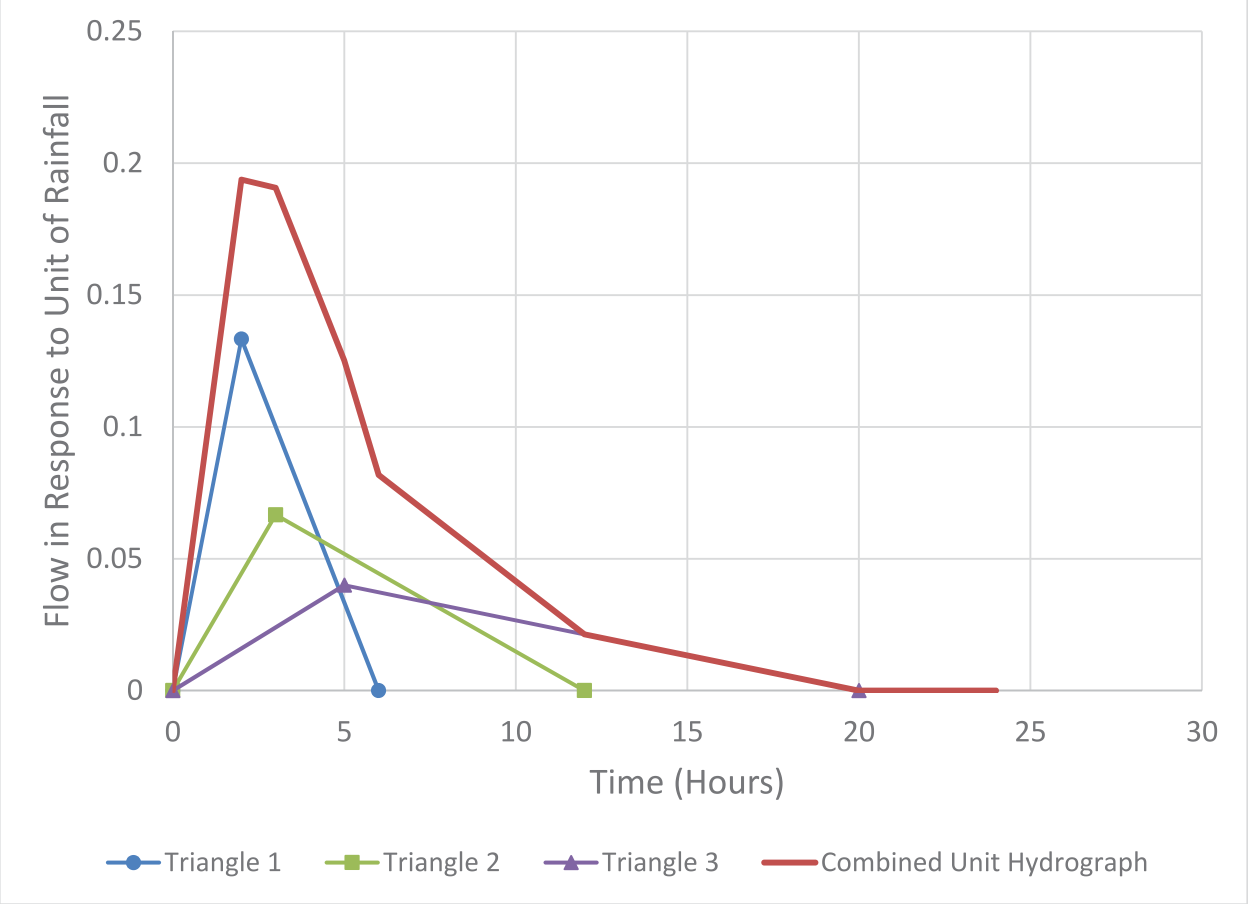


Figure 7. Example Synthetic Unit Hydrograph Using R-T-K Triangles

The unit hydrograph is used to simulate the response to a unit (one inch) of rainfall.

For each of the three triangles, T is the time in hours till the peak of the triangle; the recession limb of the triangle has a duration of K * T; and the area under the triangle is R. With three factors (R, T, and K) for each of three triangles, a total of nine factors define a set of response factors.

In InfoSewer, the factors are defined such that Rtotal is the percent of rainfall that becomes RDII, R1 is the portion of that RDII associated with the first triangle, and R2 is the portion associated with the second triangle. The value for R3 is then calculated by the software as the remaining portion of Rtotal.

For this project, the initial set of response factors was taken from the 2012 Master Plan. WSC then adjusted the response factors for each basin to make the updated model results better match the observed flow data. The updated response factors are shown in Table 7.

Table 7. Wet Weather Response Factors

Basin	Rtotal	R1	R2	T1	T2	T3	K1	K2	K3
SB01	0.3	30	40	2	4	5	1	3	4
SB02	1	50	20	2	4	6	2	2	2
SB03	0.4	60	20	2	3	4	2	2	2
SB04	1	40	40	2	3	4	1	1	1
SB05	1	80	15	3	6	8	2	3	4
SB06	1	80	15	3	6	8	2	3	4
SB07	0.5	80	10	1	2	4	1	2	2
SB08	0.5	50	20	2	3	4	1	2	3
SB09	1	40	25	3	6	8	1	2	3
SB10	0.8	50	30	1	4	8	2	4	4
SB11	2	80	20	2	3	4	3	4	4
SB12	0.3	50	50	3	6	8	1	8	4
SB13A	1	40	60	2	6	8	2	5	4
SB13B	2	80	20	1	2	3	1	1	1
SB14	0.5	20	30	1	6	8	1	2	2
SB15	1.3	60	10	4	8	9	2	3	4
SB16	2.5	80	20	1	2	3	1	1	1
SB17	1.2	50	30	1	2	4	2	2	2
SB18	0.4	60	20	2	5	8	2	3	4
SB19	1	70	5	3	5	8	2	3	4
SB20	1.2	90	10	2	6	8	2	2	2
SB21	1	20	70	1	8	9	2	3	4
SB22	1.4	50	20	2	3	4	2	2	2
SB23	3	80	20	1	2	3	1	1	1
SB24	1.2	50	30	3	4	5	1	2	2
SB25	0.3	20	20	2	4	5	1	1	1
SB26	1.5	50	40	1	3	5	1	1	1
SB27A	0.3	20	20	3	4	5	2	3	4
SB29	0.4	20	30	2	4	6	2	2	2
SB30	1	70	10	3	4	8	2	3	4
SB31	0.6	40	20	2	5	8	2	3	3
SB32	1	80	15	3	6	8	2	3	4
SB33	0.6	50	20	2	4	6	2	2	2
SB34	1	90	10	1	5	8	2	3	4
SB35	1	90	10	3	6	8	2	4	4
SB36	1.4	50	20	2	3	4	2	1	1
SB37	0.36	80	15	3	6	8	2	3	4
SB38	1	80	15	3	6	8	2	3	4
SB39	2	60	20	1	3	5	1	1	1

Basin	Rtotal	R1	R2	T1	T2	T3	K1	K2	K3
SB40	1.4	50	30	1	3	4	1	2	2
SB41	0.3	10	85	1	7	8	2	3	4
SB42	0.7	40	30	1	3	5	1	1	1
SB43	1.5	60	30	1	2	4	1	2	2
SB44	2	70	15	1	3	5	1	1	1

4.3 FUTURE DEVELOPMENT

The City's primary planning document for future changes in land use is the General Plan adopted in December 2011. The General Plan identifies anticipated growth throughout the City, and the 2012 Master Plan included flow estimates that had been prepared using the December 2011 General Plan and its Environmental Impact Report (EIR). This General Plan is still the most current planning document that can be referenced to define future growth patterns.

As part of the 2012 Master Plan, a detailed evaluation was made of parcels with the potential for growth. This information was captured in a series of GIS shapefiles, which the City provided to WSC for this project. These shapefiles identified specific parcels with growth potential and estimated the net increase in single family dwelling units, multi-family dwelling units, and non-residential square footage on each parcel. WSC compiled these shapefiles and aggregated the expected increase in development by APN.

This summation identified a total of 938 additional single family dwelling units, 7,567 multi-family residential units, and 3,162,531 square feet of non-residential development. At each parcel with expected development, an increase in wastewater production was estimated using the factors in Table 8. The factors in Table 8 were originally developed in the 2012 Master Plan; WSC reviewed them and verified that they were consistent with the updated flow assignment process.

Table 8. Additional Sanitary Flow Expected from Future Development

Land Use Type	Total Units of Development	Wastewater Flow Factor	Sanitary Flow (mgd)
Single Family Residential	938 dwelling units	280 gpd per dwelling unit	0.26
Multiple Family Residential	7,567 dwelling units	150 gpd per dwelling unit	1.14
Non-Residential Development	3,162,531 square feet	0.1 gpd per square foot	0.32
Total Additional Flow			1.72

The diurnal variation of flows from future development was assumed to follow the same pattern as similar areas of existing development.

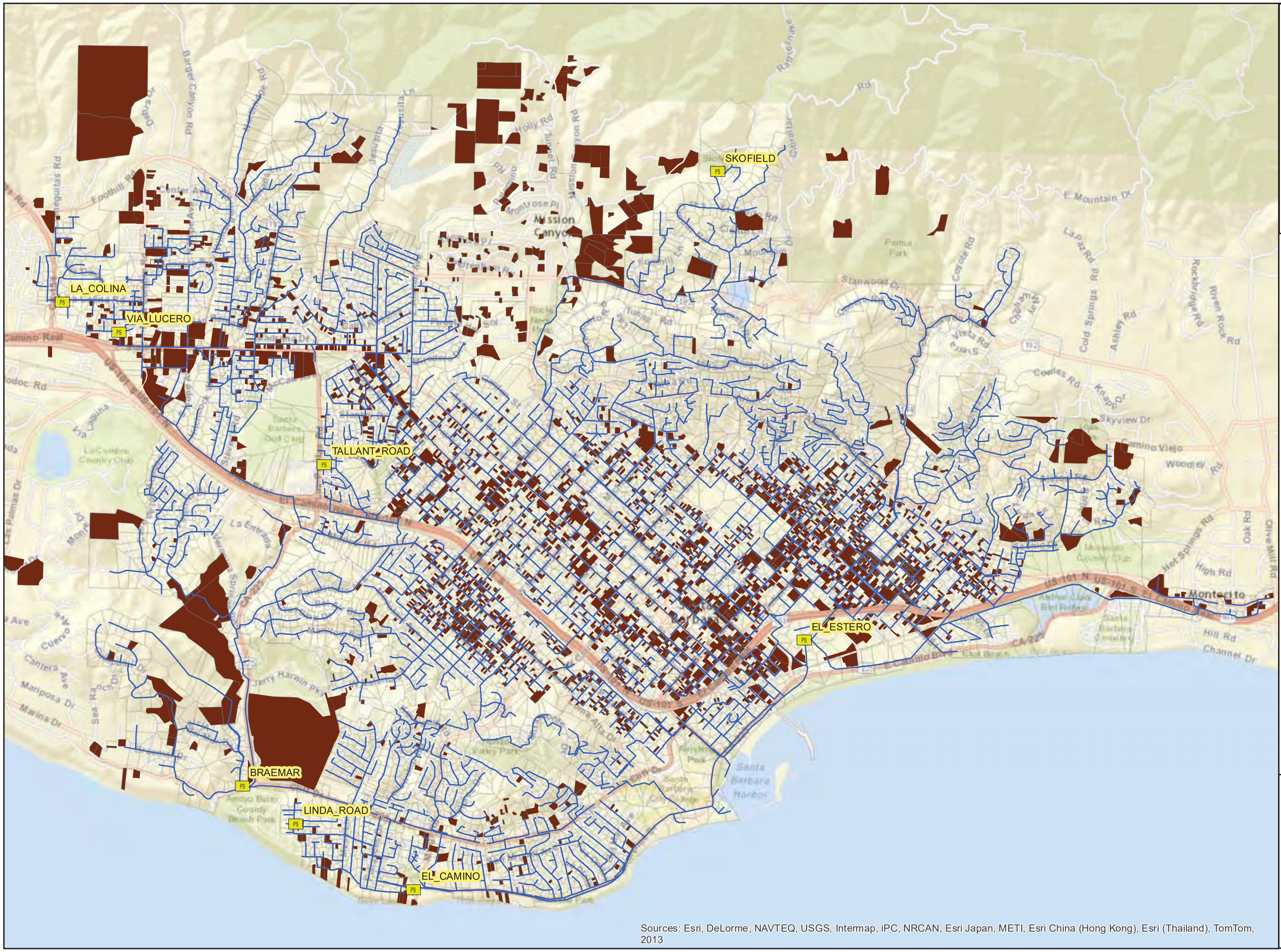
Because the shapefiles provided by the City identified the parcels with growth potential, WSC was able to assign the future flow components to a specific parcel. The parcel centroids were then used to create flow assignment points for the future sanitary flows. The parcels with additional flow from future development are shown in Figure 8. The flow assignment points within these parcels were intersected with the tributary sub-basins to aggregate flow at each manhole. In the Mission Canyon area, if parcels with additional future flow fell within the tributary sub-basin, the additional flow would be added to the model at the first downstream City-owned manhole.

WSC used a Microsoft Access database to organize the flow assignment information and aggregate the current and future flow contributions by parcel. This database has links to the parcel data, the water consumption data, and the shapefiles of future development provided by the City. The database also has a table of water-to-sewer factors, an identification of the parcels that are currently served by septic systems, and the relationship between specific land use categories and consolidated land use categories shown in Table 4. This database can be used and updated by the City to refine the flow assignment process as needed when new data become available.

City of Santa Barbara

Wastewater Collection
System Hydraulic Model

Figure 8.
Areas Expected to
Contribute Additional
Flow from New
Development



Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013

N
W E
S

0 1,000 2,000 4,000
Feet

Legend

- PS Model Pump Stations
- — Model Pipes - Existing
- ■ Parcels with Additional Flow
- ☐ Sub-Basins

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5 MODEL CALIBRATION

During the model calibration phase, the calculated model results are compared to observed system data to evaluate how well the model results reflect actual system conditions. The modeling team can then make adjustments to the input parameters and assumption in the model to make the results better match the field observations. For this project, the available field observations consisted primarily of flow measurements recorded at temporary flow meters. These field observations were gathered from previous flow monitoring studies and compared to the model-predicted flows at the meter locations. The flow assignment parameters were then adjusted so that the model results agreed more closely with the field observations.

Most of the available flow monitoring data were collected during a study performed in 2002 and 2003. At that time the average dry weather flow to the El Estero WWTP was approximately 8.5 mgd. Since that time, there has been a limited amount of new development and redevelopment in the service area. There have also been changes in water use patterns due to water conservation efforts and other factors. For this project, based on review of recent data, the dry weather flow to the El Estero WWTP was estimated as 7 mgd. On a system-wide basis, this would equate to an 18 percent decrease in flows from the 2002-2003 monitoring period. The team did not have information about what parts of the collection system may have experienced more or less significant reductions in flows from 2003 to current conditions. Therefore, for this project, the current model results were compared to the available flow monitoring data, with the understanding that current flows to the El Estero WWTP are 18 percent lower than they were at the time most of the flow monitoring data were collected.

5.1 DATA SOURCES

The City provided a number of data sets that could be used for model calibration. These included the data from 2002 and 2003 that was used for the 2012 Master Plan, as well as several more recent studies. These studies are summarized in Table 9.

Table 9. Data Sets Provided for Calibration

Data Source or Study	Time Period	Number of Sites	Major Rain Events	Notes
2002 – 2003 ADS	December 2002 – March 2003	44	3/15/2003	
2009 – 2010	December 2009 – March 2010	5	None	Sites within Basin SB15
2010 – 2011	December 2010 – March 2011	6	12/19/2010; 3/20/2011	Sites within Basin SB21
2011	March 2011	1	3/20/2011	Hourly data for confluent and effluent at El Estero WWTP
2011 – 2012	December 2011 – March 2012	6	None	Sites within Basin SB16
2012 – 2013	December 2012 – March 2013	12	None	5 sites within Basin SB20 plus an additional 7 sites
2013 US^3	August 2013	13	None	10 days of dry weather flow
2013 SCADA	January 2013 – December 2013	9 lift stations	None	Continuous data for pump status (on or off) and wet well level
2014	June 2014	1	None	Hourly data for confluent and effluent at El Estero WWTP

The City is finalizing the installation of four permanent flow meters at the downstream end of the four major trunk lines leading to the El Estero WWTP. These meters are expected to provide additional data for model calibration. At the time of this report, those meters were not yet producing data considered to be reliable by the City. When reliable data become available, the model can be used to generate predicted hydrographs at the locations where permanent meters have been installed, and the calibration process can be updated if necessary.

5.2 AVERAGE DRY WEATHER FLOW

The process of assigning dry weather flows to the model was described in Chapter 3. Briefly, WSC used winter water use to estimate wastewater production at each parcel. The modeled and observed flows at each flow monitoring location are shown in Table 10.

The ratios of modeled to observed flows are shown for the flow basins in Figure 9.

Table 10. Model-Predicted and Observed Dry Weather Flows

Meter ID	Pipe ID	Flow Study	Start Date	End Date	Measured ADWF (mgd)	Model ADWF (mgd)	Model % of Observed
SB01	G4-4	2003 ADS	12/15/2002	3/23/2003	0.028	0.036	129%
SB02	F6-198	2003 ADS	12/15/2002	3/23/2003	0.227	0.196	86%
SB03	F5-29	2003 ADS	12/15/2002	3/23/2003	0.063	0.063	100%
SB04	F5-93	2003 ADS	12/15/2002	3/23/2003	0.054	0.052	96%
SB05	E5-89	2003 ADS	12/15/2002	3/23/2003	0.043	0.057	133%
SB06	D5-99	2003 ADS	12/15/2002	3/23/2003	0.084	0.099	118%
SB07	D5-34	2003 ADS	12/15/2002	3/23/2003	0.104	0.067	64%
SB08	C5-29	2003 ADS	12/15/2002	3/23/2003	0.133	0.17	128%
SB09	B5-63	2003 ADS	12/15/2002	3/23/2003	0.302	0.303	100%
SB10	C5-52	2003 ADS	12/15/2002	3/23/2003	0.214	0.205	96%
SB11	E7-59	2003 ADS	12/15/2002	3/23/2003	0.223	0.124	56%
SB12	C7-2	2003 ADS	12/15/2002	3/23/2003	0.778	0.847	109%
SB13A	D6-46	2003 ADS	12/15/2002	3/23/2003	0.108	0.192	178%
SB13B	D5-20	2003 ADS	12/15/2002	3/23/2003	0.088	0.122	139%
SB14	E7-134	2003 ADS	12/15/2002	3/23/2003	0.849	0.905	107%
SB15	G7-36	2003 ADS	12/15/2002	3/23/2003	0.452	0.429	95%
SB15-1	F6-135	2009-2010	12/1/2009	4/1/2010	0.017	0.01	60%
SB15-2	F6-126	2009-2010	12/1/2009	4/1/2010	0.049	0.048	98%
SB15-3	F6-174	2009-2010	12/1/2009	4/1/2010	0.293	0.2	68%
SB15-4	F6-198	2009-2010	12/1/2009	4/1/2010	0.290	0.196	68%
SB15-5	G7-38	2009-2010	12/1/2009	4/1/2010	0.372	0.278	75%
SB16	F7-110	2003 ADS	12/15/2002	3/23/2003	0.179	0.124	69%
SB16-1	F6-160	2011-2012	11/29/2011	4/1/2012	0.046	0.031	67%
SB16-2	G7-132	2011-2012	11/29/2011	4/1/2012	0.069	0.056	81%
SB16-3	G7-128	2011-2012	11/30/2011	4/1/2012	0.026	0.016	62%
SB16-4	F6-143	2011-2012	11/29/2011	4/1/2012	0.021	0.013	62%
SB16-5	G5-2	2011-2012	11/29/2011	4/1/2012	0.016	0.006	38%
SB16-6	G6-76	2011-2012	11/29/2011	4/1/2012	0.022	0.018	82%
SB17	H7-45	2003 ADS	12/15/2002	3/23/2003	0.155	0.121	78%
SB18	K7-73	2003 ADS	12/15/2002	3/23/2003	0.061	0.074	121%
SB19	J7-61	2003 ADS	12/15/2002	3/23/2003	0.073	0.052	71%
SB20	J8-48	2003 ADS	12/15/2002	3/23/2003	0.176	0.149	85%
SB20-1	J8-72	2012-2013	12/4/2012	3/31/2013	0.195	0.142	73%
SB20-2	J8-75	2012-2013	12/4/2012	3/31/2013	0.006	0.007	117%

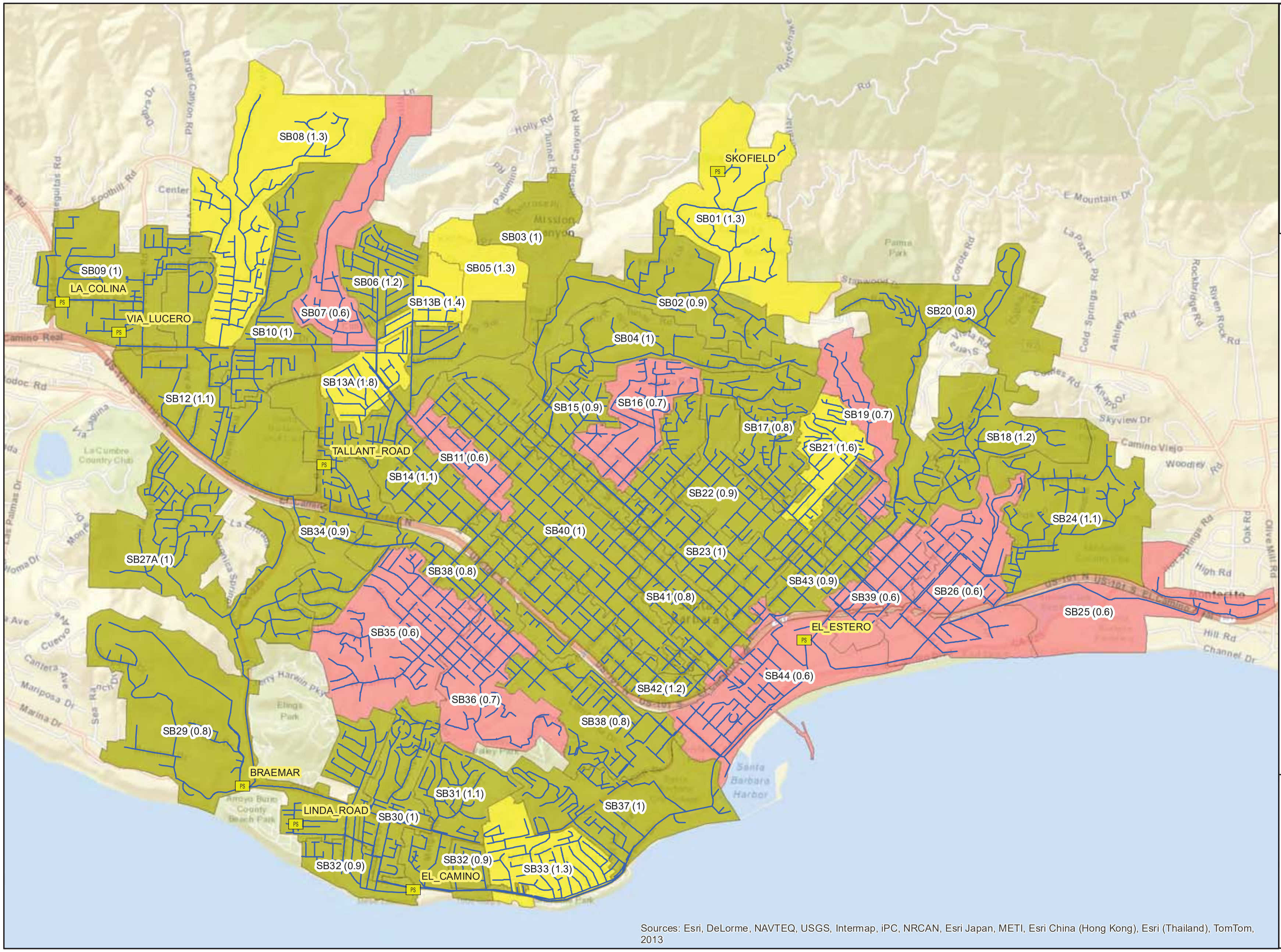
Meter ID	Pipe ID	Flow Study	Start Date	End Date	Measured ADWF (mgd)	Model ADWF (mgd)	Model % of Observed
SB20-3	K7-73	2012-2013	12/4/2012	3/31/2013	0.052	0.074	142%
SB20-4	J7-14	2012-2013	12/4/2012	3/31/2013	0.110	0.038	35%
SB20-5	J5-36	2012-2013	12/4/2012	3/31/2013	0.088	0.034	39%
SB21	H7-41	2003 ADS	12/15/2002	3/23/2003	0.052	0.084	162%
SB21-1	H7-99	2010-2011	11/29/2010	4/3/2011	0.054	0.038	70%
SB21-2	H7-42	2010-2011	11/29/2010	1/25/2011	0.050	0.046	92%
SB21-3	J7-44	2010-2011	11/29/2010	4/3/2011	0.039	0.027	69%
SB21-4	H7-97	2010-2011	11/29/2010	1/25/2011	0.027	0.043	159%
SB21-5	H7-143	2010-2011	1/25/2011	4/3/2011	0.019	0.015	79%
SB21-6	J6-89	2010-2011	1/25/2011	4/3/2011	0.021	0.017	81%
SB22	H8-41	2003 ADS	12/15/2002	3/23/2003	0.437	0.39	89%
SB23	H9-32	2003 ADS	12/15/2002	3/23/2003	1.156	1.104	96%
SB24	K8-17	2003 ADS	12/15/2002	3/23/2003	0.079	0.088	111%
SB25	K9-70	2003 ADS	12/15/2002	3/23/2003	0.104	0.065	63%
SB26	J9-11	2003 ADS	12/15/2002	3/23/2003	0.883	0.517	59%
SB27A	C10-18	2003 ADS	12/15/2002	3/23/2003	0.213	0.212	100%
SB29	D12-130	2003 ADS	12/15/2002	3/23/2003	0.431	0.339	79%
SB30	D13-32	2003 ADS	12/15/2002	3/23/2003	0.466	0.453	97%
SB31	F13-54	2003 ADS	12/15/2002	3/23/2003	0.112	0.126	113%
SB32	F13-5	2003 ADS	12/15/2002	3/23/2003	0.578	0.527	91%
SB33	F13-21	2003 ADS	12/15/2002	3/23/2003	0.193	0.245	127%
SB34	E8-89	2003 ADS	12/15/2002	3/23/2003	1.090	1.017	93%
SB35	E9-1	2003 ADS	12/15/2002	3/23/2003	0.308	0.198	64%
SB36	E9-3	2003 ADS	12/15/2002	3/23/2003	0.232	0.172	74%
SB37	G11-14	2003 ADS	12/15/2002	3/23/2003	0.950	0.927	98%
SB38	G11-13	2003 ADS	12/15/2002	3/23/2003	3.386	2.801	83%
SB39	H9-51	2003 ADS	12/15/2002	3/23/2003	0.435	0.282	65%
SB40	G10-50	2003 ADS	12/15/2002	3/23/2003	0.405	0.388	96%
SB41	H9-61	2003 ADS	12/15/2002	3/23/2003	1.151	0.972	84%
SB42	G10-44	2003 ADS	12/15/2002	3/23/2003	0.259	0.317	122%
SB43	H9-85	2003 ADS	12/15/2002	3/23/2003	0.293	0.264	90%
SB44	H10-39	2003 ADS	12/15/2002	3/23/2003	0.216	0.120	56%
Site 06	E8-28	2012-2013	12/5/2012	3/31/2013	0.665	0.911	137%
Site 07	E9-19	2012-2013	12/5/2012	3/31/2013	0.221	0.194	88%
Site 08	E9-2	2012-2013	12/5/2012	3/31/2013	3.607	2.321	64%
Site 09	F5-93	2012-2013	12/5/2012	3/31/2013	0.066	0.052	79%
Site 10	K8-71	2012-2013	12/5/2012	1/16/2013	0.121	0.085	70%

Meter ID	Pipe ID	Flow Study	Start Date	End Date	Measured ADWF (mgd)	Model ADWF (mgd)	Model % of Observed
Site 11	E13-3	2012-2013	2/26/2013	3/31/2013	0.331	0.499	151%
Site 12	H2-20	2012-2013	1/18/2013	2/24/2013	0.005	0.003	60%
US3_01	J8-20	2013 US^3	8/4/2013	8/12/2013	0.023	0.011	47%
US3_02	H8-70	2013 US^3	8/4/2013	8/12/2013	0.060	0.028	47%
US3_03	D12-68	2013 US^3	8/4/2013	8/12/2013	0.031	0.031	101%
US3_04	H8-60	2013 US^3	8/4/2013	8/12/2013	0.006	0.002	34%
US3_05	G10-74	2013 US^3	8/4/2013	8/12/2013	0.014	0.003	21%
US3_06	G12-20	2013 US^3	8/4/2013	8/12/2013	0.009	0.001	11%
US3_07	H10-73	2013 US^3	8/4/2013	8/12/2013	0.043	0.028	66%
US3_08	H10-1	2013 US^3	8/4/2013	8/12/2013	0.017	0.011	64%
US3_09	G9-29	2013 US^3	8/4/2013	8/12/2013	0.075	0.057	76%
US3_10	F6-201	2013 US^3	8/4/2013	8/12/2013	0.025	0.004	16%
US3_11	E9-19	2013 US^3	8/4/2013	8/12/2013	0.145	0.194	134%
US3_12	H7-41	2013 US^3	8/4/2013	8/12/2013	0.144	0.084	58%
US3_13	E12-107	2013 US^3	8/4/2013	8/12/2013	0.008	0.002	24%
WWTP	WWTP	2003 ADS			8.470	7.106	84%

City of Santa Barbara

Wastewater Collection
System Hydraulic Model

Figure 9.
Modeled and Observed
Dry Weather Flow
Ratio by Basin



Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013

N
W E
S

0 1,000 2,000 4,000
Feet

Legend

PS Model Pump Stations

— Model Pipes - Existing

Basins (Dry Weather Ratio)

Modeled to Observed

🟥 < 0.75

🟩 0.75 - 1.25

🟨 > 1.25

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The results in Table 10 show that for most monitoring points, the model results agree fairly well with the monitoring data. However, there are some locations where the model is not able to match the observed flow data. A number of potential factors could account for discrepancies between the model results and the observed data:

- The system-wide flow to the El Estero WWTP has fallen from approximately 8.5 mgd in 2002 to approximately 7 mgd under current conditions. This reduction is equivalent to 18 percent as a system-wide average, but it may be more pronounced in certain parts of the collection system.
- Water conservation efforts by the City and economic development patterns have led to changes in water use patterns since the flow data were collected.
- The City has completed several sewer rehabilitation projects to address structural defects; these projects may be contributing to a reduction in groundwater infiltration into the collection system.
- There has been some new development and re-development since 2002, potentially leading to higher dry weather flows in certain parts of the collection system.
- Since 2002 there have been sewer system improvements involving the construction of new pipes, the abandonment of some old pipes, and the redirection of flow. The team held a workshop with City staff to review flow direction and routing in the current system, and that input has been incorporated into the existing conditions model. However, the older flow monitoring data may reflect a different system configuration. For example, Basin SB11 is smaller than it was in 2002 because a new pipe, Pipe D6-140, diverts flow from the northern portion of Basin SB11 west to Basin SB14. Similarly, the construction of Pipe H8-106 at Quarantina Street and Haley Street diverts flow from Basin SB22 to Basin SB43.
- Some of the data presented in Table 10 were collected during a study performed by US^3 for the City in August of 2013. This study collected approximately 10 days of flow data in areas near certain dischargers. The flow data collected during these 10 days may not correspond with the two previous years of winter water use data. Some of these dischargers may not have been operating for the 2011-2013 period of water use data, or their discharge may vary seasonally. For example, Pipe H7-41 was monitored during the US^3 study with a measured average flow of 0.144 mgd. This pipe had a modeled average dry weather flow of 0.084 mgd. The same pipe was monitored as Site SB21 in the 2002-2003 study, when the measured dry weather flow was 0.052 mgd. Factors such as sewer rehabilitation and repair projects and new connections may have contributed to an increase in dry weather flows in this part of the collection system.
- In some instances flow data may have been associated with an incorrect pipe or manhole number. For example, Site US3_10 in the US^3 study was identified as Pipe F6-201, but it was also identified as a 15-inch diameter pipe. In that portion of East Mission Street, there are two parallel mains; Pipe F6-201 is a 6-inch main, and Pipe F6-190 is a 15-inch main. The flow data may reflect flows measured in Pipe F6-190.

In light of these potential factors leading to discrepancies, the model results are considered to be in reasonable agreement with the observed data.

5.3 DIURNAL DRY WEATHER FLOW

WSC associated diurnal patterns with the dry weather load assigned to each manhole. These patterns are included as Appendix A. Based on the updated dry weather loading parameters, the model-predicted dry weather inflow hydrograph at the El Estero WWTP is shown in Figure 10. Figure 10 also shows the average confluent and effluent flows for June 2014, a recent dry month.

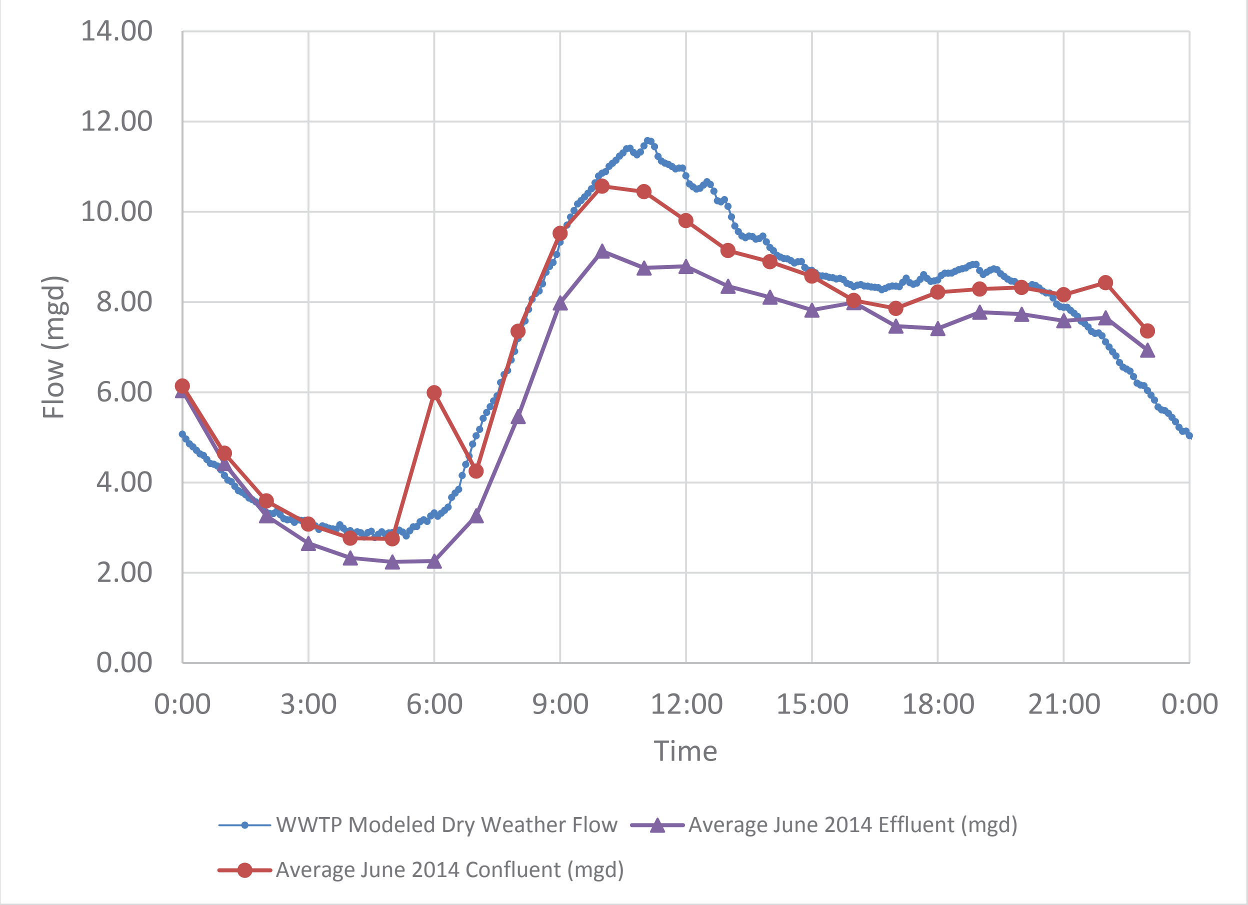


Figure 10. Model-Predicted and Observed Dry Weather Hydrographs at El Estero WWTP

The modeled flows in Figure 10 do not include any recycled flows from within the WWTP. Therefore, they would be expected to be less than the flow measured at the confluent flow meter at the WWTP headworks. The effluent flow meter, meanwhile, does not capture water that has been treated and distributed as recycled water. Therefore, the modeled hydrograph coming into the WWTP would be expected to be between the confluent and effluent data sets. While the modeled hydrograph is not consistently between the two observed hydrographs, there is generally good agreement in the shapes of the hydrographs.

5.4 WET WEATHER FLOW

The major storms with data available for calibration occurred in March of 2003 and March of 2011. The temporal distribution of these storms is shown in the following figures.

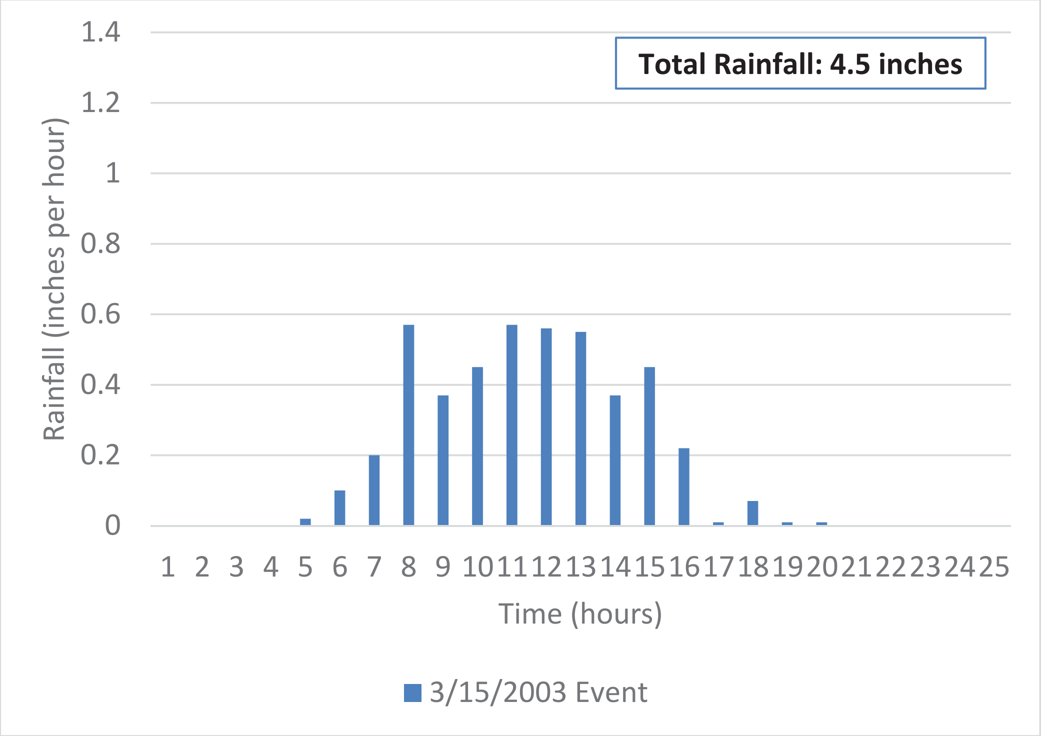


Figure 11. March 2003 Storm Event

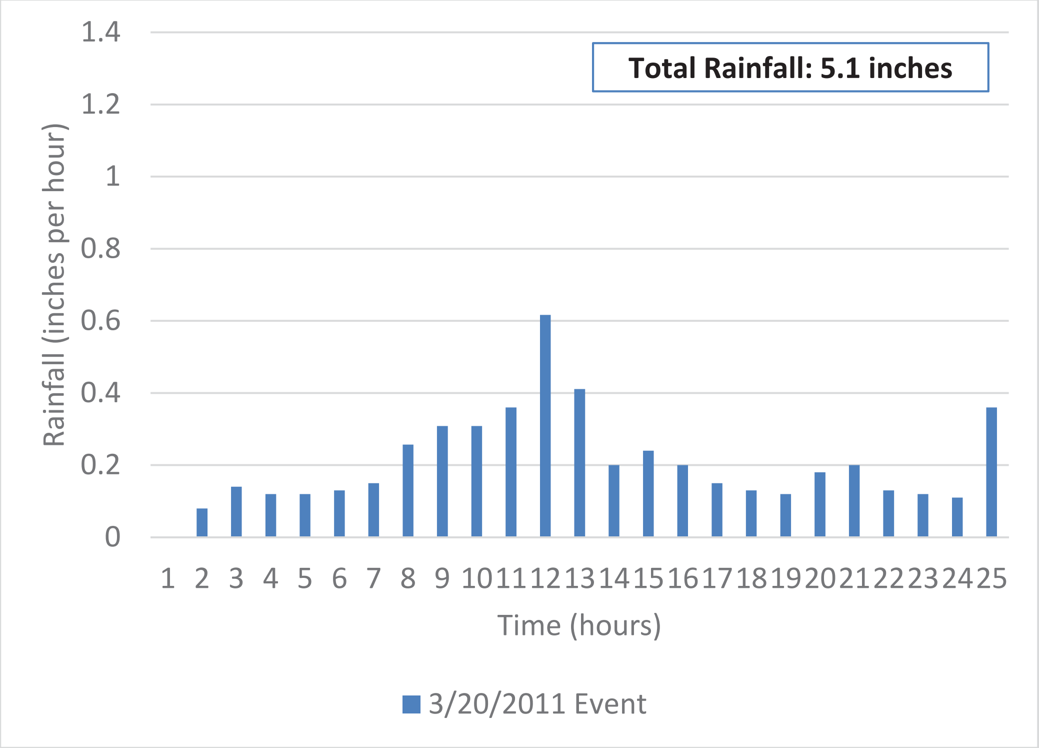


Figure 12. March 2011 Storm Event

Chapter 4 described the use of response factors to estimate wastewater flow attributable to rainfall-derived infiltration and inflow (RDII). WSC adjusted the response factors for each basin to match the available monitoring data. The response factors that were presented in Table 7 reflect the outcome of the calibration process. Graphs showing the observed and modeled flows from individual basins are included in Appendix B. The model-predicted hydrograph at the El Estero WWTP for the March 2011 event is shown in Figure 13.

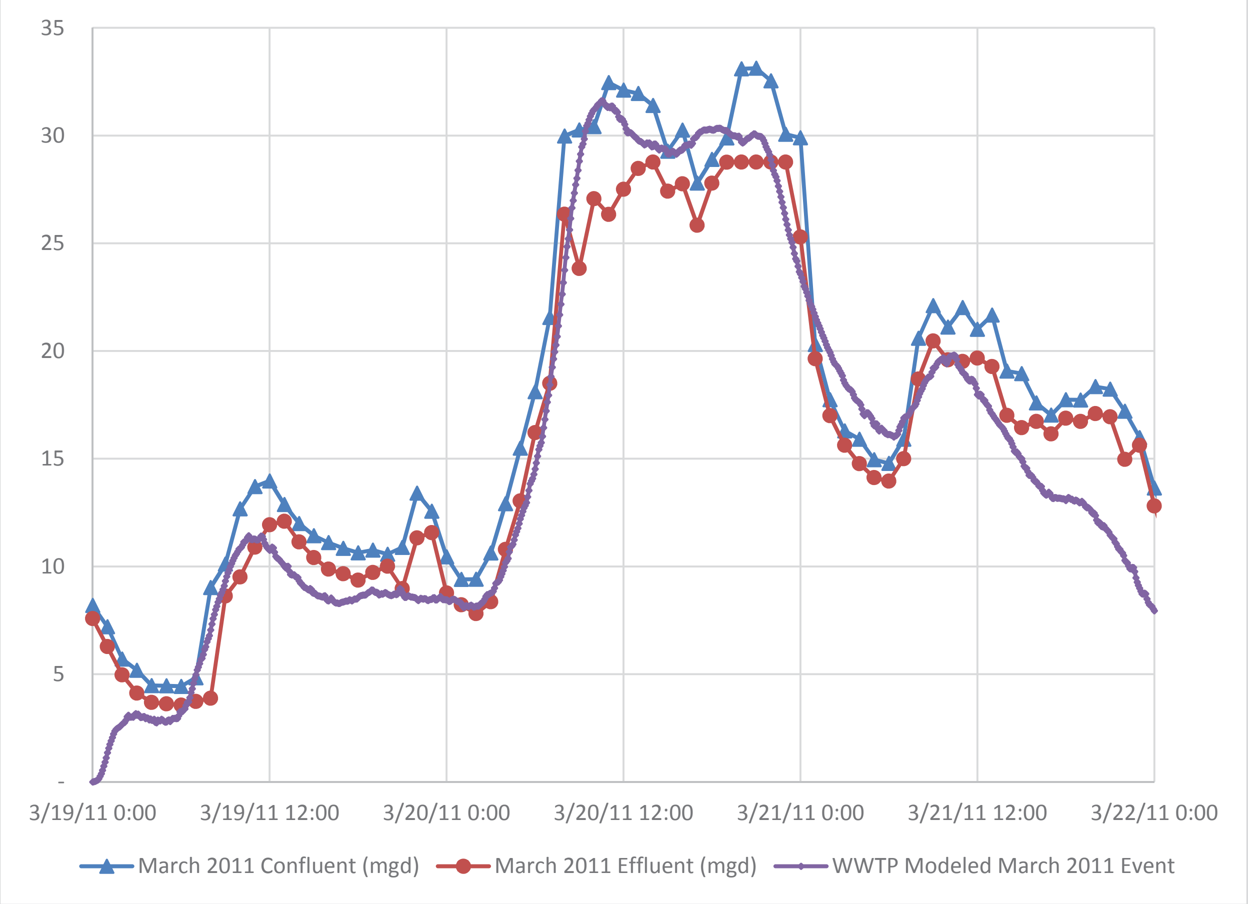


Figure 13. Model-Predicted and Observed Hydrographs at El Estero WWTP during March 20, 2011 Storm

There is generally good agreement between the modeled and observed flows until after the peak of the hydrograph. The observed flow data show the flows continuing at an elevated level for approximately 12 hours before dropping back to more normal levels. As noted previously, there are a number of potential factors leading to discrepancies between the current model results and the observed flows gathered in previous studies. Therefore, the team did not adjust any response factors outside the normally expected range in an effort to force the model output to match the observed flows.

5.5 DISCUSSION

The results presented in this chapter show that the dry weather model results are in reasonable agreement with the observed data. While there are some discrepancies between field observations and the updated model results, a number of factors have been identified that could help explain those discrepancies.

The modeled dry weather flows are being estimated using winter water use data and system-wide water to sewer factors. In order to achieve better agreement between the modeled and observed data, the team could elect to calculate different water to sewer factors for different parts of the service area. Alternatively, groundwater infiltration could be added in certain parts of the system as a constant flow input, and the sanitary contribution could be reduced. Both of these changes would increase the level of complexity in the flow assignment process, and in light of the potential discrepancies it is not clear that the model should be further adjusted to match flow monitoring data that may not reflect the current system configuration. At this point WSC recommends using consistent system-wide water to sewer factors to allocate dry weather flows.

Some of the hydrographs in Appendix B show the influence of an upstream pump station turning on or off. The updated hydraulic model is being run with a 30-second time step and a 5-minute reporting interval, while the observed data are hourly averages and do not show the influence of the upstream pump stations.

The City is currently in the process of installing permanent flow monitors on the major trunks sewers that convey flow to the El Estero WWP. The continuous, long-term data from these monitors will allow the City to compare the model results to current system operations over an extended period of time. For this project, the model has been calibrated using the best available data. At this point the model is considered to reasonably represent current conditions and is considered suitable for system analysis.

6 SYSTEM ANALYSIS

WSC used the hydraulic model to simulate the performance of the collection system under dry and wet weather flow conditions. The initial set of model scenarios were intended to identify potential hydraulic deficiencies in the current system. Model scenarios were created to represent dry weather and wet weather conditions under existing land use. In addition, scenarios were added for 2050 with the additional future dry weather flow discussed in Chapter 4. The same wet weather flow assignment parameters were used for current and future conditions.

WSC used a 24-hour design storm for system analysis. The 2012 Master Plan presented a 10-year storm that had been developed using a Natural Resources Conservation Service (NRCS) Type I rainfall distribution. This storm was used for the updated model runs and is shown in Figure 14.

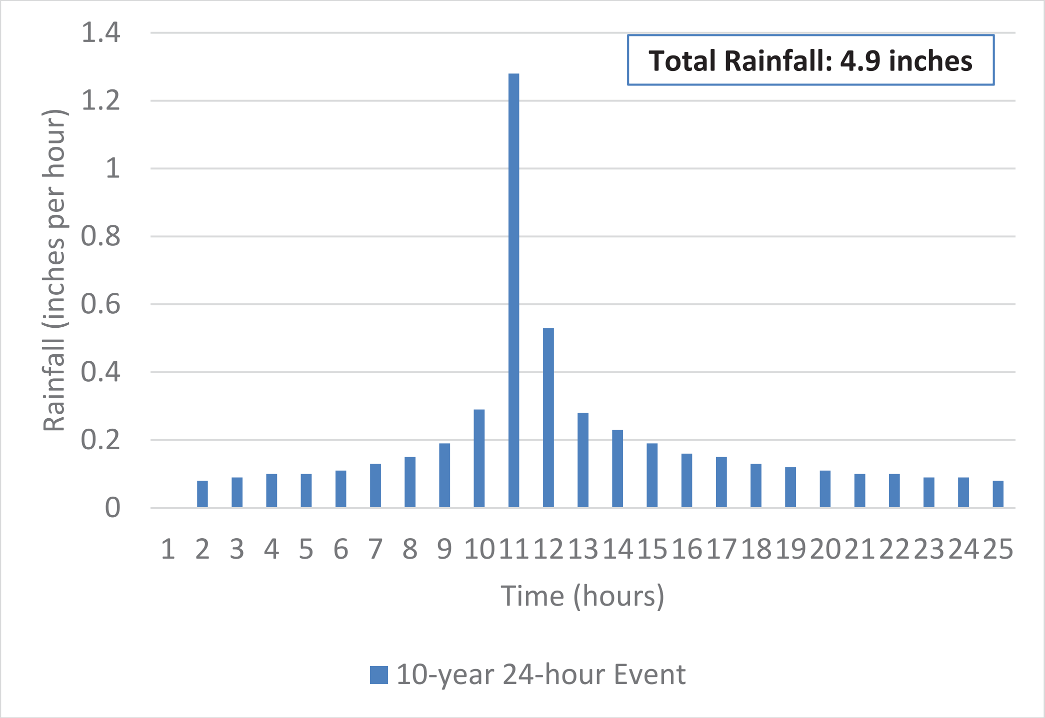


Figure 14. 10-year 24-hour Design Storm Event

WSC added the design storm event as a rainfall hyetograph in the InfoSewer model and created model scenarios for current and 2050 land use. The model-calculated influent hydrographs to the El Estero WWTP are shown in Figure 15.

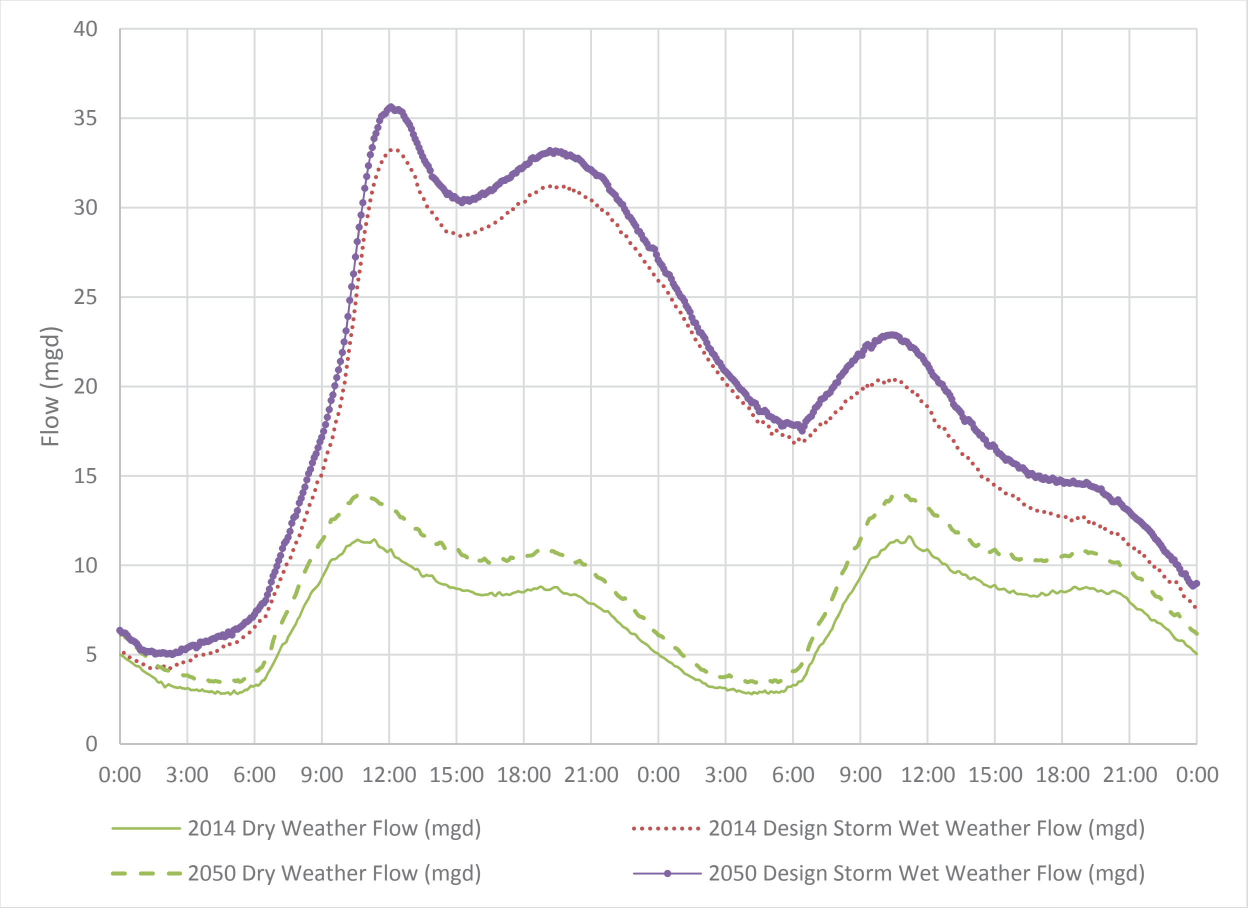


Figure 15. Modeled Hydrographs at El Estero WWTP

The modeled peak flow to the El Estero WWTP is approximately 33 mgd for current land use and 35 mgd for 2050 land use. These numbers are approximately equal to the corresponding values calculated in the 2012 Master Plan. These model scenarios were run without accounting for any flow restriction into the El Estero WWTP. If system operators restrict the total flow entering the headworks at El Estero, an increased amount of surcharging could occur in the collection system.

The calculated flows to each pump station are shown in Table 11.

Table 11. Model-Predicted Flows at Pump Stations

Lift Station Name	Current Average Dry Weather Flow (mgd)	Current Peak Dry Weather Flow (mgd)	Current Peak Wet Weather Flow (mgd)	2050 Average Dry Weather Flow (mgd)	2050 Peak Dry Weather Flow (mgd)	2050 Peak Wet Weather Flow (mgd)	Firm Capacity (mgd)
Braemar	0.26	0.46	1.54	0.33	0.59	1.62	1.50
El Camino De La Luz	0.041	0.10	0.22	0.045	0.11	0.23	0.22
El Estero WWTP	7.1	11.6	33.3	8.7	13.9	35.6	32 (approximate)
La Colina	0.14	0.26	0.63	0.15	0.28	0.64	0.58
Linda Road	0.026	0.045	0.11	0.027	0.046	0.11	0.14
Skofield	0.004	0.006	0.091	0.004	0.007	.092	0.36
Tallant Road	0.001	0.003	0.007	0.001	0.003	0.007	0.06
Via Lucero	0.12	0.22	0.46	0.16	0.29	0.51	0.58

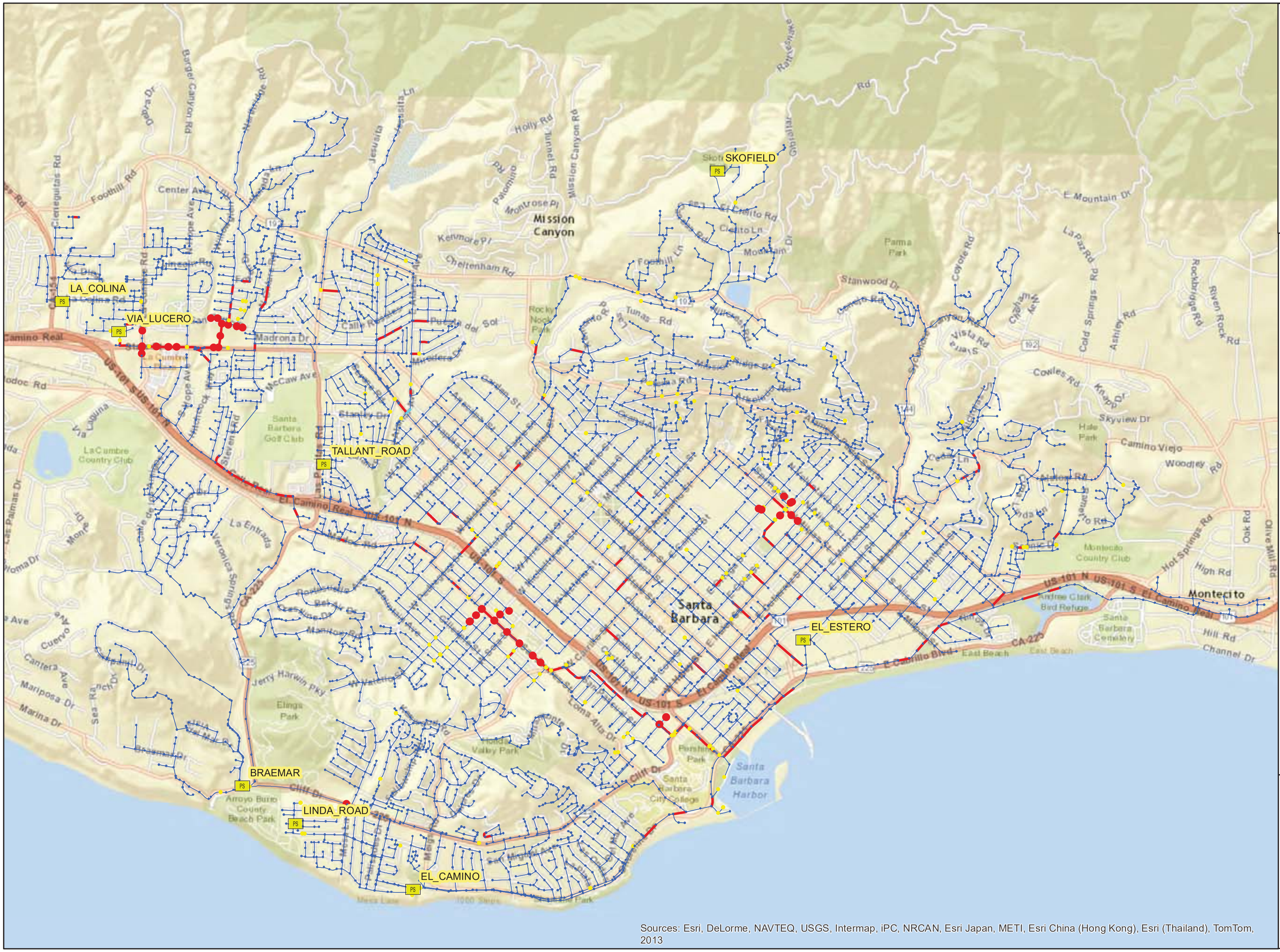
WSC focused the system analysis on wet weather conditions during the design storm, since wet weather flows are significantly higher than dry weather. The following two figures show wet weather conditions with current land use and with 2050 land use. The pipes have been symbolized based on the ratio of their peak flow to their calculated capacity (based on Manning's equation). If a pipe experiences a peak flow higher than its capacity, the hydraulic grade line will need to have a steeper slope than the pipe slope. If this situation occurs on an isolated segment, it may not lead to any problems. However, if a series of pipes have peak flows greater than their capacity, the increased hydraulic grade could lead to surcharging that approaches the ground surface, increasing the chance of an overflow.

The InfoSewer model calculated a maximum depth of surcharging at each manhole. This information has been used to color code the manholes. The red manholes are locations where the model predicted that the hydraulic grade line would rise to within one foot of the ground surface. Manholes with less surcharging are shown in the other colors. As described in the next chapter, WSC used the depth of surcharging to help identify and prioritize recommendations for proposed pipeline improvements.

City of Santa Barbara

Wastewater Collection
System Hydraulic Model

Figure 16.
System Conditions Under
Current Peak Wet
Weather Flows



N
W E
S

0 1,000 2,000 4,000
Feet

Legend

PS Model Pump Stations

Model Manholes-2014 Flows

Surcharge Below Ground

- ● 1 foot or less
- ● 1 to 3 feet
- · Greater than 3 feet

Model Pipes - 2014 Flows

Max Flow / Capacity

- — 0 - 1
- — Greater than 1
- — Model Pipes - Existing

Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013

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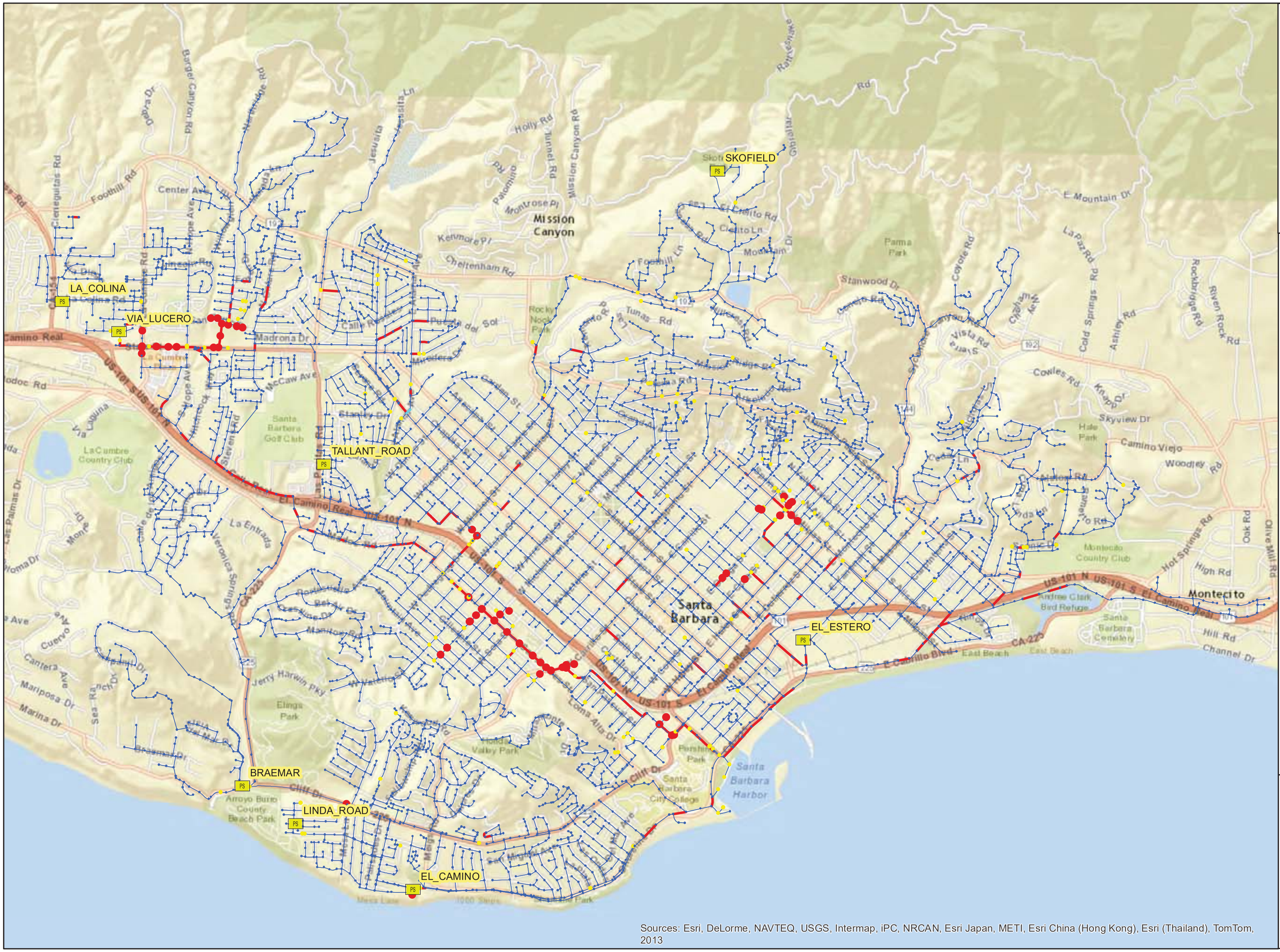
City of Santa Barbara

Wastewater Collection
System Hydraulic Model

Figure 17.
System Conditions Under
2050 Peak Wet
Weather Flows



Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013

Legend

PS Model Pump Stations

Model Manholes-2050 Flows

Surcharge Below Ground

- ● 1 foot or less
- ● 1 to 3 feet
- · Greater than 3 feet

Model Pipes - 2050 Flows

Max flow / Capacity

- 0 - 1
- Greater than 1
- Model Pipes - Existing

Water Systems Consulting, Inc.

7 RECOMMENDATIONS

7.1 SYSTEM EVALUATION CRITERIA

The City has adopted design criteria for sizing new sewer pipelines based on the allowable depth to diameter (d/D) ratio during peak dry weather flow. The allowable d/D during peak dry weather flow is 0.5 for pipes 12 inches and smaller, and 0.75 for pipes larger than 12 inches. During peak wet weather flow, the flows are expected to exceed these d/D values. In the 2012 Master Plan, the City adopted a criterion that during peak wet weather flow, surcharging was acceptable as long as the calculated hydraulic grade line remained more than 1 foot below the ground surface. Using the 1-foot surcharging standard, the 2012 Master Plan identified 12 recommended pipeline improvement projects. Some of these projects have been implemented, but most have not been constructed.

The 2012 model was skeletonized and included primarily the larger-diameter trunk sewers. For this project, WSC developed a dynamic model that includes almost all pipelines in the City's system. The model includes a large number of 6-inch and 8-inch pipes that have numerous lateral connections. In some areas allowing surcharge to within 1 foot of the ground surface may create a situation where water backs up the laterals and creates flooding issues.

For this project, WSC developed the proposed improvements in phases. The first set, Phase 1, contained proposed projects that alleviated areas with predicted surcharge within 1 foot of the ground surface under existing land use. The second set, Phase 2, contained projects necessary to address areas with predicted surcharge within 1 foot of the ground with 2050 land use flows included. These improvements are on the same order of magnitude as the improvements identified in the 2012 Master Plan (and include some of the same pipe segments).

For Phase 3, WSC identified the pipe segments whose calculated capacity was less than the model-predicted peak wet weather flow (after the implementation of Phase 1 and 2 projects). These are the segments with a calculated flow to capacity ratio (q/Q) of greater than 1.0 at peak flow. In some of these areas, the model results indicated that some limited surcharging might occur, but that it would remain well below the ground surface. For this report, WSC identified the segments and estimated a total cost if all of these segments required a relief project. However, it is recommended that the City perform additional research to verify the diameters and invert elevations of these segments to confirm the potential need for developing a relief project.

7.2 PROPOSED SYSTEM IMPROVEMENTS

Based on the evaluation criteria described above, WSC developed proposed improvement projects. These improvements are intended to represent one possible approach to addressing the predicted capacity deficiency. There are several key points about these proposed improvements:

- The projects were developed using the updated hydraulic model, which has been calibrated using the best available wet weather data. In some cases the best available wet weather data was from 2003. Since that time the City has performed several sewer improvement and rehabilitation projects. Therefore the current system might respond to a storm event differently than the system did in 2003.
- These projects were identified based solely on hydraulic capacity. The City has an on-going program for inspecting its sewers and planning rehabilitation or replacement projects based on structural defects or maintenance issues. The model can be used to provide capacity information for all pipelines, and thereby allow the City to make decisions about pipe segments on a comprehensive basis that includes both structural condition and hydraulic capacity.
- The improvements were added to the model as new parallel pipelines, without taking any existing infrastructure out of service. As the City moves forward with review and planning of these proposed improvements, it may be that the existing infrastructure in the area has structural or maintenance issues that need to be addressed. In this case it may be more economical to construct one new, larger-diameter pipeline than to maintain two parallel smaller-diameter pipelines.
- During the system evaluation process, WSC provided the City with an initial list of the Phase 1 and Phase 2 improvements. City staff gathered record drawings and checked records of CCTV inspection to verify pipe diameters and connections. The City provided these findings to WSC, and WSC made adjustments to the model input where appropriate. However, the City may still wish to field-verify the existing conditions in areas where a hydraulic capacity constraint has been identified.
- The improvements were developed without detailed site information or information about other potential City projects, such as water main replacement, storm drain construction, or street paving. Coordination with these projects could affect the scope and the priority of these proposed improvements.
- The City may wish to prioritize the areas around the proposed improvements for further study and analysis. Additional temporary flow monitoring in areas where the model predicts surcharging could provide information to confirm the need for an improvement. The installation of manhole “smart lids” that measure surcharge depth and send an alarm to system operators if the surcharge is significant could also provide valuable field data while reducing the risk of an overflow.

WSC developed Phase 1 and Phase 2 projects to address areas with surcharge within one foot of the ground for existing and 2050 land use, respectively. Phase 3 includes all pipe segments with a calculated peak flow higher than the calculated capacity (after the implementation of Phase 1 and 2 projects). Approximately 6.4 miles of mains fell into this category for 2050 land use. These segments are identified in Appendix C.

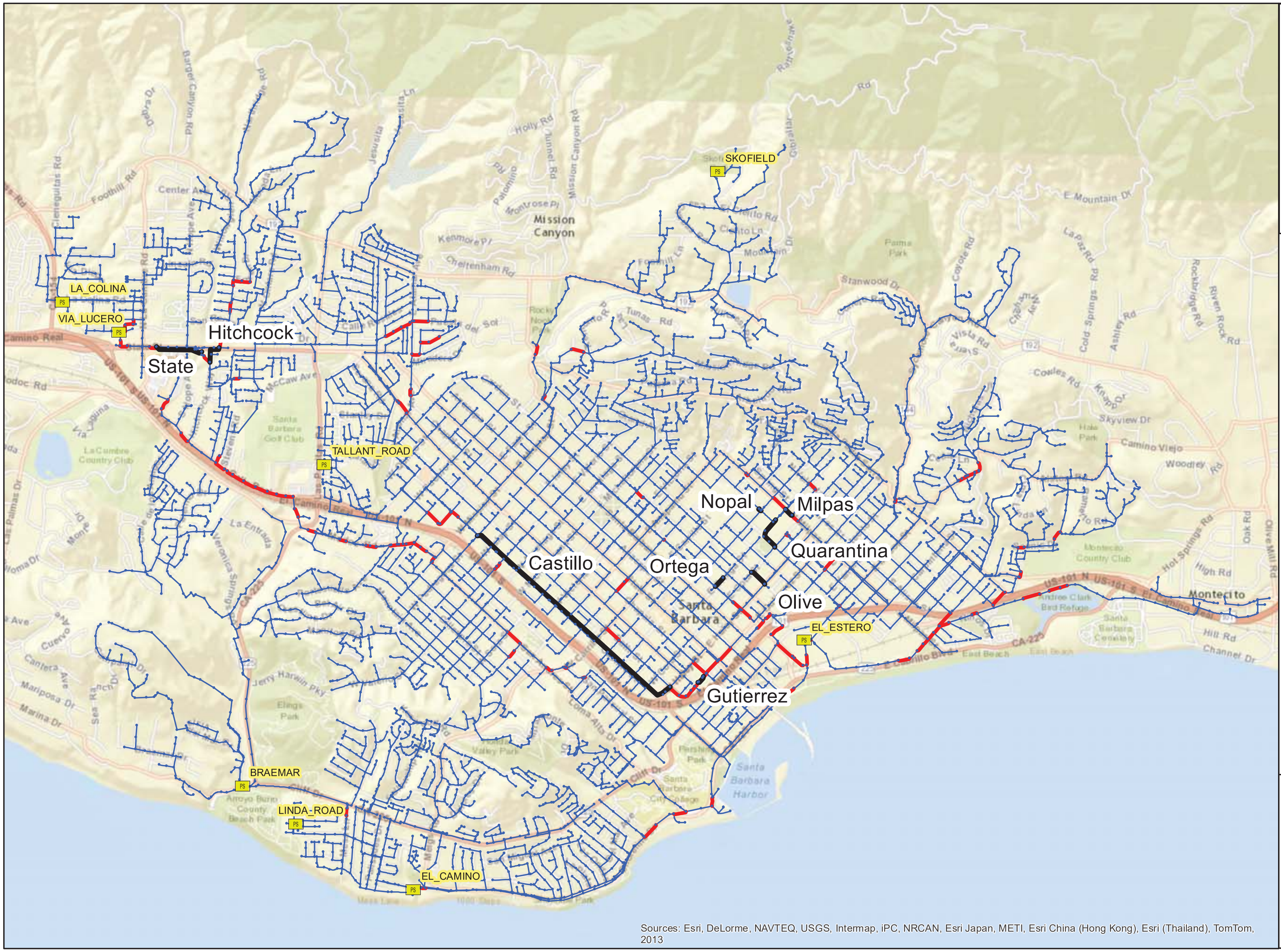
As shown in Table 11, during the design storm wet weather runs at 2050, the peak flow to some lift stations slightly exceeded the stations' firm capacity. In the model, the system was able to accommodate the flow by activating both pumps for a brief period. These lift stations are typically intended to have one pump operating at a time, with the other pump on standby. If the stations are able to operate for brief periods of time with pumps running, the model results indicated that a capacity upgrade is not required. When the model was limited to only one pump running at each station, the results indicated surcharging occurring upstream of the Braemar and La Colina pump stations. At this time WSC has not developed proposed improvements to increase the capacity of these lift stations. It is recommended that the City investigate the feasibility of operating two pumps at these stations for brief periods of time.

A planning-level cost estimate was prepared for each proposed pipeline improvement project. These cost estimates are based upon the Class 4 Conceptual Report Classification of Opinion of Probably Construction Cost developed by Association for the Advancement of Cost Engineering (AACE) International. Class 4 estimates are intended to provide a conceptual level of effort that has an expected accuracy range from -30% to +50%. The unit costs and cost estimate assumptions are shown in Table 12.

Table 12. Unit Costs and Cost Estimate Assumptions

Sewer Diameter	Estimated Construction Cost per Foot
8-inch	$180
10-inch	$200
12-inch	$220
18-inch	$240
Additions to Estimated Construction Cost Based on Length	
Contingency	30%
Engineering, Administration, Construction Management, and Legal	35%

An overview of the proposed pipeline improvements is shown in Figure 18. The three subsequent figures show more detailed views of the proposed improvements centered on three areas: Castillo Street, State Street, and Ortega Street. The proposed improvement projects are summarized in Table 13.



Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013

City of Santa Barbara

Wastewater Collection
System Hydraulic Model

Figure 18.
Overview of
Proposed System
Improvements

N
W E
S

0 1,000 2,000 4,000
Feet

Legend

PS	Model Pump Stations
•	Model Manholes
▬	Model Pipes - Improvements
🟥	Phase 3 Segments
—	Model Pipes - Existing

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City of Santa Barbara

Wastewater Collection
System Hydraulic Model

Figure 19.
Proposed System
Improvements (Castillo)

Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013

Legend

- 🟨 Model Pump Stations
- • Model Manholes
- ▬ Model Pipes - Improvements
- 🟥 Phase 3 Segments
- → Model Pipes - Existing

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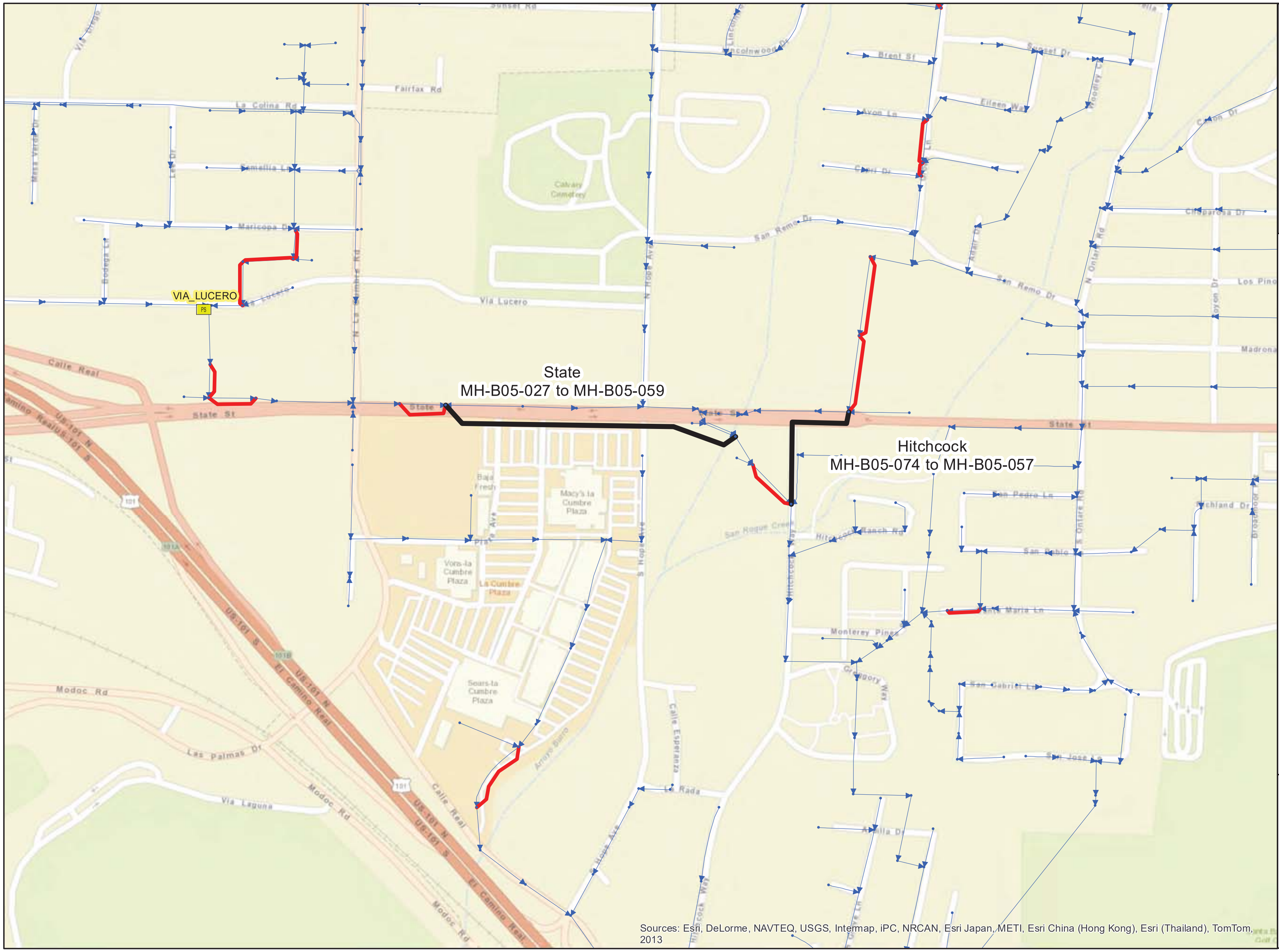
City of Santa Barbara

Wastewater Collection
System Hydraulic Model

Figure 20.
Proposed System
Improvements (State)



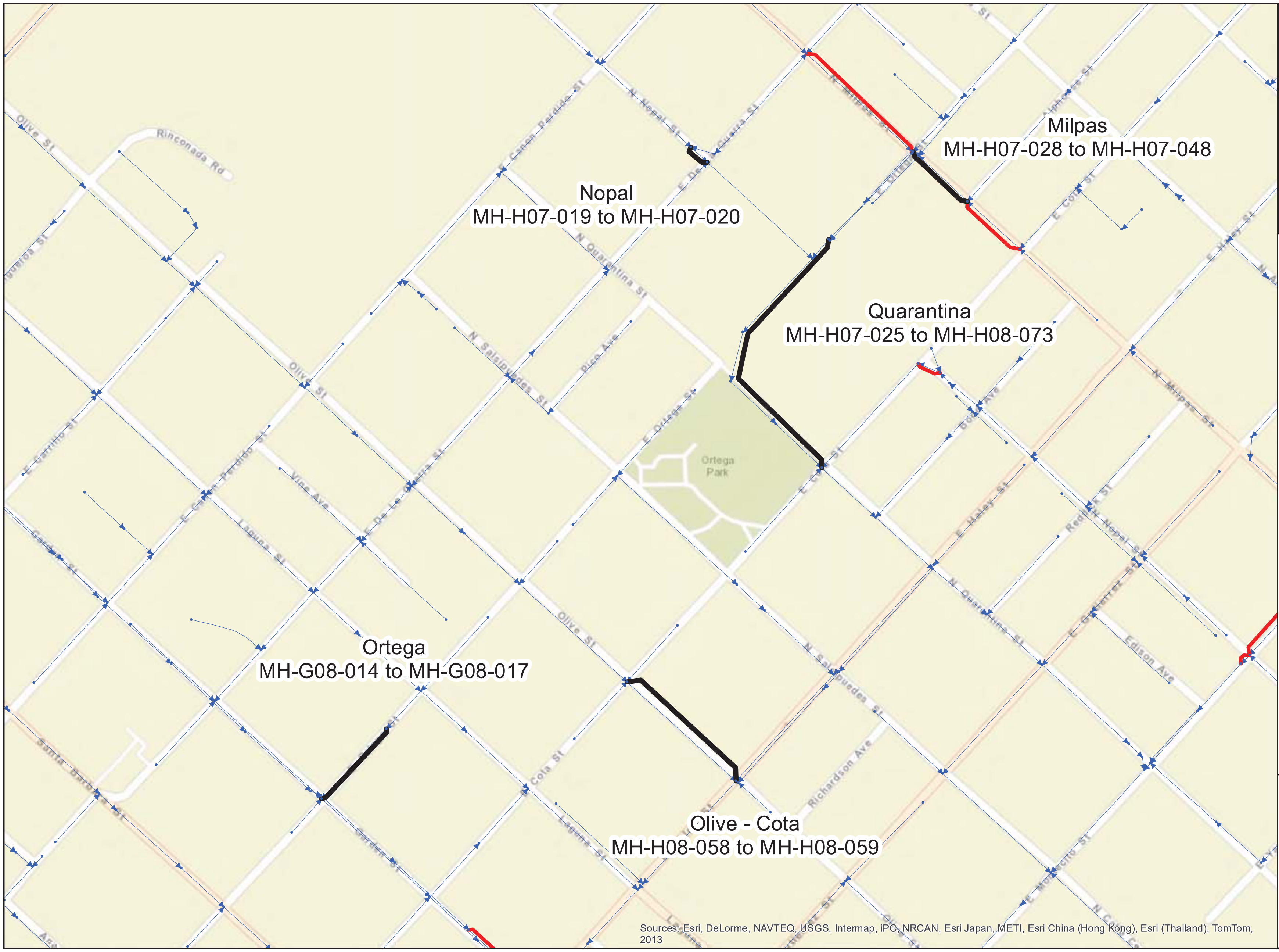
Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013

WATER SYSTEMS CONSULTING, INC.

City of Santa Barbara

Wastewater Collection
System Hydraulic Model

Figure 21.
Proposed System
Improvements (Ortega)



Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013

N
W E
S

0 250 500
Feet

Legend

PS	Model Pump Stations
•	Model Manholes
▬	Model Pipes - Improvements
▬	Phase 3 Segments
→	Model Pipes - Existing

WSC
Water Systems Consulting, Inc.

Table 13. Proposed Pipeline Improvements

Phase	Area	Description	Length (ft)	Diameter (in)	Planning-Level Estimated Project Cost
1	**Castillo Street**	This project would divert flow from the existing trunk sewer on the west side of Highway 101. The new pipeline would follow Castillo Street from Pedregosa Street to Haley Street, where it would re-connect to the existing system.	7,600	18	$3,201,000
1	**Gutierrez Street**	An existing inverted siphon with two 8-inch pipes carries flow under Mission Creek. If the Castillo Street project described above were constructed, this siphon would not have capacity for the additional flow.	250	18	$105,000
1	**State Street**	This project would provide additional capacity in State Street in front of La Cumbre Plaza and would address the restriction in the current siphon under Arroyo Burro	1,400	12	$541,000
1	**Hitchcock Way**	This project would divert flow from State Street and direct it south along Hitchcock Way	680	12	$263,000
1	**Milpas Street**	This project would provide relief for an existing 6-inch pipe between Alphonse Street and Ortega Street	260	8	$82,000
1	**Quarantina Street**	This project would start near the intersection of Ortega Street and the extension of Nopal Street. It would provide capacity to carry flow southwest in Ortega Street and then southeast in Quarantina Street.	1,040	12	$402,000

Phase	Area	Description	Length (ft)	Diameter (in)	Planning-Level Estimated Project Cost
1	**Nopal Street**	At Nopal Street and De La Guerra Street, a short reach of 6-inch pipe is a hydraulic bottleneck; this project would provide a parallel pipe.	100	10	$35,000
2	**Olive Street**	This project would provide relief for an existing 8-inch pipe in Olive Street from Cota Street to Haley Street. The existing pipe is a hydraulic bottleneck.	550	8	$174,000
2	**Ortega Street**	Between Laguna Street and Garden Street, an existing 6-inch pipe is a hydraulic bottleneck; this project would provide a parallel pipe.	340	8	$107,000
3	**Various**	This placeholder is for all Phase 3 segments; not all are expected to require a relief project.	33,000	Varies	$13,000,000

7.3 MODEL MAINTENANCE

The model that has been developed for this project will be a valuable resource for City staff in future planning and system management efforts. WSC has provided interim copies of the InfoSewer model to City staff so that they can become familiar with how the model simulations are set up. WSC will provide an electronic submittal that includes the final InfoSewer model, the updated sub-basin boundaries, and the Microsoft Access database used for flow assignment. With this information, City staff will be able to re-generate model input as needed and maintain the model.

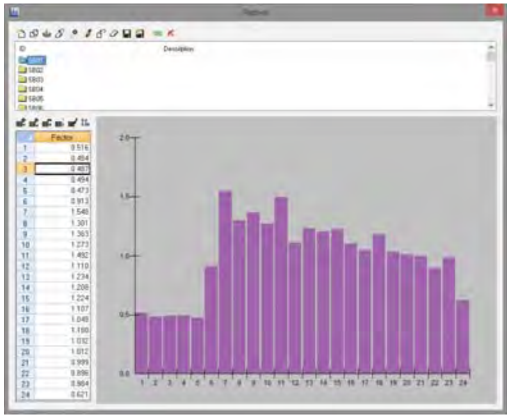
The model was developed using water consumption data from 2011 through 2013, and it was calibrated to storm events that occurred in 2003 and 2011. The model will need to be maintained and updated as new information becomes available. WSC recommends that the City:

- Establish a procedure for comparing the model infrastructure to the GIS database on a regular basis and updating the model infrastructure as needed.
- Use the continuous flow monitoring data from the newly installed flow monitors to review the model calibration and make adjustments if needed to dry weather and wet weather flow assignment parameters. Use of this long-term data from the major trunk sewers will increase the level of confidence in the model's representation of system flows.

- Monitor wet weather events in an attempt to gather information on how the current system responds to storm events. Consider using the model to help identify and prioritize areas for additional temporary flow monitoring or use of manhole "smart lids."

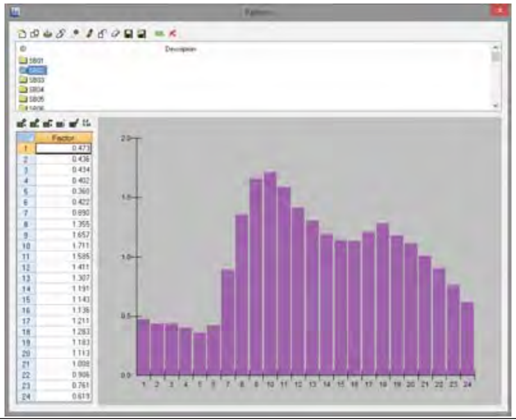
APPENDIX A. DRY WEATHER DIURNAL PATTERNS

SB01



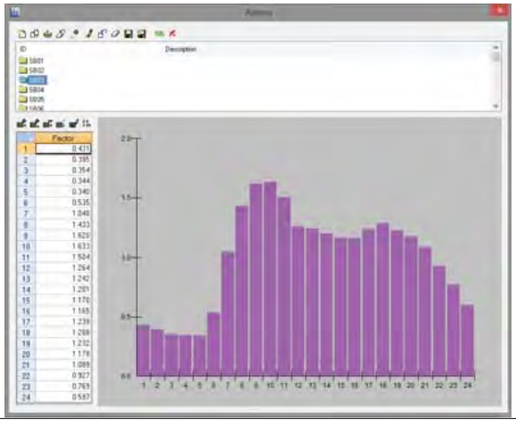
	Factor
1	0.516
2	0.484
3	0.487
4	0.494
5	0.473
6	0.913
7	1.548
8	1.301
9	1.363
10	1.273
11	1.492
12	1.110
13	1.234
14	1.208
15	1.224
16	1.107
17	1.049
18	1.180
19	1.032
20	1.012
21	0.999
22	0.896
23	0.984
24	0.621

SB02



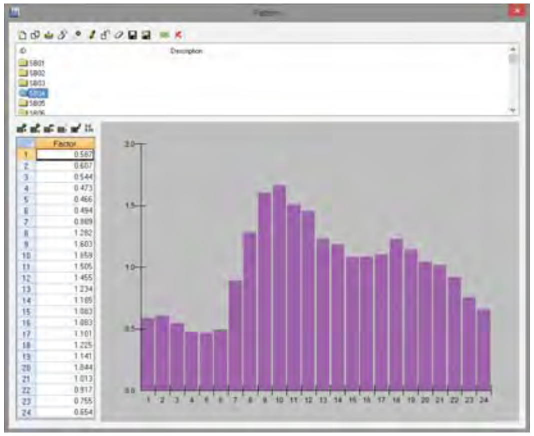
	Factor
1	0.473
2	0.436
3	0.434
4	0.402
5	0.360
6	0.422
7	0.890
8	1.355
9	1.657
10	1.711
11	1.585
12	1.411
13	1.307
14	1.191
15	1.143
16	1.136
17	1.211
18	1.283
19	1.183
20	1.113
21	1.008
22	0.906
23	0.761
24	0.619

SB03



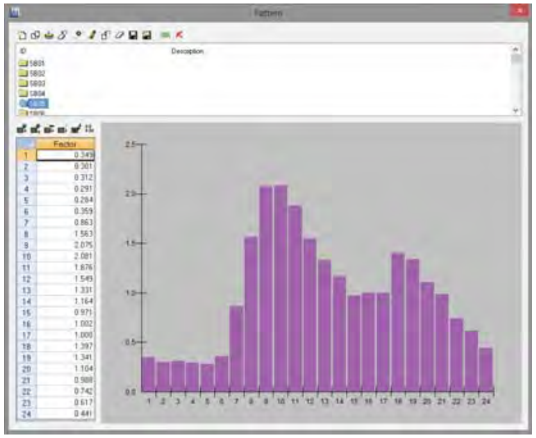
	Factor
1	0.411
2	0.395
3	0.354
4	0.344
5	0.340
6	0.535
7	1.048
8	1.433
9	1.629
10	1.633
11	1.504
12	1.264
13	1.242
14	1.201
15	1.170
16	1.165
17	1.239
18	1.288
19	1.232
20	1.178
21	1.089
22	0.927
23	0.763
24	0.587

SB04



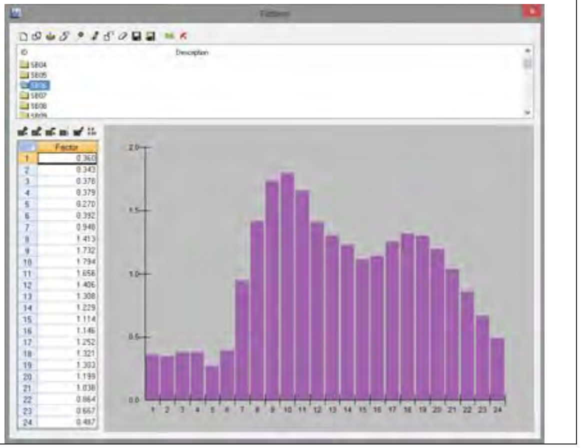
	Factor
1	0.587
2	0.607
3	0.544
4	0.473
5	0.466
6	0.494
7	0.889
8	1.282
9	1.603
10	1.659
11	1.505
12	1.455
13	1.234
14	1.185
15	1.083
16	1.083
17	1.101
18	1.225
19	1.141
20	1.044
21	1.013
22	0.917
23	0.755
24	0.654

SB05



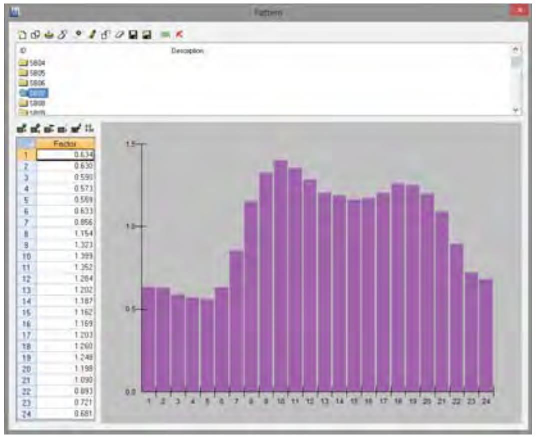
	Factor
1	0.349
2	0.301
3	0.312
4	0.291
5	0.284
6	0.359
7	0.863
8	1.563
9	2.075
10	2.081
11	1.876
12	1.549
13	1.331
14	1.164
15	0.971
16	1.002
17	1.000
18	1.397
19	1.341
20	1.104
21	0.988
22	0.742
23	0.617
24	0.441

SB06



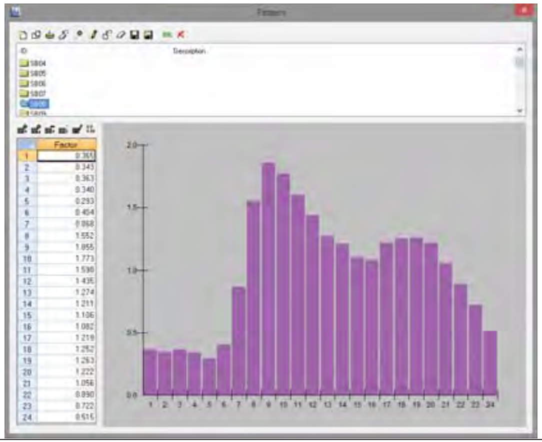
	Factor
1	0.360
2	0.343
3	0.378
4	0.379
5	0.270
6	0.392
7	0.948
8	1.413
9	1.732
10	1.794
11	1.656
12	1.406
13	1.308
14	1.229
15	1.114
16	1.146
17	1.252
18	1.321
19	1.303
20	1.199
21	1.038
22	0.864
23	0.667
24	0.487

SB07



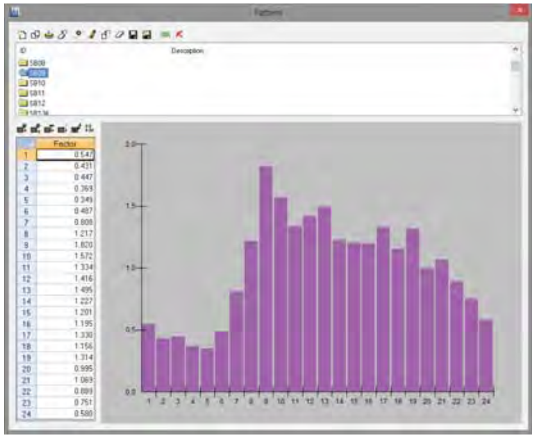
	Factor
1	0.634
2	0.630
3	0.590
4	0.573
5	0.569
6	0.633
7	0.856
8	1.154
9	1.323
10	1.399
11	1.352
12	1.284
13	1.202
14	1.187
15	1.162
16	1.169
17	1.203
18	1.260
19	1.248
20	1.198
21	1.090
22	0.893
23	0.721
24	0.681

SB08



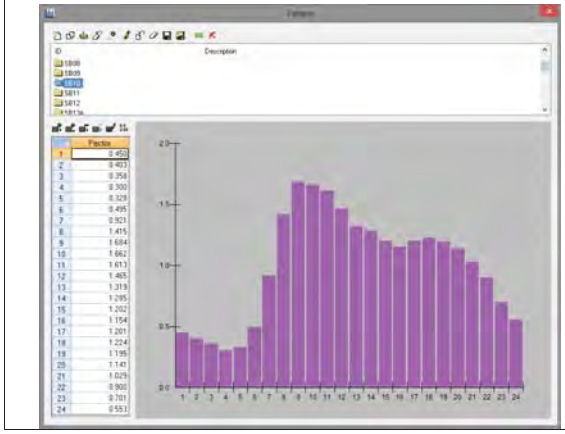
	Factor
1	0.365
2	0.343
3	0.363
4	0.340
5	0.293
6	0.404
7	0.868
8	1.552
9	1.855
10	1.773
11	1.590
12	1.435
13	1.274
14	1.211
15	1.106
16	1.082
17	1.219
18	1.252
19	1.253
20	1.222
21	1.056
22	0.890
23	0.722
24	0.515

SB09



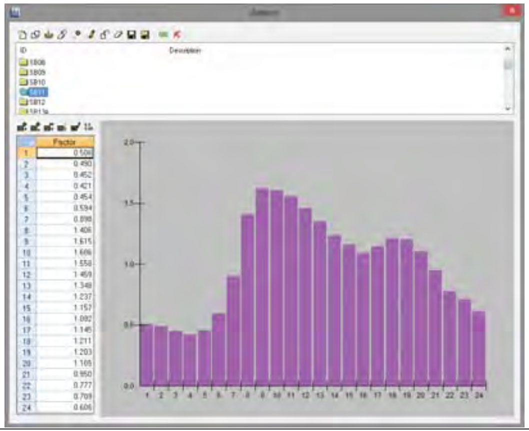
	Factor
1	0.547
2	0.431
3	0.447
4	0.369
5	0.349
6	0.487
7	0.808
8	1.217
9	1.820
10	1.572
11	1.334
12	1.416
13	1.495
14	1.227
15	1.201
16	1.195
17	1.330
18	1.156
19	1.314
20	0.995
21	1.069
22	0.889
23	0.751
24	0.580

SB10



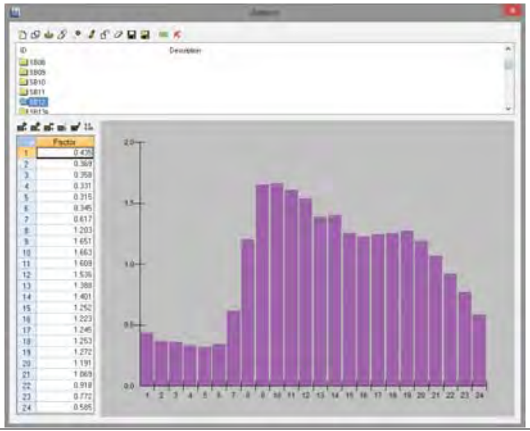
	Factor
1	0.450
2	0.403
3	0.358
4	0.300
5	0.329
6	0.495
7	0.923
8	1.415
9	1.684
10	1.662
11	1.613
12	1.465
13	1.319
14	1.285
15	1.202
16	1.154
17	1.201
18	1.224
19	1.195
20	1.141
21	1.029
22	0.900
23	0.701
24	0.553

SB11



	Factor
1	0.508
2	0.490
3	0.452
4	0.421
5	0.454
6	0.594
7	0.898
8	1.406
9	1.615
10	1.606
11	1.558
12	1.459
13	1.348
14	1.237
15	1.157
16	1.092
17	1.145
18	1.211
19	1.203
20	1.105
21	0.950
22	0.777
23	0.709
24	0.606

SB12



	Factor
1	0.435
2	0.369
3	0.358
4	0.331
5	0.315
6	0.345
7	0.617
8	1.203
9	1.651
10	1.663
11	1.609
12	1.536
13	1.388
14	1.401
15	1.252
16	1.223
17	1.245
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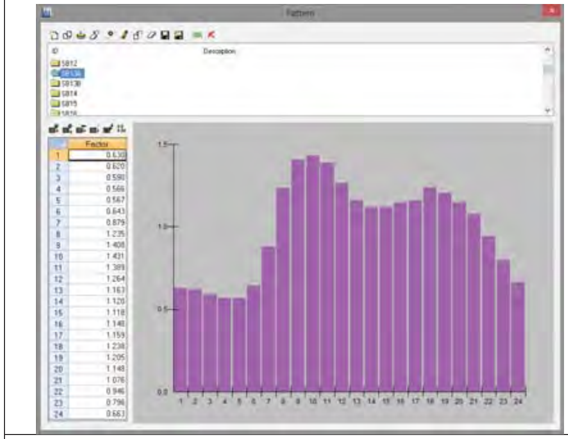
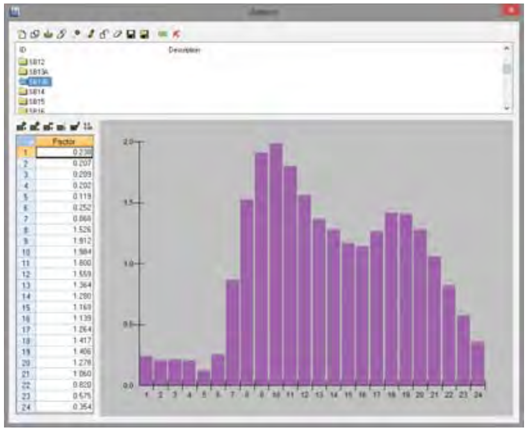
19	1.272
20	1.191
21	1.069
22	0.918
23	0.772
24	0.585

SB13A



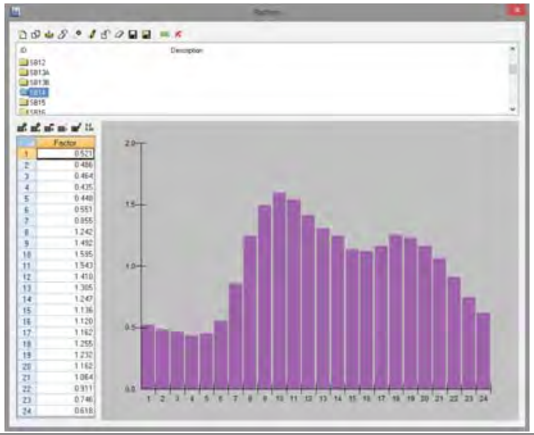
	Factor
1	0.630
2	0.620
3	0.590
4	0.566
5	0.567
6	0.643
7	0.879
8	1.235
9	1.408
10	1.431
11	1.389
12	1.264
13	1.163
14	1.120
15	1.118
16	1.148
17	1.159
18	1.238
19	1.205
20	1.148
21	1.076
22	0.946
23	0.796
24	0.663

SB13B



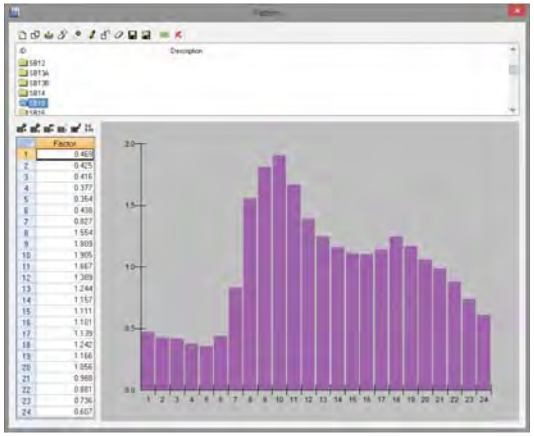
	Factor
1	0.230
2	0.207
3	0.209
4	0.202
5	0.119
6	0.252
7	0.868
8	1.526
9	1.912
10	1.984
11	1.800
12	1.559
13	1.364
14	1.280
15	1.169
16	1.139
17	1.264
18	1.417
19	1.406
20	1.278
21	1.060
22	0.820
23	0.575
24	0.354

SB14



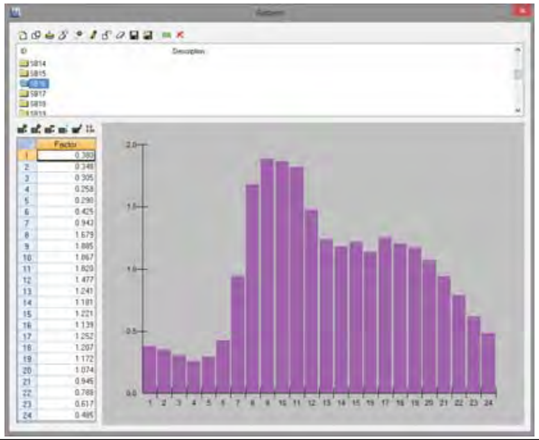
	Factor
1	0.521
2	0.486
3	0.464
4	0.435
5	0.448
6	0.551
7	0.855
8	1.242
9	1.492
10	1.595
11	1.543
12	1.410
13	1.305
14	1.247
15	1.136
16	1.120
17	1.162
18	1.255
19	1.232
20	1.162
21	1.064
22	0.911
23	0.746
24	0.618

SB15



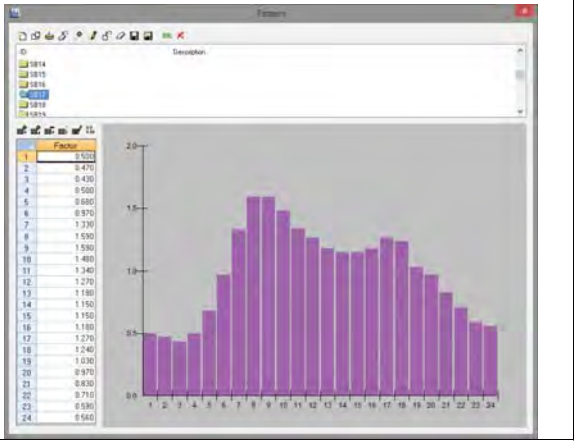
	Factor
1	0.465
2	0.425
3	0.416
4	0.377
5	0.354
6	0.438
7	0.827
8	1.554
9	1.809
10	1.905
11	1.667
12	1.389
13	1.244
14	1.157
15	1.111
16	1.101
17	1.139
18	1.242
19	1.166
20	1.056
21	0.988
22	0.881
23	0.736
24	0.607

SB16



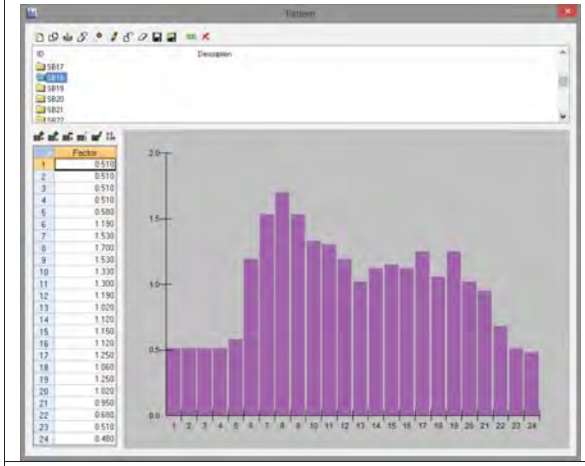
	Factor
1	0.380
2	0.348
3	0.305
4	0.258
5	0.290
6	0.425
7	0.942
8	1.679
9	1.885
10	1.867
11	1.820
12	1.477
13	1.241
14	1.181
15	1.221
16	1.139
17	1.252
18	1.207
19	1.172
20	1.074
21	0.945
22	0.788
23	0.617
24	0.485

SB17



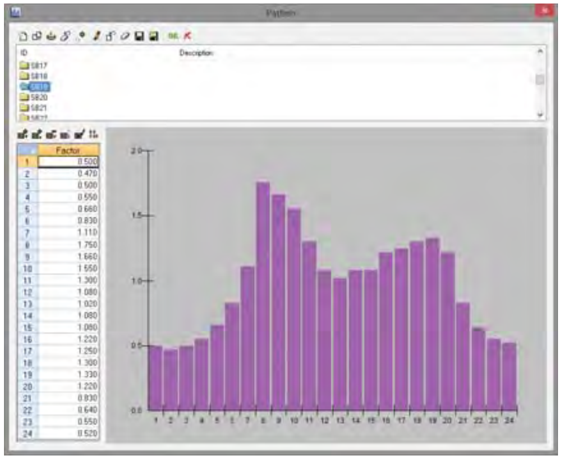
	Factor
1	0.500
2	0.470
3	0.430
4	0.500
5	0.680
6	0.970
7	1.330
8	1.590
9	1.590
10	1.480
11	1.340
12	1.270
13	1.190
14	1.150
15	1.150
16	1.180
17	1.270
18	1.240
19	1.030
20	0.970
21	0.830
22	0.710
23	0.590
24	0.560

SB18



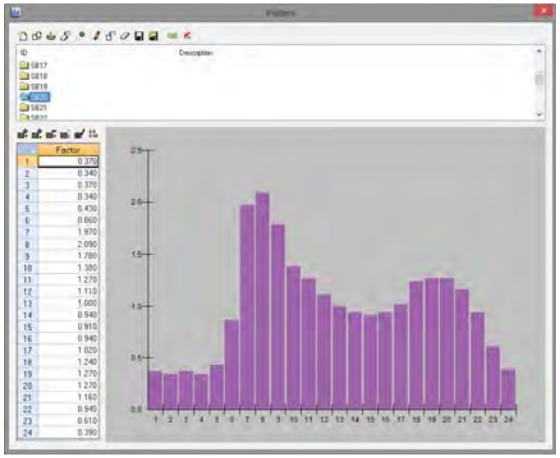
	Factor
1	0.510
2	0.510
3	0.510
4	0.510
5	0.580
6	1.190
7	1.530
8	1.700
9	1.530
10	1.330
11	1.300
12	1.190
13	1.020
14	1.120
15	1.150
16	1.120
17	1.250
18	1.060
19	1.250
20	1.020
21	0.950
22	0.680
23	0.510
24	0.480

SB19



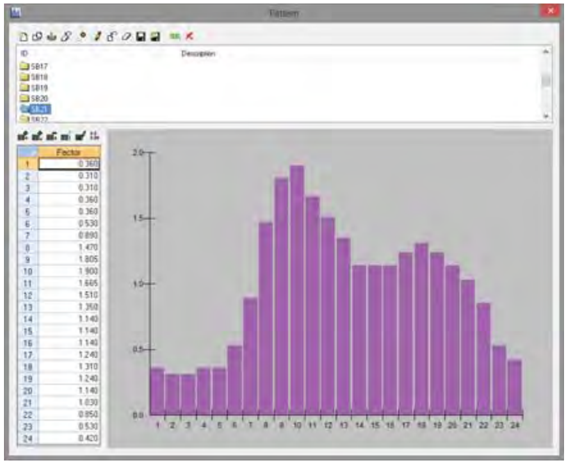
	Factor
1	0.500
2	0.470
3	0.500
4	0.550
5	0.660
6	0.830
7	1.110
8	1.750
9	1.660
10	1.550
11	1.300
12	1.080
13	1.020
14	1.080
15	1.080
16	1.220
17	1.250
18	1.300
19	1.330
20	1.220
21	0.830
22	0.640
23	0.550
24	0.520

SB20



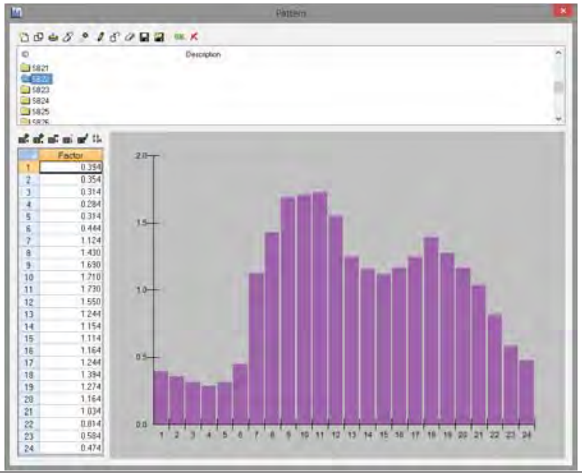
	Factor
1	0.370
2	0.340
3	0.370
4	0.340
5	0.430
6	0.860
7	1.970
8	2.090
9	1.780
10	1.380
11	1.270
12	1.110
13	1.000
14	0.940
15	0.910
16	0.940
17	1.020
18	1.240
19	1.270
20	1.270
21	1.160
22	0.945
23	0.610
24	0.390

SB21



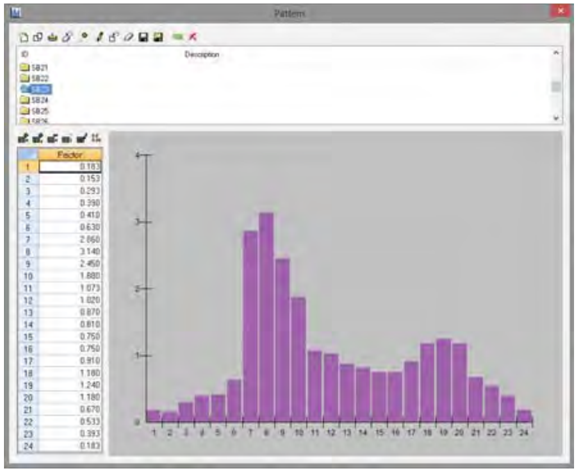
	Factor
1	0.360
2	0.310
3	0.310
4	0.360
5	0.360
6	0.530
7	0.890
8	1.470
9	1.805
10	1.900
11	1.665
12	1.510
13	1.350
14	1.140
15	1.140
16	1.140
17	1.240
18	1.310
19	1.240
20	1.140
21	1.030
22	0.850
23	0.530
24	0.420

SB22



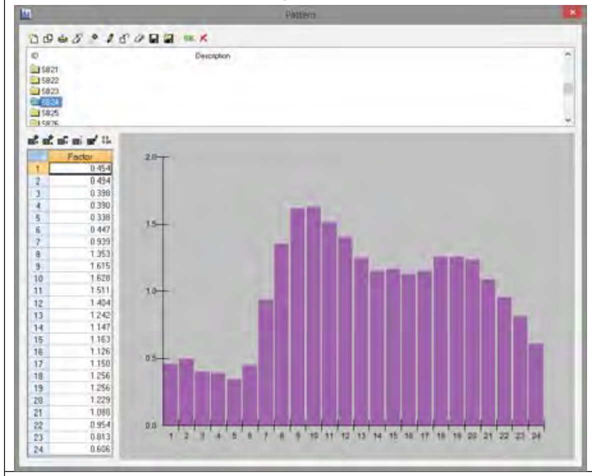
	Factor
1	0.394
2	0.354
3	0.314
4	0.284
5	0.314
6	0.444
7	1.124
8	1.430
9	1.690
10	1.710
11	1.730
12	1.550
13	1.244
14	1.154
15	1.114
16	1.164
17	1.244
18	1.394
19	1.274
20	1.164
21	1.034
22	0.814
23	0.584
24	0.474

SB23



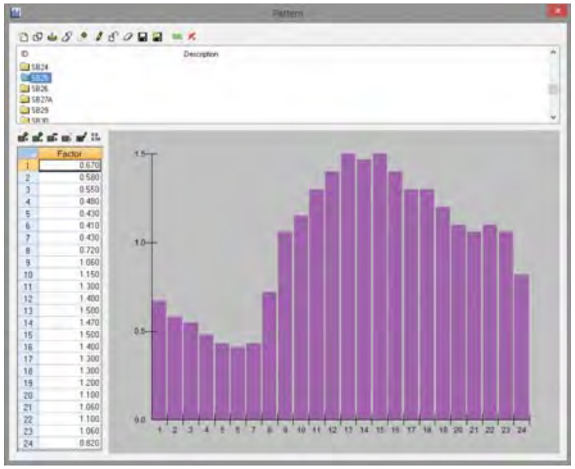
	Factor
1	0.183
2	0.153
3	0.293
4	0.390
5	0.410
6	0.630
7	2.860
8	3.140
9	2.450
10	1.880
11	1.073
12	1.020
13	0.870
14	0.810
15	0.750
16	0.750
17	0.910
18	1.180
19	1.240
20	1.180
21	0.670
22	0.533
23	0.393
24	0.183

SB24



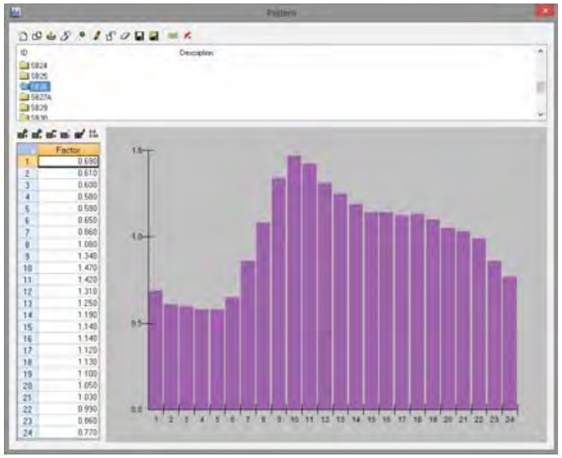
	Factor
1	0.454
2	0.494
3	0.398
4	0.390
5	0.338
6	0.447
7	0.939
8	1.353
9	1.615
10	1.628
11	1.511
12	1.404
13	1.242
14	1.147
15	1.163
16	1.126
17	1.150
18	1.256
19	1.256
20	1.229
21	1.080
22	0.954
23	0.813
24	0.606

SB25



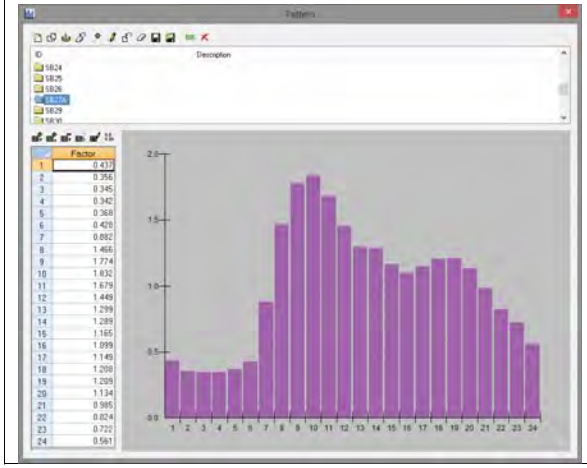
	Factor
1	0.670
2	0.580
3	0.550
4	0.480
5	0.430
6	0.410
7	0.430
8	0.720
9	1.060
10	1.150
11	1.300
12	1.400
13	1.500
14	1.470
15	1.500
16	1.400
17	1.300
18	1.300
19	1.200
20	1.100
21	1.060
22	1.100
23	1.060
24	0.820

SB26



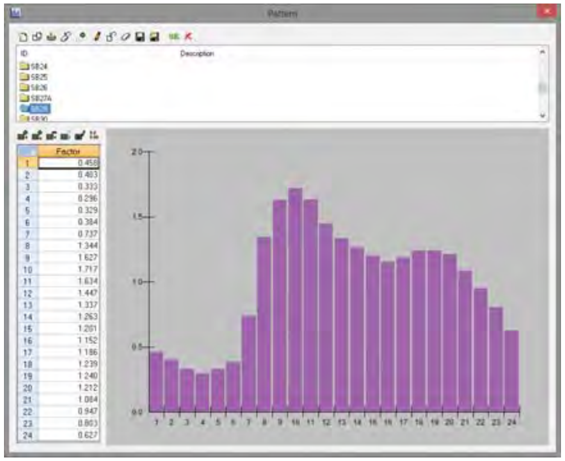
	Factor
1	0.690
2	0.610
3	0.600
4	0.580
5	0.580
6	0.650
7	0.860
8	1.080
9	1.340
10	1.470
11	1.420
12	1.310
13	1.250
14	1.190
15	1.140
16	1.140
17	1.120
18	1.130
19	1.100
20	1.050
21	1.030
22	0.990
23	0.860
24	0.770

SB27A



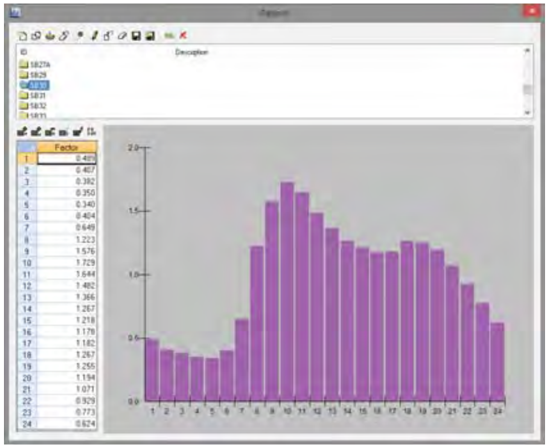
	Factor
1	0.437
2	0.356
3	0.345
4	0.342
5	0.368
6	0.428
7	0.882
8	1.466
9	1.774
10	1.832
11	1.679
12	1.449
13	1.299
14	1.289
15	1.165
16	1.099
17	1.149
18	1.208
19	1.209
20	1.134
21	0.985
22	0.824
23	0.722
24	0.561

SB29



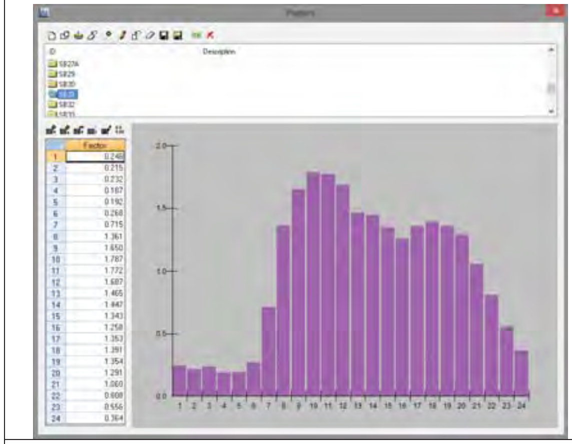
	Factor
1	0.458
2	0.403
3	0.333
4	0.296
5	0.329
6	0.384
7	0.737
8	1.344
9	1.627
10	1.717
11	1.634
12	1.447
13	1.337
14	1.263
15	1.201
16	1.152
17	1.186
18	1.239
19	1.240
20	1.212
21	1.084
22	0.947
23	0.803
24	0.627

SB30



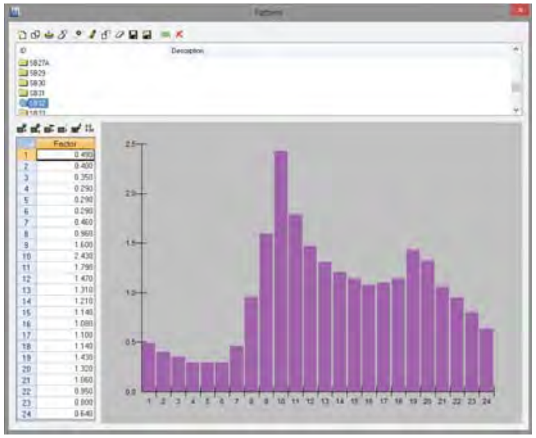
	Factor
1	0.489
2	0.407
3	0.382
4	0.350
5	0.340
6	0.404
7	0.649
8	1.223
9	1.576
10	1.729
11	1.644
12	1.482
13	1.366
14	1.267
15	1.218
16	1.178
17	1.182
18	1.267
19	1.255
20	1.194
21	1.071
22	0.929
23	0.773
24	0.624

SB31



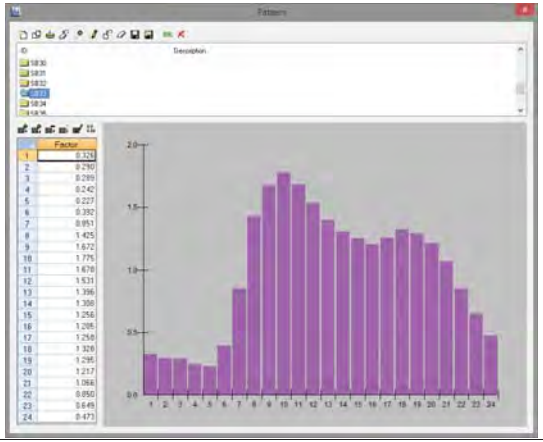
	Factor
1	0.248
2	0.215
3	0.232
4	0.187
5	0.192
6	0.268
7	0.715
8	1.361
9	1.650
10	1.787
11	1.772
12	1.687
13	1.465
14	1.447
15	1.343
16	1.258
17	1.353
18	1.391
19	1.354
20	1.291
21	1.060
22	0.608
23	0.556
24	0.364

SB32



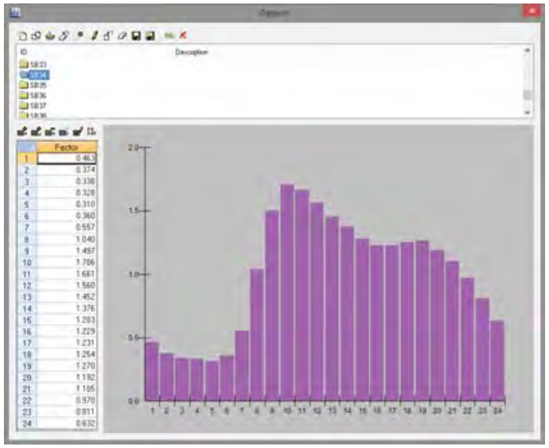
	Factor
1	0.490
2	0.400
3	0.350
4	0.290
5	0.290
6	0.290
7	0.460
8	0.960
9	1.600
10	2.430
11	1.790
12	1.470
13	1.310
14	1.210
15	1.140
16	1.080
17	1.100
18	1.140
19	1.430
20	1.320
21	1.060
22	0.950
23	0.800
24	0.640

SB33



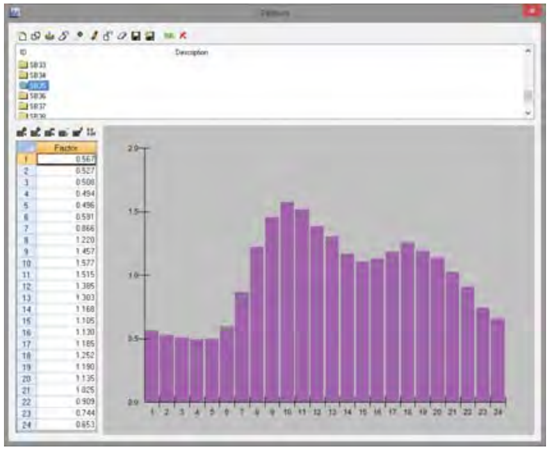
	Factor
1	0.326
2	0.290
3	0.289
4	0.242
5	0.227
6	0.392
7	0.851
8	1.425
9	1.672
10	1.775
11	1.678
12	1.531
13	1.396
14	1.308
15	1.256
16	1.205
17	1.258
18	1.328
19	1.295
20	1.217
21	1.066
22	0.850
23	0.649
24	0.473

SB34



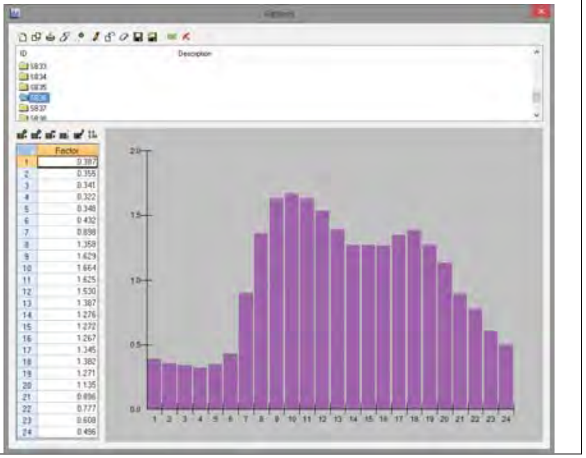
	Factor
1	0.463
2	0.374
3	0.338
4	0.328
5	0.310
6	0.360
7	0.557
8	1.040
9	1.497
10	1.706
11	1.661
12	1.560
13	1.452
14	1.376
15	1.283
16	1.229
17	1.231
18	1.254
19	1.270
20	1.192
21	1.105
22	0.970
23	0.811
24	0.632

SB35



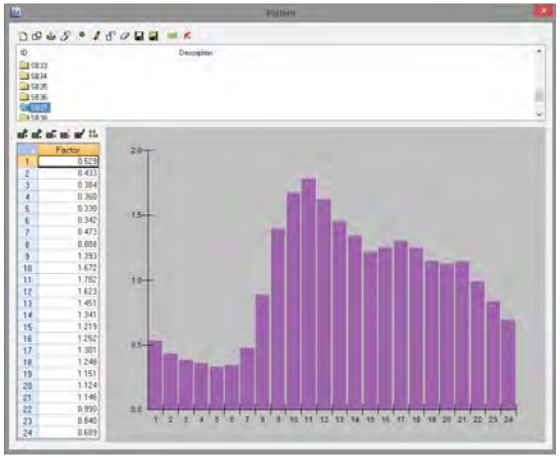
	Factor
1	0.567
2	0.527
3	0.508
4	0.494
5	0.496
6	0.591
7	0.866
8	1.220
9	1.457
10	1.577
11	1.515
12	1.385
13	1.303
14	1.168
15	1.105
16	1.130
17	1.185
18	1.252
19	1.190
20	1.135
21	1.025
22	0.909
23	0.744
24	0.653

SB36



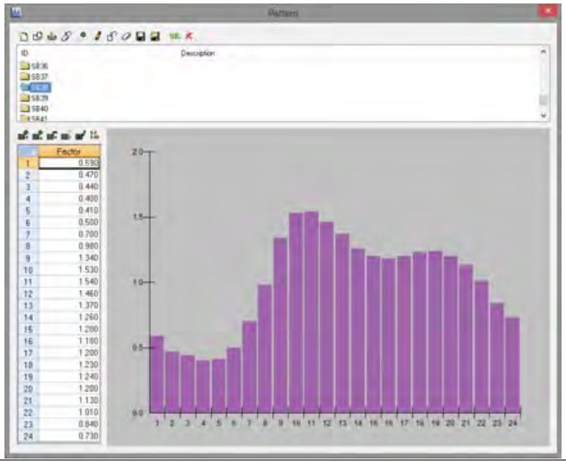
	Factor
1	0.387
2	0.355
3	0.341
4	0.322
5	0.348
6	0.432
7	0.898
8	1.358
9	1.629
10	1.664
11	1.625
12	1.530
13	1.387
14	1.276
15	1.272
16	1.267
17	1.345
18	1.382
19	1.271
20	1.135
21	0.896
22	0.777
23	0.608
24	0.496

SB37



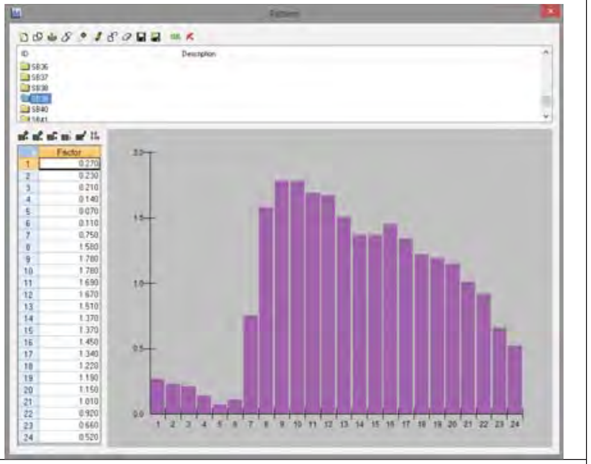
	Factor
1	0.529
2	0.433
3	0.384
4	0.360
5	0.330
6	0.342
7	0.473
8	0.888
9	1.393
10	1.672
11	1.782
12	1.623
13	1.451
14	1.341
15	1.219
16	1.252
17	1.301
18	1.248
19	1.151
20	1.124
21	1.146
22	0.990
23	0.840
24	0.689

SB38



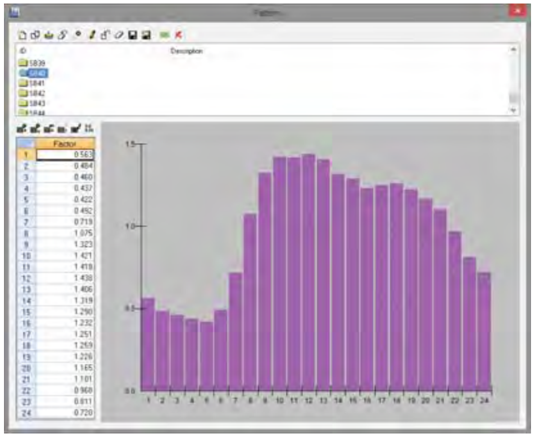
	Factor
1	0.590
2	0.470
3	0.440
4	0.400
5	0.410
6	0.500
7	0.700
8	0.980
9	1.340
10	1.530
11	1.540
12	1.460
13	1.370
14	1.260
15	1.200
16	1.180
17	1.200
18	1.230
19	1.240
20	1.200
21	1.130
22	1.010
23	0.840
24	0.730

SB39



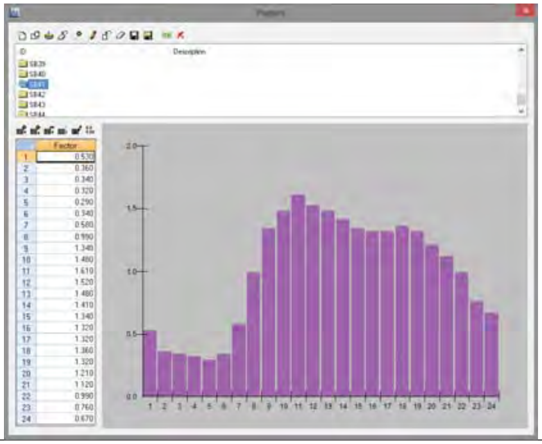
	Factor
1	0.270
2	0.230
3	0.210
4	0.140
5	0.070
6	0.110
7	0.750
8	1.580
9	1.780
10	1.780
11	1.690
12	1.670
13	1.510
14	1.370
15	1.370
16	1.450
17	1.340
18	1.220
19	1.190
20	1.150
21	1.010
22	0.920
23	0.660
24	0.520

SB40



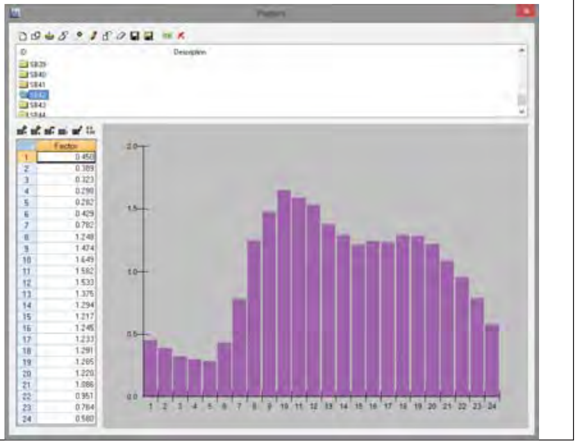
	Factor
1	0.563
2	0.484
3	0.460
4	0.437
5	0.422
6	0.492
7	0.719
8	1.075
9	1.323
10	1.421
11	1.419
12	1.438
13	1.406
14	1.319
15	1.290
16	1.232
17	1.251
18	1.259
19	1.226
20	1.165
21	1.101
22	0.960
23	0.811
24	0.720

SB41



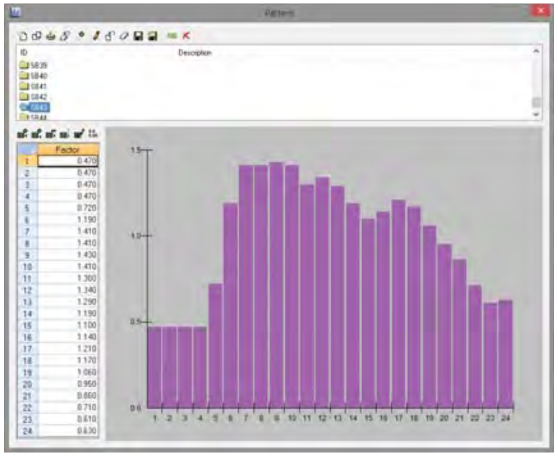
	Factor
1	0.530
2	0.360
3	0.340
4	0.320
5	0.290
6	0.340
7	0.580
8	0.990
9	1.340
10	1.480
11	1.610
12	1.520
13	1.480
14	1.410
15	1.340
16	1.320
17	1.320
18	1.360
19	1.320
20	1.210
21	1.120
22	0.990
23	0.760
24	0.670

SB42



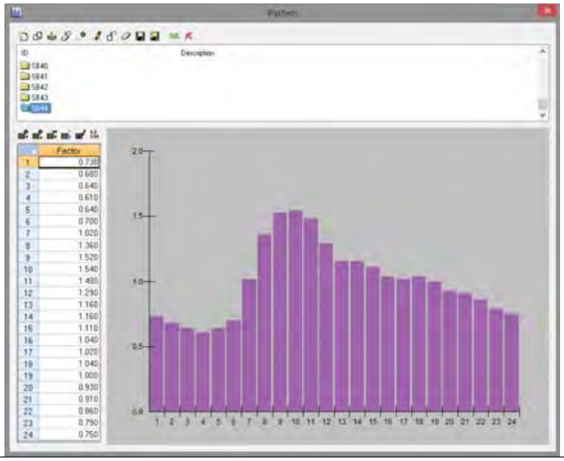
	Factor
1	0.450
2	0.389
3	0.323
4	0.298
5	0.282
6	0.429
7	0.782
8	1.248
9	1.474
10	1.649
11	1.582
12	1.533
13	1.375
14	1.294
15	1.217
16	1.245
17	1.233
18	1.291
19	1.265
20	1.220
21	1.086
22	0.951
23	0.784
24	0.580

SB43



	Factor
1	0.470
2	0.470
3	0.470
4	0.470
5	0.720
6	1.190
7	1.410
8	1.410
9	1.430
10	1.410
11	1.300
12	1.340
13	1.290
14	1.190
15	1.100
16	1.140
17	1.210
18	1.170
19	1.060
20	0.950
21	0.860
22	0.710
23	0.610
24	0.630

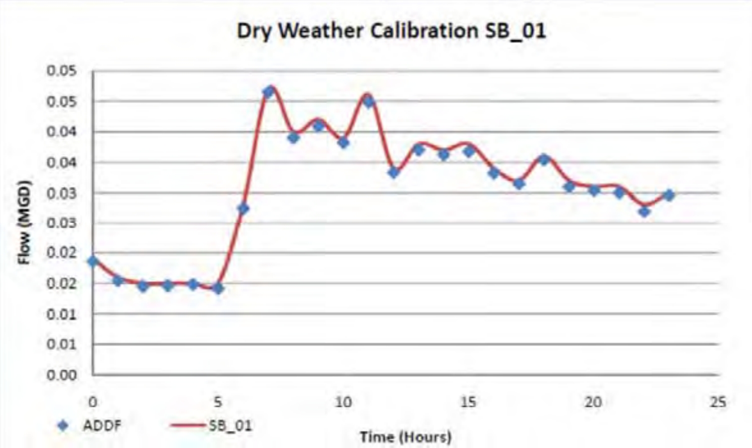
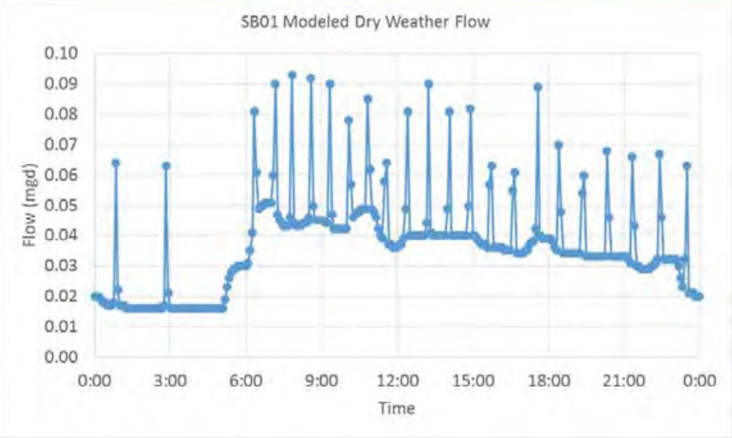
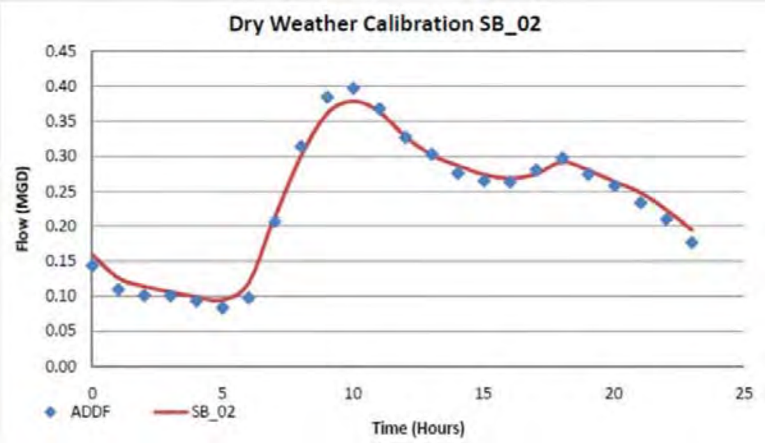
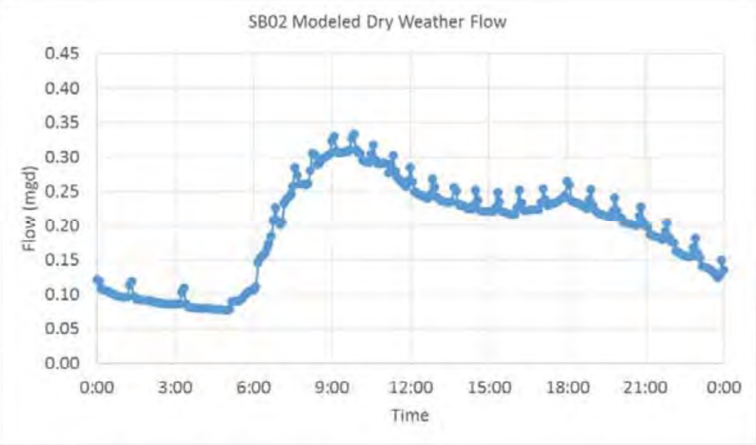
SB44

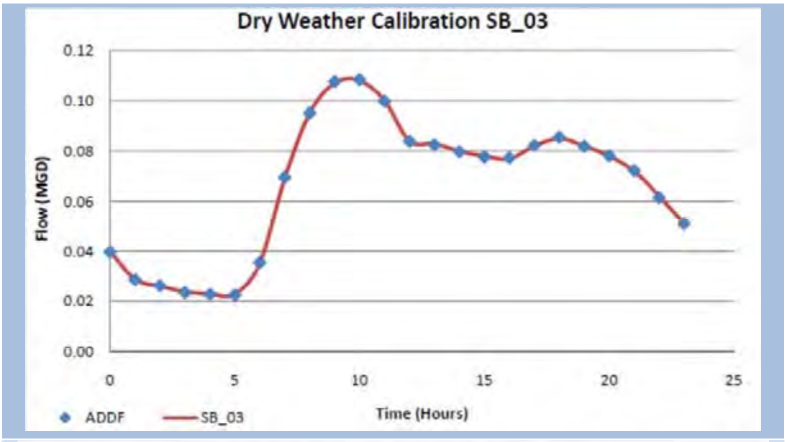
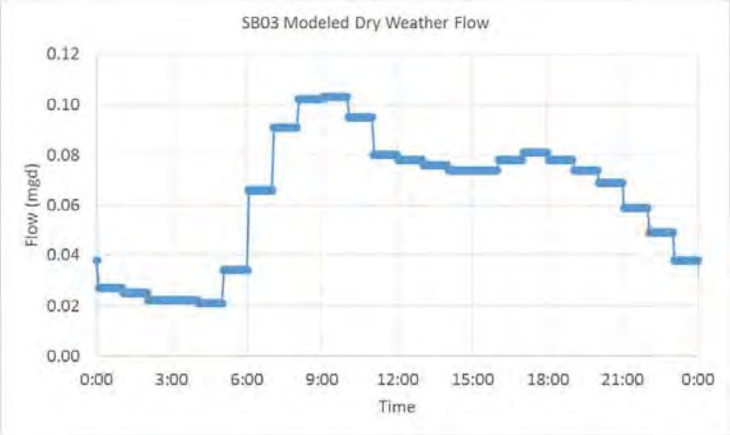
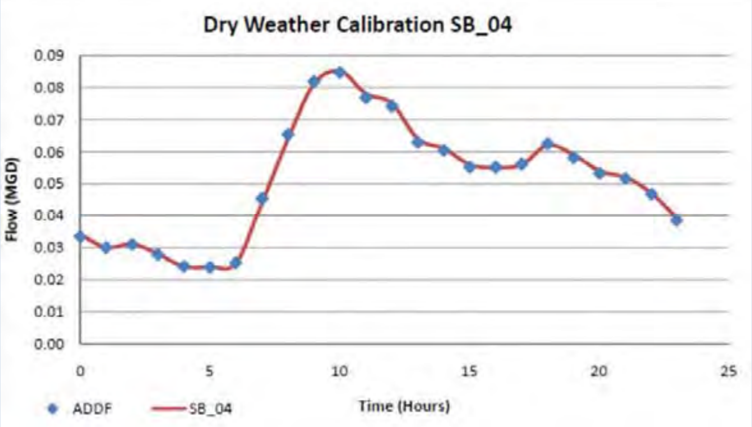
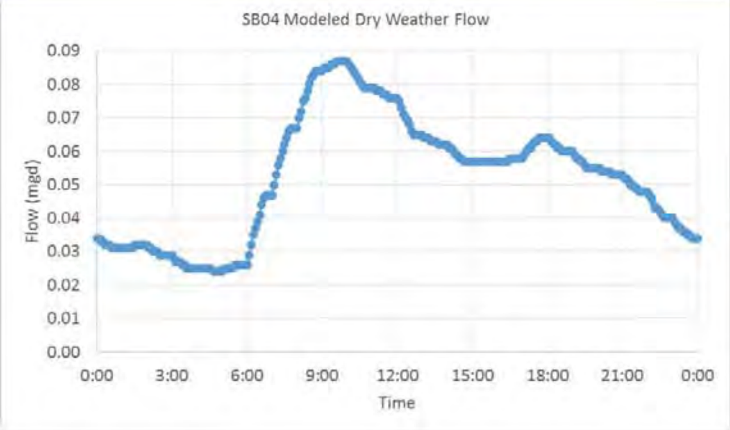


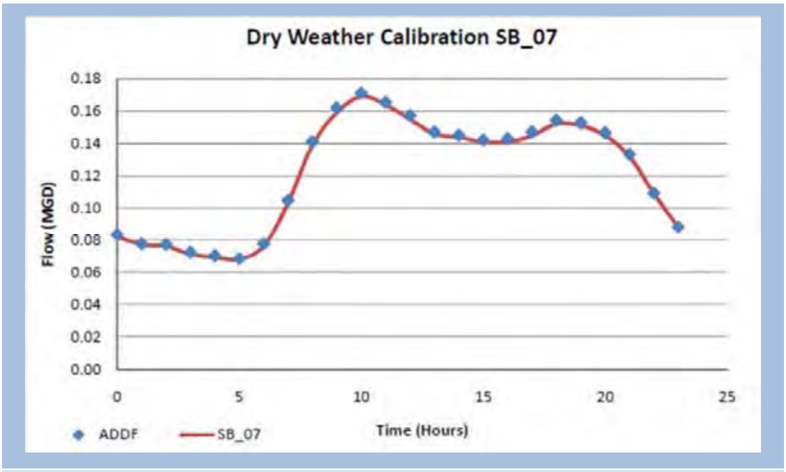
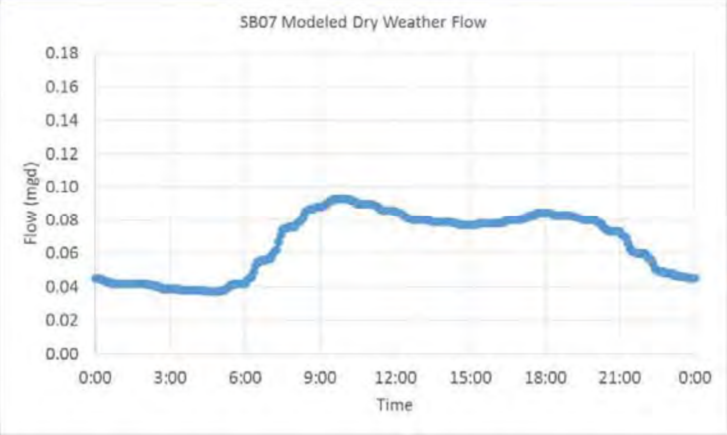
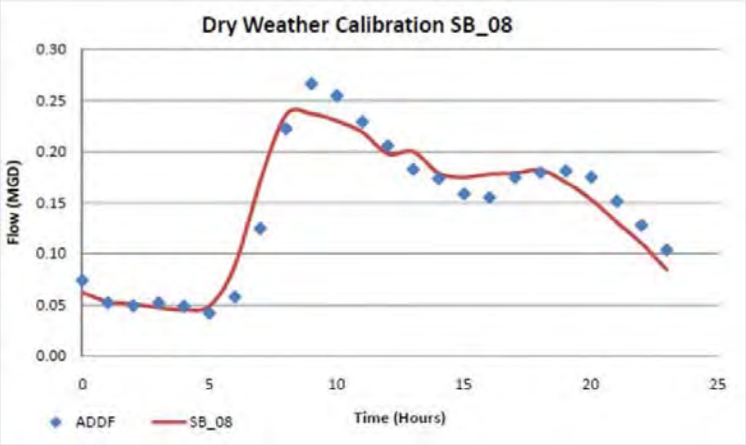
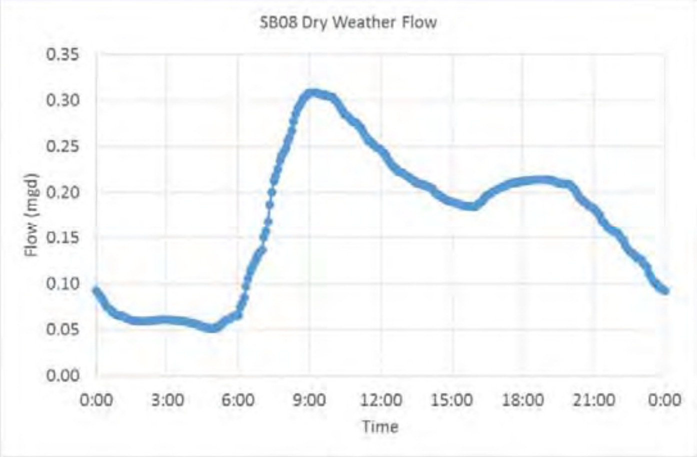
	Factor
1	0.730
2	0.680
3	0.640
4	0.610
5	0.640
6	0.700
7	1.020
8	1.360
9	1.520
10	1.540
11	1.480
12	1.290
13	1.160
14	1.160
15	1.110
16	1.040
17	1.020
18	1.040
19	1.000
20	0.930
21	0.910
22	0.860
23	0.790
24	0.750

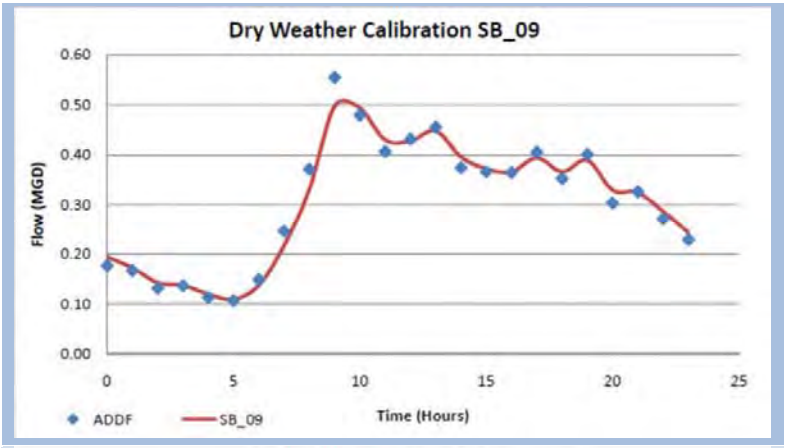
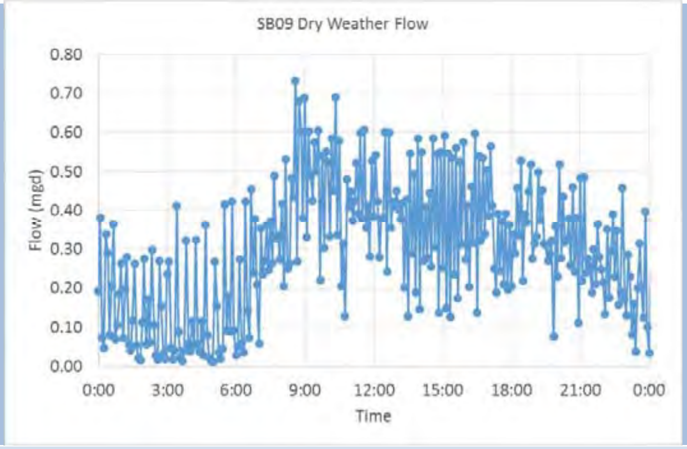
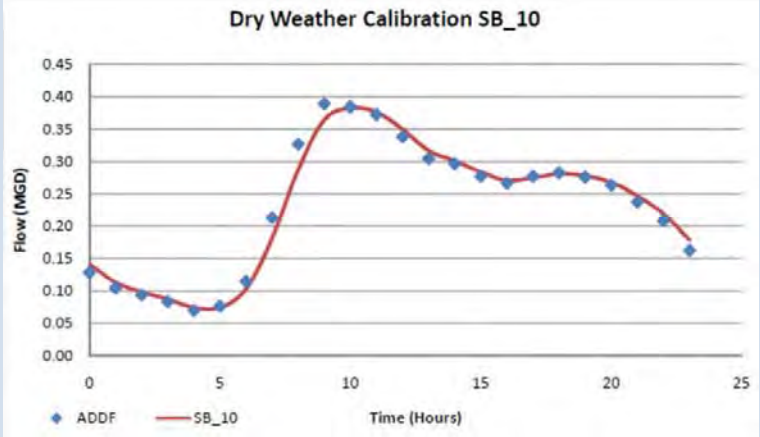
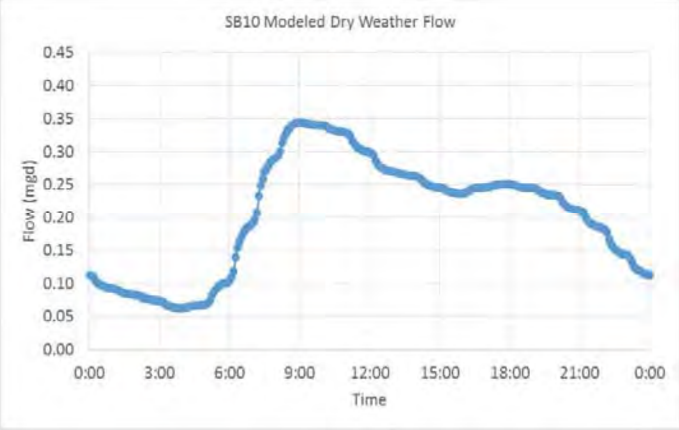
APPENDIX B. MODELED AND OBSERVED HYDROGRAPHS

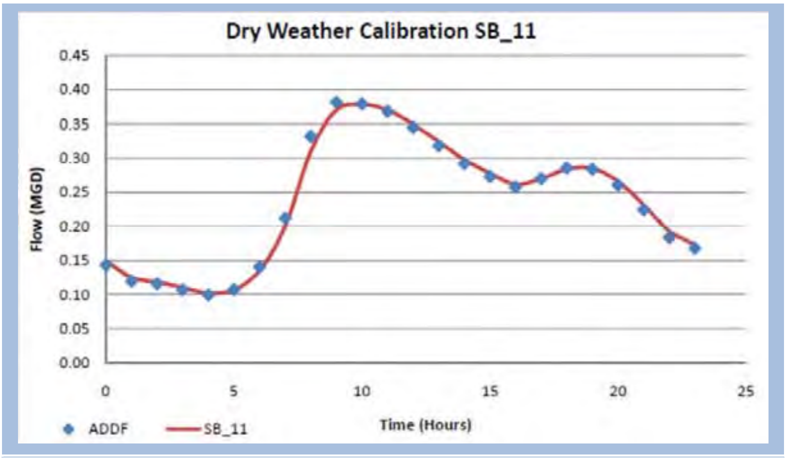
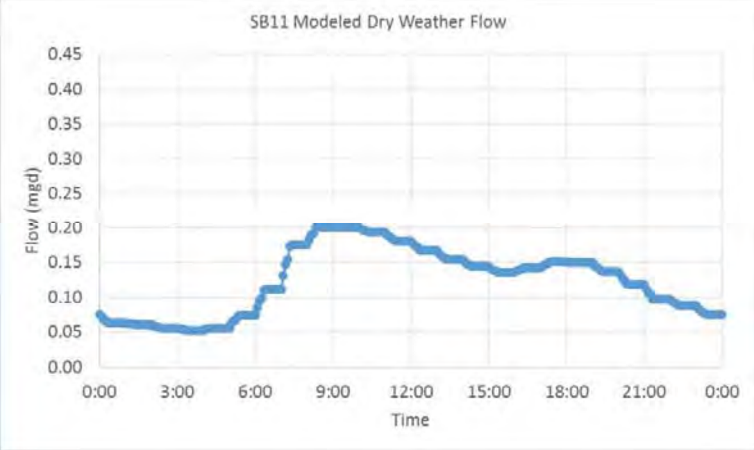
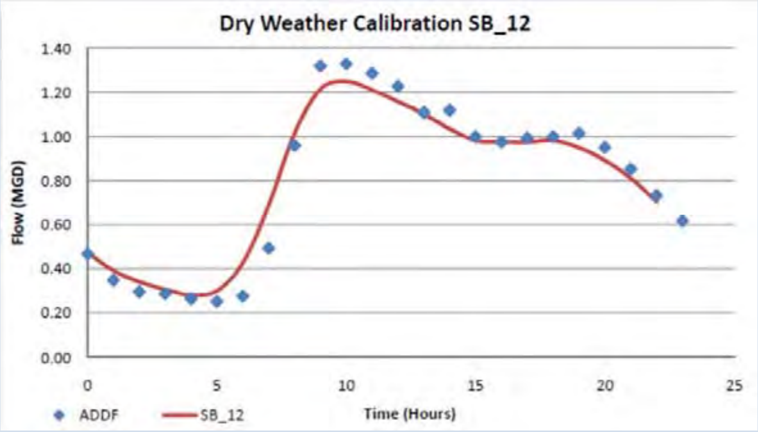
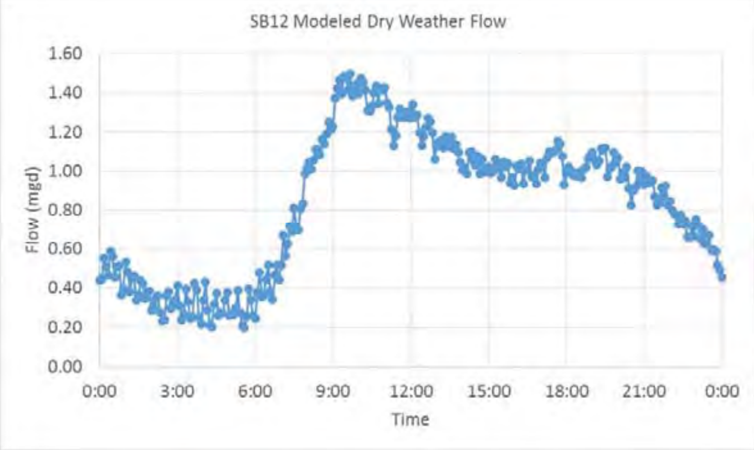
Dry Weather

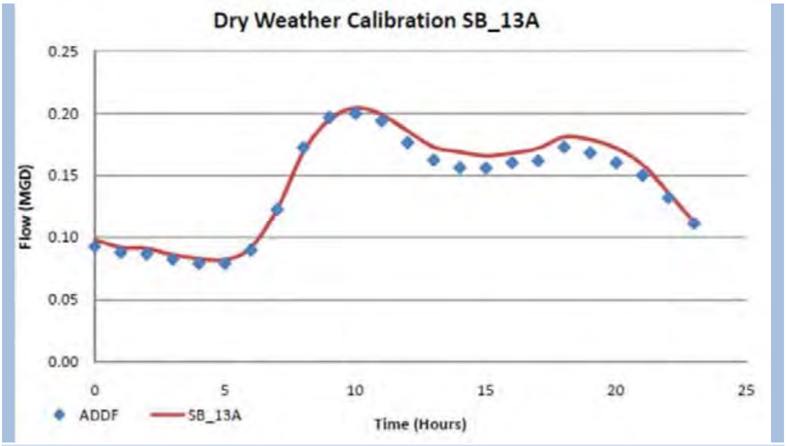
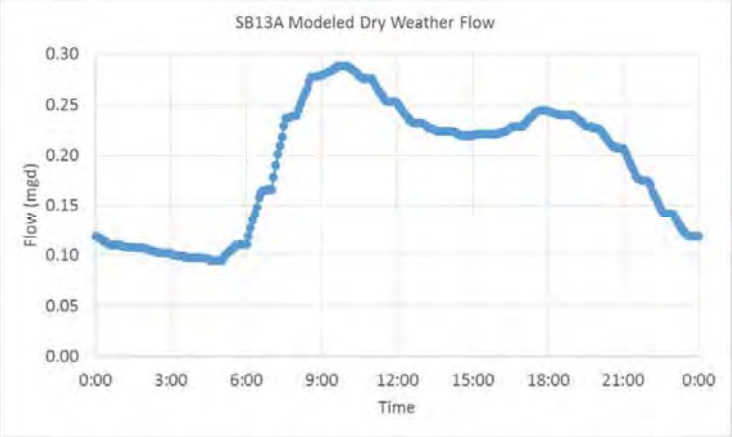
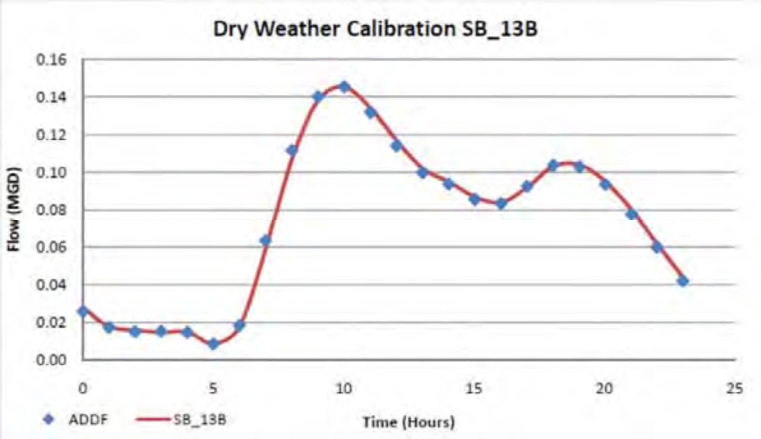
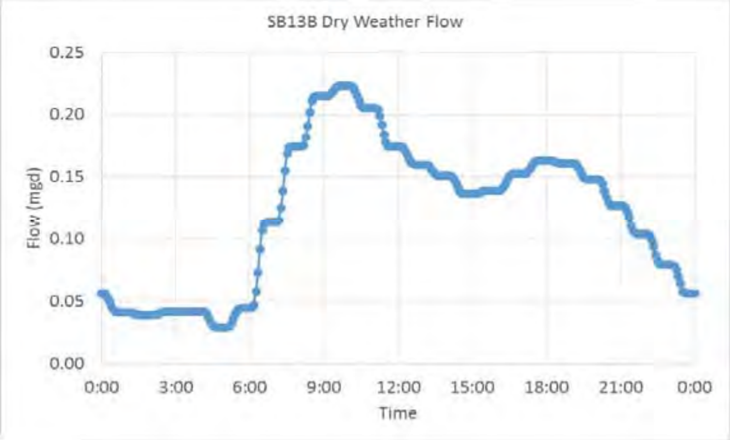
Meter ID	Run	Observed	Updated Model Results
SB01	Dry Weather		
SB02	Dry Weather		

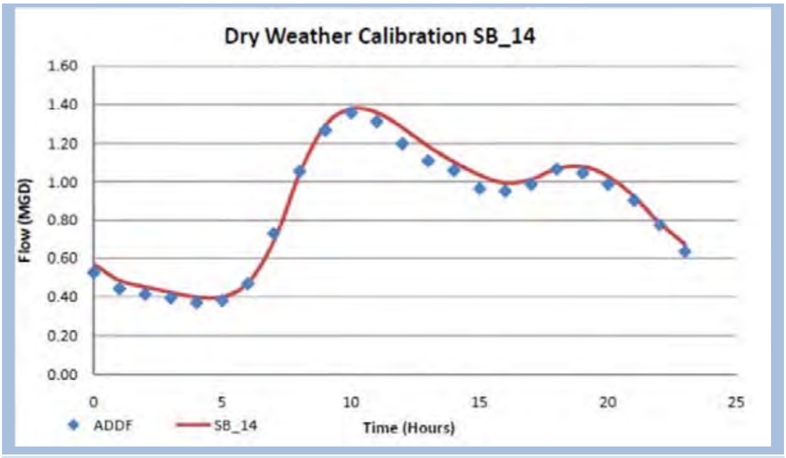
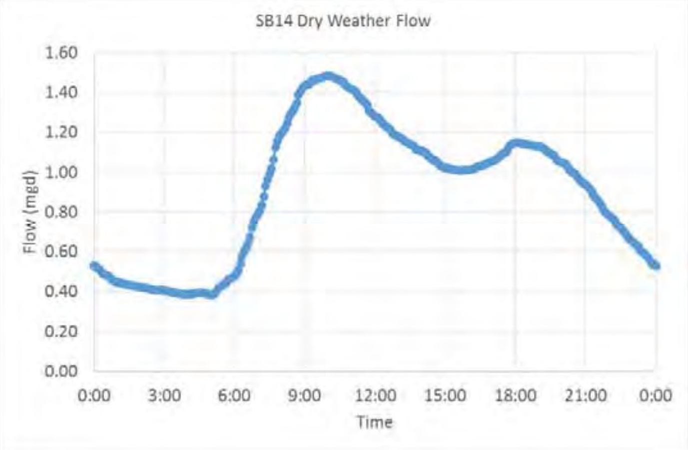
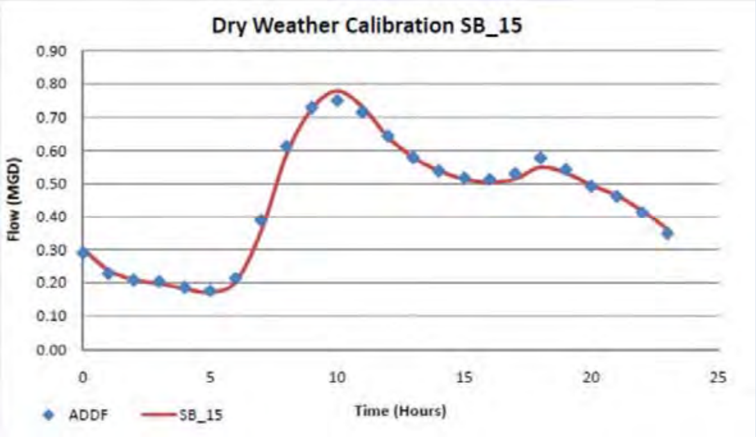
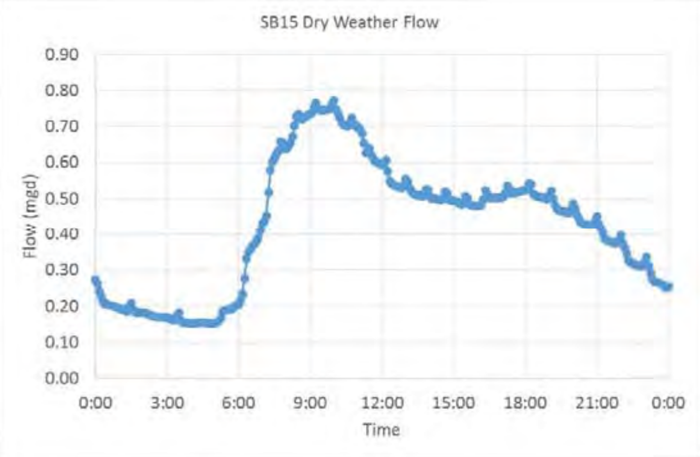
Meter ID	Run	Observed	Updated Model Results
SB03	Dry Weather		
SB04	Dry Weather		

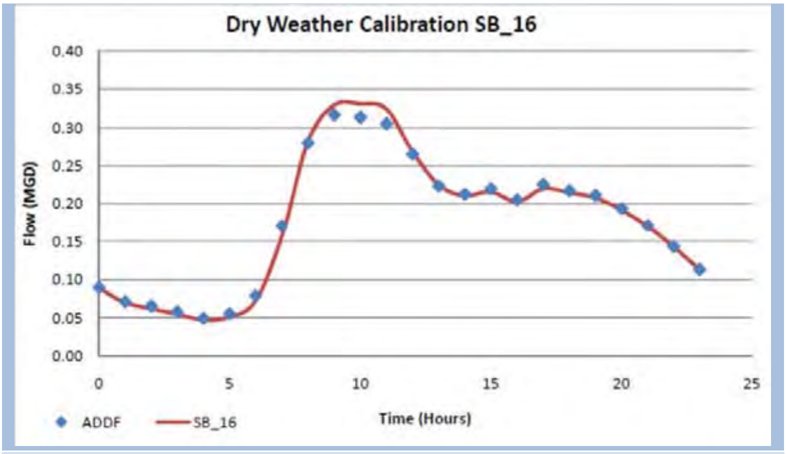
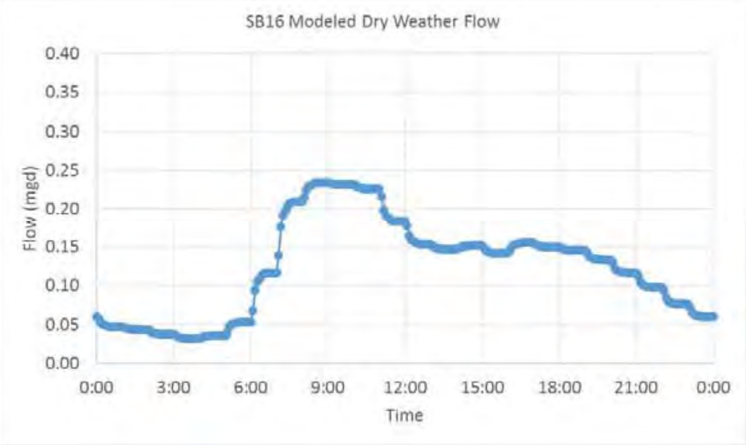
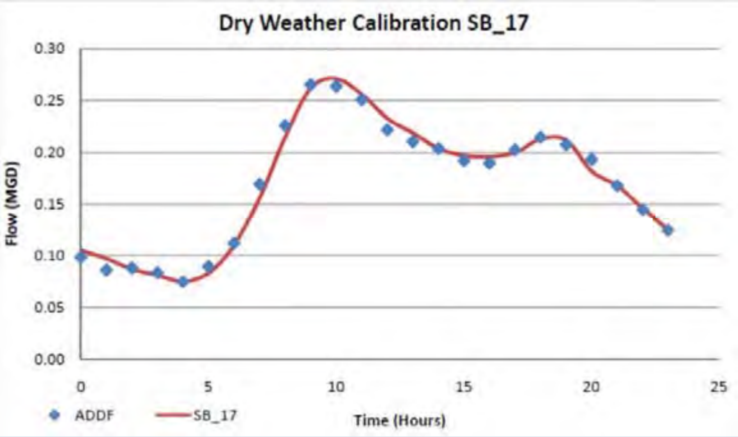
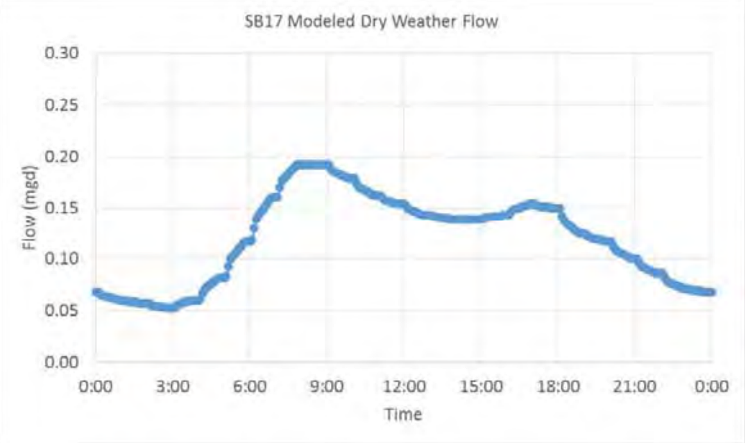
Meter ID	Run	Observed	Updated Model Results
SB07	Dry Weather		
SB08	Dry Weather		

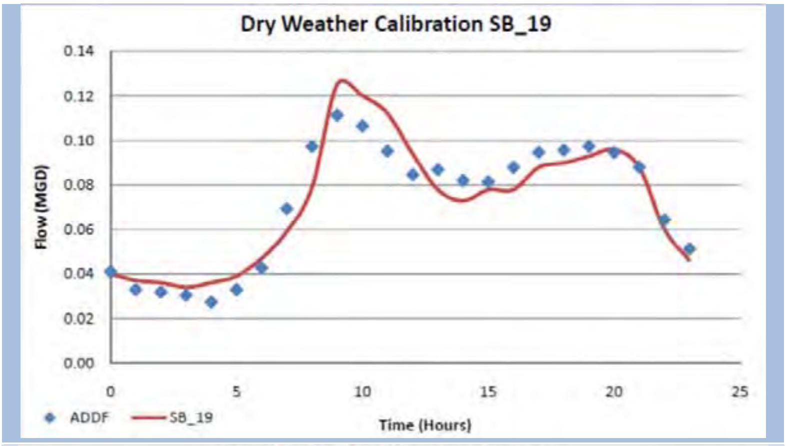
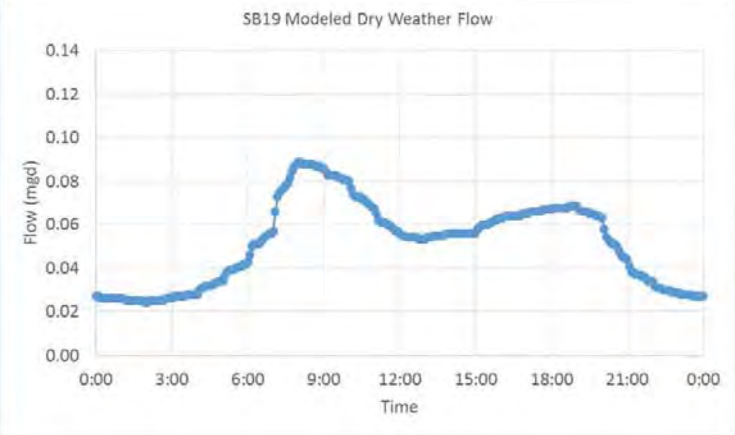
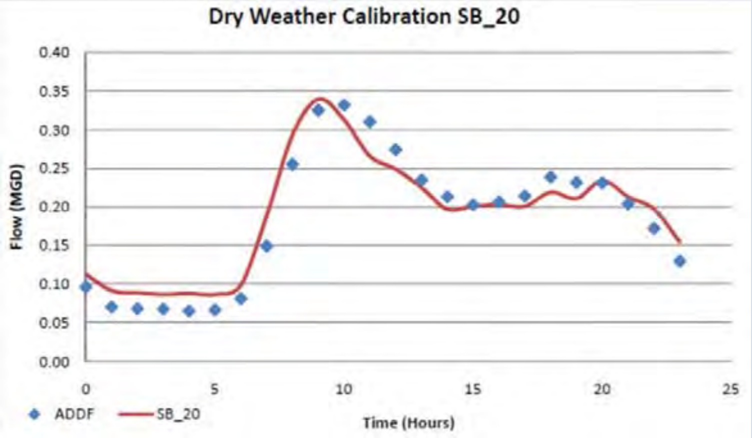
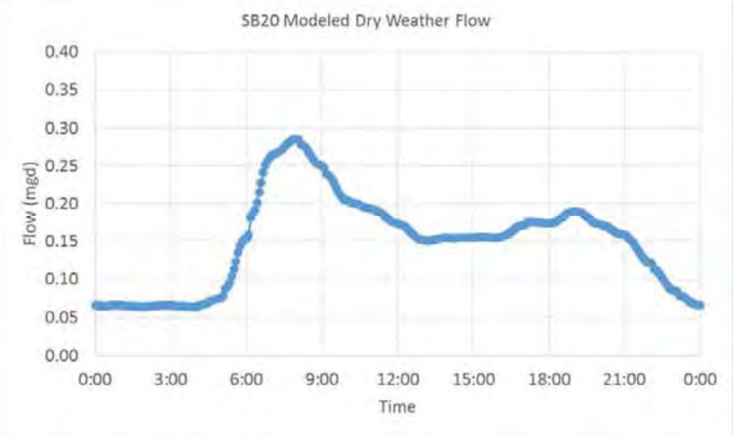
Meter ID	Run	Observed	Updated Model Results
SB09	Dry Weather		
SB10	Dry Weather		

Meter ID	Run	Observed	Updated Model Results
SB11	Dry Weather		
SB12	Dry Weather		

Meter ID	Run	Observed	Updated Model Results
SB13A	Dry Weather		
SB13B	Dry Weather		

Meter ID	Run	Observed	Updated Model Results
SB14	Dry Weather		
SB15	Dry Weather		

Meter ID	Run	Observed	Updated Model Results
SB16	Dry Weather		
SB17	Dry Weather		

Meter ID	Run	Observed	Updated Model Results
SB19	Dry Weather		
SB20	Dry Weather		

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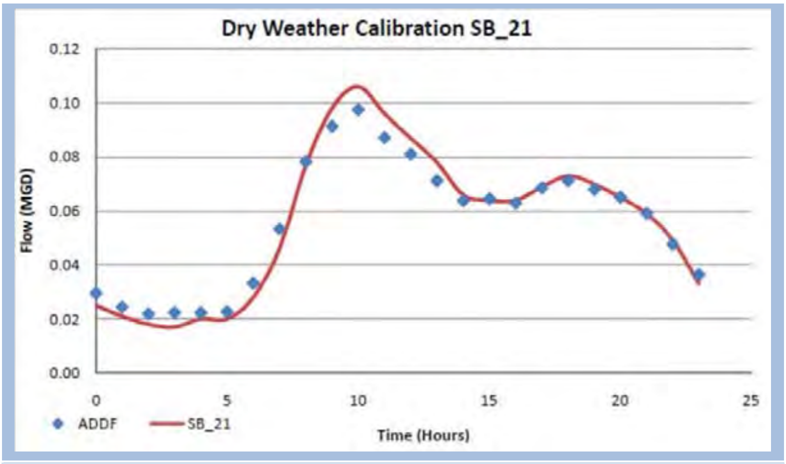
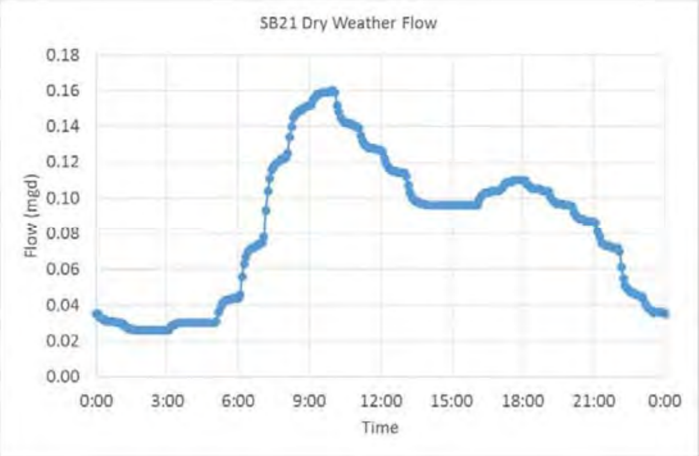
<tr><td>SB21</td><td>Dry Weather</td><td>
</td><td>
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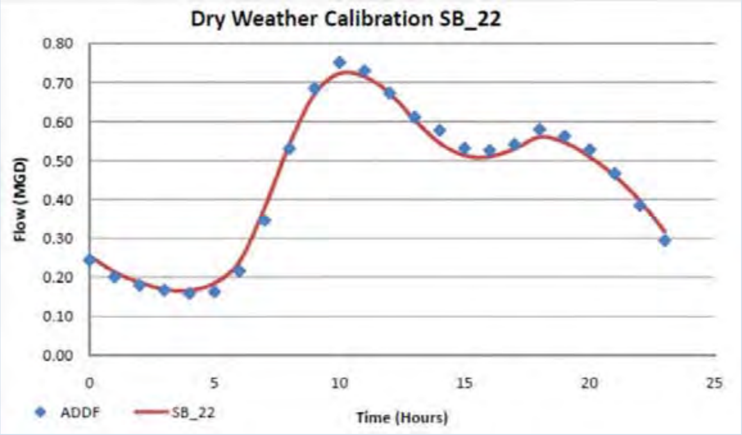
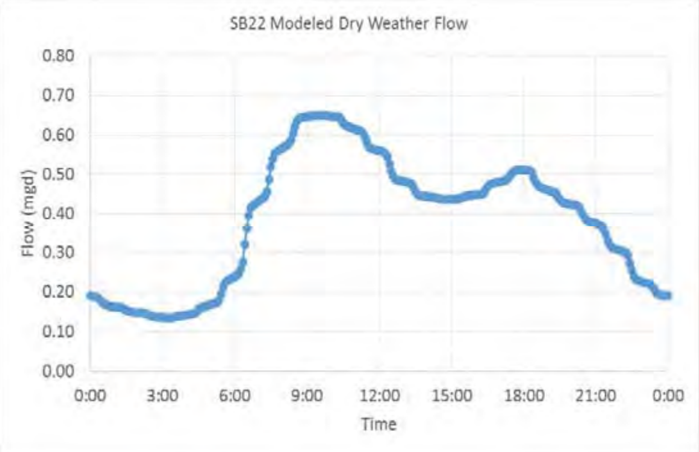
<tr><td>SB22</td><td>Dry Weather</td><td>
</td><td>
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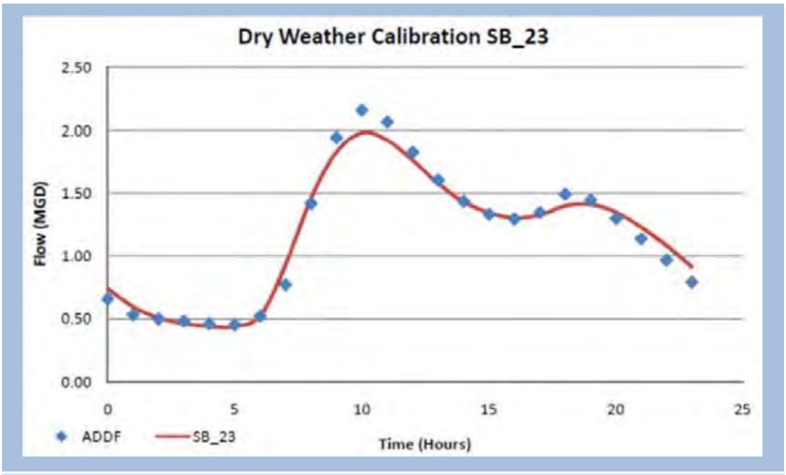
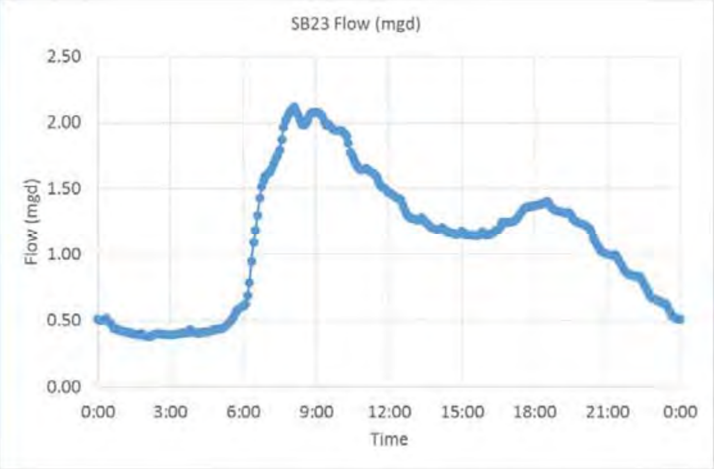
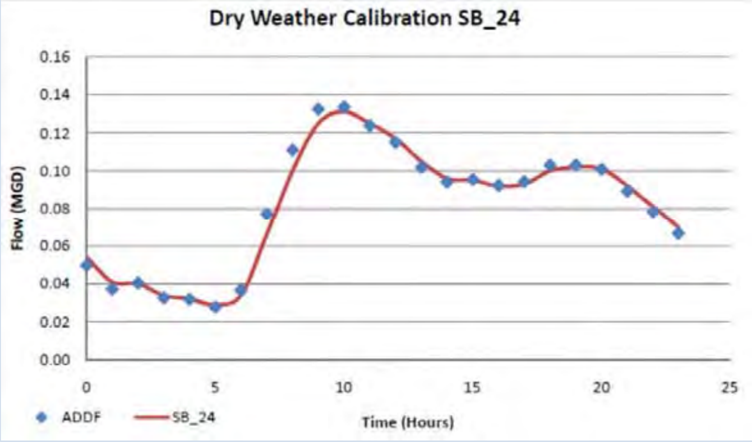
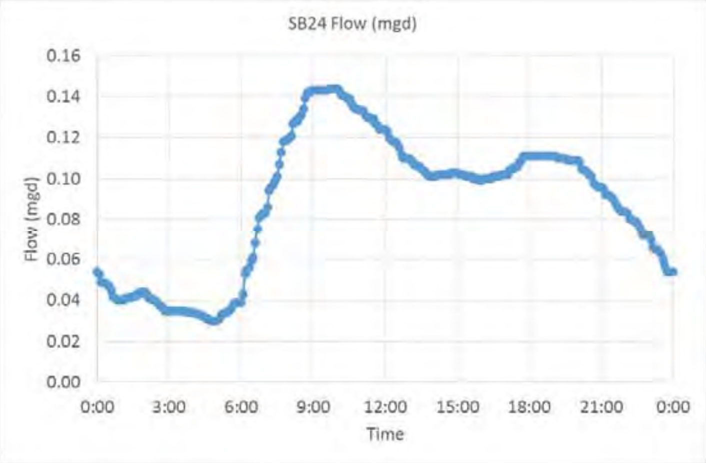
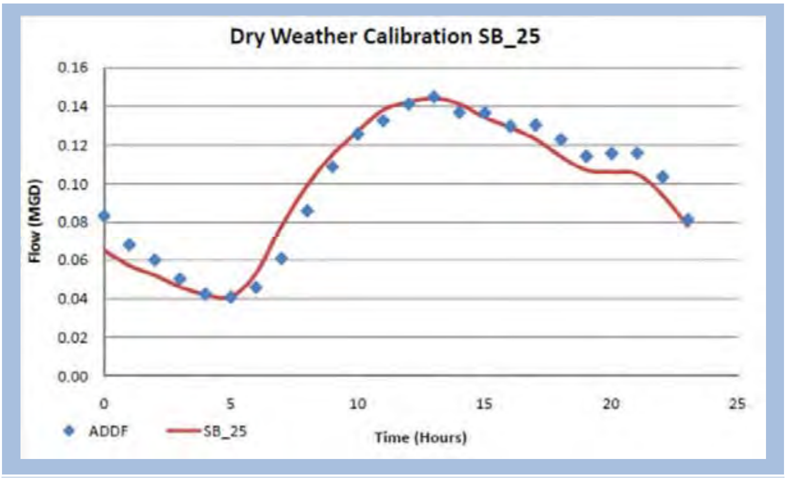
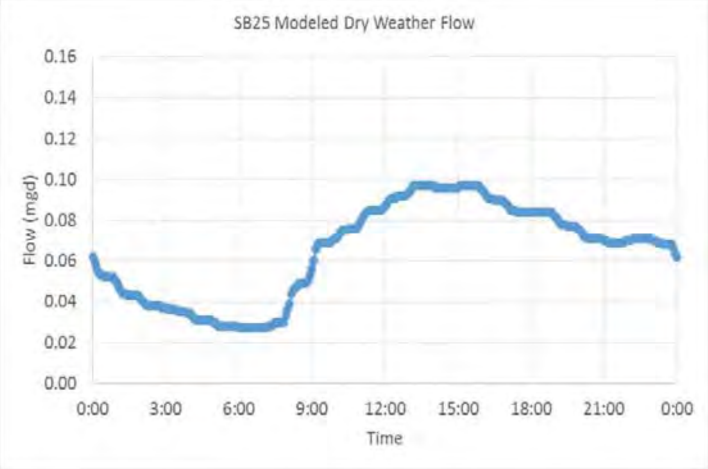
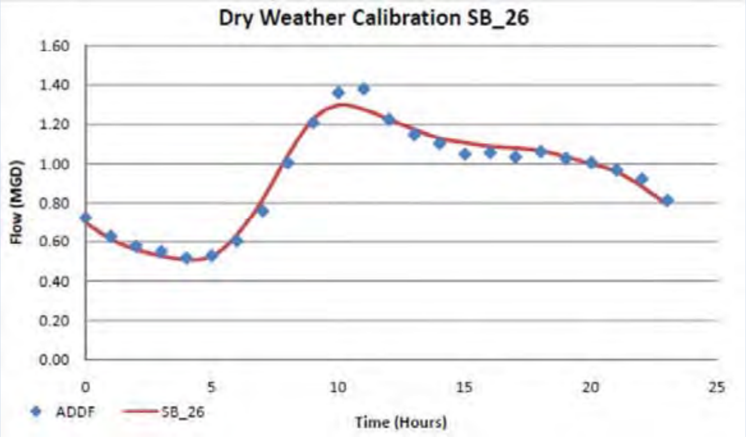
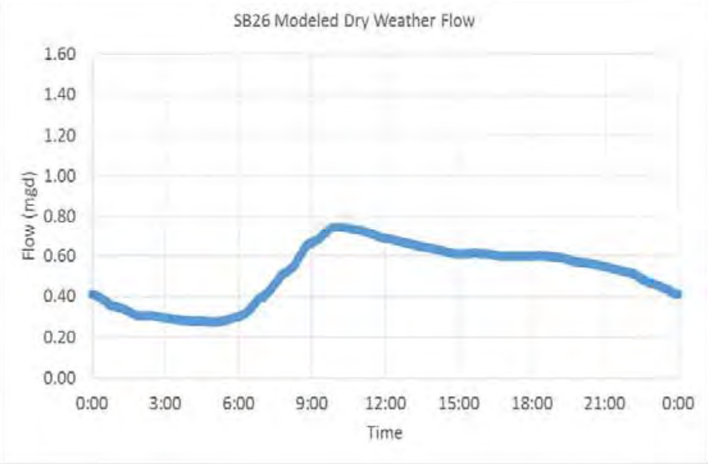
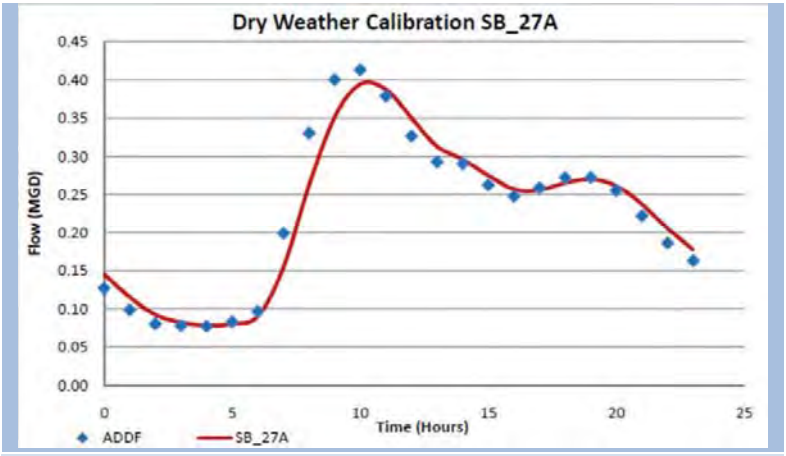
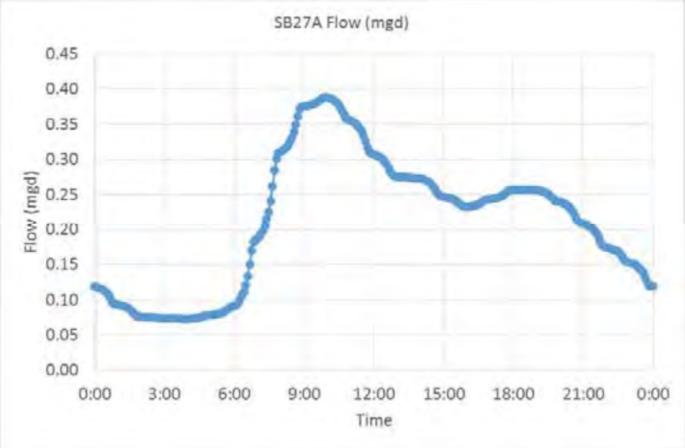
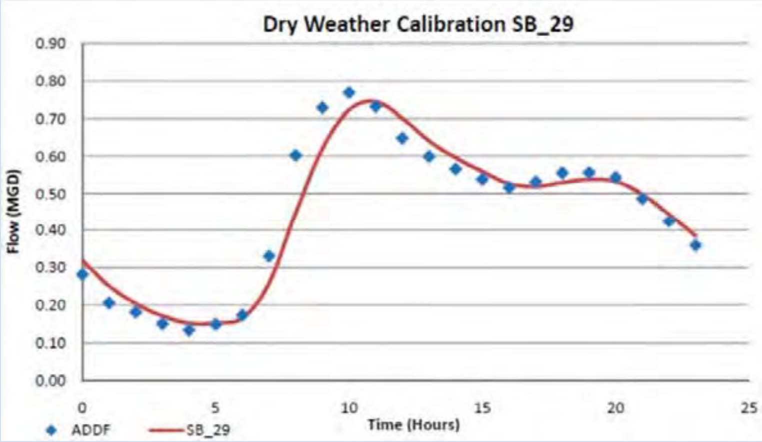
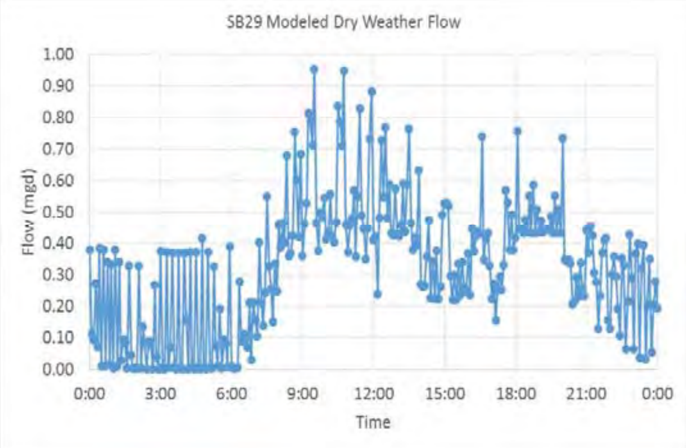
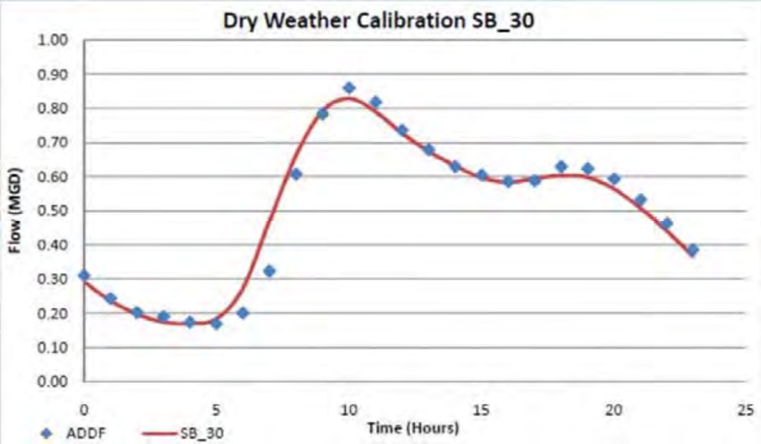
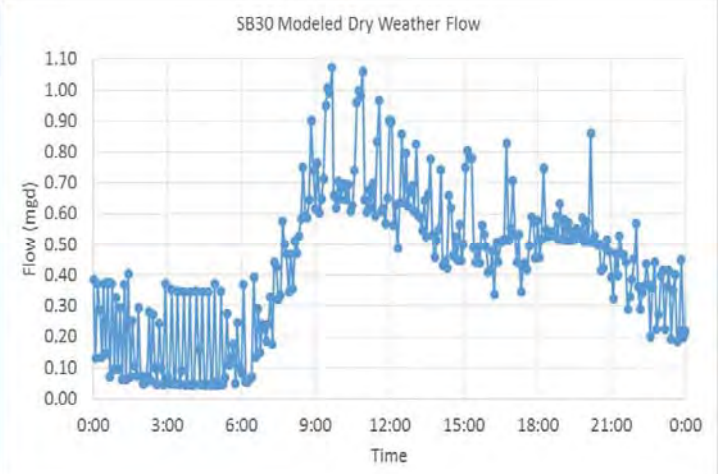
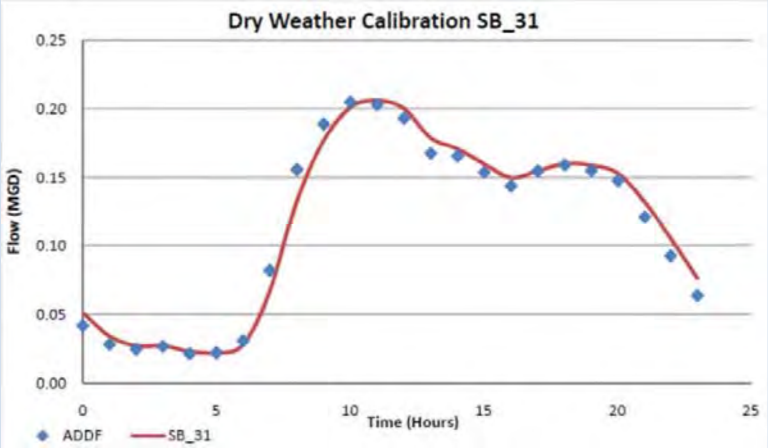
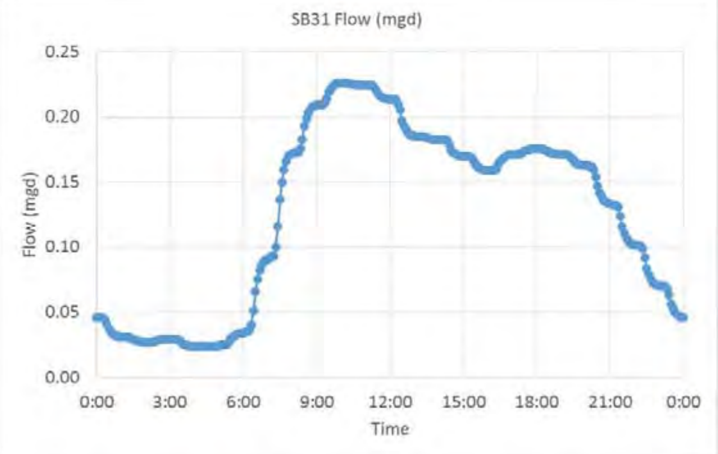
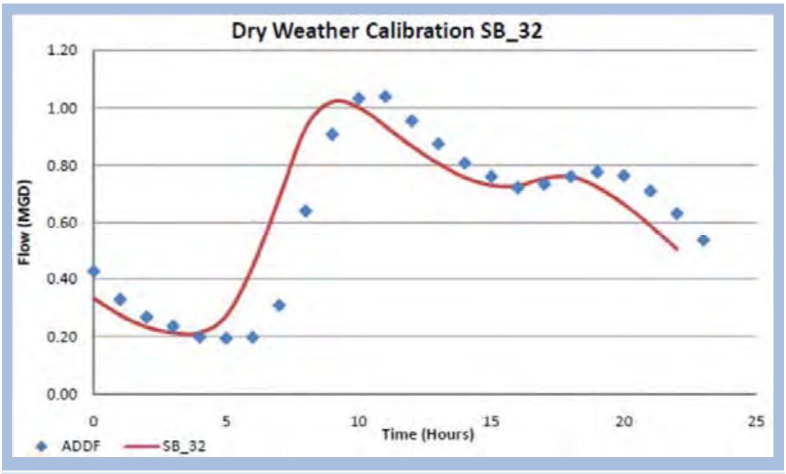
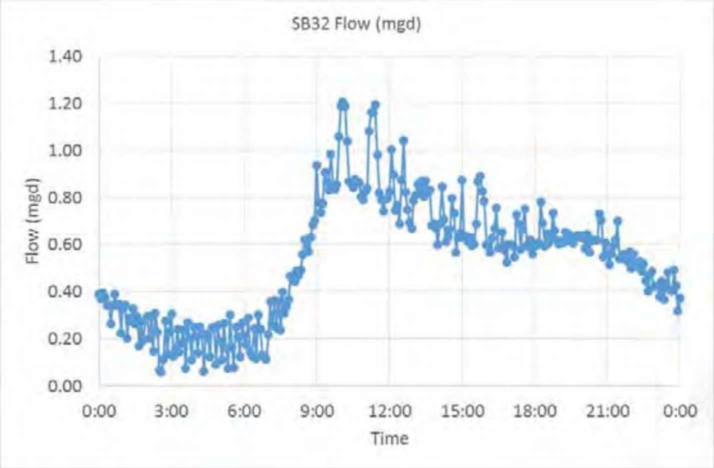
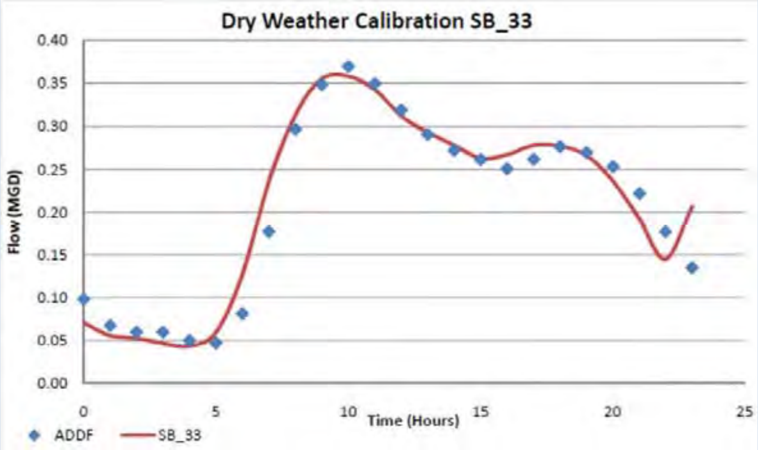
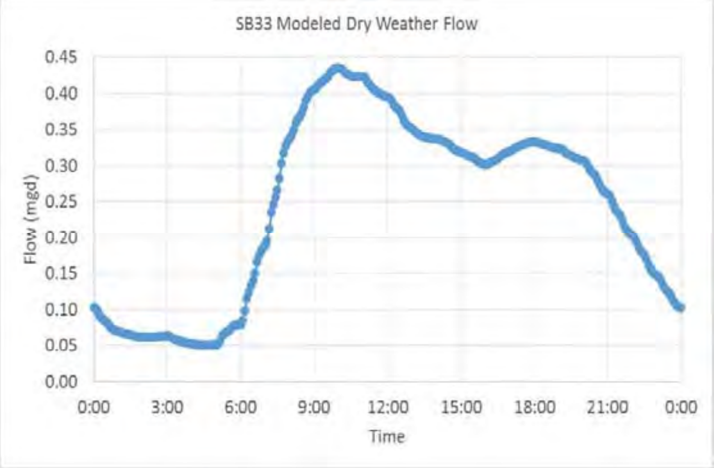
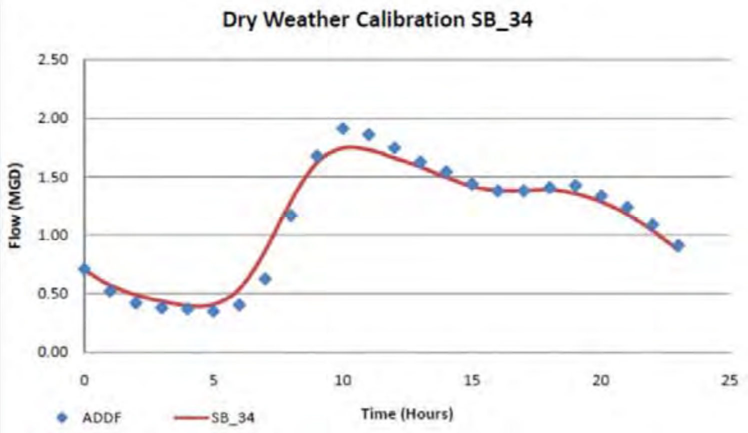
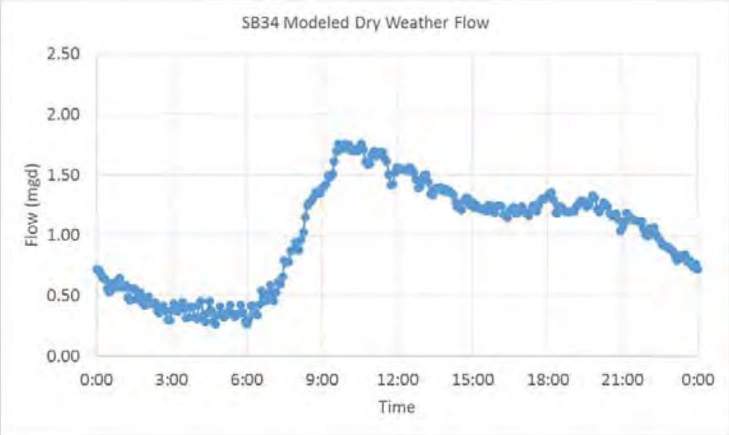
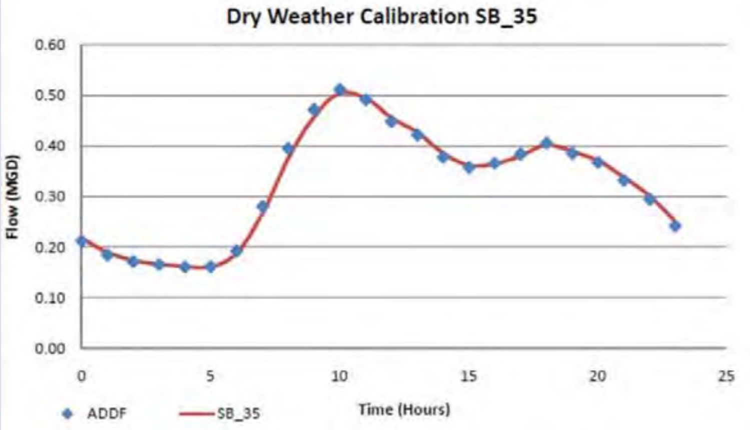
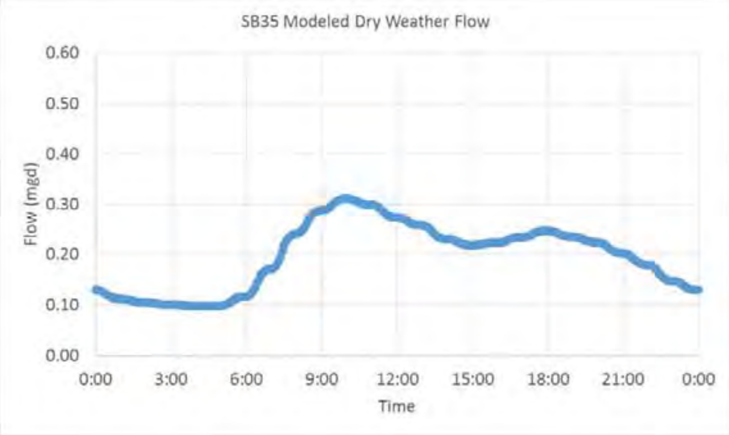
Meter ID	Run	Observed	Updated Model Results
SB23	Dry Weather		
SB24	Dry Weather		

Meter ID	Run	Observed	Updated Model Results
SB25	Dry Weather		
SB26	Dry Weather		

Meter ID	Run	Observed	Updated Model Results
SB27A	Dry Weather		
SB29	Dry Weather		

Meter ID	Run	Observed	Updated Model Results
SB30	Dry Weather		
SB31	Dry Weather		

Meter ID	Run	Observed	Updated Model Results
SB32	Dry Weather		
SB33	Dry Weather		

Meter ID	Run	Observed	Updated Model Results
SB34	Dry Weather		
SB35	Dry Weather		

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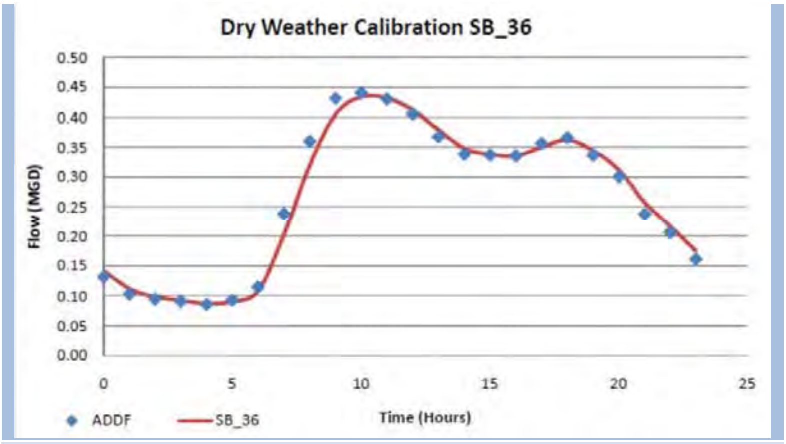
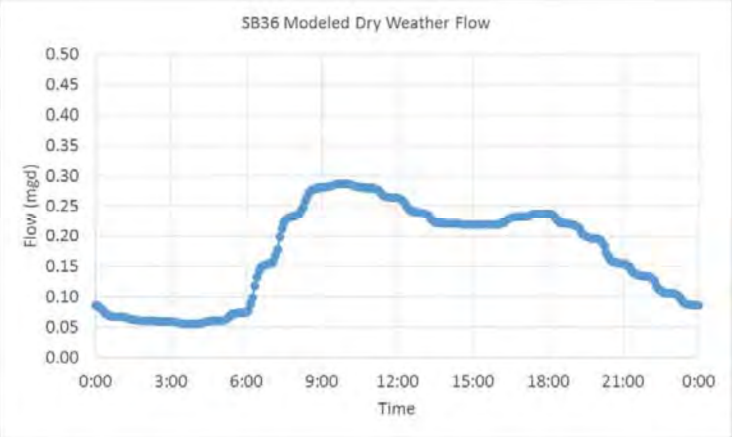
<tr><td>SB36</td><td>Dry Weather</td><td>
</td><td>
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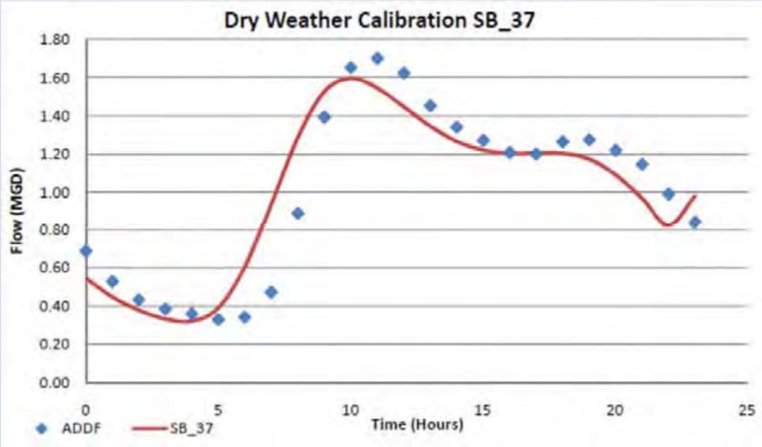
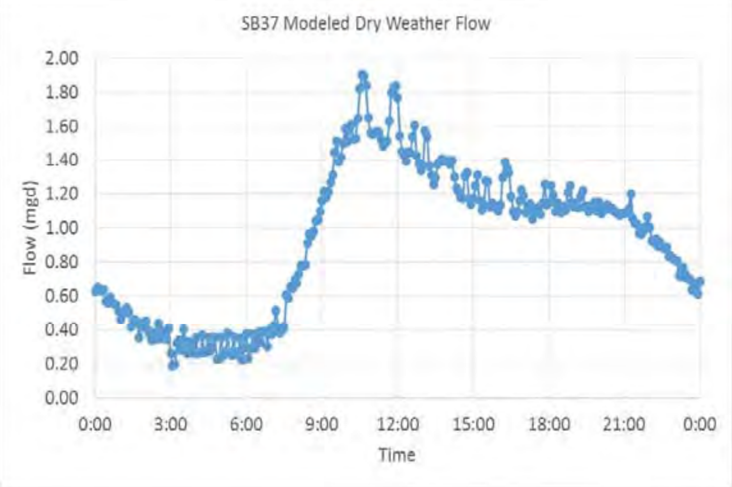
<tr><td>SB37</td><td>Dry Weather</td><td>
</td><td>
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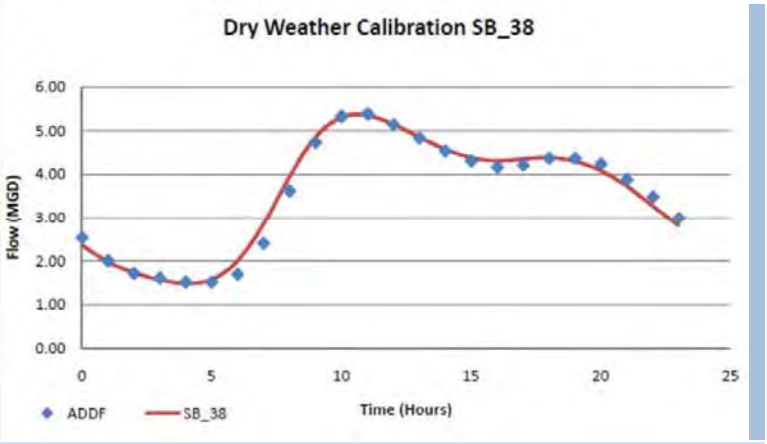
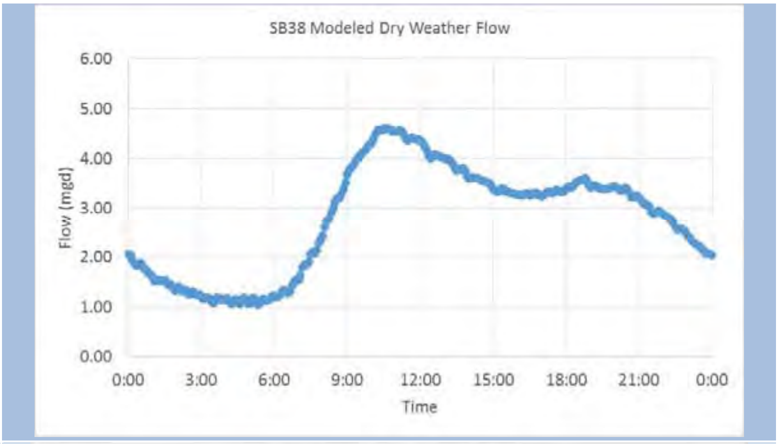
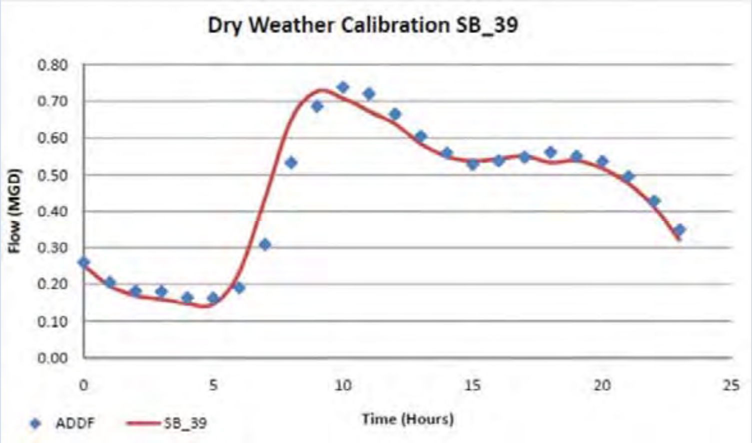
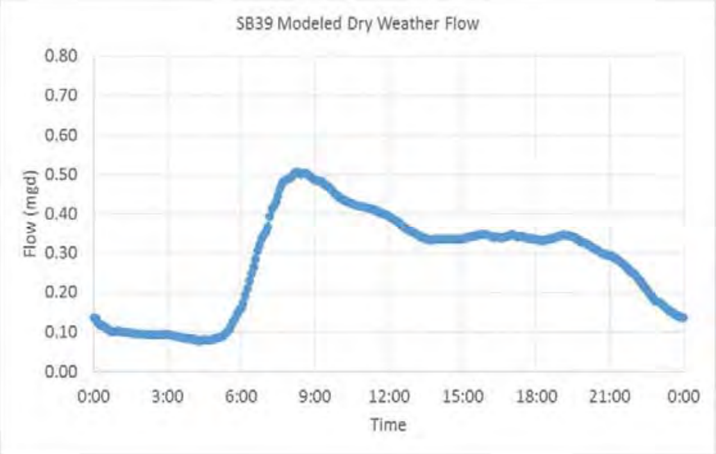
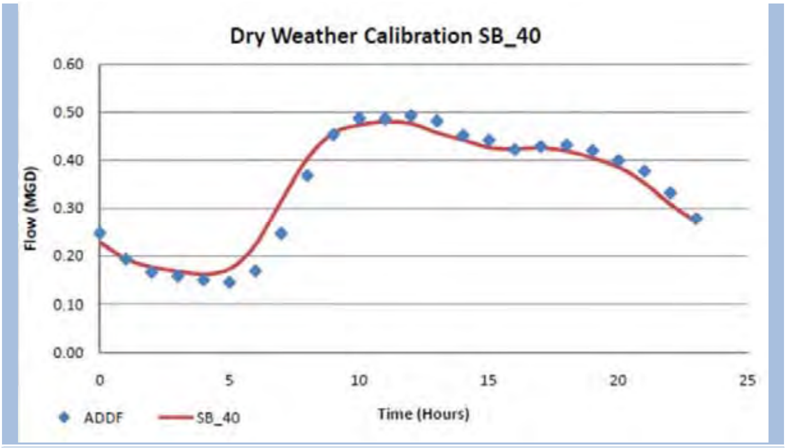
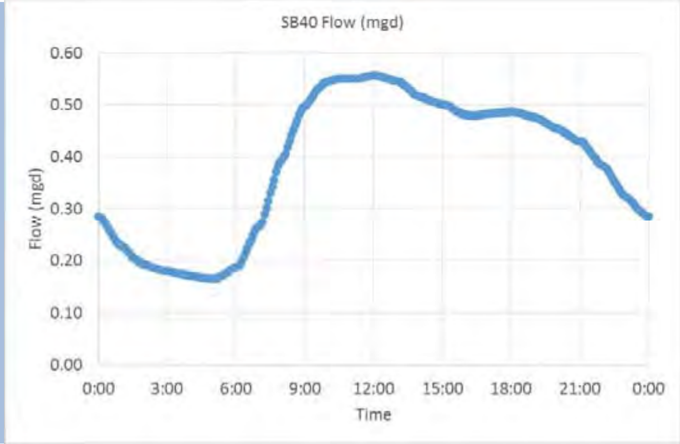
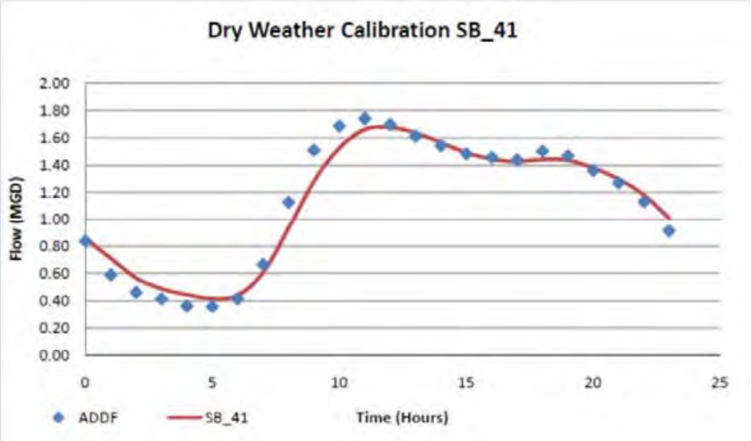
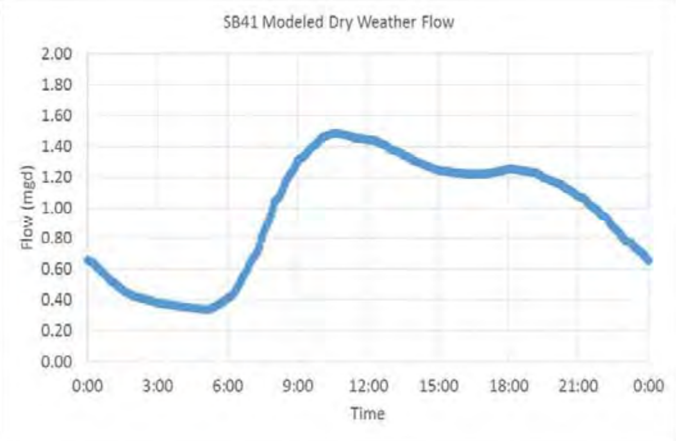
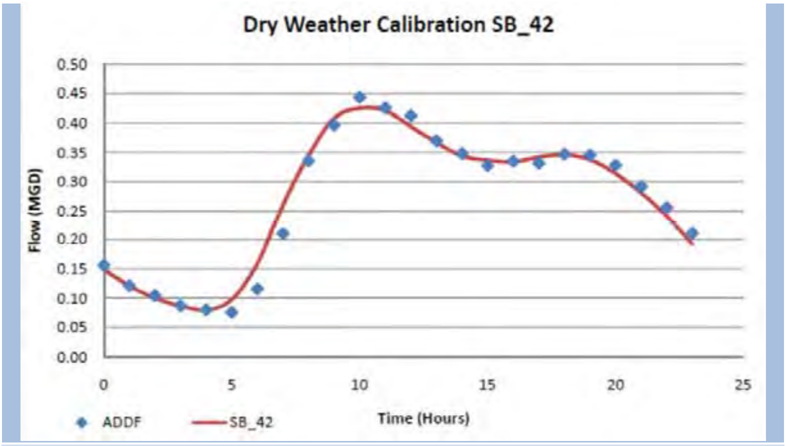
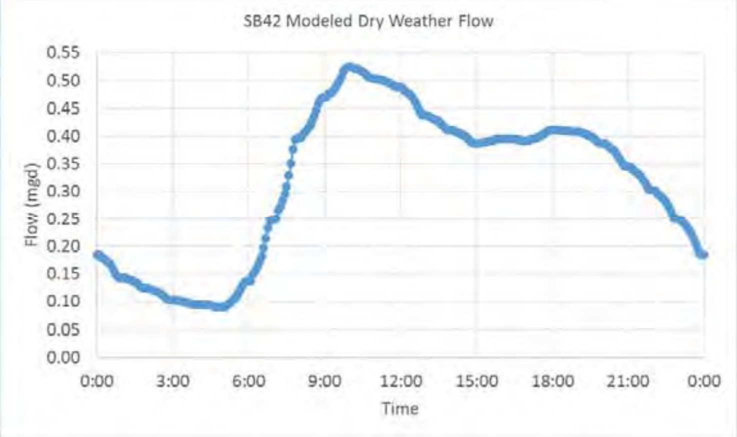
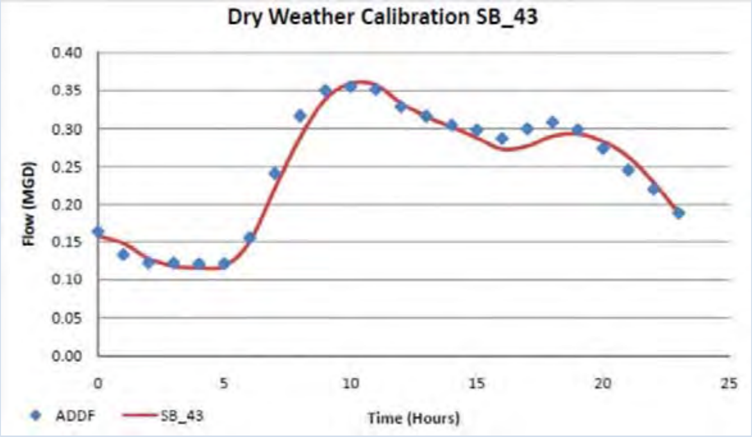
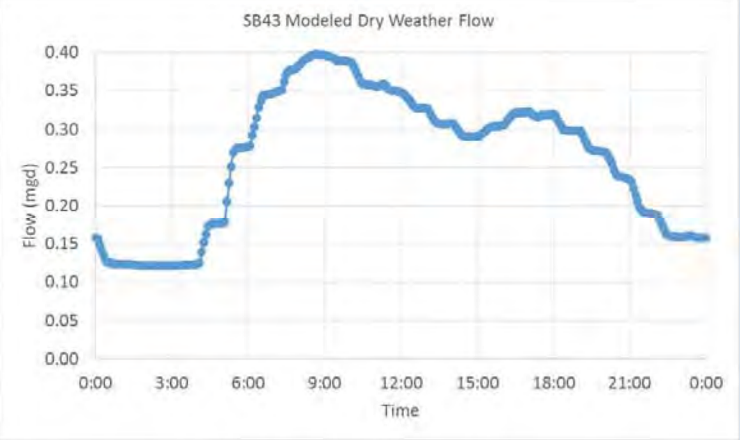
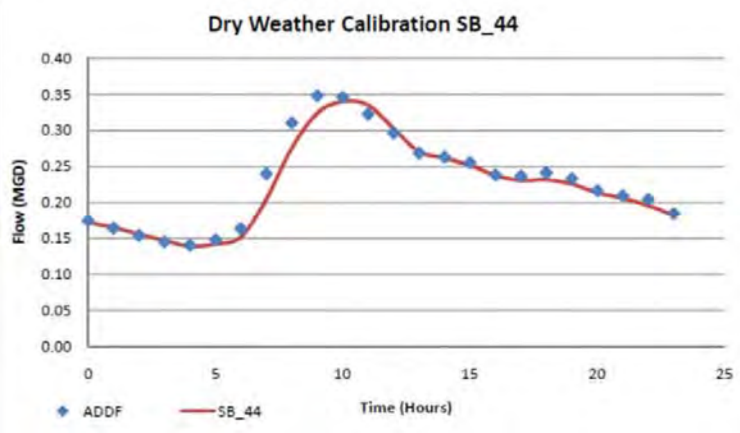
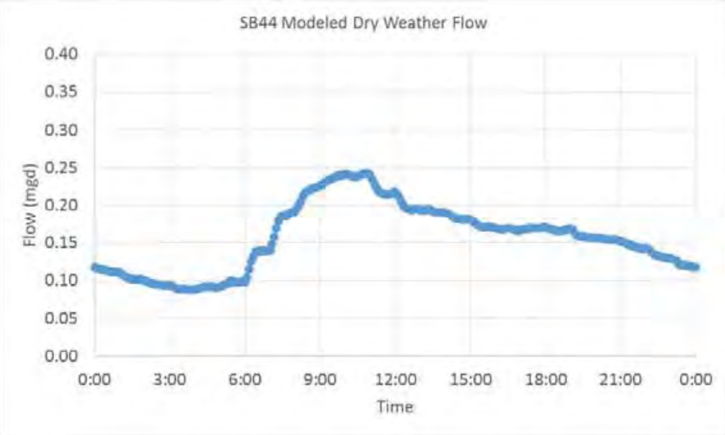
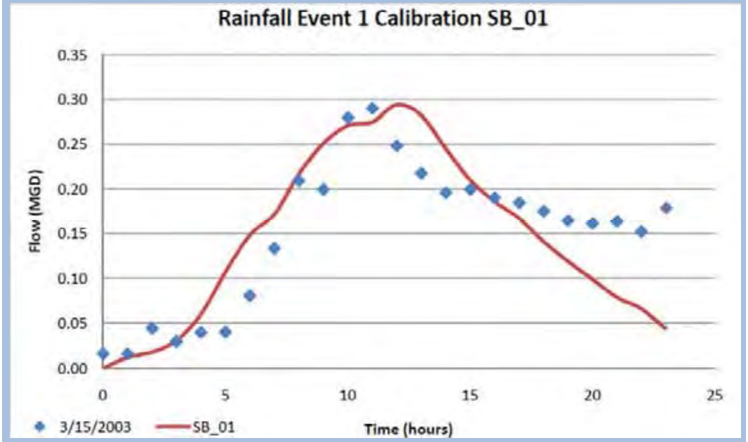
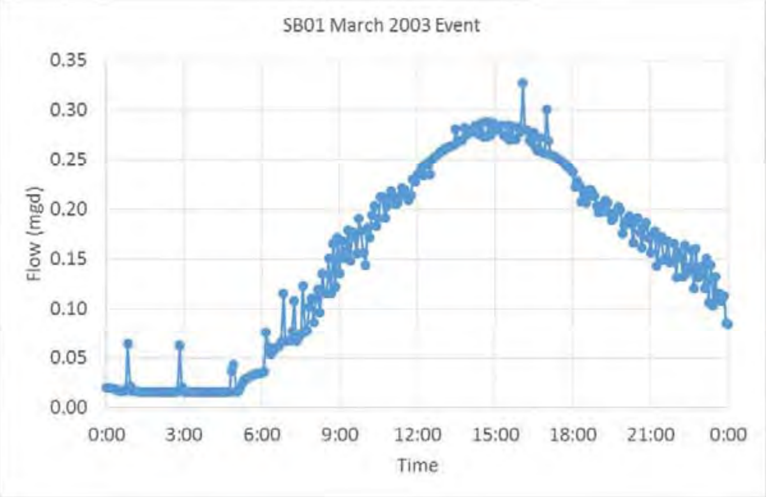
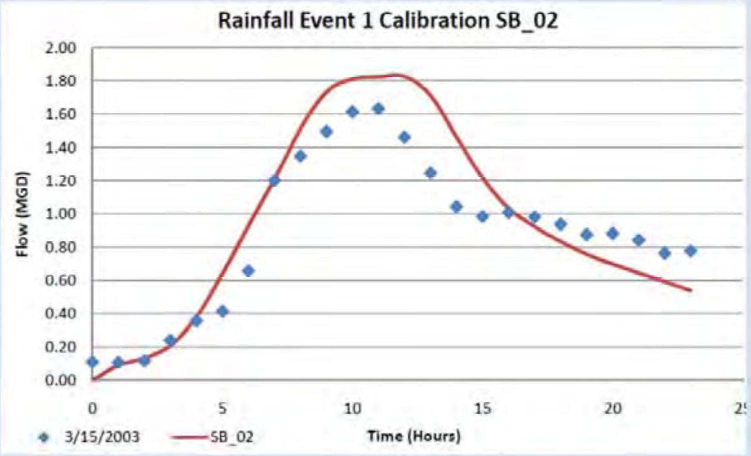
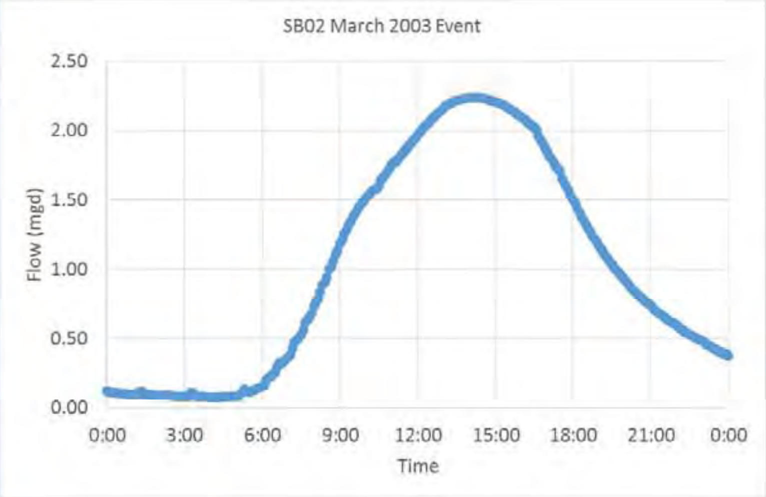
Meter ID	Run	Observed	Updated Model Results
SB38	Dry Weather		
SB39	Dry Weather		

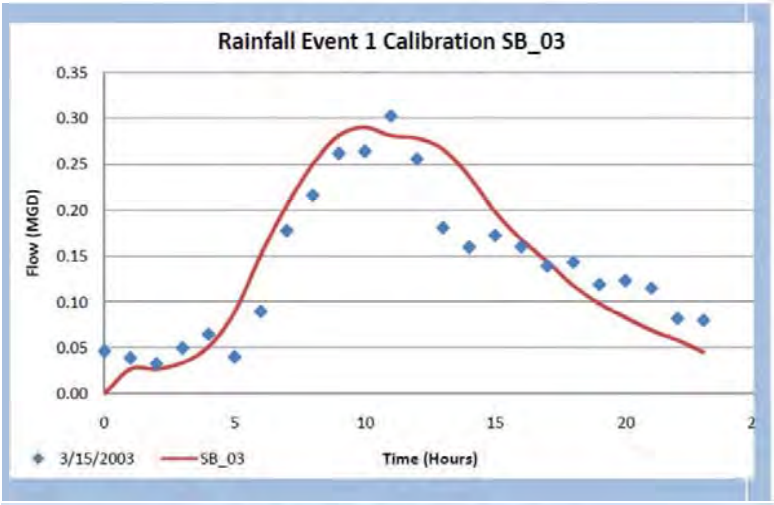
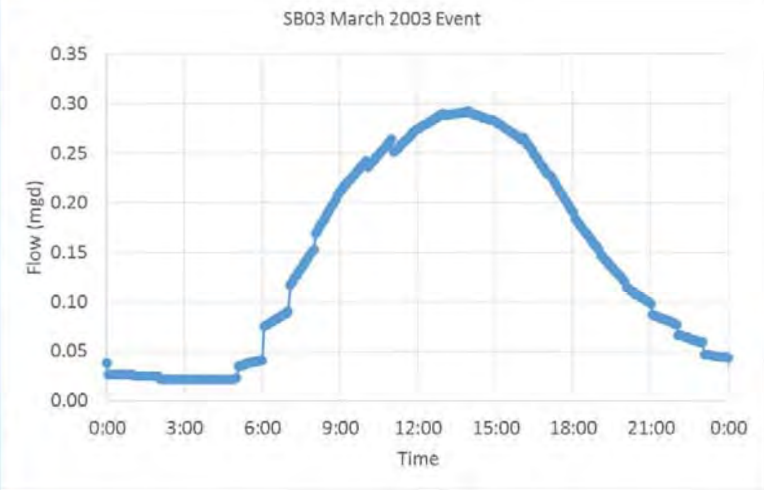
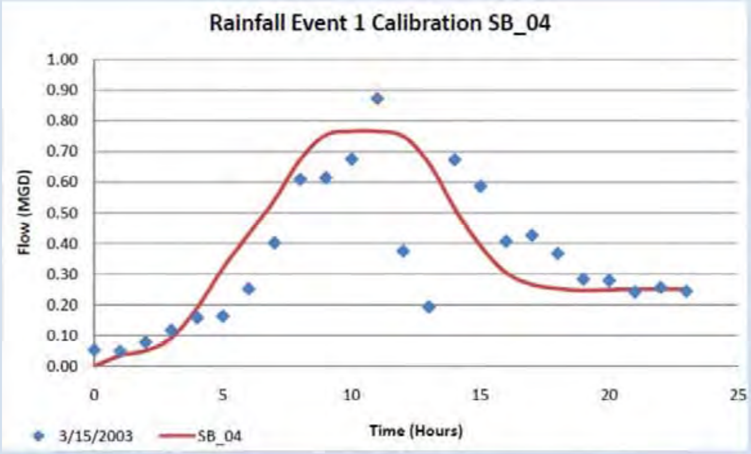
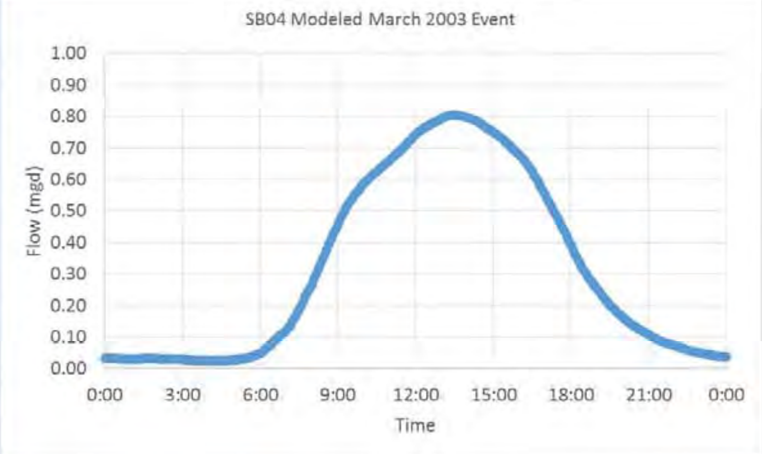
Meter ID	Run	Observed	Updated Model Results
SB40	Dry Weather		
SB41	Dry Weather		

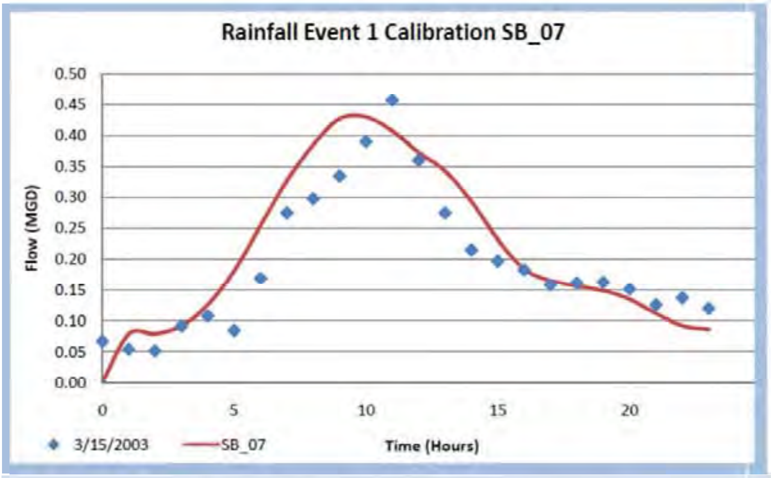
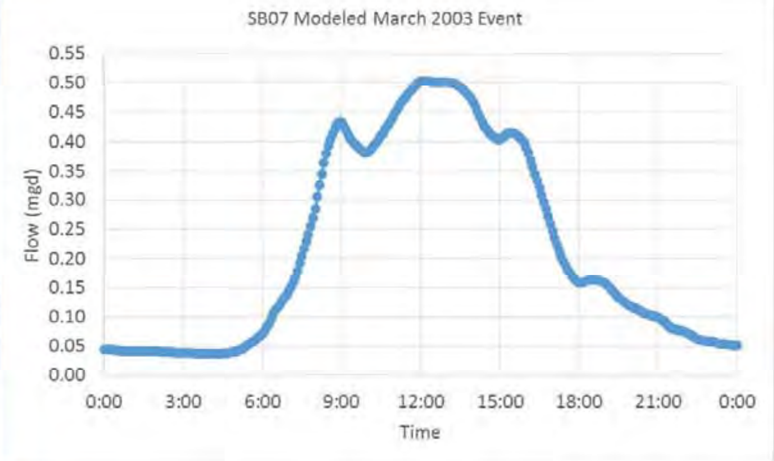
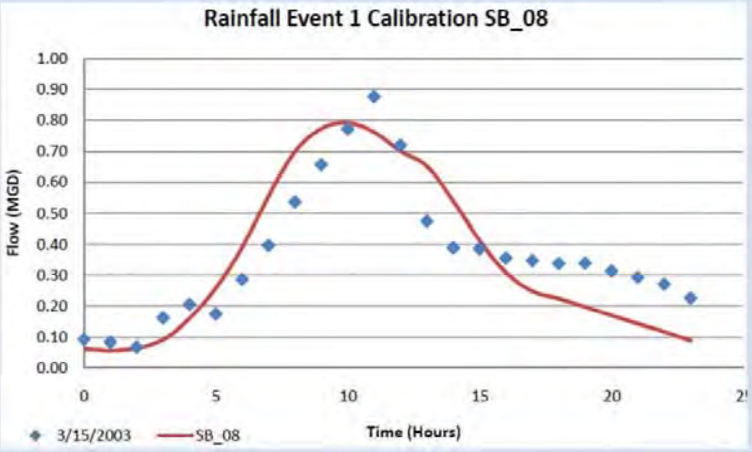
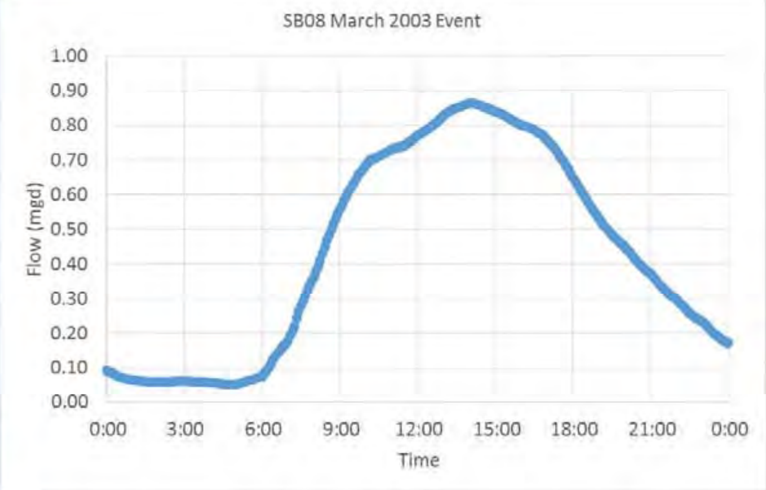
Meter ID	Run	Observed	Updated Model Results
SB42	Dry Weather		
SB43	Dry Weather		

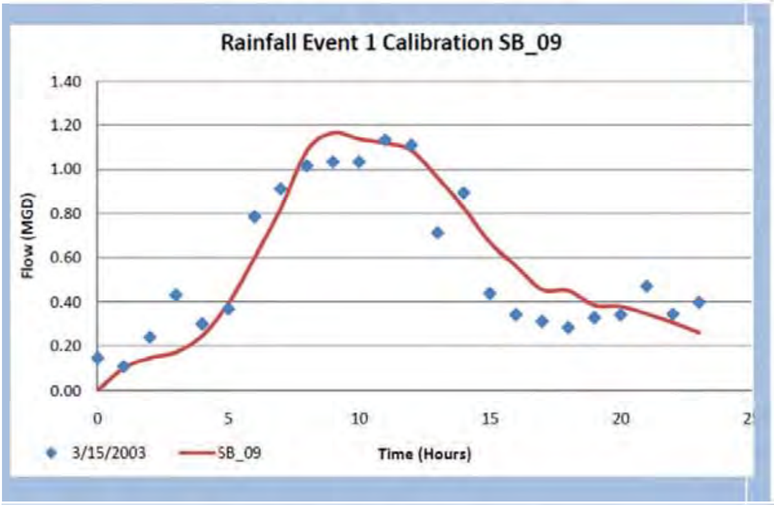
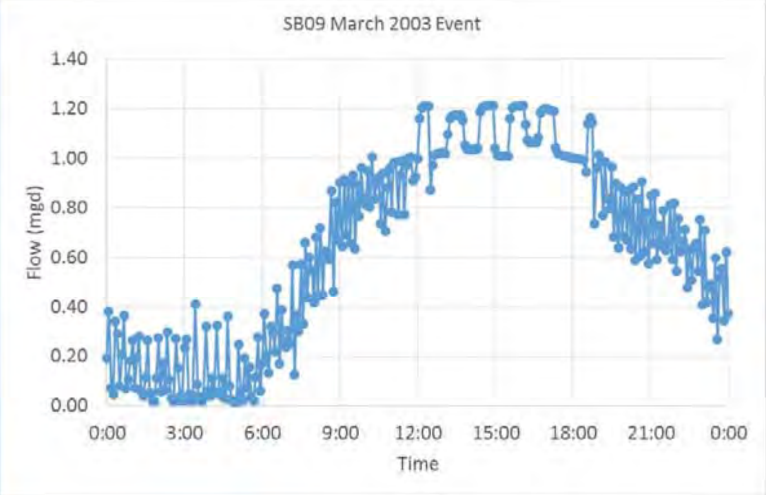
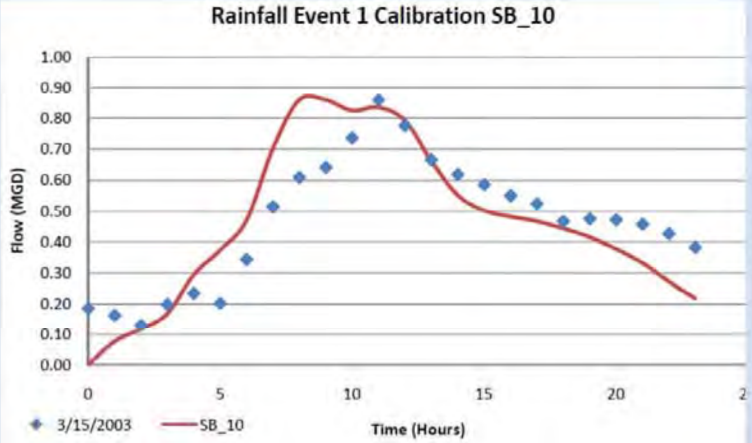
Meter ID	Run	Observed	Updated Model Results
SB44	Dry Weather		

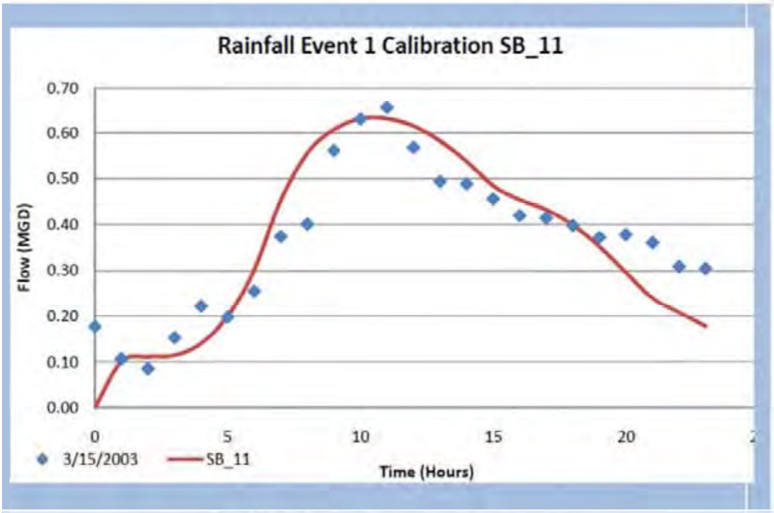
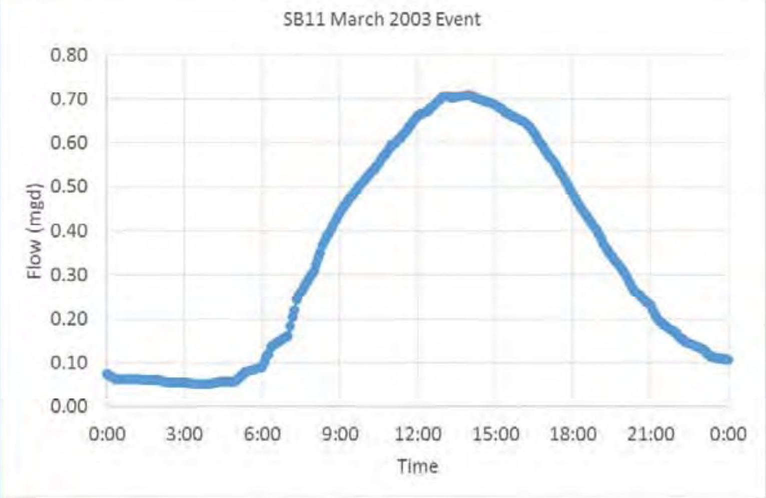
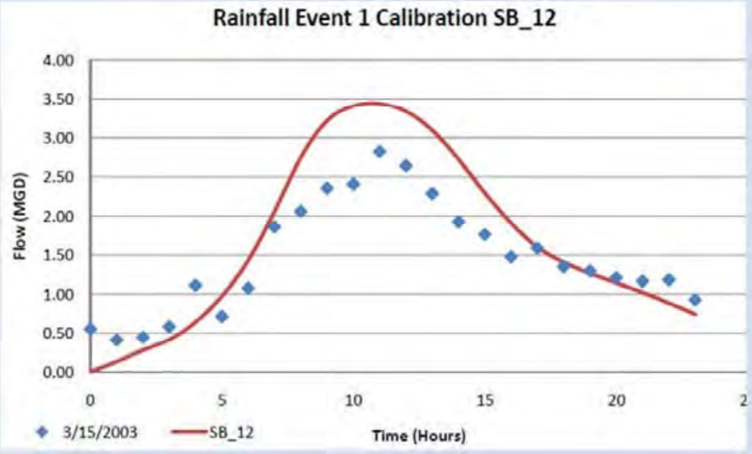
Wet Weather

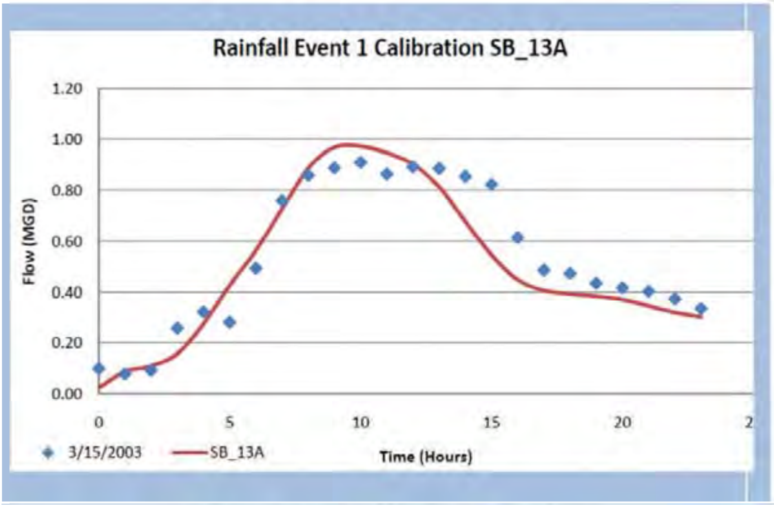
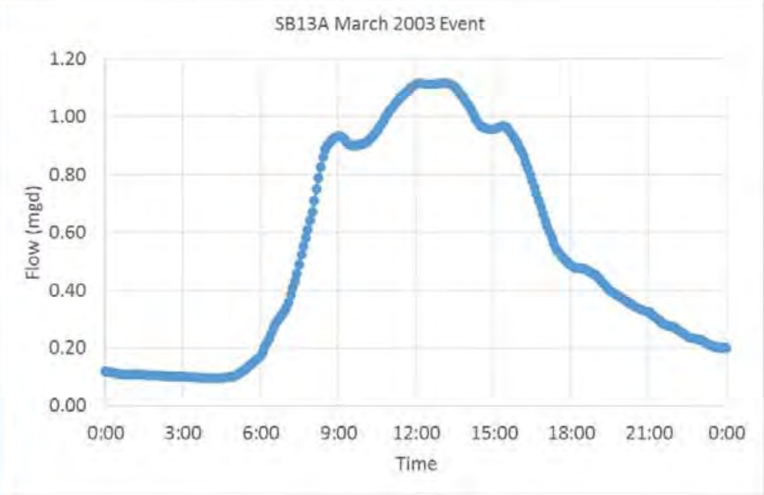
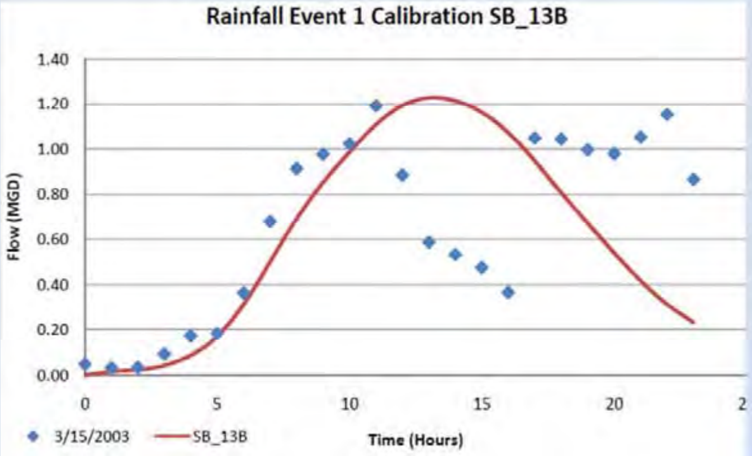
Meter ID	Run	Observed	Updated Model Results
SB01	March 15, 2003		
SB02	March 15, 2003		

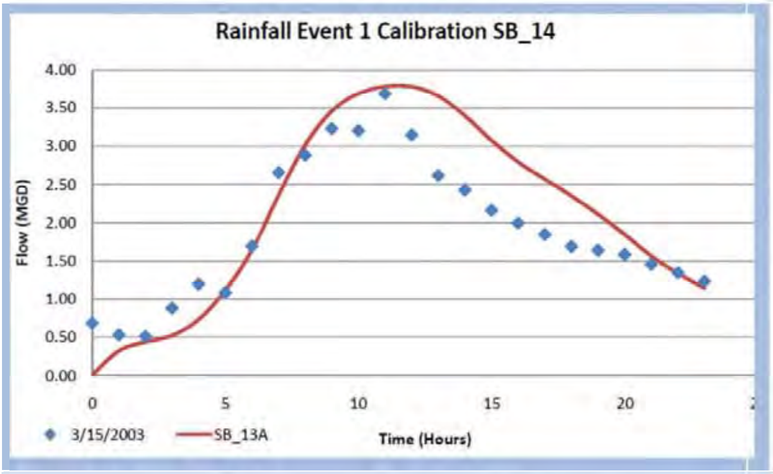
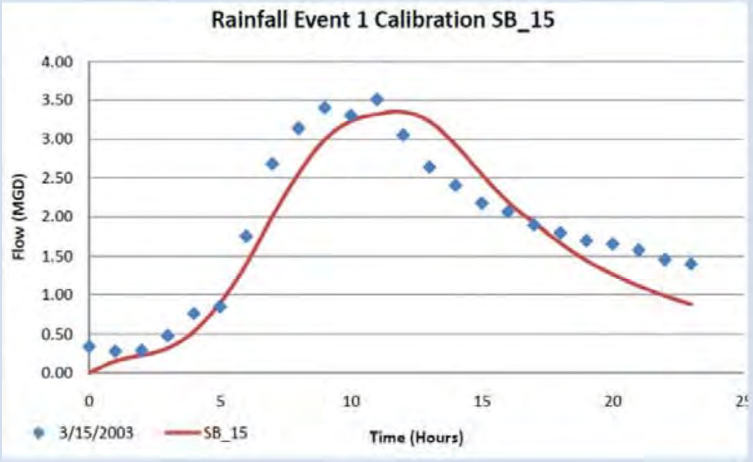
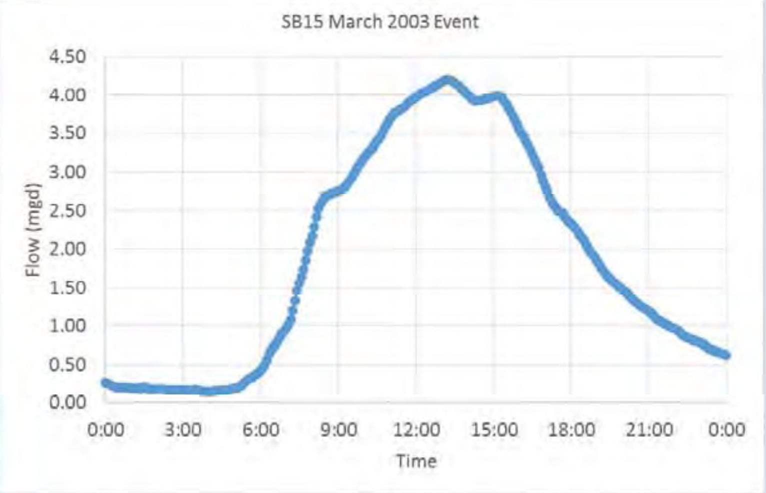
Meter ID	Run	Observed	Updated Model Results
SB03	March 15, 2003		
SB04	March 15, 2003		

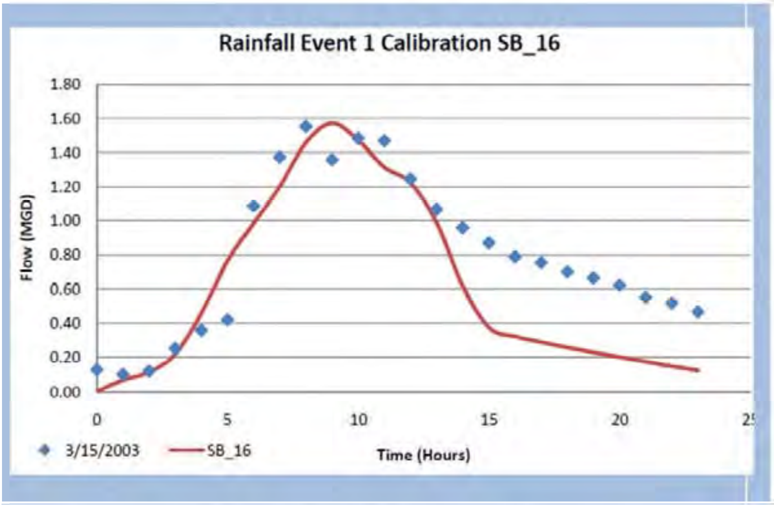
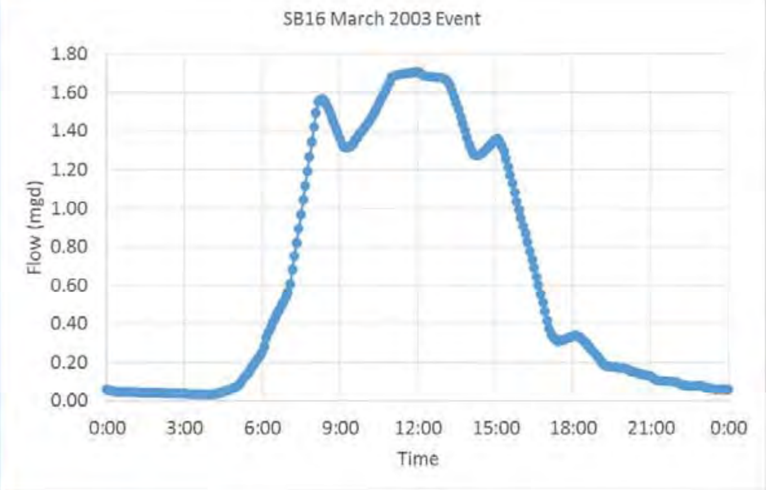
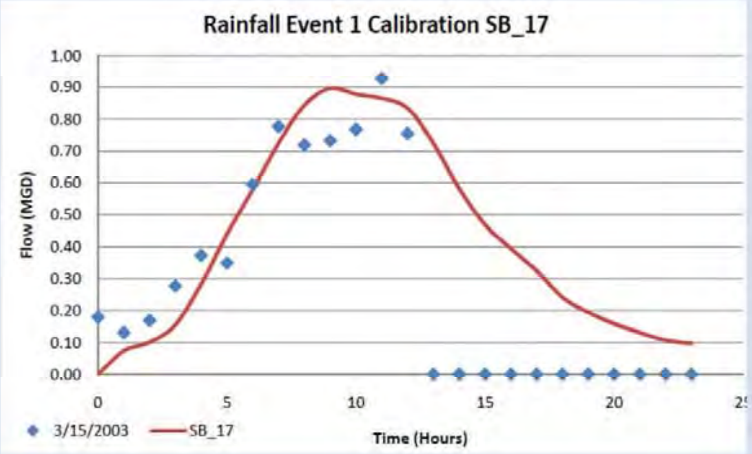
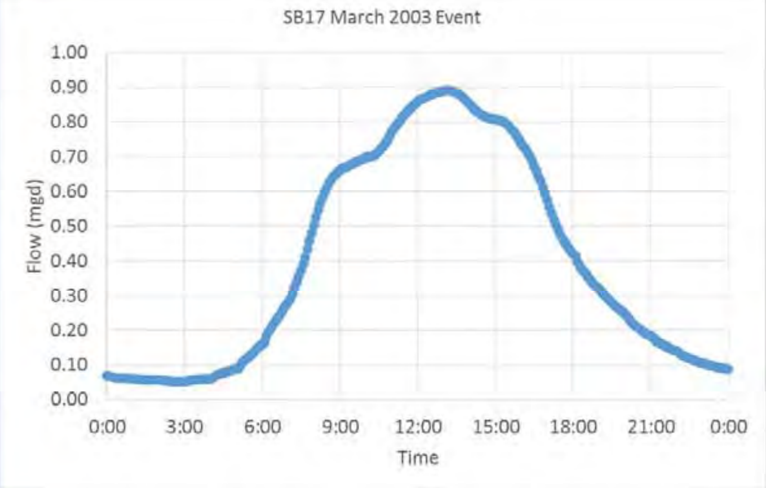
Meter ID	Run	Observed	Updated Model Results
SB07	March 15, 2003		
SB08	March 15, 2003		

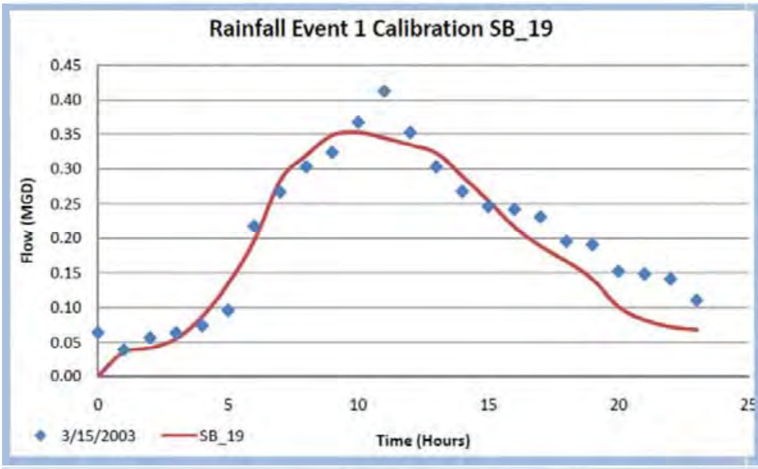
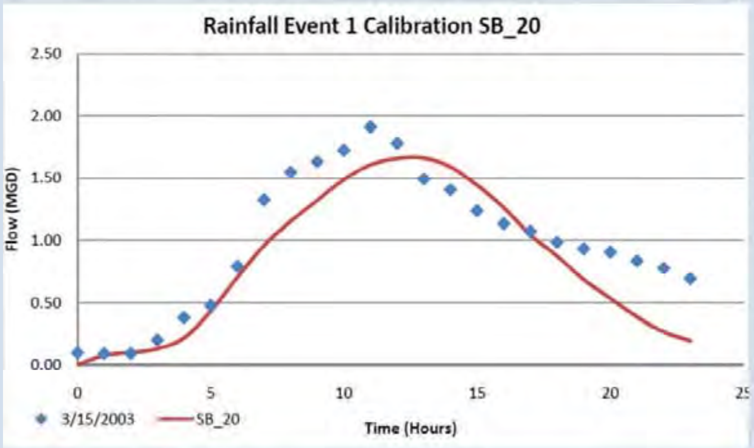
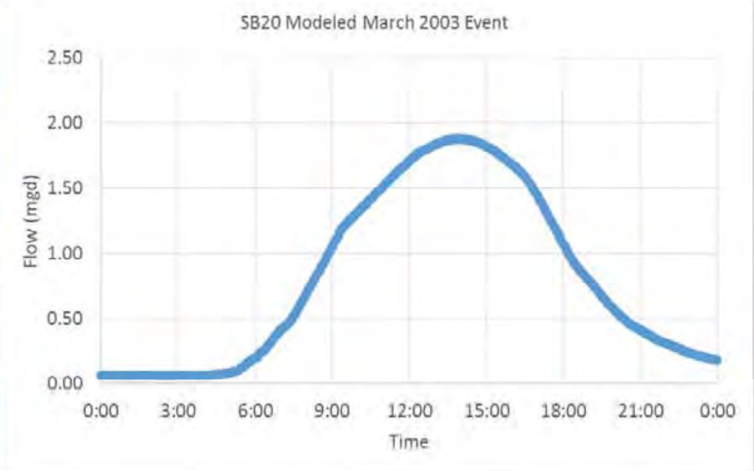
Meter ID	Run	Observed	Updated Model Results
SB09	March 15, 2003	 Rainfall Event 1 Calibration SB_09 	 SB09 March 2003 Event
SB10	March 15, 2003	 Rainfall Event 1 Calibration SB_10 	 SB10 Modeled March 2003 Event

Meter ID	Run	Observed	Updated Model Results
SB11	March 15, 2003		
SB12	March 15, 2003		

Meter ID	Run	Observed	Updated Model Results
SB13A	March 15, 2003	 Rainfall Event 1 Calibration SB_13A	 SB13A March 2003 Event
SB13B	March 15, 2003	 Rainfall Event 1 Calibration SB_13B	 SB13b Modeled March 2003 Event

Meter ID	Run	Observed	Updated Model Results
SB14	March 15, 2003		
SB15	March 15, 2003		

Meter ID	Run	Observed	Updated Model Results
SB16	March 15, 2003		
SB17	March 15, 2003		

Meter ID	Run	Observed	Updated Model Results
SB19	March 15, 2003		
SB20	March 15, 2003		

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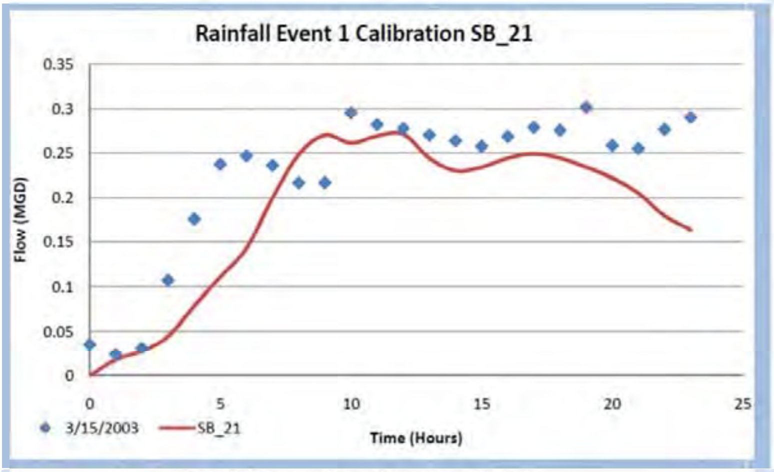
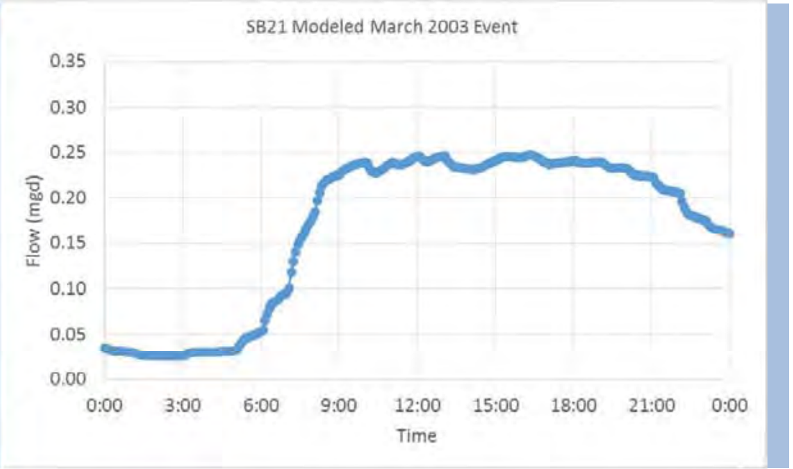
<tr><td>SB21</td><td>March 15, 2003</td><td>
</td><td>
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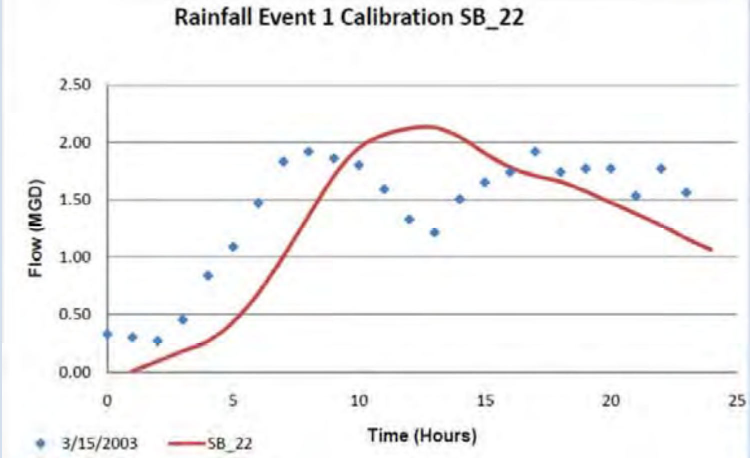
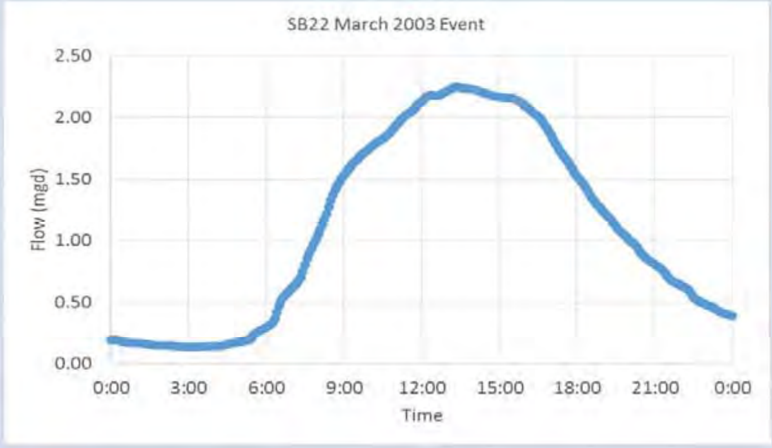
<tr><td>SB22</td><td>March 15, 2003</td><td>
</td><td>
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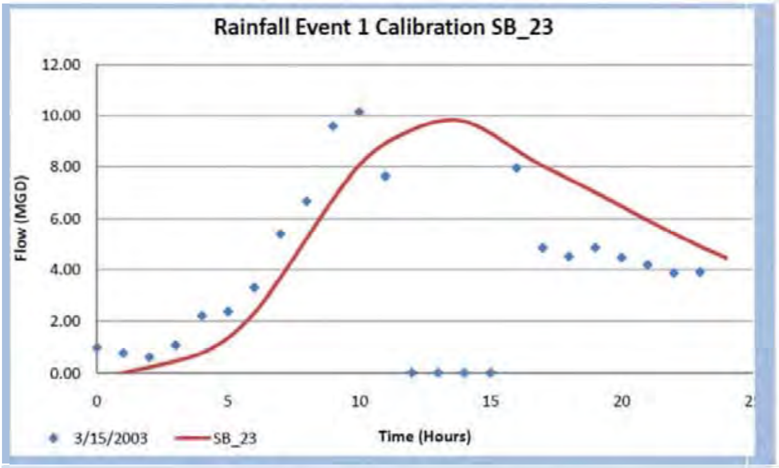
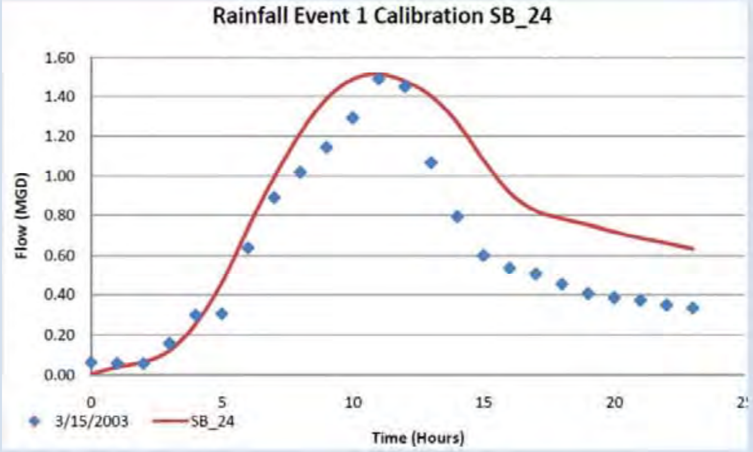
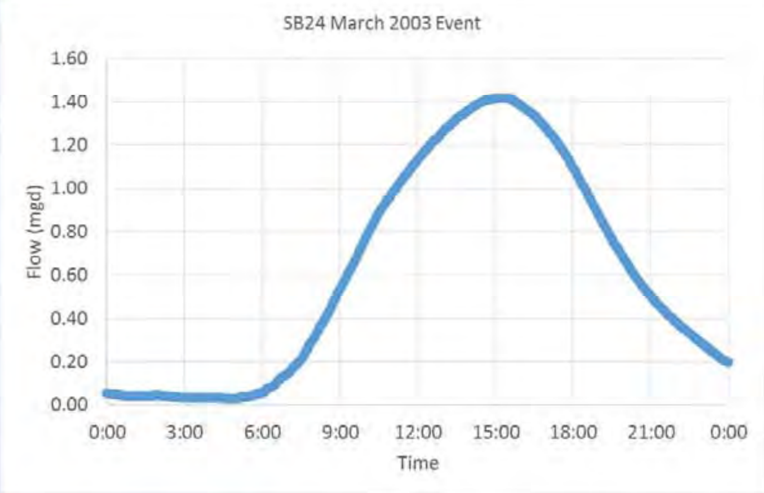
Meter ID	Run	Observed	Updated Model Results
SB23	March 15, 2003		
SB24	March 15, 2003		

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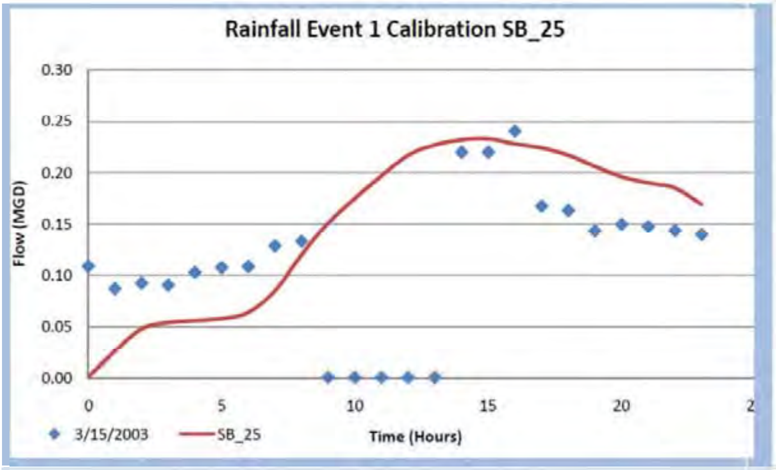
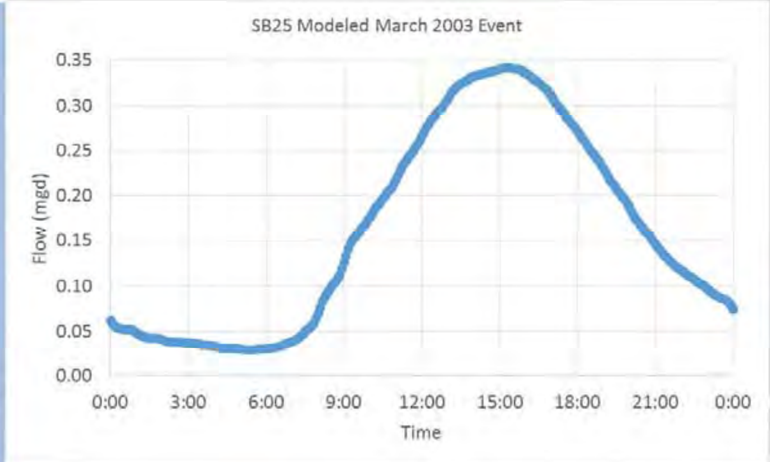
<tr><td>SB25</td><td>March 15, 2003</td><td>
</td><td>
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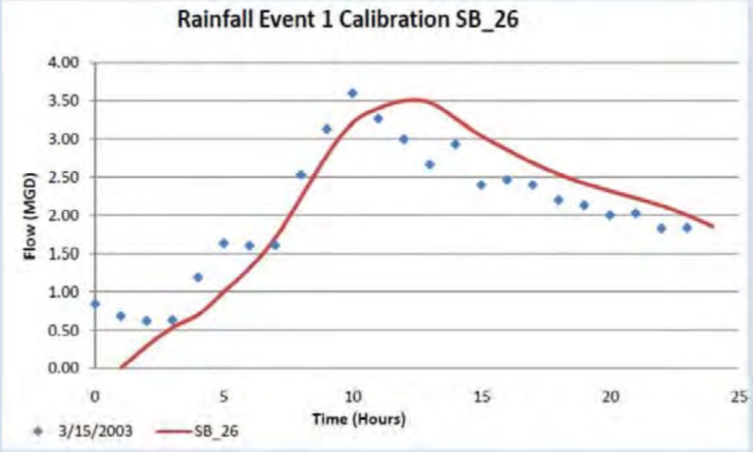
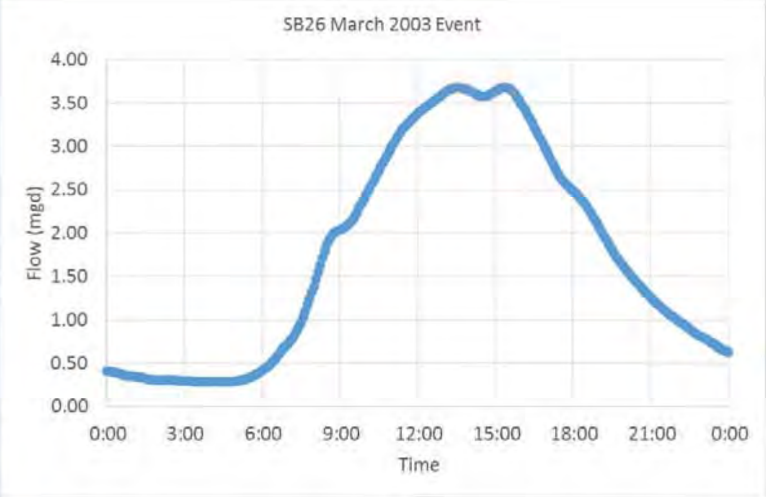
<tr><td>SB26</td><td>March 15, 2003</td><td>
</td><td>
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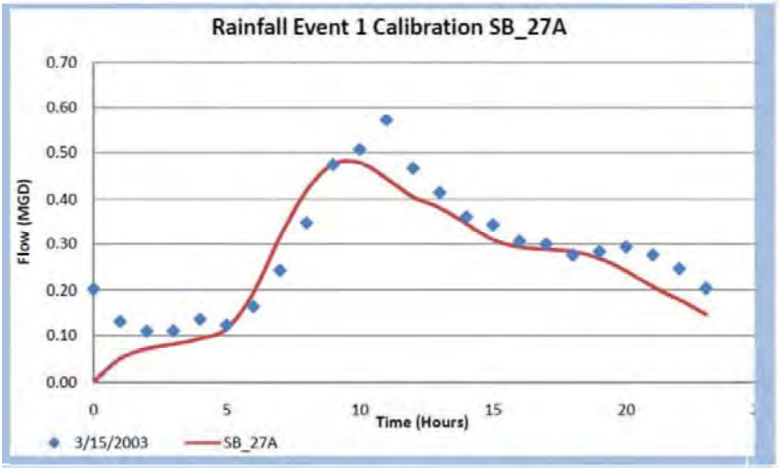
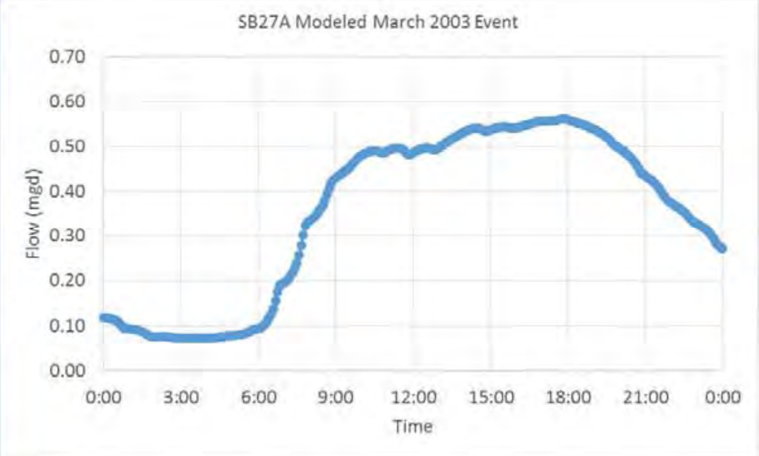
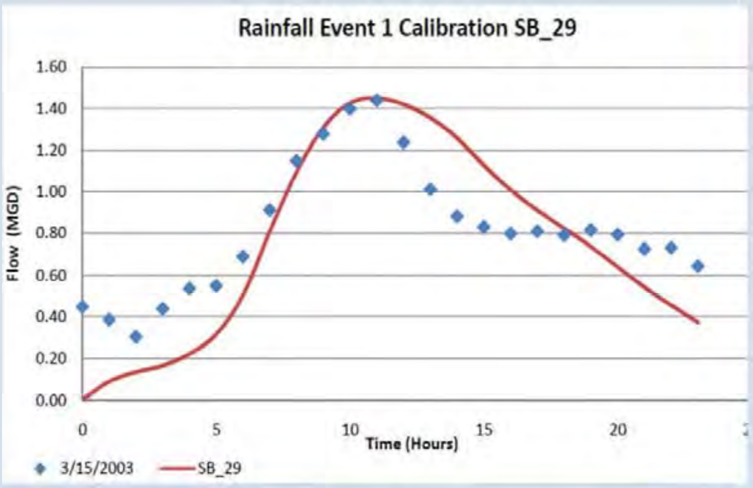
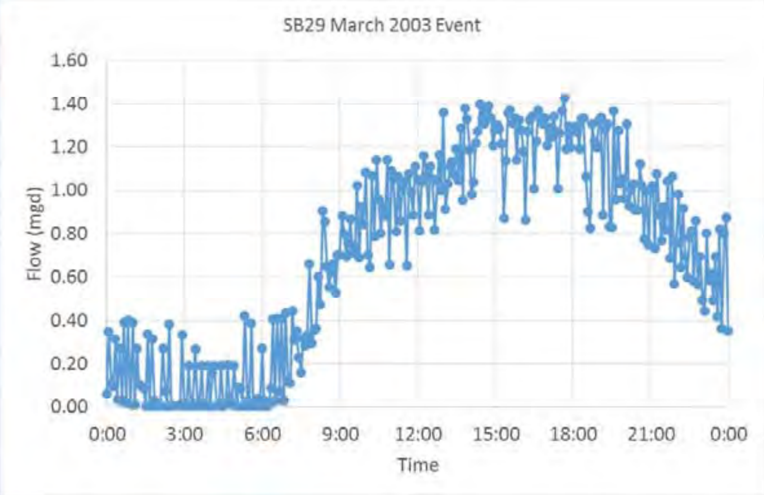
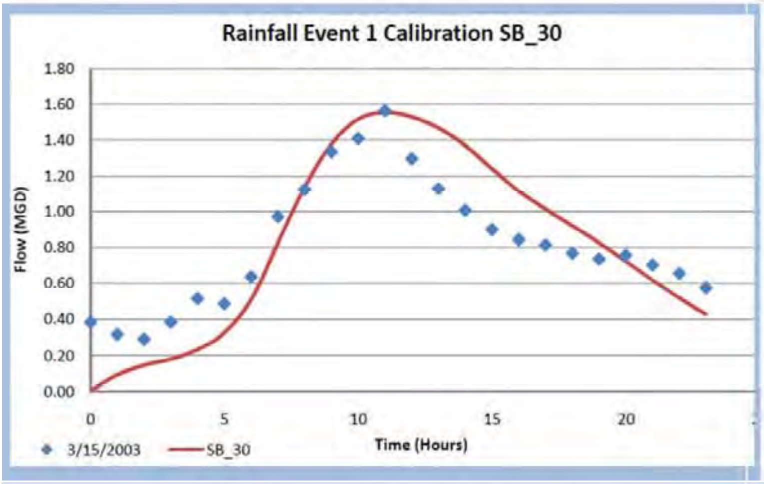
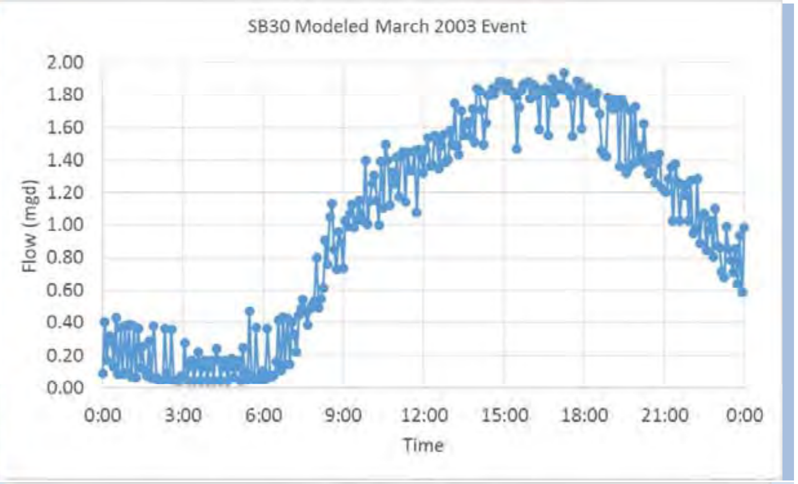
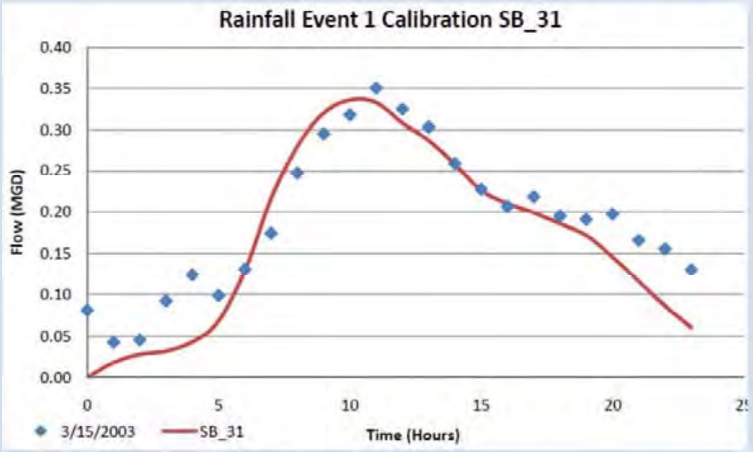
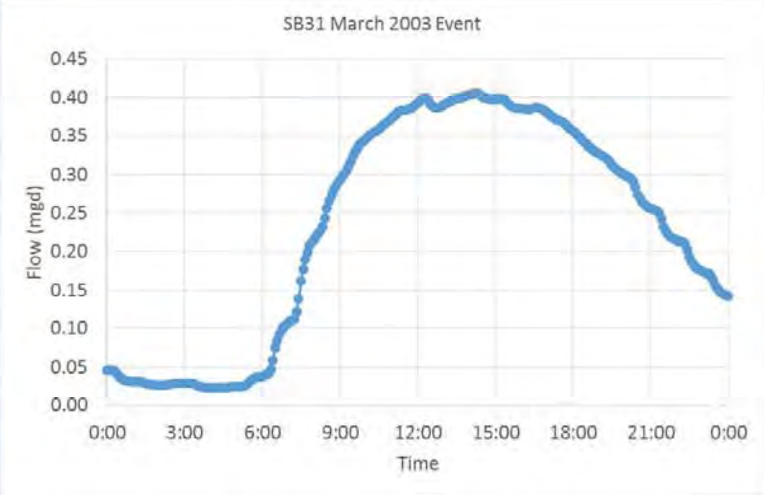
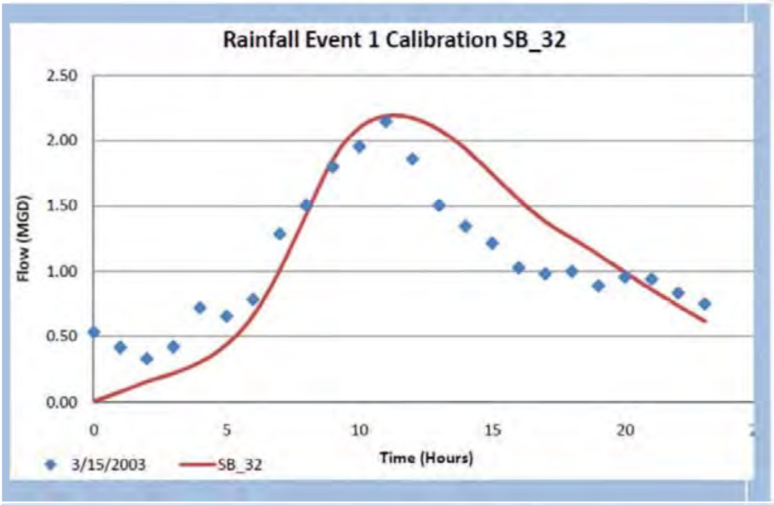
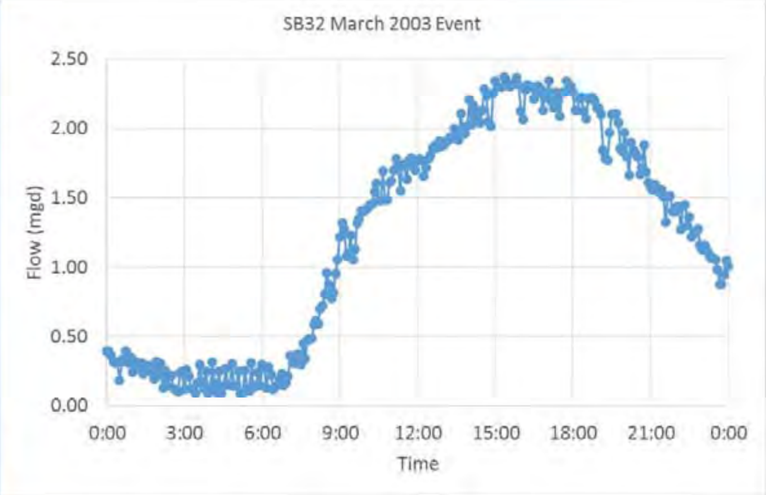
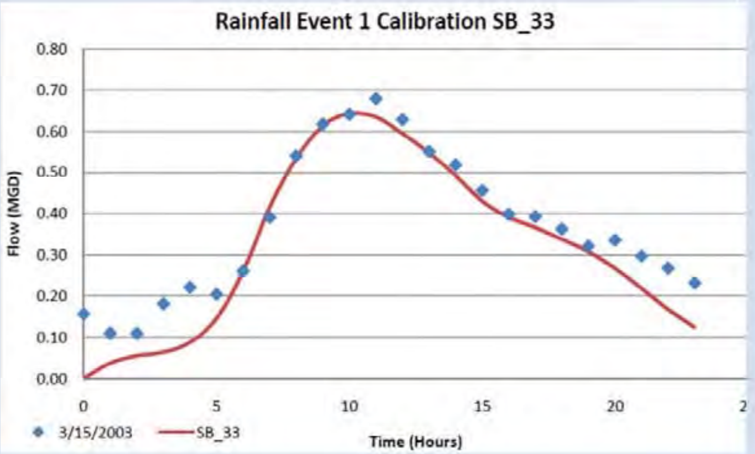
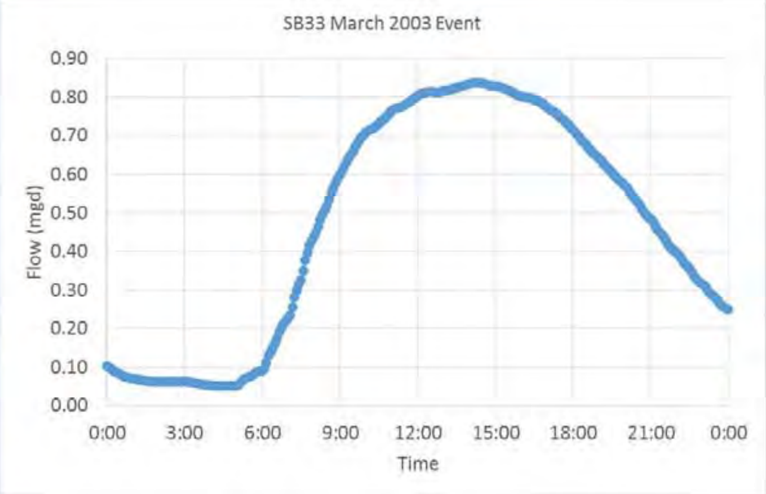
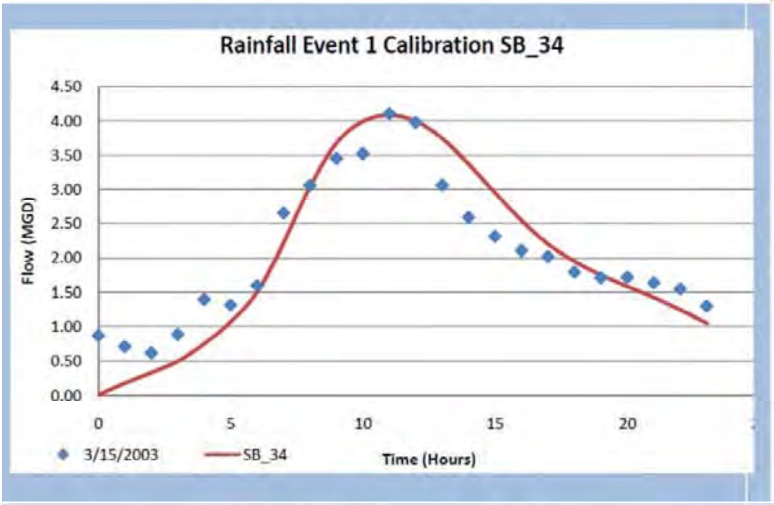
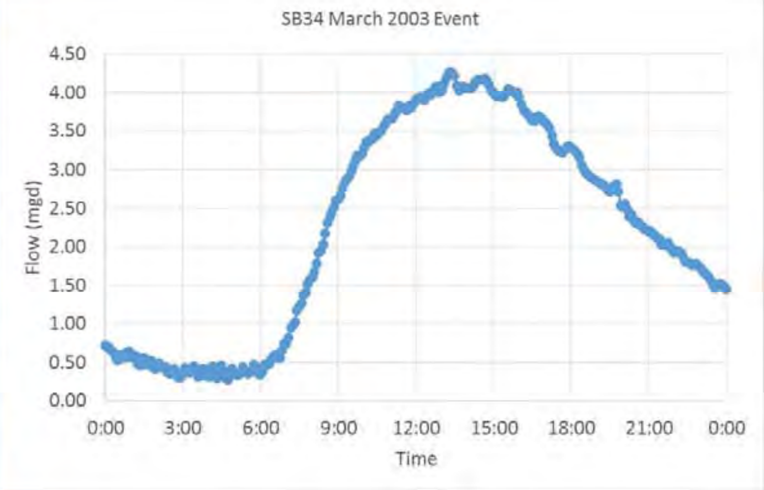
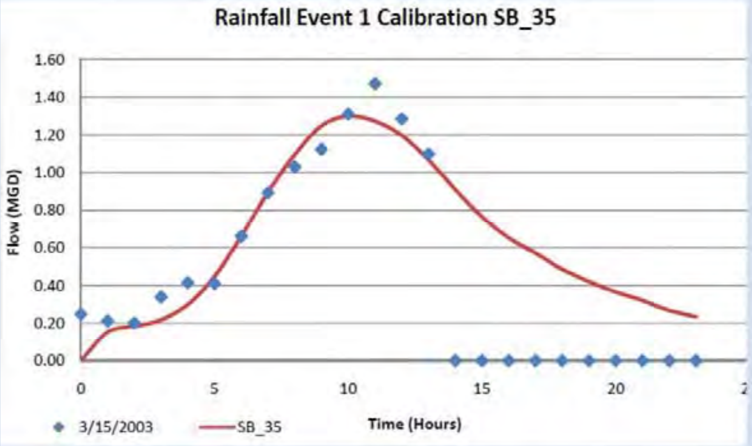
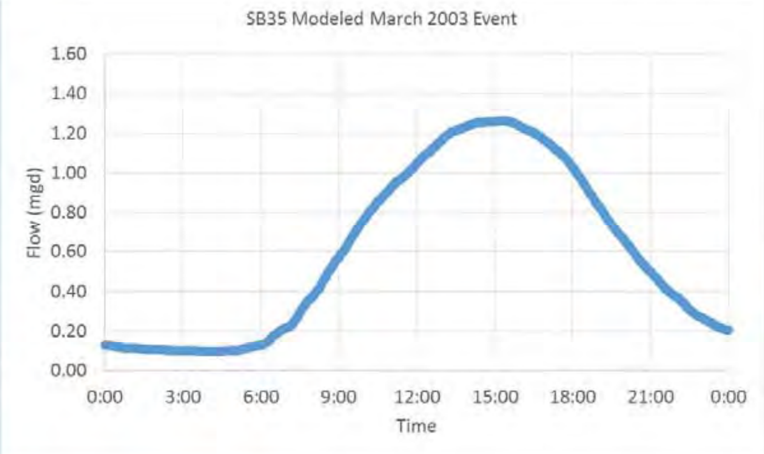
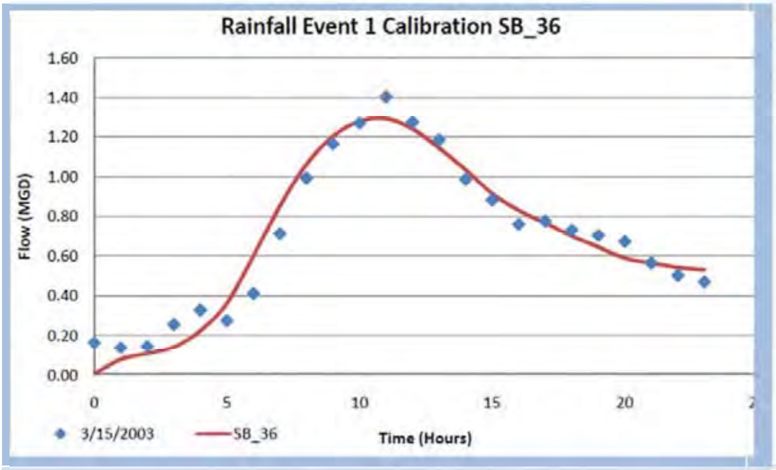
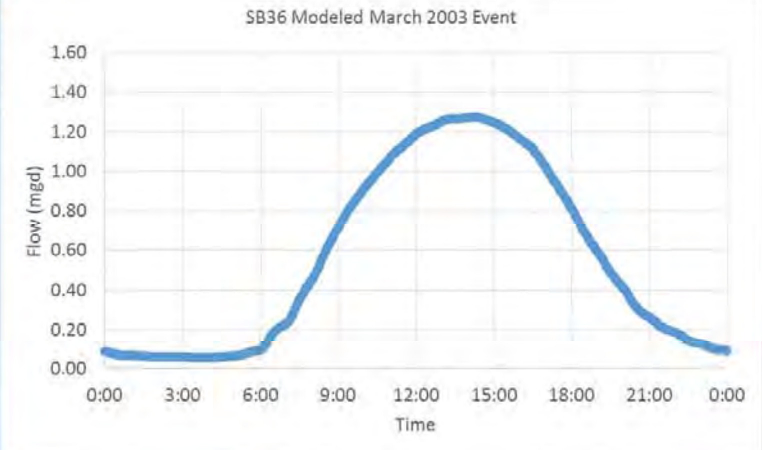
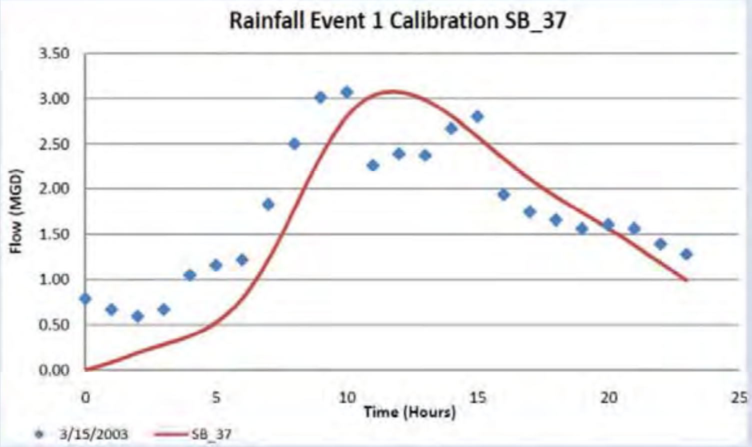
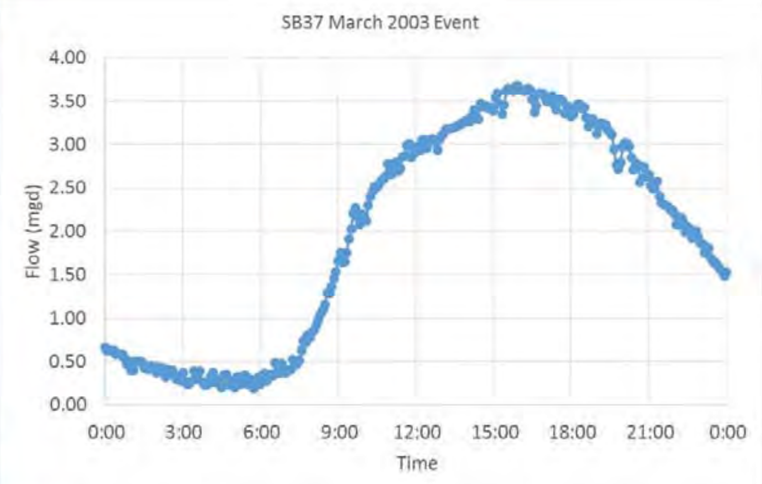
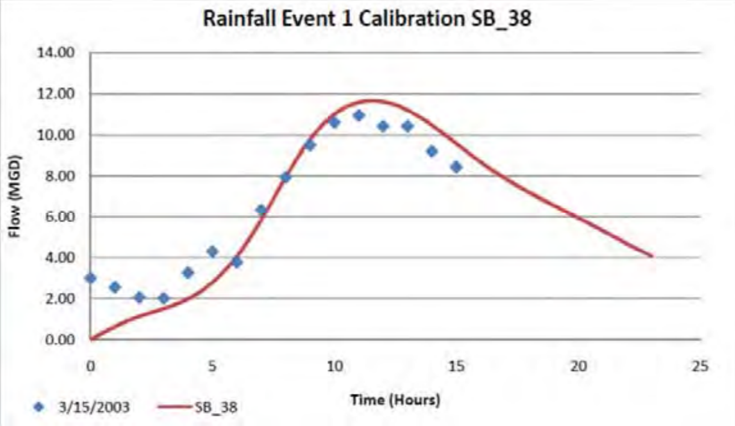
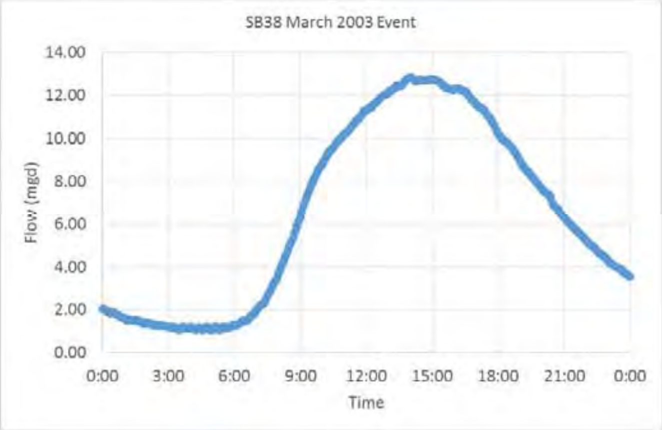
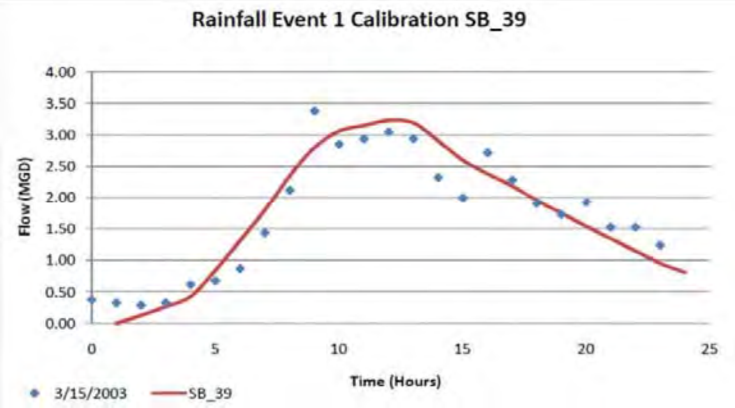
Meter ID	Run	Observed	Updated Model Results
SB27A	March 15, 2003		
SB29	March 15, 2003		

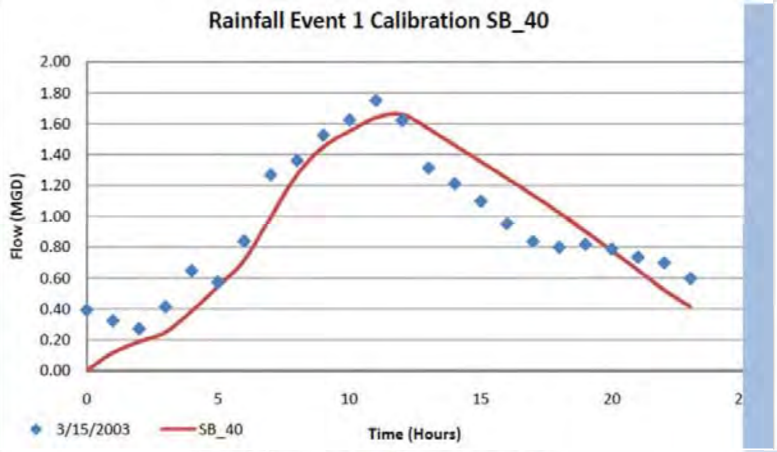
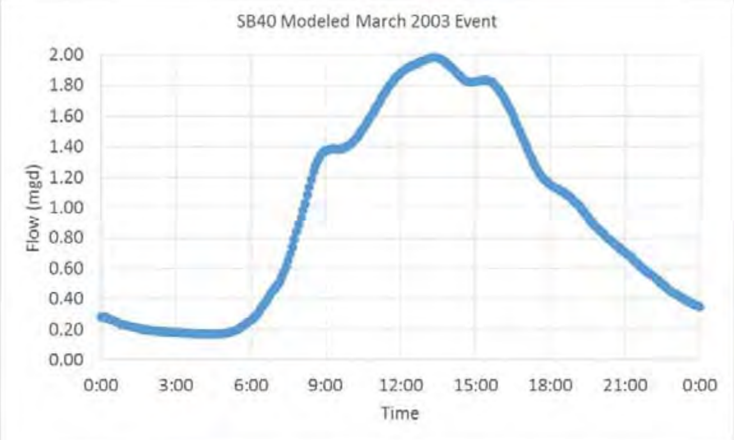
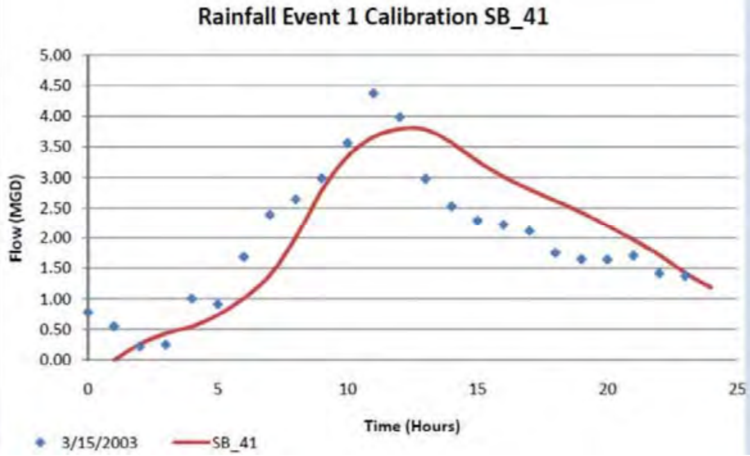
Meter ID	Run	Observed	Updated Model Results
SB30	March 15, 2003		
SB31	March 15, 2003		

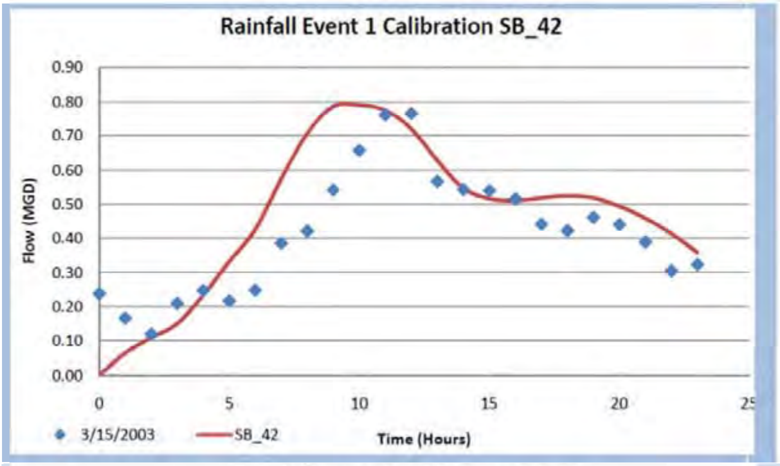
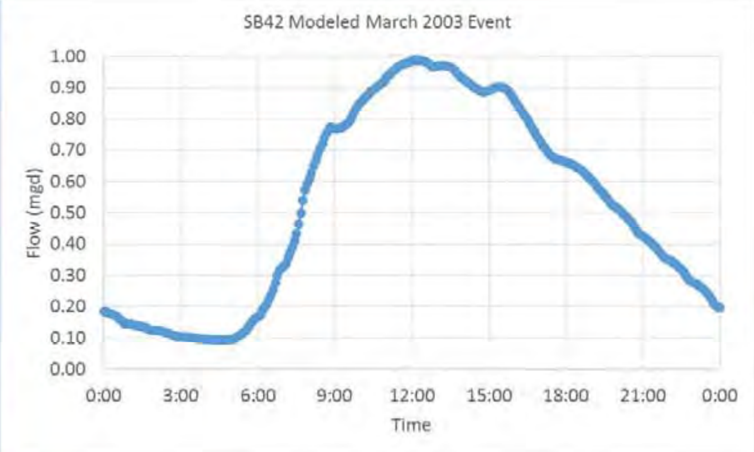
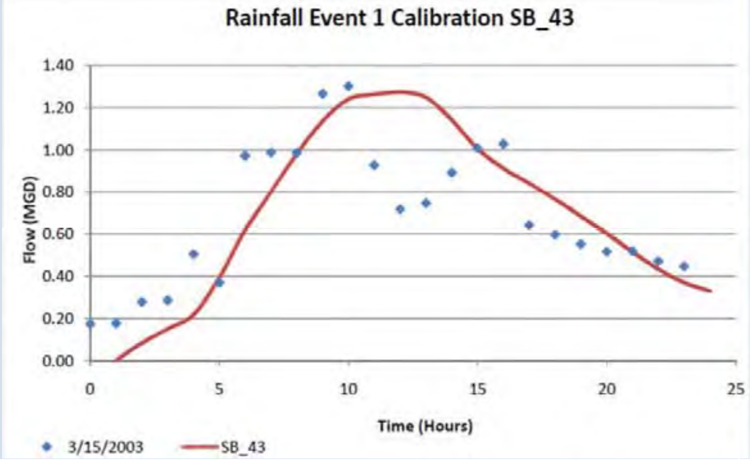
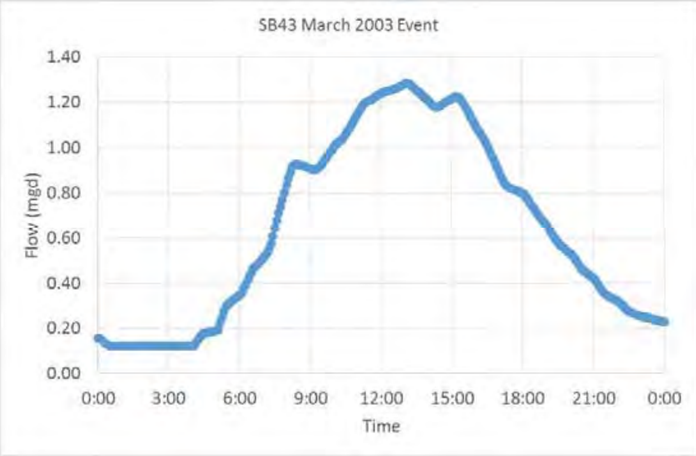
Meter ID	Run	Observed	Updated Model Results
SB32	March 15, 2003		
SB33	March 15, 2003		

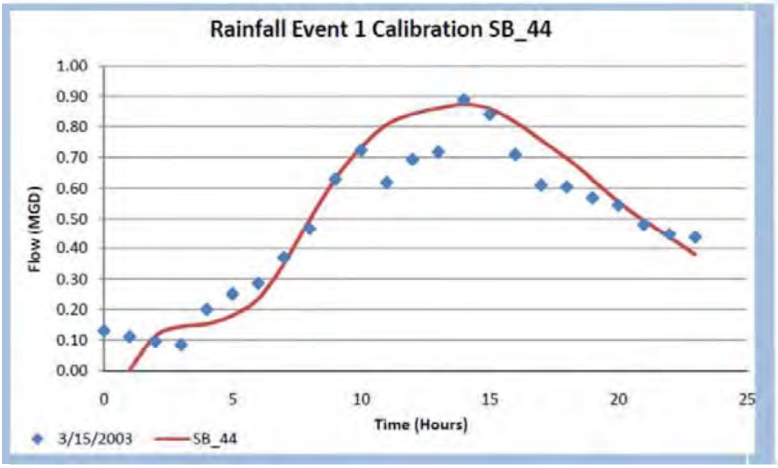
Meter ID	Run	Observed	Updated Model Results
SB34	March 15, 2003	 Rainfall Event 1 Calibration SB_34	 SB34 March 2003 Event
SB35	March 15, 2003	 Rainfall Event 1 Calibration SB_35	 SB35 Modeled March 2003 Event

Meter ID	Run	Observed	Updated Model Results
SB36	March 15, 2003		
SB37	March 15, 2003		

Meter ID	Run	Observed	Updated Model Results
SB38	March 15, 2003		
SB39	March 15, 2003		

Meter ID	Run	Observed	Updated Model Results
SB40	March 15, 2003		
SB41	March 15, 2003		

Meter ID	Run	Observed	Updated Model Results
SB42	March 15, 2003	 Rainfall Event 1 Calibration SB_42 	 SB42 Modeled March 2003 Event
SB43	March 15, 2003	 Rainfall Event 1 Calibration SB_43 	 SB43 March 2003 Event

Meter ID	Run	Observed	Updated Model Results
SB44	March 15, 2003		

APPENDIX C. PHASE 3 SEGMENTS

Pipe ID	From Manhole	To Manhole	Length (ft)	Diameter (inches)	Maximum q/Q
B4-88	MH-B04-032	MH-B05-042	130	8	1.18
B5-28	MH-B05-063	MH-B05-061	77	8	1.31
B5-61	MH-B05-028	MH-B05-027	211	10	6.70
B5-63	MH-B05-012	MH-B05-066	247	10	1.46
B5-67	MH-B05-035	MH-B05-034	213	8	1.03
B5-68	MH-B05-036	MH-B05-035	152	8	1.64
B5-69	MH-B05-038	VIA_LUCERO	26	6	1.84
B5-75	MH-B05-041	MH-B05-040	198	8	1.27
B5-76	MH-B05-042	MH-B05-041	231	8	1.71
B5-93	MH-B05-058	MH-B05-057	248	18	2.33
B5-98	MH-B05-066	MH-B05-065	302	10	1.17
B6-19	MH-B06-028	MH-B06-025	350	8	1.09
B6-27	MH-B06-018	MH-B06-017	312	10	1.42
B7-43	MH-B07-031	MH-C07-015	314	18	1.14
BRAEMAR_INLET	MH-C11-025	BRAEMAR	24	8	1.30
C11-28	MH-C11-026	MH-C11-025	53	8	1.45
C4-108	MH-C04-092	MH-C04-090	59	8	1.16
C4-110	MH-C04-093	MH-C04-092	199	8	1.06
C4-34	MH-C04-074	MH-C04-075	249	8	1.14
C4-37	MH-C04-075	MH-C04-073	159	8	1.79
C4-96	MH-C04-044	MH-C04-074	235	8	1.09
C5-29	MH-C05-072	MH-B05-074	352	8	1.22
C5-30	MH-C05-073	MH-C05-072	363	8	1.16
C5-95	MH-C05-062	MH-C05-059	197	10	6.26
C6-39	MH-C06-039	MH-B07-031	239	18	1.09
C7-10	MH-C07-010	MH-C07-009	288	18	1.03
C7-11	MH-C07-011	MH-C07-010	378	18	1.10
C7-12	MH-C07-012	MH-C07-011	379	18	1.15
C7-13	MH-C07-014	MH-C07-013	191	18	1.23
C7-17	MH-C07-005	MH-C07-006	213	18	1.25
C7-18	MH-C07-004	MH-C07-008	258	18	1.32
C7-2	MH-C07-009	MH-C07-005	280	18	1.16
C7-8	MH-C07-013	MH-C07-012	378	18	1.14
C8-17	MH-C08-022	MH-C08-024	230	18	1.03
D12-12	MH-D12-004	MH-D12-007	216	18	2.07
D13-10	MH-D13-005	MH-E13-042	119	15	1.01
D13-57	MH-D13-044	MH-D13-005	24	18	1.01

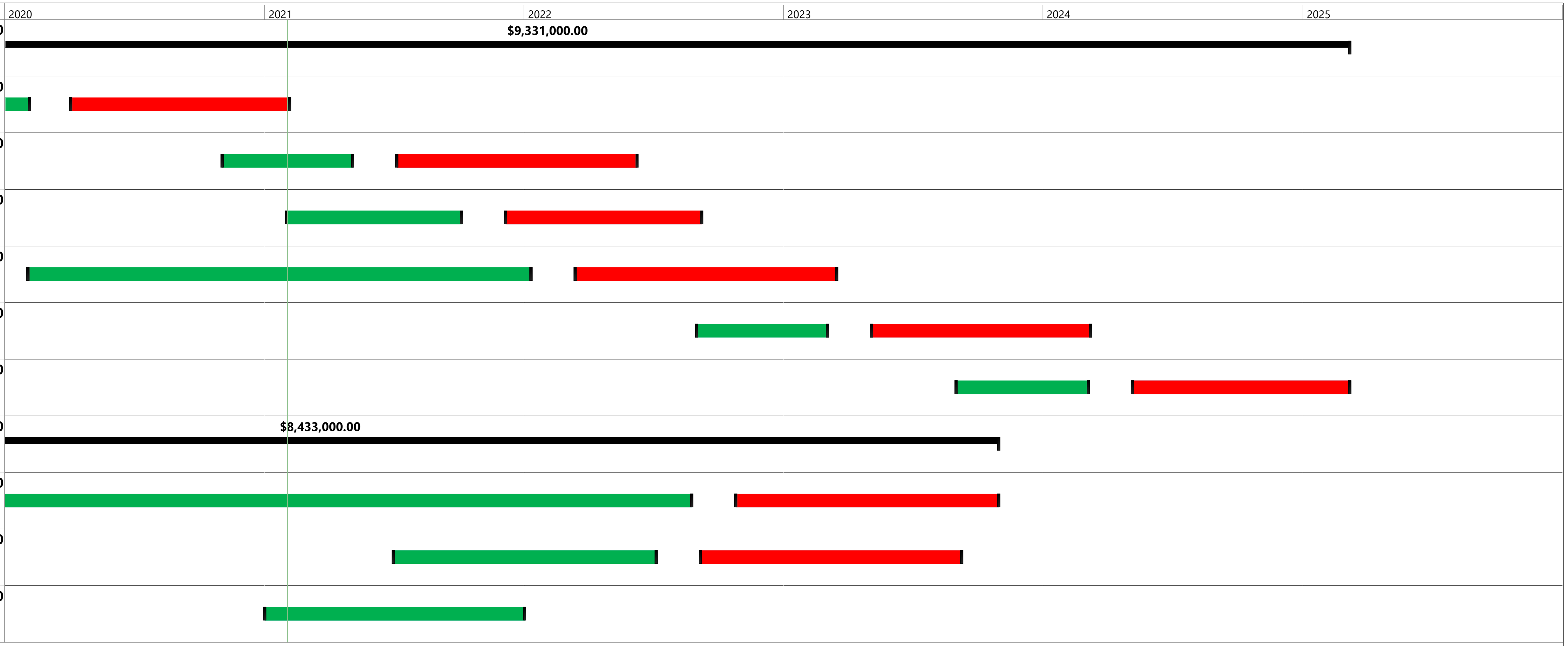
Pipe ID	From Manhole	To Manhole	Length (ft)	Diameter (inches)	Maximum q/Q
D4-123	MH-D04-017	MH-D04-015	535	6	1.10
D4-131	MH-D04-093	MH-D04-094	43	6	1.34
D4-134	MH-E04-102	MH-D04-093	418	6	1.29
D5-15	MH-D05-023	MH-D05-022	239	6	1.44
D5-18	MH-D05-002	MH-D06-023	182	6	1.17
D5-92	MH-D05-049	MH-D05-050	274	6	1.06
D5-93	MH-D05-101	MH-D05-049	278	6	1.04
D5-97	MH-D05-050	MH-D05-052	275	6	1.09
D6-42	MH-D06-004	MH-D06-027	382	10	1.09
D6-43	MH-D06-045	MH-D06-004	80	10	1.81
D8-171	MH-D08-012	MH-D08-011	184	15	1.69
D8-81	MH-D08-046	MH-E08-037	222	18	3.62
D8-82	MH-D08-047	MH-D08-046	224	18	2.50
D8-83	MH-D08-051	MH-D08-047	238	18	1.08
D8-84	MH-D08-058	MH-D08-057	225	18	1.06
D8-84B	MH-D08-057	MH-D08-051	264	18	1.08
D8-87	MH-D08-049	MH-D08-060	308	18	1.05
E5-76	MH-E05-068	MH-E05-016	350	6	1.09
E5-83	MH-E05-016	MH-D05-024	239	6	1.09
E7-129	MH-E07-070	MH-E07-071	31	15	1.36
E7-137	MH-E07-081	MH-E07-054	253	15	1.07
E7-138	MH-E07-082	MH-E07-081	31	15	1.46
E7-139	MH-E07-083	MH-E07-082	462	15	1.01
E7-148	MH-E07-084	MH-E07-083	61	15	1.16
E7-149	MH-E07-089	MH-E07-084	458	15	1.19
E8-90	MH-E08-035	MH-E08-033	176	18	1.09
E8-96	MH-E08-070	MH-E08-048	107	8	2.41
E8-97	MH-E08-071	MH-E08-070	119	8	2.06
E9-32	MH-E09-072	MH-E09-003	496	21	1.07
E9-34	MH-E09-006	MH-E09-002	239	8	1.25
F10-53	MH-F10-037	MH-F10-035	75	21	1.41
F10-63	MH-F10-044	MH-F10-043	68	21	1.35
F10-66	MH-F10-047	MH-F10-048	184	21	1.50
F5-24	MH-F05-001	MH-F05-068	275	10	1.40
F5-44	MH-F05-012	MH-F05-011	165	6	1.05
F5-52	MH-F05-012	MH-F05-009	382	8	1.07
F6-187	MH-F06-067	MH-F06-056	131	6	1.65
F8-41	XX-022	MH-F08-026	288	6	1.11
F9-25	MH-F09-006	MH-F09-005	522	8	1.21
G10-39	MH-G10-026	MH-G10-076	480	20	1.02

Pipe ID	From Manhole	To Manhole	Length (ft)	Diameter (inches)	Maximum q/Q
G10-41	CO-G10-009	MH-G10-027	119	20	1.37
G10-44	MH-G10-028	MH-G10-030	145	20	1.25
G10-45	MH-G10-023	MH-G10-028	174	20	1.57
G10-46	MH-G10-034	MH-G10-023	212	20	1.30
G10-50	MH-G10-044	MH-G10-027	513	12	1.19
G10-68	MH-G10-035	MH-G10-034	210	21	1.30
G10-69	MH-G10-036	MH-G10-035	363	20	1.08
G11-10	MH-G11-023	CO-G11-009	178	24	1.30
G12-17	MH-G12-002	MH-G12-001	259	24	1.24
G12-24	MH-G12-008	MH-G12-009	376	21	1.56
G12-3	MH-G12-020	MH-G12-021	500	21	1.15
G7-22	MH-G07-040	MH-G07-032	260	8	1.32
G8-117	MH-G08-065	MH-F08-033	512	8	1.73
G8-74	MH-G08-047	MH-G08-046	24	15	1.49
G9-20	MH-G09-025	MH-H09-048	487	20	1.23
H10-54	MH-H10-037	MH-H10-036	360	33	1.12
H10-55	MH-H10-040	MH-H10-037	341	33	1.21
H7-101	MH-H07-057	MH-H07-040	259	6	1.05
H7-14	MH-H07-025	MH-H07-024	89	10	1.08
H7-31	MH-H07-093	MH-H07-092	85	6	1.28
H7-39	MH-H07-019	MH-H07-020	78	6	1.23
H7-42	MH-H07-029	MH-H07-028	248	6	1.06
H7-45	MH-H07-052	MH-H07-050	501	12	1.47
H7-50	MH-H07-024	MH-H08-082	354	15	1.17
H8-45	MH-H08-030	MH-H08-029	83	6	1.15
H8-68	MH-H08-066	MH-H08-067	42	6	1.98
H9-102	MH-H09-076	MH-H09-086	155	24	1.08
H9-14	CO-H09-002	MH-H09-037	189	36	1.85
H9-16	MH-H09-035	MH-H09-036	281	24	1.02
H9-20	MH-H09-009	MH-H09-017	334	18	1.27
H9-21	MH-H09-002	MH-H09-009	366	18	1.13
H9-42	MH-H09-033	MH-H09-032	426	42	1.18
H9-43	MH-H09-083	MH-H10-004	339	33	1.49
H9-44	MH-H09-030	MH-H09-029	573	33	2.89
H9-75	MH-H09-067	MH-H09-071	137	24	1.14
H9-79	MH-H10-003	MH-H09-074	289	42	1.08
H9-88	MH-H09-029	MH-H09-083	71	33	1.77
J7-100	MH-J07-081	MH-J07-080	83	8	1.03
J8-24	MH-J08-050	MH-H08-066	509	8	1.00
J9-13	MH-J09-026	MH-J09-025	333	24	1.33

Pipe ID	From Manhole	To Manhole	Length (ft)	Diameter (inches)	Maximum q/Q
J9-14	MH-J09-028	MH-J09-027	271	18	1.33
J9-15	MH-J09-031	MH-J09-028	196	18	2.18
K6-42	MH-K06-069	MH-K06-066	140	6	1.15
K7-1	MH-K07-004	MH-K07-003	228	6	1.66
K7-23	MH-K07-003	MH-K07-002	142	6	1.32
K7-58	MH-K07-060	XX-039	129	6	1.27
K7-59	MH-K07-059	MH-K07-060	71	6	1.14
K8-106	MH-K08-079	MH-K08-077	186	6	1.56
K8-117	MH-K08-063	MH-K08-061	162	8	1.01
K8-123	MH-K08-061	MH-K08-060	18	8	1.42
K8-3	XX-038	MH-K08-001	13	6	2.73
K8-76	MH-K08-033	MH-K09-031	504	12	1.10
K9-11	MH-K09-056	MH-K09-018	509	8	1.05
K9-17	MH-K09-015	MH-J09-031	252	21	1.00
K9-18	MH-K09-017	MH-K09-015	256	21	1.84
K9-28	MH-K09-027	MH-K09-003	157	18	1.17
K9-29	MH-K09-007	MH-K09-017	301	18	2.41
L8-21	MH-L08-008	MH-L08-007	262	6	2.34
L8-25	MH-L08-022	MH-L08-023	346	8	2.98
L8-32	MH-L08-021	MH-L08-022	213	8	1.02
L9-12	MH-L09-004	MH-K09-055	506	12	1.54

Appendix I2 Capital Improvement Plan

ID	Task Name	Funding Source	Cost
1	***Collection System Projects***		**$9,331,000.00**
2	FY20 Rehabiltiation & Repair	CIP - SSO Compliance (48328)	**$2,376,000.00**
5	FY22 Rehabilitation & Repair	CIP - SSO Compliance (48328)	**$1,578,000.00**
8	Santa Barbara Junior High Sewer Main Relocation	CIP - Capacity Improvement	**$630,000.00**
11	Caltrans Sewer Pipe Crossing Rehabilitation	CIP - SSO Compliance (48328)	**$1,477,000.00**
14	FY24 Rehabilitation & Repair	CIP - SSO Compliance (48328)	**$1,635,000.00**
17	FY25 Rehabilitation & Repair	CIP - SSO Compliance (48328)	**$1,635,000.00**
20	***Lift Station Projects***		**$8,433,000.00**
21	Braemar Lift Station Rehabilitation	CIP - Lift Station Rehabilitation (48367)	**$6,883,000.00**
24	Via Lucero	CIP - Lift Station Rehabilitation (48367)	**$1,550,000.00**
27	Lift Station Condition Assessment	CIP - Lift Station Rehabilitation (48367)	**$150,000.00**



Wastewater CIP Timeline-20210
Tue 2/2/21

Preliminary Design 🟦 Final Design 🟩 Construction 🟥 Project Summary ▬

Appendix J1 2019 Collection System Annual Report

Annual Wastewater Collection System Report 2019

Prepared by
City of Santa Barbara
Santa Barbara, California
March 31, 2020

Table of Contents

List of Figures

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List of Appendices

Appendix O. Memory Stick containing electronic files as follows:

1. Annual Report and all Appendices in PDF format.
2. Appendices D-K in Microsoft Excel format.

Introduction and Background

Introduction

On April 27, 2011, Santa Barbara Channelkeeper filed a lawsuit against the City of Santa Barbara in the United States District Court for alleged violations of the Clean Water Act. The parties engaged in extensive Court-ordered and supervised mediation that resulted in the Court's entry of a Consent Decree on May 14, 2012. The parties again engaged in negotiations in 2016, which resulted in the Court's entry of an Amendment to the Consent Decree (Amended Consent Decree) on March 24, 2017.

The Amended Consent Decree requires submission of an Annual Report by March 31st of each year, providing details relevant to the City's implementation of and compliance with the Amended Consent Decree in the preceding year.

This Annual Report includes the following required information for the reporting time period, January 1, 2019 through December 31, 2019:

a. Compliance with SSO Performance Reduction Standards
    i) A statement and explanation of the City's compliance or non-compliance with the Sanitary Sewer Overflow (SSO) Reduction Performance Standard for 2019
    ii) Sanitary Sewer Overflows (SSOs) during the reporting time period
    iii) SSO Response and Analysis Report for each SSO
    iv) Reports of Blockages during the reporting time period and the City's analysis of each Blockage
    v) Written Records, including distribution list, of debriefing after each SSO event
b. Cleaning Program
    i) Cleaning Reports including:
        (1) Identification of sewer mains cleaned in 2019
        (2) Findings and size of proofing tool used and documentation of known issues that precluded the use of the correct size proofing tool
    ii) Document of the rationale (by assignment of codes) for the cleaning frequency changes made at each Cleaning Schedule Review Committee meeting
c. Condition Assessment and CIP Program
    i) CCTV inspection schedules for the upcoming year for inspection of gravity sewers
    ii) A statement of:
        (1) The miles of sewer that were assessed in the preceding year
        (2) The miles of sewer assessed receiving each grade in the PACP Grading System
        (3) A summary of the mileage and identification of sewers repaired, rehabilitated and/or replaced during the preceding year
    iii) List of all pipe segments that were not repaired, rehabilitated or reinspected by CCTV as required by Exhibit A of the Consent Decree Amendment

    - iv) Written Records of all QA/QC of contractor's first week of condition assessment and subsequent QA/QC if required
    - v) Written Records of QA/QC of condition assessment data entry into Cartegraph OMS
- d. Training and Audits
    - i) Field audits performed by the Superintendent, Supervisor or Lead Operator
    - ii) Written Records of SSO response drills
    - iii) Written Records of initial and annual SSO training
- e. Any program modifications or delays in 2019

Consent Decree Implementation and Compliance

For purposes of this report, Consent Decree Implementation and Compliance is being organized into the following sections, with specific detailed information required by the Amended Consent Decree identified above in the following sections:

1. Introduction and Background
2. Expenditures
3. Compliance with SSO Performance Standards and Blockages
4. Cleaning Program
5. Condition Assessment and Capital Improvement Program
6. Training, Field Audits, and Program Modifications
7. Summary, Implementation Schedule and Delays

Expenditures

Expenditures

The City worked diligently to comply with the many requirements of the Amended Consent Decree and has been successful in meeting all deadlines and implementing meaningful modifications to programs and work practices. While it is the City's intent to accomplish all work set forth in the Amended Consent Decree, the City is dependent on rate payer revenues to fund all of its work, and resources are not unlimited.

Expenditures on the Amended Consent Decree requires that resources be diverted from other parts of the operation and must be managed to ensure that other critical work is not delayed or diverted. The Amended Consent Decree does provide protection if the scope of work or cost of work exceeds the City's planned expenditures. To this end, the Consent Decree's Paragraph 49 describes the expenditure cap, which increases by one percent each year for inflation. When the City does not meet its SSO Performance Reduction Standard for a given year, the expenditure cap increases by three percent of the collection system operating budget for the following year.

A summary of the expenditure cap for years 2012 to 2019 is shown in Table 2-1 below, with modifications per the Amendment shown in 2017. Consistent with Paragraph 49 of the Consent Decree, the expenditure cap increased by one percent each year for inflation and an additional three percent of the collection system operating budget was added to the expenditure cap when the SSO Performance Standard was not met in the prior year.

Table 2-1. Expenditure Cap Summary

Year	Expenditure Cap	Meet SSO Performance Standard for Year?	With 1% Increase (Inflation)	With 3% Increase of Operating Budget (SSO Standard)
2012	$5,100,891	No*	$5,151,900	$5,231,741
2013	$5,231,741	Yes	$5,284,058	NA- met goal
2014	$5,284,058	No	$5,336,899	$5,432,796
2015	$5,432,796	No	$5,487,124	$5,584,814
2016	$5,584,814	Yes	$5,640,663	NA- met goal
2017	$5,790,663**	No	$5,848,570	$6,024,027
2018	$6,024,027	Yes	$6,084,267	NA- met goal
2019	$6,084,267	Yes	NA	NA

*City contends that SSO Performance Standards were met in 2012, but to avoid further disputes for expenditure cap purposes, three percent increase of the operating budget was added to the expenditure cap for 2013.

**2017 expenditure cap includes the one-time $150,000 increase per Paragraph 49 of the Amended Consent Decree

Summary cost components for 2019 are shown in Table 2-2 below. Though the City operates on a fiscal year budget from July through June each year, these costs specifically represent Calendar Year 2019 data.

Table 2-2. Cost Summary Table

Operations	Non Capital Consent Decree Expenditures	Consent Decree Capital Expenditures	Total
$4,476,377.89	$2,062.50	$2,632,428.08	$7,110,868.47

The City spent considerable time and resources in 2019 performing important work to meet the deadlines of the Amended Consent Decree and to address and implement previous comments and requests from ChannelKeeper:

- Completing Consent Decree deliverable documents;
- Continuing implementation of prior comments from ChannelKeeper;
- Performing engineering work critical to the design of capital projects;
- Completing construction of planned sewer collection system construction projects;
- Operating computer software and related hardware associated with the City's wastewater collection system-related programs;
- Implementing and training staff to use the upgraded CMMS software, Cartegraph OMS, for daily data entry and analysis;
- Performing condition assessment activities associated with the development of an annual CIP Program sewer main rehabilitation/replacement project.
- Issuing a bid for a Recycle Combination Vacuum-Jetter to enhance cleaning operations
- Drafting a Request for Proposals to replace City's CCTV inspection system, both equipment and vehicle.
- Utilizing a Public Relations firm to further enhance public outreach
- Added additional staff to the Sewer Lateral Inspection Program to help with public outreach
- Implemented two additional sewer lateral repair/rehabilitation options for the private lateral owner to utilize.
- Planning a website upgrade to provide more information on collection system-related programs.
- Nominated for and won 2019 Collection System of the Year – Medium for CWEA Tri-Counties and State organizations.

Compliance with SSO Performance Reduction Standards and Blockages

SSO History

In 2019, the City was below the Amended Consent Decree's 2019 SSO Reduction Performance Standard of eight SSOs. The City's system experienced four SSOs. Please see Appendix A for the SSO Response and Analysis Reports for these SSOs.

A listing of the four SSO events and a summary of related wastewater collection system performance matters are provided in Table 3-1.

Table 3-1. SSO Event Listing

	Location	SSO Date	Primary Cause
1	800 Blk Portosuello	1/16/2019	Roots
2	745 Las Alturas	3/23/2019	Roots
3	605 Willowglen	4/30/2019	Structural failure
4	396 Las Alturas	12/31/2019	Roots

An overview of the four SSO locations is provided in Figure 3-1. All SSO Response and Analysis Reports are located in Appendix A. Written records, including distribution lists, of staff debriefings after each SSO Event are located in Appendix B.

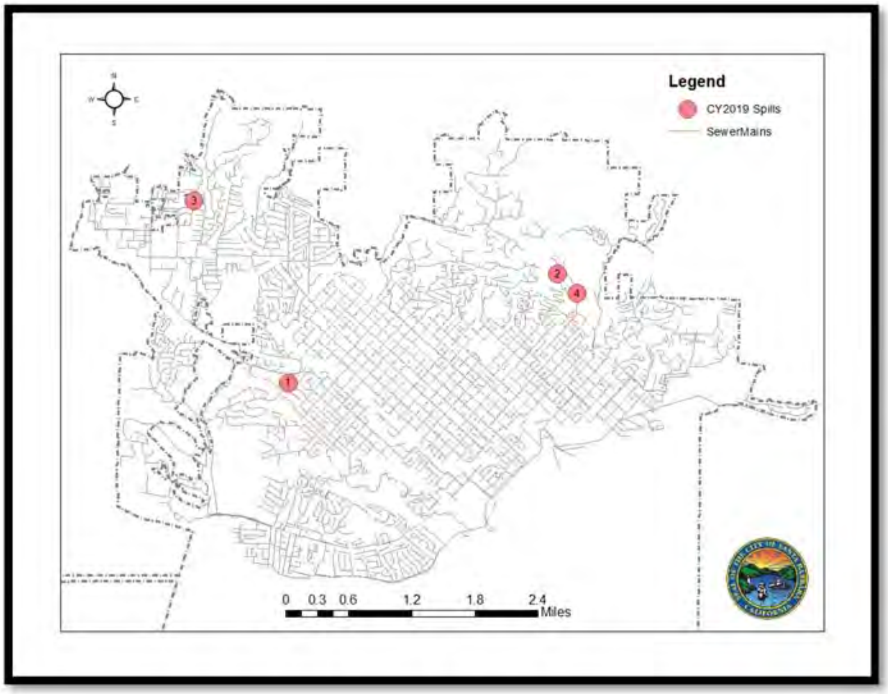

Figure 3-1. SSO Events Location Map

Overflows by Cause

Table 3-2 summarizes the four SSOs by cause for the reporting period.

Table 3-2. SSO Event Summary by Primary Cause

SSO Cause	Number of SSO Events	Percent of Total SSOs
Roots	3	75%
Debris	0	0%
Grease	0	0%
Other	0	0%
Structural Defects	1	25%

Table 3-3 provides a condition finding-based summary of each of the four SSO events. When possible, City staff has performed a visual observation of the SSO main immediately after the initial blockage is cleared, but before the sewer main is aggressively cleaned. These visual observations have provided valuable information and insight into the exact cause of the spill, which may not have been determined from cleaning findings alone. Therefore, a visual finding column is included in Table 3-3 to provide this additional information.

Table 3-3. SSO Event Condition Finding Details

	Asset ID	Grease	Roots	Debris	Other	Overall Finding	Visual Finding
1	D8-44	Clear	Heavy	Clear	Clear	Heavy	Roots from lateral
2	J5-23	Clear	Heavy	Clear	Clear	Heavy	Roots
3	B3-29	Clear	Clear	Clear	Clear	Clear	Structural failure
4	J6-72	Heavy	Medium	Clear	Clear	Clear	Roots from lateral

Overflows by Volume

Table 3-4 summarizes the four SSO events by volume, showing total event volume, volume recovered, and net volume released, and volume that reached public waters. Approximately 80% of the total SSO volume was recovered during emergency response events for the four SSO events in 2019.

Table 3-4. SSO Event Summary by Volume in Gallons

	Total Volume	Volume Recovered	Volume Not Recovered	Volume Reaching Public Waters	% Recovered
1	525	525	0	0	100%
2	21	0	21	0	0%
3	103	1	102	102	1%
4	56	36	20	20	64%
Totals:	705	562	143	122	80%

3.1.4 Public Water Overflow Impacts

In 2019, two of the City SSOs reached public waters; SSO Events 3 and 4. Approximately 122 gallons from these two SSO Events were unrecoverable and reached public waters.

Blockage History

In 2019, the City's system experienced three Blockages. A listing of these Blockage events and a summary of related wastewater collection system performance matters are provided in Table 3-5 below.

Table 3-5. Blockage Event Listing

	Pipe ID	Location	Blockage Date	Primary Cause
1	H8-27	Haley & Nopal	2/11/2019	Grease & Roots
2	G9-86	629 Bradbury	11/26/2019	Roots intrusion
3	F7-145	209 E. Islay	12/6/2019	Roots from lateral

An overview map of the location of these Blockage is provided in Figure 3-2 below. The Blockage analysis reports are located in Appendix C.

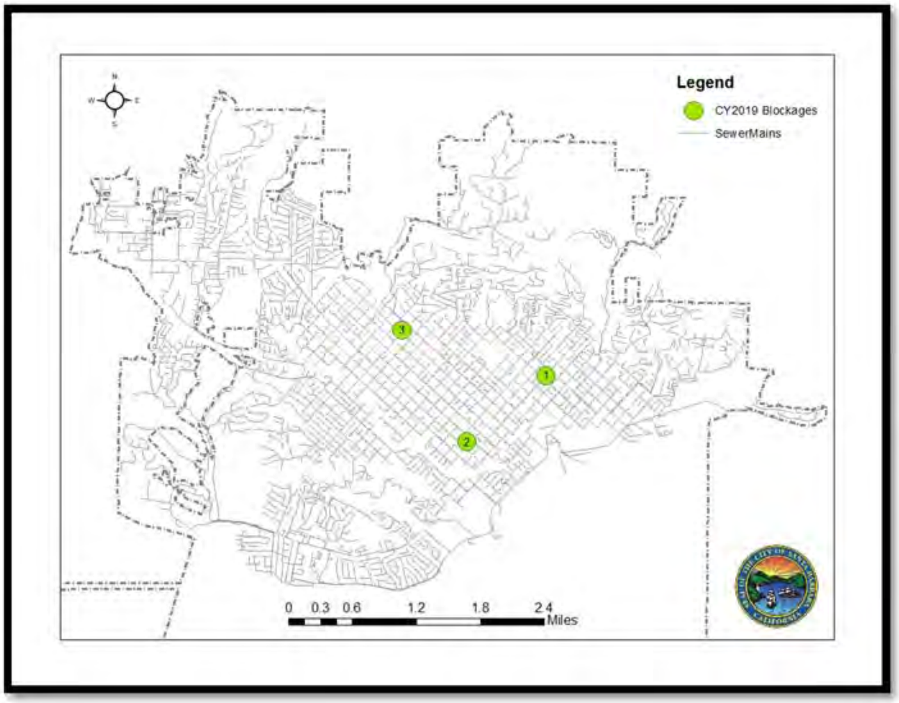

Figure 3-2. Blockage Event Location Map

Table 3-6. Blockage Event Condition Finding Details

	Pipe ID	Grease	Roots	Debris	Other	Overall Finding
1	H8-27	Light	Heavy	Clear	Medium	Heavy
2	G9-86	Clear	Medium	Clear	Clear	Medium
3	F7-145	Clear	Heavy	Clear	Clear	Heavy

Cleaning Program

Sewer Mains Cleaned in 2019

Cleaning Activity Summaries

In 2019, the City cleaned approximately 300.2 miles of sewer mains. These sewer main cleaning activities resulted in 7,210 cleaning events being performed on 4,474 individual sewer mains. The tables below describe in detail these sewer main cleaning activities.

Key analyses contained in this report have produced the following results:

- 7,210 sewer main cleaning events were completed in 2019. These cleaning events represent approximately 300.2 miles of sewer mains.
- 4,474 individual sewer mains were cleaned, many of them several times in 2019.
    - These cleaned sewer mains represent approximately 183.6 geographic miles of the overall Wastewater Collection System, which is approximately 257 geographic miles. Thus, in 2019, the City cleaned nearly 73% of its entire wastewater collection system.

Table 4-1 lists the monthly sewer main cleaning events and related cleaning mileages for 2019. In summary, the City performed an average of 607 cleaning events monthly with a resulting average of 25.0 miles of sewer main being cleaned each month.

Table 4-1. Sewer Main Cleaning Monthly Summaries

Month	Monthly Cleaning Events	Monthly Cleaning Mileage
January	461	19.8
February	656	28.5
March	788	33.6
April	599	25.3
May	614	25.6
June	772	32.2
July	505	21.9
August	699	28.6
September	499	20.7
October	757	30.3

November	489	18.6
December	371	15.0
Totals:	7,210	300.2
Monthly Averages:	601	25.0

Table 4-2 lists the number of times that individual sewer mains were cleaned in 2019. Sewer mains being cleaned only one time over the reporting period represent 67 percent of the geographic sewer mains that were cleaned and 42 percent of all the cleaning events performed. Sewer mains being cleaned more than one time in 2019 represent the remaining 33 percent of geographic sewer mains and 58 percent of total cleaning events.

Table 4-2. Sewer Main Cleaning Event History

Number of Times Cleaned	Number of Mains Cleaned	Cleaning Mileage	Geographic Mileage
1	3114	123.7	123.7
2	853	77.7	38.8
3	292	36.2	12.1
4	55	7.7	1.9
5	19	5.7	1.1
6	40	10.3	1.7
7	26	9.0	1.3
8	18	5.0	0.7
9	12	4.1	0.5
10	7	3.3	0.3
11	10	5.4	0.5
12	20	9.0	0.8
13	7	2.4	0.2
14	1	0.6	0.1
Totals	4,474	300.2	183.6

Condition Findings

Table 4-3 provides information related to the amount of materials found when cleaning events were performed over the reporting period. In summary, 97 percent of the sewer main cleaning events resulted in “Clear” or “Light” condition findings, which indicate that the cleaning schedules for these sewer mains are adequate and that they do not require more frequent cleaning. The condition findings for the remaining 3 percent of the cleaning events performed have resulted in the sewer main cleaning frequencies being adjusted so that these pipes are cleaned more frequently in the future. Sewer mains representing these Overall condition findings are shown in Figure 4-1.

Table 4-3. Sewer Main Cleaning Condition Findings Summary

Overall Condition Finding	Number of Mains	Number of Events	Cleaning Mileage
Heavy	34	36	1.6
Medium	165	175	7.6
Light	1,364	1,859	81.2
Clear	2,911	5,140	209.9
Total	4,474	7,210	300.3

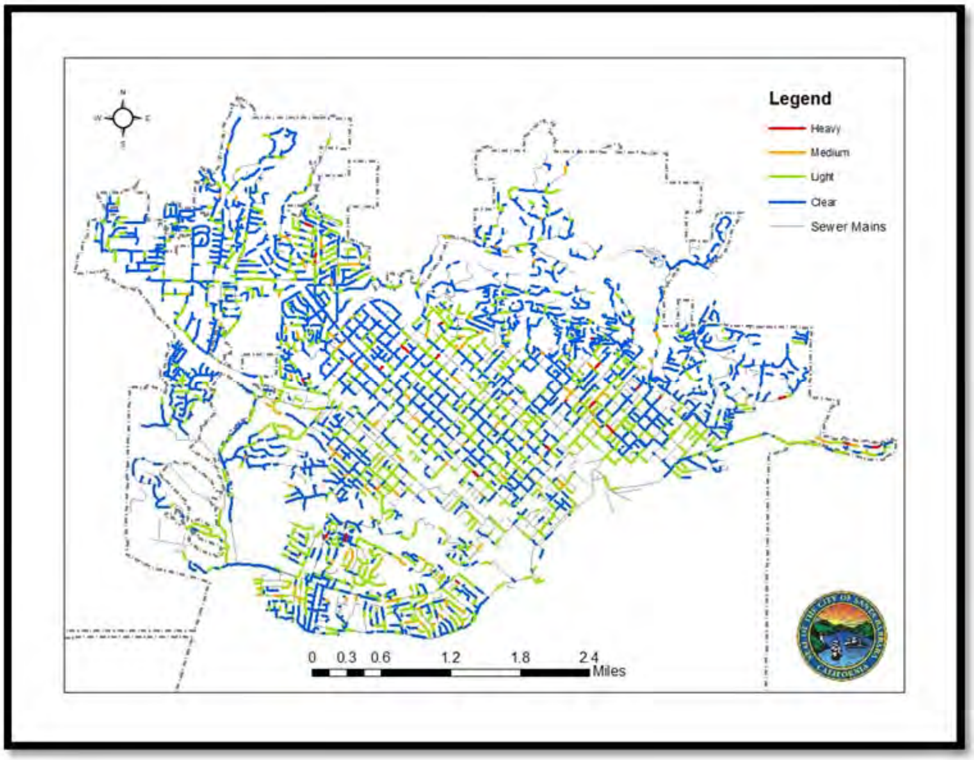

Figure 4-1. Overall Condition Findings

A more detailed examination of these condition findings can be made through a review of Table 4-4. It demonstrates that a small percentage of pipe cleaning events completed resulted in “heavy” or “medium” condition findings. Of these “heavy” and “medium” condition findings, roots, grease and debris constitute the primary contributors of potential blockage-forming materials in sewer mains. Sewer mains representing the standard condition findings are presented in Figures 4-2, 4-3 and 4-4.

Table 4-4. Cleaning Event Condition Finding Summary

Category	Grease	Roots	Debris	Other
Heavy:	4	19	12	2
Medium:	13	100	98	5
Light:	155	440	1,424	26
Clear:	7,038	6,651	5,676	7,177
Totals:	7,210	7,210	7,210	7,210

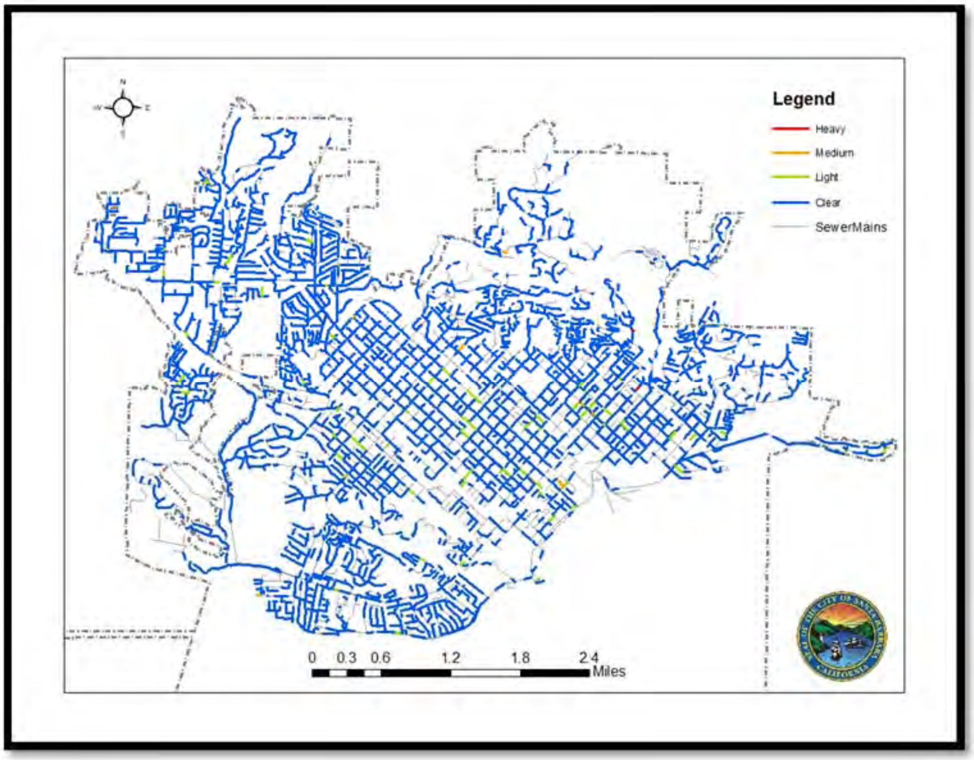

Figure 4-2. Grease Condition Findings

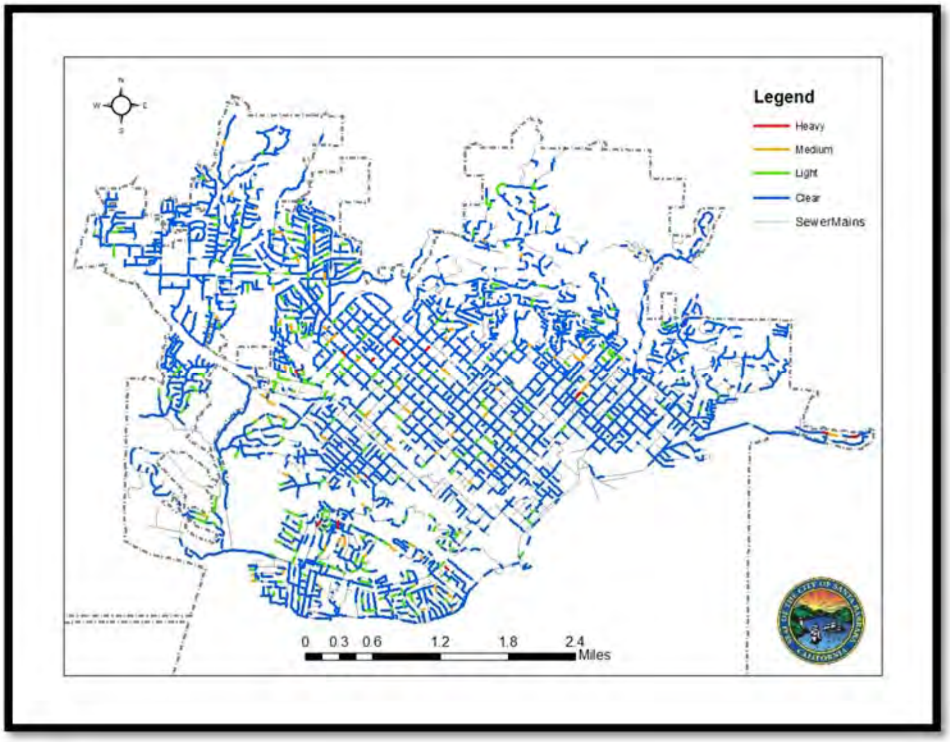

Figure 4-3. Roots Condition Findings

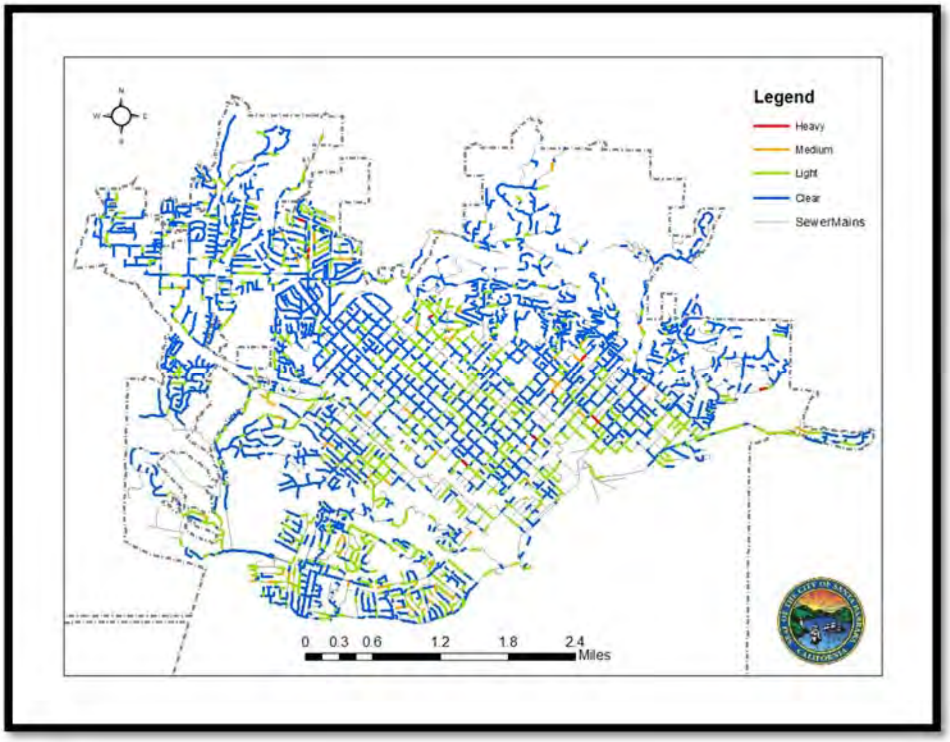

Figure 4-4. Debris Condition Findings

Cleaning Report

A report identifying all sewer mains cleaned in 2019 is located in Appendix D. The report includes the sewer main segment ID, date cleaned, cleaning findings, size of sewer main, size of proofer tool used, and the "known issues" field. If the proper sized proofer tool is not used after cleaning the sewer main, the reason why is documented in the known issues field. Outlined below are typical reasons a smaller proofer tool is used explaining some of the inconsistencies and anomalies in the data.

- For sewer mains larger than 12-inches in diameter, visual inspection is conducted in lieu of using a proofer tool, whenever possible. It is not practical to proof sewer mains larger than 12-inches in diameter in the City's sewer system because it is difficult to maneuver larger sized proofers in the City's smaller diameter manholes. Therefore, the City conducts a visual inspection of those sewer mains to confirm they were adequately cleaned. There are, however, times when visual inspection is not feasible, such as during peak flows and when visual inspection equipment is either being repaired or deployed elsewhere in the system. The City uses specialized cleaning nozzles for its large diameter sewer mains to clean debris from the bottom of the sewer main.
- Staff noticed that the proofers were out of "round" in early 2017. The City replaced all of its proofers prior to 2018. As Staff has returned to clean some of these mains, office staff has been updating the records when sewer mains are now able to be cleaned with the correct size proofer tools.
- Siphons and sewer mains in easements, under the freeway, and in difficult access areas pose risks with using the correct sized proofer. Typically, a proofer tool one size smaller is used to reduce the risk of getting the proofer tool stuck in the sewer main and having to retrieve it through excavation.
- Additional reasons a smaller sized proofer tool may need to be used:
    - A sewer main is cleaned via access from an adjacent sewer main that requires a smaller sized proofer tool. This typically happens in easements where an access structure is difficult or unsafe to get to. If these two mains are cleaned together or separately there may be different sized proofer tools used at different times;
    - Rehabilitated sewer mains and sewer mains with internal spot line repairs may require a smaller proofer tool, especially if there are top hats installed or an offset is lined through;
    - GIS errors; and
    - Contractor error. Staff has been working with contractors to document the reason the correct size proofer tool could not be used.

Frequency Change Code Report

Each month a Cleaning Schedule Review Committee Meeting is held to discuss and coordinate various cleaning and scheduling matters. The planner/scheduler brings proposed cleaning frequency changes that would normally occur outside of the cleaning algorithm. If approved, a frequency change code is used to document the change in the CMMS.

Appendix E contains the Frequency Change Code Report. This Report identifies sewer mains where a frequency change code was used to document a change made outside of the cleaning algorithm. In 2019, there were 191 cleaning frequency changes made outside of the algorithm. This number has decreased from the 244 cleaning frequency changes reported in 2018.

Cleaning Program Modifications

The City is constantly analyzing its cleaning program with the goal of reducing SSO events. During 2019, Staff continued reviewing cleaning findings and using visual observations to ensure that each pipe is assigned to the correct cleaning program and on the correct frequency. If pipes were discovered to have roots either through visual confirmation or new cleaning findings, the cleaning program was adjusted so that the pipe was assigned to one of the two root control cleaning programs. Table 4-5 below summarizes the current percentage of pipes within each of the four cleaning programs at the end of 2019.

Table 4-5. Sewer Main Cleaning Program Summary

Cleaning Program	Number of Sewer Mains	Miles	Percent of System (by Number of Sewer Mains)
System Wide Cleaning	1,918	71.2	30.6%
Accelerated Cleaning	1,006	45.0	16.0%
Accelerated Root Cleaning	2,574	105.0	41.0%
Chemical Root Control	777	31.2	12.4%

In 2019, the City increased the number of sewer mains in the Accelerated Root Cleaning and Chemical Root Control programs due to inspection data or cleaning findings documenting roots are present in the sewer main. Below is a summary description of each program and planned changes to cleaning frequencies.

System Wide Cleaning Program

The System Wide Cleaning Program is intended for those sewer mains without a history of heavy or medium findings. They are sewer mains that can be cleaned on a longer frequency, and are currently cleaned on a 36-month or 60-month cleaning frequency, depending on the size. For sewer mains 8-inch in diameter or less, the City will continue to clean these sewer mains in this cleaning program at the 36-month cleaning frequency until data suggests that the frequency should be increased. The cleaning frequency for sewer mains larger than 8-inch in diameter will remain at 60-months.

Approximately 30.6% of the City's sanitary sewer system is on the System Wide Cleaning Program.

Accelerated Cleaning Program

The Accelerated Cleaning Program is for sewer mains with a history of debris or grease findings that require more frequent cleaning than the System Wide Program. Sewer mains in this program are cleaned at least every 24-months. Approximately 16.0% of the City's system is assigned to the Accelerated Cleaning Program.

Current cleaning frequencies for the Accelerated Cleaning Program are 24, 12, 6, 4, 2 and 1-month. A new 2-month cleaning frequency was added in 2018 to allow for greater flexibility when scheduling future cleaning events. The 2-month cleaning frequency is used when decreasing the cleaning frequency from 1- month; however, it is not used when increasing the cleaning frequency from 4-months to 1-month, i.e., when cleaning findings are heavy or medium. In that case, the sewer main will go directly to a 1-month cleaning frequency.

Accelerated Root Cleaning Program (ARCP)

The Accelerated Root Cleaning Program was a new program established in February 2017 for sewer mains with a history of root findings. Sewer mains in this program are cleaned at least every 12-months and are not removed from the program until the source of root intrusion is identified and eliminated. Alternatively, they may be placed in the Chemical Root Control program. Approximately 41.0% of the City's system is assigned to the ARCP. This program has been fully implemented and each sewer main in this program has been initially cleaned per its new cleaning cycle.

Current cleaning frequencies for the ARCP are 12, 6, 4, 2 and 1-month. A new 2-month cleaning frequency was added in 2018 to allow for greater flexibility when scheduling future cleaning events. The 2-month cleaning frequency is used when decreasing the cleaning frequency from 1- month; however, it is not be used when increasing the cleaning frequency from 4-months to 1-month, i.e., when cleaning findings are heavy or medium. In that case, the sewer main will go directly to a 1-month cleaning frequency.

Chemical Root Control Program (CRCP)

The City has performed chemical root foaming services annually since 2014. Sewer mains in this program are treated with an herbicide to inhibit root growth in the sewer main. Approximately 12.4% of the City's system is assigned to the Chemical Root Control Program (CRCP).

Per manufacturer's recommendations, sewer mains should be retreated 2-years after the initial treatment. Thereafter, sewer mains can be treated every 3-years.

Current cleaning frequencies for the CRCP are 36, 24, 12, and 6-months. A new 36-month cleaning frequency was added in 2019 to allow the City to align with manufacturer's recommendations.

1.1.1.1 2019 CRCP Activities

In 2019, the City contracted with Dukes Root Control (Dukes) to perform chemical root foaming services on 16.9 miles of sewer mains. These sewer mains were last treated in fall 2017, and were retreated in fall 2019 for their 2-year cycle. See Figure 4-5 below for the spatial distribution of the chemical root treated sewer mains in 2019.

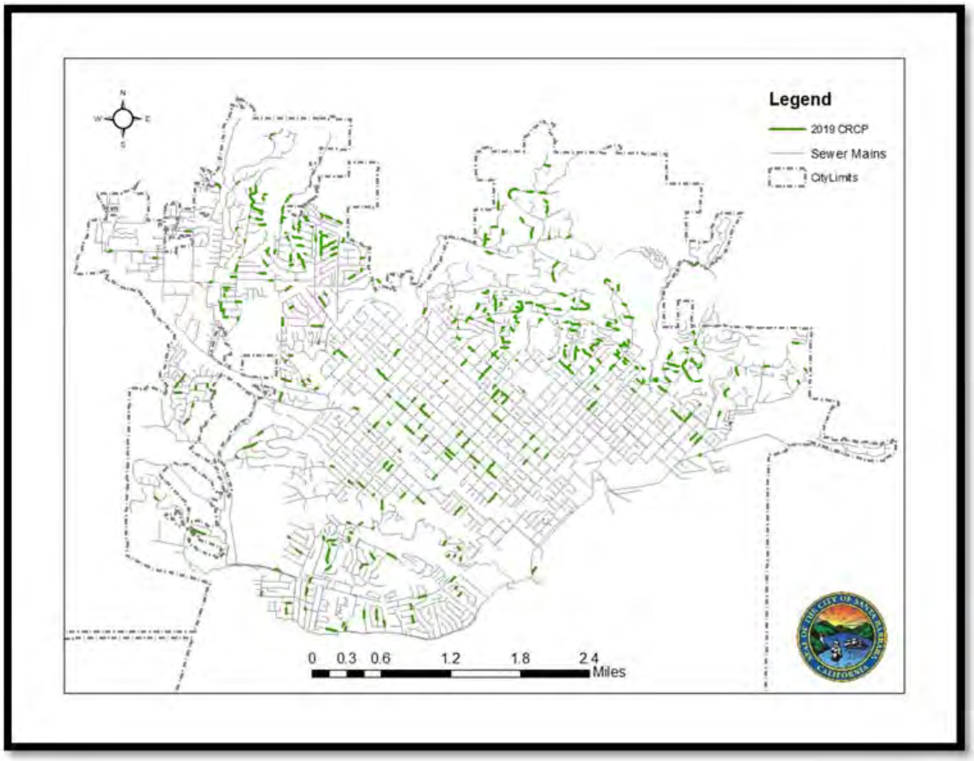

Figure 4-5. Chemical Root Control Program

Cleaning Mileage Projections

Cleaning mileage projections for the next three years are presented in Table 4-6. For this analysis, and projection, the mileage is based on the current frequency.

Table 4-6 Projected Minimum Cleaning Mileage Requirements

Year	1 month	2 month	4 month	6 month	12 month	24 month	36 month	60 month	Total
2020	23.6	16.8	34.7	61.7	105.8	12.5	4.4	1.4	260.9
2021	23.6	16.8	34.7	61.7	105.8	13.7	41.3	2.6	300.1
2022	23.6	16.8	34.7	61.7	105.8	12.5	7.2	7.7	270.0

Contract Cleaning

The City renewed its “On-Call” contract for cleaning services in place since it was designed and bid in 2018. The contractor augmented City staff cleaning and completed approximately 10 miles of contract cleaning each quarter (roughly every three months and submitted the cleaning results and findings through Cartegraph OMS to the City for analysis and documentation.

Additional Collection System Programs

Acoustic Sounding Program

While staff mainly focused on managing the increased cleaning due to the shift to the 36-month maximum frequency for pipes 8-inches in diameter and smaller, City staff still completed a significant number of acoustic sounding tasks performed in 2019. In total, 368 assessment events on approximately 16.8 miles of sewer mains were completed over the reporting period. Staff adjusted the selection of pipes for acoustic sounding and focused on the pipes 8-inch and smaller diameter sewer mains, not scheduled for cleaning in 2019.

Assessment results are provided on a scale of zero to 10, with a zero indicating the sewer main may have a significant pipe anomaly or blockage, and a 10 indicating the sewer main is clear. Follow-up maintenance protocols have been implemented to investigate and remedy sewer mains with low assessment scores.

The acoustic sounding activities completed in 2019 are summarized in Table 4-7 and shown in Figure 4-6 below.

Table 4-7. Acoustic Inspection Results

Acoustic Score	Number of Tests Receiving Each Score	Mileage Receiving Each Score
10	7	0.4
9	58	2.2
8	77	2.7
7	48	1.8
6	57	2.6
5	19	1.0
4	29	1.4
3	16	0.9
2	11	0.6
1	10	0.6
0	36	2.7
Total	368	16.8

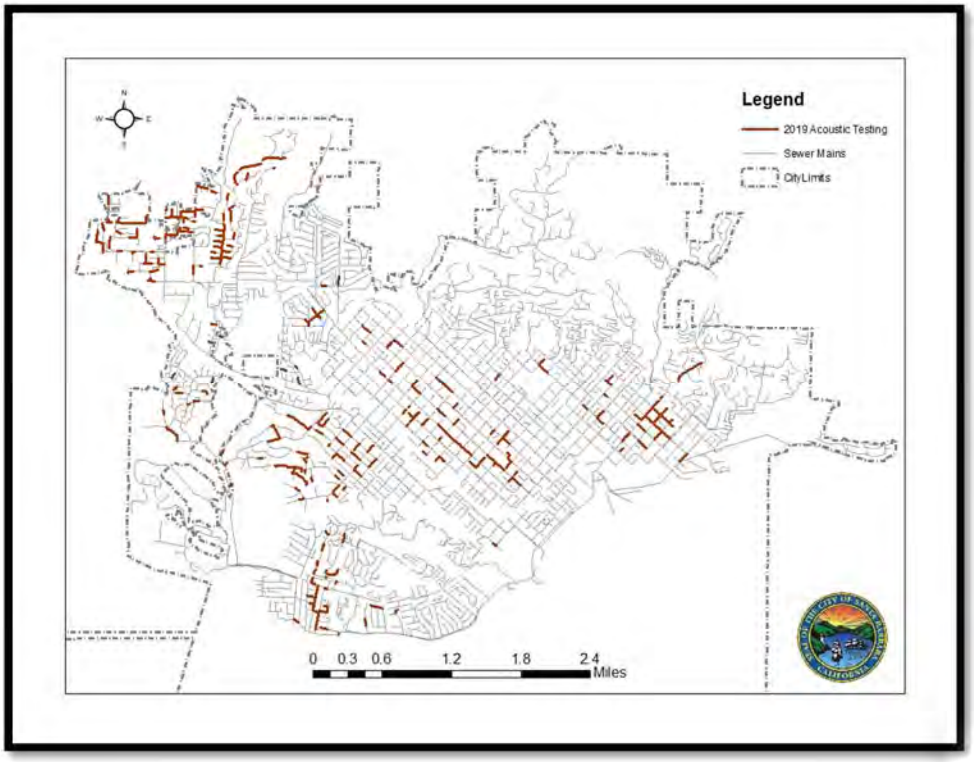

Figure 4-6. Acoustic Sounding Program

The acoustic sounding program has been incorporated into the City's work plan as an effective screening tool to identify potential blockages in City sewer mains. City staff can quickly and cost effectively acoustically sound sewer pipes and follow-up with appropriate and timely activities with the goal of reducing SSOs. The City plans to continue its acoustic sounding activities.

FOG Management Program

The City has an inspector responsible for inspection of the 582 food service establishments (FSE) that produce fats, oils and grease (FOG) in the City's service area. FSE's are inspected on a two-year cycle with the goal to inspect approximately 25-30 restaurants per month. In addition to inspection, the inspector provides public education and outreach to the FSE's. FOG related spills have trended down over the past years, largely due to the success of the FOG program.

In 2019, 601 site visits/inspections were performed. Staff will continue to provide FOG inspections and site visits in future years.

Sewer Lateral Inspection Program

The Sewer Lateral Inspection Program (SLIP) is an important element of the City's comprehensive strategy to eliminating sewer spills and is focused on inspection of commercial properties, condominiums and other common interest developments, as well as residential properties whose sewer lateral or connection to the main is in need of repair. In 2019, 896 SLIP letters were sent to property owners to inspect their sewer lateral and 392 connections were replaced. Staff continues to focus on the SLIP program in an effort to reduce public and private SSOs.

1.1.2 Public Outreach Program

In 2019, the City continued to develop the Public Outreach Program. The City began the process of restructuring its existing communication program in 2018 with the goal of establishing a new, more effective public outreach program. The City's intent is to develop and implement a public outreach program that informs, educates and provides valuable information for residents and businesses to help reduce private and public spills.

Recognizing that there are companies that specialize in strategic communication and public involvement, one of the first steps the City took was selecting a public relations consultant to assist wastewater staff in developing a successful outreach program. The consultant's initial focus was on the Sewer Lateral Inspection Program, however, additional public outreach and educational materials were developed in 2019 to inform the residential population about proper disposal of fats, oils and grease material and which materials should not be disposed of in the sewer system (What to Flush?).

City Staff spent a significant amount of time in 2019 updating public outreach materials and restructuring the wastewater system webpages. Some of the other notable accomplishments in 2019 include:

- Finalizing communication plan for SLIP, FOG and "What to Flush?" topics
- Developing informational content for use in various communication material including the sewer lateral inspection program letters and on the City's website.
- Adding informational content to SLIP Residential Resources, FOG, and "What to Flush?" webpages.
- Developing an outreach calendar to establish a schedule for the public to come to be a part of the outreach meetings and events.
- Establishing office hours outside of normal business hours to assist the public with wastewater and SLIP related questions.
- Hosting a focus group to seek input from the public and other City staff members on improvements to the webpage and informational handouts.
- Publishing a Fats, Oils and Grease notification in November 2019 "City News in Brief" informing or reminding property owners of the issues associated with discharging these types of materials down the drain
- Begin to convert all public outreach materials to be bilingual.
- Developed and implement two additional repair or rehabilitation options for the public's private sewer lateral connection to the public sewer main.

Future work will include assisting wastewater staff with further website updates and developing other infographics for use in other publications like water bill inserts or other educational campaigns about wastewater collections issues.

Condition Assessment and CIP

1.1 Condition Assessment

Completed Condition Assessment Work

In 2019, approximately 26.8 miles of sewer mains were televised. The CCTV inspection work that was completed in 2019 produced the information which appears in Table 5-1 below, with the PACP results of CCTV inspections summarized in Table 5-2. Sewer segment locations inspected are shown in Figure 5-1. Since 2012, CCTV data is placed into the POSM (Pipeline Observation System Management) software system for storage and condition assessment work.

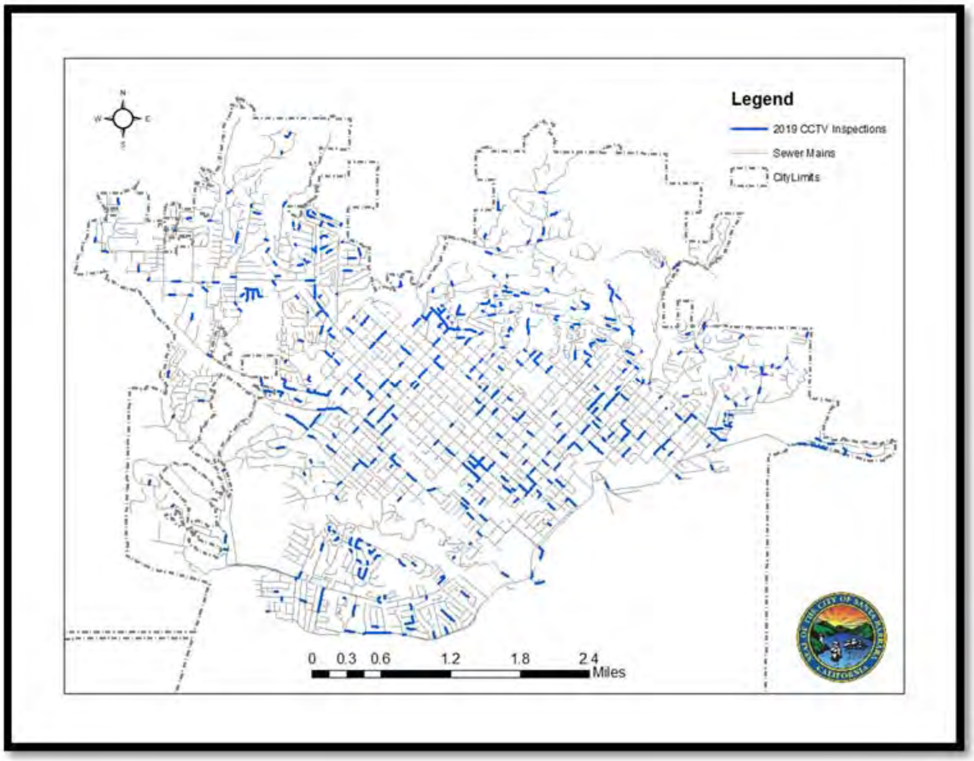

Figure 5-1. CCTV Inspection Events

Table 5-1. CCTV Events Mileage Summary	
CCTV Source	Total Mileage
City	17.8
Contract	9.0
Total	26.8

Table 5-2. CCTV Inspection Results	
PACP Score	Mileage Receiving Each Score
5	7.6
4	0.1
3	0.8
2	2.4
1	10.0
0	5.9
Total	26.8

QA/QC Program

In 2019, approximately 9.0 miles of CCTV assessment work was performed by contactors. This included CCTV inspections conducted through the annual capital and On-Call CCTV contracts.

The CCTV Planner/Scheduler is committed to ensuring the quality of the data entered into the CCTV database meets PACP standards. Staff recognizes that contractor data requires a significant amount of QA/QC, and overall in 2019, Wastewater staff performed QA/QC on 97.5% of the 9.0 miles of contractor's inspections and entered the results into Cartegraph OMS. This report is included in Appendix F.

QA/QC of all records of condition assessment data entry into the CMMS are included in Appendix G.

Exhibit A Pipes

The City relies on the Planner/Scheduler and scheduling features in Cartegraph OMS to meet the timelines set forth for repair, rehabilitation, replacement, and/or reinspection of sewer mains with Grade 4 or Grade 5 defects. In 2019, all sewer mains were reinspected per the timeline per Exhibit A and therefore, there are no mains listed in Appendix H.

Planned Condition Assessment Work

The City owns one CCTV truck with televising hardware that functions with POSM software. City staff will use this system to continue its planned televising work of City sewer mains and to respond to: SSO events, system blockages, customer complaints and requests, quality control review of contracted sewer main cleaning, and ad-hoc organizational needs.

The City is in the process of issuing a bid for CCTV inspection services to assist staff with obtaining an initial PACP inspection for sewer mains associated with the upcoming annual pavement overlay projects. All City sewer mains televised will be assessed by the Contractor according to PACP Code standards. The resulting CCTV data and inspection information will be recorded in the CMMS and transmitted to the City and uploaded into the City's CCTV server. Work is anticipated to begin in July 2020 and focuses on 6" and 8" diameter.

PACP Certified City staff will continue to check the Contractor's PACP coded-video to ensure that the video is of appropriate quality and that the PACP code results are accurate and representative of the City sewer mains being assessed.

City staff will also participate in the planned annual system-wide CCTV scheduled work as needed. It is estimated that this City televising work will result in approximately 20 miles or more of City sewer main being assessed in 2020. Table 5-3 summarizes the planned CCTV work for 2020. A graphical representation of City sewer mains planned to be televised by contractor or City forces is shown in Figure 5-2 below. A listing of these individual sewer mains is provided in the Appendix I.

Table 5-3. Planned CCTV Assessment

CCTV Source	Pipe Mileage
City	19.0
Contractor	14.4
Total	33.4

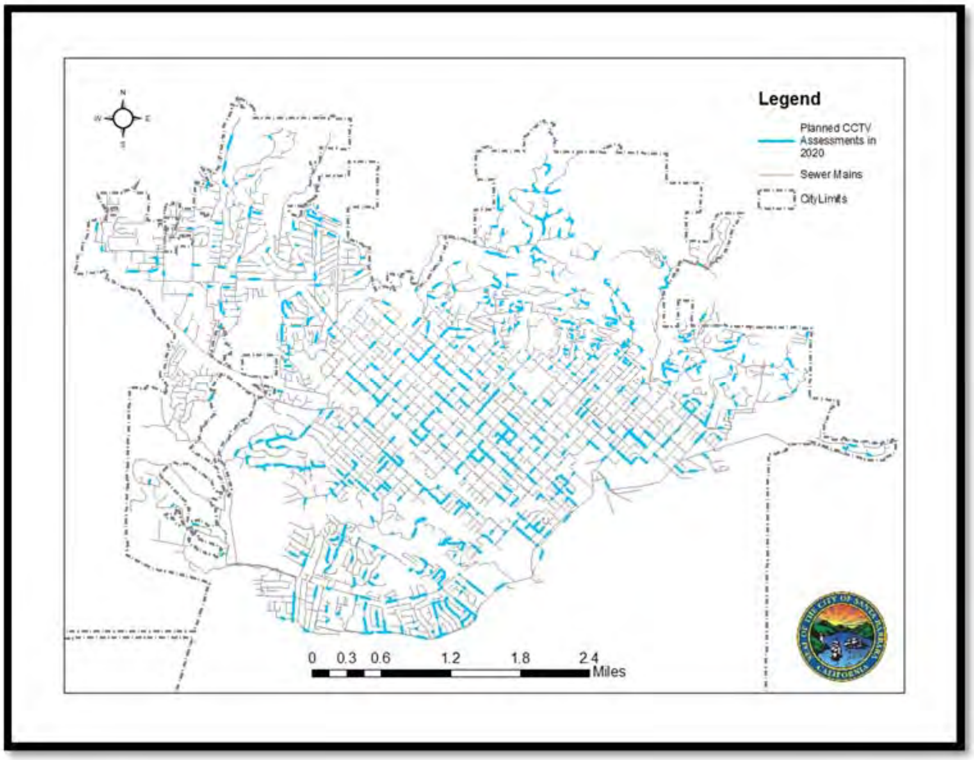

Figure 5-2. Planned CCTV Tasks

Capital Improvement Program

Completed Rehabilitation, Repair and/or Replacement Work

The City completed CIP construction project pipe mileage totaling 4.01 miles in 2019. Project-related information is shown in Figure 5-3 and Table 5-4 below. A list of these sewer main segment is located in Appendix J.

Table 5-4. CIP Project Pipe Mileage Completed

Project Type	Type of Work	Segments	Miles
Sewer Main Rehabilitation	Rehab	77	3.87
Sewer Main Repairs	Repair	1	0.03
Sewer Main Replacement	Replacement	9	0.11
	Total	87	4.01

[1] A segment of pipe is the distance from manhole to manhole or manhole to clean-out.

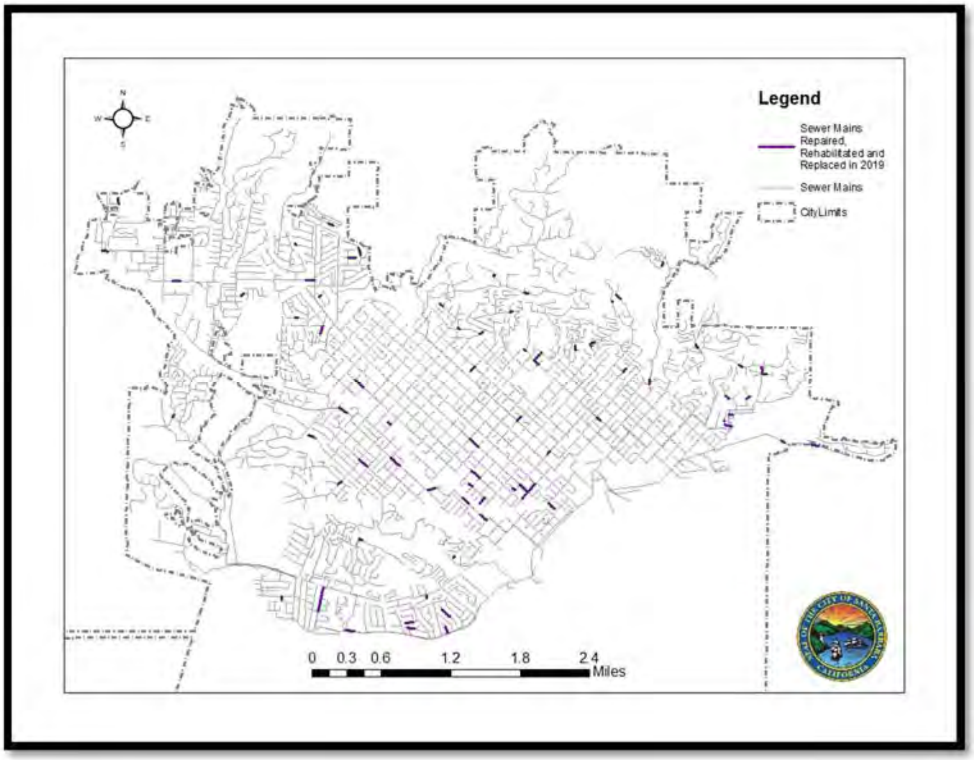

Figure 5-3. CIP Pipe Mileage Completed

In 2019, eight mains were replaced through two bridge replacement projects. For the Montecito-Yanonali Bridge Replacement Project, a 15-inch sewer main suspended from the bridge was replaced with a new. Epoxy lined main. The Gutierrez Bridge Replacement Project included the replacement of a critical double barrel siphon underneath Mission Creek.

The La Colina Force Main Rehabilitation Project intended to rehabilitate the original 60-year-old ductile iron force main, approximately 3,100 linear feet in length, that is in poor condition and is no longer in service. A new force main was constructed in 2015, and rehabilitating the old force main expected to provide increased reliability and redundancy. The bid for the force main rehabilitation was issued in May 2018 but unfortunately, the costs were significantly higher than the expected project costs. The City rejected the bid, reevaluated the construction approach and bid documents and reissued the bid for replacement of the existing force main in December 2018. The original forcemain was successfully replaced and the project completed in September 2019.

The Consent Decree provides pipe rehabilitation, replacement, and/or repair in excess of the required miles shall be credited to the following year. The following table summarizes construction pipe mileage for 2012 through 2019. Previous High Risk Pipe (HRP) mileage is shown for clarity and completeness, but will no longer be tracked separately per the Amended Consent Decree. All pipe mileage is documented in the Non-HRP miles column for 2017, except the 0.3 miles completed at the beginning of 2017 to satisfy the 10 mile HRP commitment.

Table 5-5. CIP Pipe Mileage Summary

Calendar year	HRP (Miles)	Non-HRP (Miles)	Total (Miles)
2012	1.0	4.1	5.1
2013	2.4	1.7	4.1
2014	2.3	3.4	5.7
2015	2.0	4.1	6.1
2016	2.0	3.8	5.8
2017	0.3	3.3	3.6
2018	N/A	3.6	3.6
2019	N/A	4.0	4.0
Total	10.0	28.0	38.0

Planned Rehabilitation, Repair and/or Replacement Work

The FY20 Wastewater Main Rehabilitation and Repair Project was competitively bid in December 2019. This project will rehabilitate, repair or replace approximately 3.0 miles. Construction is expected to begin May 2020.

The FY21 Wastewater Main Rehabilitation and Repair Project is currently in preliminary design stage working on scoping the project. The project is expected to be bid in Winter 2020 with construction commencing in 2021. The City expects to continue with an annual capital improvement project, with a combination of pipe repairs, rehabilitations, and/or replacements to maintain the condition of the system at an acceptable level.

The asset IDs of the sewer mains currently scheduled to be repaired, rehabilitated or replaced in 2020 may be found in Appendix K.

In addition to the CIP rehabilitation and repair contract outlined in the Table 5-6 below, the City has an on-call sewer main repair construction contract in place to provide for repairs of sewer mains to be performed on an as-needed basis. This work will be directed to repair pipes throughout the system, as prioritized by the City's condition assessment work. Work completed will be credited to the annual repair, rehabilitation and replacement goals.

Table 5-6. Planned CIP Work for 2020

CIP Projects	Project Total Mileage
Wastewater Main Rehabilitation and Repairs FY20	3.0
Total	3.0

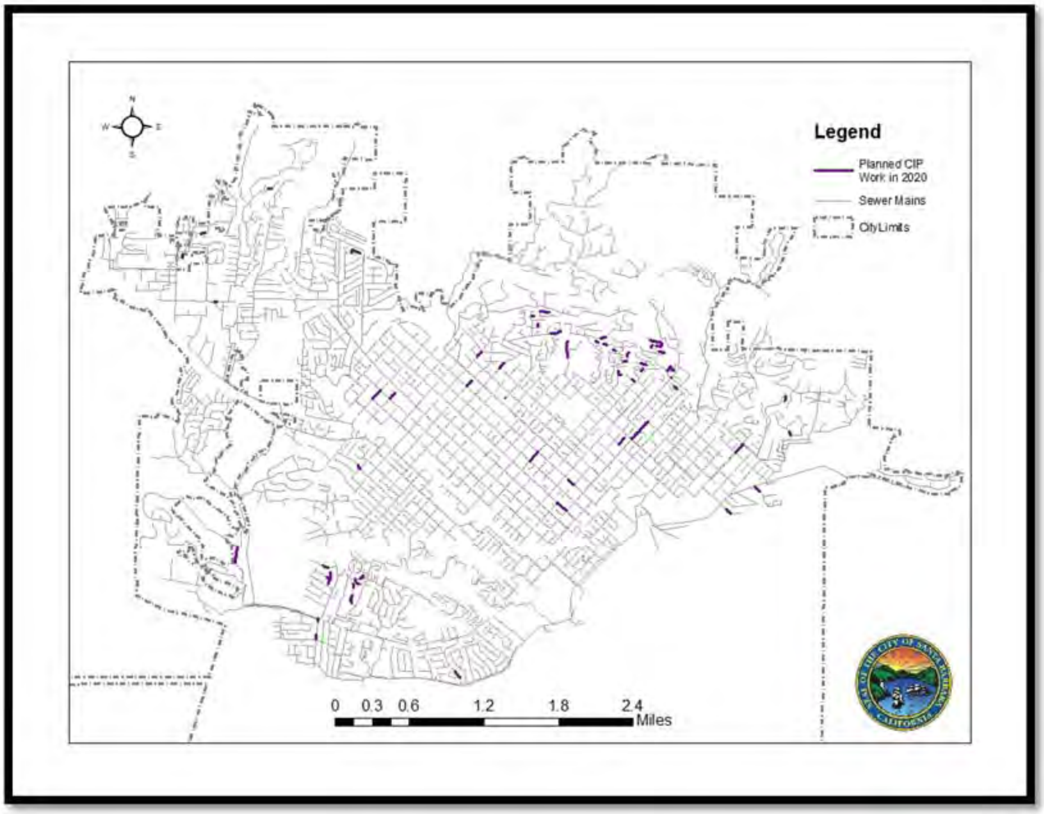

Figure 5-4. Planned CIP Work

Planned Lift Station Work

The Braemar Lift Station Rehabilitation Project is intended to replace aging equipment and address operation and maintenance challenges. The work generally includes replacement of the existing pumps and motors with new pumps and motors with Variable Frequency Drives (VFD). The VFDs are expected to provide a better long-term solution for maintenance issues in the wet well, in addition to increased energy efficiency. The work also includes replacing the existing ventilation system, rehabilitation of the wet well, condition assessment of the surge tank and associated appurtenances, replacing the motor control center, evaluating the condition for the standby generator, and upgrades to the SCADA system.

The design has been submitted to the City's Building and Safety Division and due to the lift station's proximity to Arroyo Burro Creek and location in a FEMA floodplain, it was determined that the plans needed to be revised to include a flood wall protection and to address Sea Level Rise (SLR). This new design element, along with funding the improvements, has delayed the project until they can be addressed. It is anticipated to be bid in 2020, with construction potentially starting in 2021.

Training, Field Audits and Program Modifications

Training and Field Audits

The following sections outline various training and field audits performed in 2019.

Training

The following formal training events were conducted with field staff in 2019.

- Annual SSO training, per Section 3.6.1.6 SSO Response and Reporting Plan, conducted on September 17, 2019. The agenda and sign-in sheets are located in Appendix L.
- SSO Response Drills (Section 3.6.1.7 of the 2015 SSO Response and Reporting Plan), conducted on the following dates with training documents located in Appendix M.
    - November 18 – Public SSO response drill and documentation
    - December 5 – Wet Weather response simulation and documentation review
    - December 18 – Responding to Private lateral sewer discharge response drill and documentation

Additionally, the Superintendent and Field Supervisor attended an Overflow Emergency Response Plan Reporting Requirements and SSO Volume Estimation Methods training by DKF Solutions the City of San Diego on September 19, 2019.

Field Audits

384 field audits, per Cleaning Plan (Section 5.2), were conducted in 2019. A listing of the field audit dates, staff visited and location are located in Appendix N.

Program Modifications

The following sections outline upcoming Program Modifications that were not previously discussed in the report.

Business and Technology-Driven Modifications

The City continued its efforts in 2019 to develop and invest in technological systems to assist the City in its asset management of the collection system. This includes further refining its practices in Cartegraph OMS by using the geographic mapping and scheduling functions within the software to group longer duration pipes such as mains with 12-month, 24-month, 36-month and 60-month cleaning frequencies. This resulted in increased productivity for cleaning crews. Additionally, Wastewater staff expanded its ways to use Cartegraph OMS to document repair work and coordinate with other divisions within the City such as Streets Maintenance.

In 2019, the City expanded the use of Cartegraph OMS to several other departments. This expansion helped coordinate and plan maintenance and capital improvement work between all public and private construction improvement work.

In 2020, the City plans to take the next steps in getting new pipeline inspection software. The new software is expected to interface with Cartegraph OMS which will improve efficiency and data integrity between the two databases. Being able to merge these software applications will also help the City organize and prioritize maintenance and capital work.

Summary, Implementation Schedule and Delays

The plans, activities and actions provided in this Annual Wastewater Collection System Report demonstrate the City of Santa Barbara's commitment to sustaining the highest level of environmental service to its citizens at a budgetary cost consistent with provisions of the Amended Consent Decree. By so doing, the City now is undertaking important new measures which are designed to achieve compliance with SSO Reduction Goals outlined in the Amended Consent Decree.

A schedule which summarizes the City's commitment to continued progress in this regard is provided below in Tables 7-1 and 7-2.

Table 7-1. Summary Schedule for Proposed Actions.

Proposed Action	Start Date	Completion Date
Cleaning City Staff Work	January 2020	On-going
CCTV City Staff Work	January 2020	On-going
CIP Condition Assessment Work	January 2020	On-going
CIP Pipeline Construction Work	July 2020	On-going
CCTV Contract Work for Capital Projects	June 2020	On-going
CCTV Contract Work– FY20 CCTV Project	July 2020	August 2020
Cleaning Contract Work – "On-Call"	January 2020	Quarterly As-needed

Table 7-2. Schedule for Additional Actions Designed to Further Reduce SSO Events.

Proposed Action	Start Date	Completion Date
Chemical Root Control Contract Work	October 2020	November 2020
Acoustic Sounding City Staff Work	January 2020	On-going

Although the Amended Consent Decree expires on March 31, 2020, the City remains committed to the ongoing programs that were developed in response to the Consent Decree requirements and SSO Reduction Action Plans (RAPS) over the past few years. The only planned change is the City's Collection team will be returning to the fiscal year (July 1 – June 30) reporting period to align with the City budgets as opposed to the calendar year as outlined by the Consent Decree.

Delays

Besides the Braemar Lift Station Rehabilitation Project which has been delayed by the unforeseen flood wall requirements and addressing SLR to be included in the design, the COVID-19 pandemic is expected to have a significant impact to the community and the economy. While the full scope and duration of the impacts cannot reasonably be determined at the time of the report, it is the City's priority to maintain its current maintenance practices and capital improvement programs to protect public health and prevent SSOs.

Appendix J2 2018 SSO Reduction Action Plan

2018 SSO Reduction Action Plan

Prepared by
City of Santa Barbara
Santa Barbara, California
March 31, 2018

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Appendix A. SSO Response and Analysis Reports

Appendix B. Written Records of Staff Debriefings After SSO Events

Appendix C. Blockage Analysis Reports

Appendix D. Planned CCTV Assessments

Appendix E. Planned CIP Work

Appendix F. Memory Stick containing electronic files as follows:

1. 2018 SSO Reduction Action Plan and all Appendices in PDF Format.
2. Microsoft Excel Tables for SSO and Blockage Information.
3. Appendices D and E in Microsoft Excel format.

Appendix G. Quantitative Analysis Technical Memorandum by Brown & Caldwell dated April 2, 2018

Section 1

Introduction and Background

1.1 Requirement to Prepare Report

On April 27, 2011, Santa Barbara Channelkeeper filed a lawsuit against the City of Santa Barbara in the United States District Court for alleged violations of the Clean Water Act. The parties engaged in extensive Court-ordered and supervised mediation that resulted in the Court's entry of a Consent Decree on May 14, 2012. The parties again engaged in negotiations in 2016, which resulted in the Court's entry of an Amendment to the Consent Decree (Amended Consent Decree) on March 24, 2017.

The Amended Consent Decree sets forth as one of its primary objectives, Sanitary Sewer Overflow (SSO) Reduction Performance Standards (SSO Standards). In the event that the City does not achieve those performance standards, the City must prepare an SSO Reduction Action Plan (SSO RAP) designed to achieve compliance with the SSO Standards set forth for the following calendar year and submit it to Channelkeeper concurrently with the submission of the applicable Annual or Semi-Annual Report.

Per the Amended Consent Decree, the SSO Standard is eight SSOs per year. Over the six-month reporting time period for the 2017 Semi-Annual Report (January 1, 2017 through June 30, 2017), the City experienced 11 SSOs from the publicly owned sewer system. This exceeds the number set forth in the SSO Standards by three. However, three of these SSOs Events occurred on February 17, 2017, during a 25-year storm event. Per paragraph 14(b) of the Consent Decree, SSOs caused by severe natural conditions (such as storm events exceeding a 10-Year 24-Hour storm) are not counted towards the SSO Standard. This reduced the actual number of SSOs that count towards the SSO Standard to eight for the 2017 Semi-Annual Reporting period.

The City experienced two additional SSOs in July 2017, totaling 13 SSO Events in 2017. As stated above, three of these SSO events occurred during a 25-year storm event and are not counted towards the SSO Standard; therefore, the City experienced ten SSO Events that count towards the SSO Standard in 2017, which exceeded the 2017 SSO Standard by two.

A SSO RAP has been prepared and is being submitted concurrent with the 2017 Annual Report. The SSO RAP includes the following required information:

a) Specific Action taken during the portion of the calendar year prior to the Annual Report that was designed to achieve compliance with the SSO Standard.
b) Additional measures to be taken during the upcoming year to achieve compliance with the SSO Standard.
c) Tables in Microsoft Excel format that include following SSO and Blockage information:
    i) Location of each spill, and total number of spills, associated with roots;
    ii) Location of each spill, and total number of spills, associated with debris;
    iii) Cleaning frequency, both before and after the spill, for each pipe segment for each spill associated with roots and/or debris;
    iv) Blockages occurring after January 1, 2017, the location of each Blockage and cause of each Blockage;

  - v) Blockages occurring after January 1, 2017, the cleaning frequency, both before and after the Blockage, for each pipe segment for each Blockage associated with roots, Fats Oils and Grease (FOG), and/or debris;
  - vi) Location of each spill, and total number of spills, associated with structural defects;
  - vii) PACP quick score, repair and/or replacement schedule, both before and after the spill for each pipe segment for each spill associated with structural defects; and
  - viii) Location of each spill, and total number of spills associated with FOG.
- d) Analysis of the exiting program and any proposed program changes or improvements to achieve the SSO Standard, including but not limited to:
  - i) Quantitative analysis of the accuracy of the reporting relating to spill causes;
  - ii) Review of existing and proposed cleaning schedule to reduce roots, FOG or debris related spills, if any;
  - iii) Review of the existing and proposed repair and replacement schedules to reduce structural defect related spills, if any;
  - iv) Quantitative analysis of the trends in spills over the previous five years, including spills causes, level of effort (in miles cleaned and pipe segments repaired and/or replaced), and the relationship, if any, between the level of effort and spill reduction;
  - v) Quantitative analysis of trends in Blockages during the time since the 2016 Amendment, and the relationship, if any, between level of effort (in miles cleaned and pipe segments repaired and/or replaced) and Blockage reduction; and
  - vi) Analysis of resource reallocation required (e.g. staff, contracted services and/or equipment) to implement program changes recommended in the SSO RAP.
- e) Proposed implementation schedule.

1.2 SSO RAP Implementation and Compliance

For purposes of this report, the SSO RAP Implementation and Compliance is being organized into the following sections, with specific detailed information required by the Amended Consent Decree identified above in the following sections:

1. Introduction and Background;
2. SSO and Blockage Information and Analysis;
3. Cleaning Program Activities, Analysis, and Proposed Changes;
4. Capital Improvement Program (CIP) Activities, Analysis, and Proposed Changes; and
5. Summary and Implementation Schedule.

Section 2

SSO and Blockage Information and Analysis

2.1 2017 SSO History

In 2017, the City's system experienced 13 SSOs; however, three SSOs occurred on February 17, 2017, during a 25-year storm event. Per paragraph 14(b) of the Consent Decree, SSOs caused by severe natural conditions (such as storm events exceeding a 10-Year 24-Hour storm) are not counted towards the SSO Reduction Performance Standard. This reduces the actual number of SSOs that count towards the SSO Reduction Performance Standard to ten. Please see Appendix A for the SSO Response and Analysis Reports for these three storm related SSO events, which are discussed separately.

A listing of the ten SSO events and a summary of related wastewater collection system performance matters are provided in Table 2-1, and the three storm related SSOs are provided in Table 2-1A.

Table 2-1. SSO Event Listing

	Location	SSO Date	Primary Cause
1	1334 San Pascual Street	1/4/17	Roots
2	226 S. Salinas Street	1/26/17	Roots
3	Plaza Bonita	2/9/17	Debris
4	951 Medio Road	3/9/17	Roots
5	1833 Barker Pass Road	4/6/17	Debris
6	524 E. Victoria	5/9/17	Other – construction defect
7	Braemar Lift Station	5/15/17	Other – operator error
8	620 E. Quinientos Street	5/30/17	Debris
9	429 Orilla Del Mar	7/18/17	Grease
10	505 E. Canon Perdido	7/28/17	Other – construction defect

Table 2-1A. Storm Related SSO Event Listing

	Location	SSO Date	Primary Cause
A	Vernon Road at Serena Road	2/17/17	Storm Related
B	Gutierrez at APS	2/17/17	Storm Related
C	Alphonse at Alisos Streets	2/17/17	Storm Related

An overview of the ten SSO locations is provided in Figure 2-1. The three storm related SSO locations are provided in Figure 2-1A. All SSO Response and Analysis Reports are located in Appendix A. Written records, including distribution lists, of staff debriefings after each SSO Event are located in Appendix B.

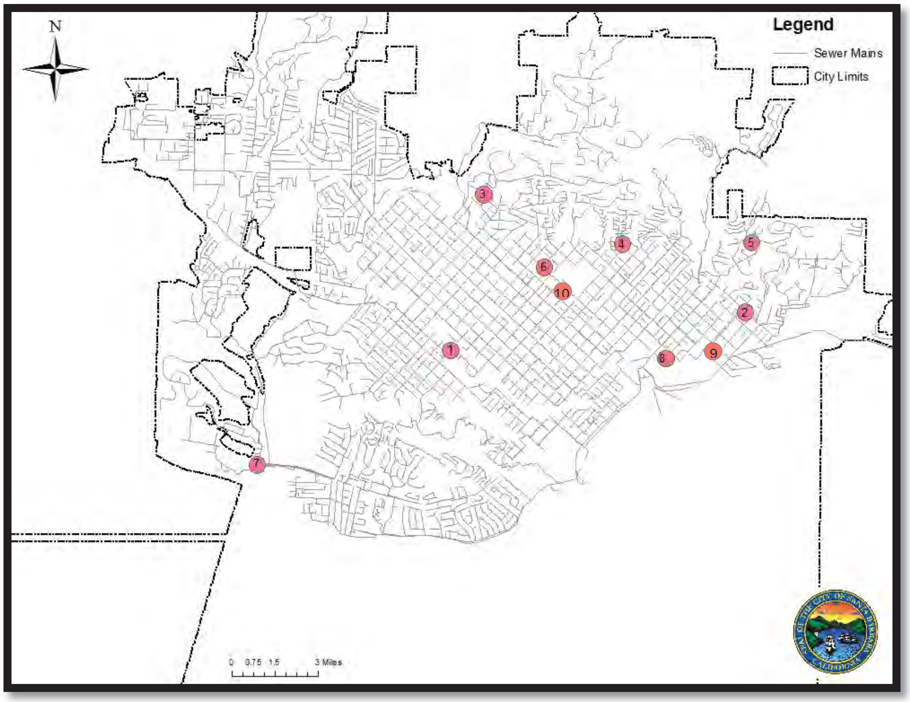


Figure 2-1. SSO Events Location Map

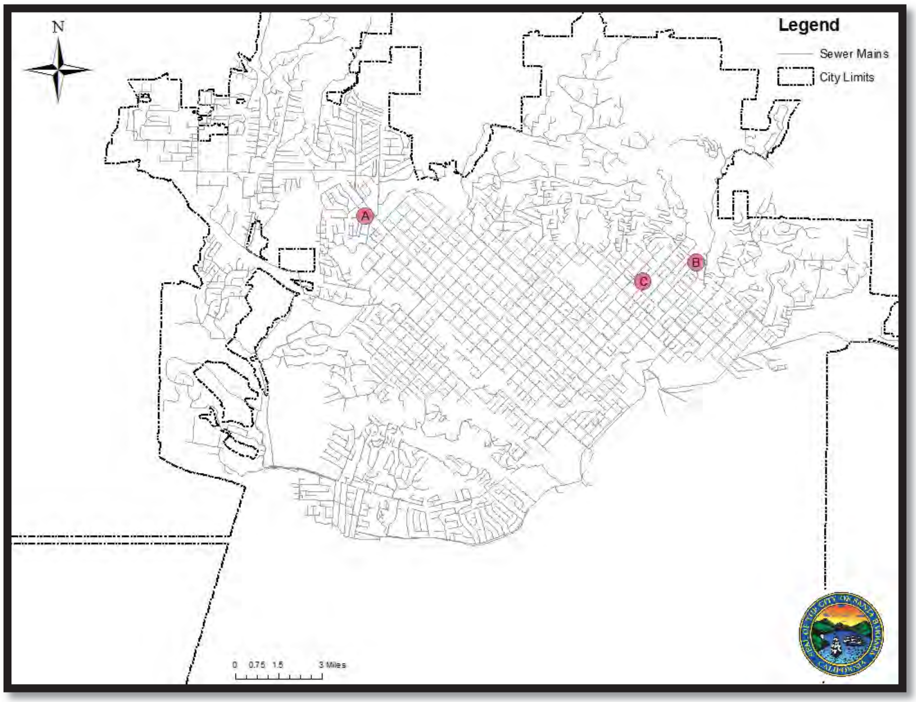


Figure 2-1A. Storm Related SSO Events Location Map

2.1.1 SSO Caused by Severe Natural Conditions

Events A through C occurred during an extreme rainfall event on February 17, 2017, in which the County determined it to be more than a 25-year storm event. This is above the design capacity of the City's wastewater collection system and these three storm related SSOs would not have occurred under normal operating conditions. SSO Events A and C occurred because of excessive flows in the sewer system. SSO Event B was caused by a combination of high flows, and materials dislodging and mobilizing downstream as a result of the high flows, which eventually blocked a downstream sewer main. The analysis of each of these spills reveals that the primary cause was extraordinary hydraulic flows in the system.

2.2 Quantitative Analysis of Accuracy of Reporting

Table 2-3 below provides a condition finding-based summary of each of the ten SSO events. In 2017, City staff implemented two new practices to improve SSO reporting accuracy as follows:

1. Post Incident Response Meetings. These meetings are held as soon as practical with responding staff to review and confirm SSO event details. The meetings have proven valuable in accurately estimating spill volumes and documenting SSO event facts.

2. Visual Observations. When possible, City staff performs a visual observation on the SSO main immediately after the initial blockage is cleared, but before the sewer main is aggressively cleaned. This has allowed staff to better identify the exact cause of the SSO, which may not have been determined from cleaning findings alone, and has improved accuracy for reporting spill causes. Therefore, a visual finding column is included in Table 2-2 to provide this additional information.

These two new practices have yielded valuable information for the City to accurately document SSO causes and volumes, which may not be apparent from cleaning findings alone. It also provides the City with the ability to identify and correct issues to prevent future SSO events. The City has reviewed the 2017 SSO Events and is 100% accurate in its reporting.

See Appendix A for additional details regarding these SSO Events.

Table 2-2. SSO Event Condition Finding Details

	Pipe ID	Grease	Roots	Debris	Other	Primary Cause	Visual Finding
1	E9-26	Heavy	Clear	Clear	Clear	Roots	Protruding roots at lateral
2	K8-32	Light	Light	Clear	Clear	Roots	Heavy roots at blockage location and many joints
3	F5-73	Clear	Clear	Light	Clear	Debris	Heavy debris at material change location
4	H6-38	Clear	Medium	Clear	Clear	Roots	Roots observed in sewer main
5	K6-41	Clear	Clear	Clear	Clear	Debris	Debris and Grease build-up at lateral
6	G7-27	Clear	Clear	Clear	Clear	Other – Construction Defect	Paper and debris caught on delaminated HDPE weld beads
7	NA	NA	NA	NA	NA	Other – Operator Error	N/A – Operator Error
8	J9-20	Clear	Clear	Heavy	Clear	Debris	N/A
9	K9-19	Heavy	Clear	Clear	Clear	Grease	Grease accumulating on lateral roots protruding into sewer main
10	G8-47	Clear	Clear	Clear	Clear	Other – Construction Defect	Lateral liner blocking sewer main

2.3 Overflows by Cause

Table 2-3 summarizes the ten SSOs by cause for 2017. As noted above, three SSO Events were due to a 25-Year Storm event and are not included in Table 2-3.

Three events were listed as "Other," SSO Events 6, 7 and 10. These three SSO Events have a high likelihood of not being repeated in the future and SSO Events 7 and 10 were not caused by lack of maintenance of the City's sanitary sewer system.

- SSO Event 6 was due to a construction defect. During the SSO analysis, it was determined that the cause of the SSO was due to paper and debris catching and accumulating on delaminating HDPE weld beads. The weld beads were successfully removed by staff on May 24, 2017.
- SSO Event 7 was due to operator error at the Braemar Lift Station. During routine maintenance, an operator incorrectly switched valves while alternating force mains and caused the SSO. Valves have now been clearly identified and the Standard Operating Procedure (SOP) was updated to prevent this from happening again in the future.

- SSO Event 10 was due to a construction defect. A private contractor performed lateral lining to repair a property owner's private sewer lateral and the lateral liner protruded into the sewer main, thereby blocking the entire sewer main. Changes were made to the Sewer Lateral Inspection Program (SLIP) and the SLIP Project Coordinator is now on-site during lateral lining installation to ensure material is installed correctly and requires a post-cure video after to confirm nothing changed.

Table 2-3. SSO Event Summary by Primary Cause

SSO Cause	Number of SSO Events	Percent of Total SSOs
Roots	3	30%
Other	3	30%
Grease	1	10%
Debris	3	30%
Structural Defects	0	0%

2.3.1 Overflows by Roots

In 2017, roots were the primary cause for three SSO Events (30%). Table 2-4 provides the location, Pipe ID, date of SSO Event, and cleaning frequencies, both before and after the SSO event. This information is also provided as an electronic table in Microsoft Excel format in Appendix F. An overview of the Root related SSO Events is shown in Figure 2-2.

Table 2-4. Root Related SSO Events

	Location	Pipe ID	Date	Cleaning Frequency Before SSO (months)	Cleaning Frequency After SSO (months)
1	1334 San Pascual Street	E9-26	1/4/17	60	6
2	226 S. Salinas Street	K8-32	1/26/17	12	6
4	951 Medio Road	H6-38	3/9/17	60	6

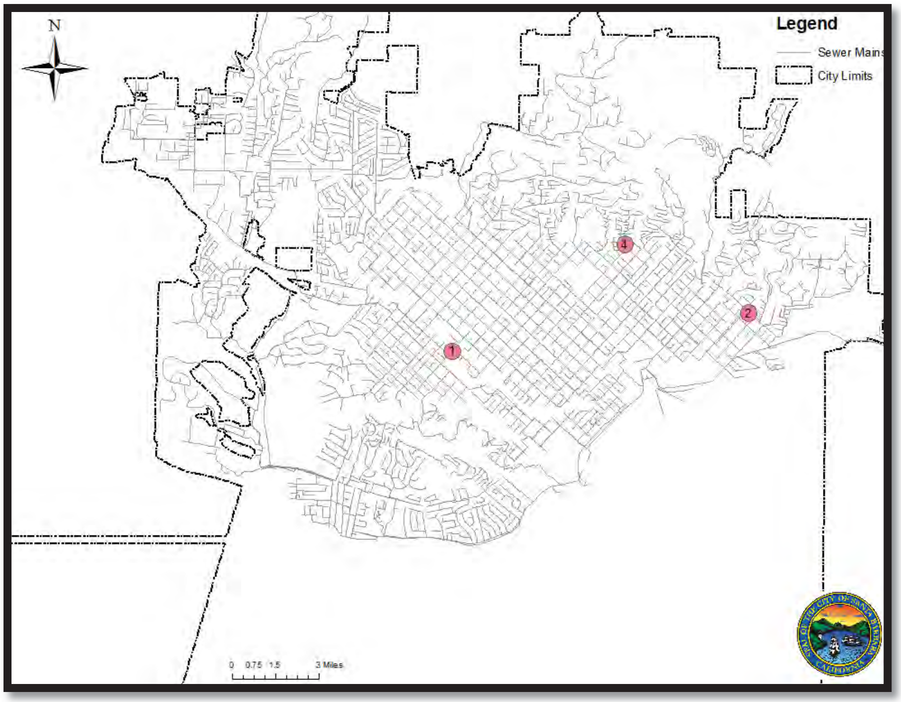


Figure 2-2. Root Related SSO Location Map

2.3.2 Overflows by Debris

The City's system experienced three debris related spills (30%) in 2017. Table 2-5 provides the location, Pipe ID, SSO Event Date, and cleaning frequencies, both before and after the SSO event. This information is also provided as an electronic table in Microsoft Excel format in Appendix F. An overview of the Debris related SSO Events is shown in Figure 2-3.

Table 2-5. Debris Related SSO Events

	Location	Pipe ID	SSO Date	Cleaning Frequency Before SSO (months)	Cleaning Frequency After SSO (months)
3	Plaza Bonita	F5-73	2/9/17	60	12
5	1833 Barker Pass Road	K6-41	4/6/17	24	6
8	620 E. Quinientos Street	J9-20	5/30/17	4	1

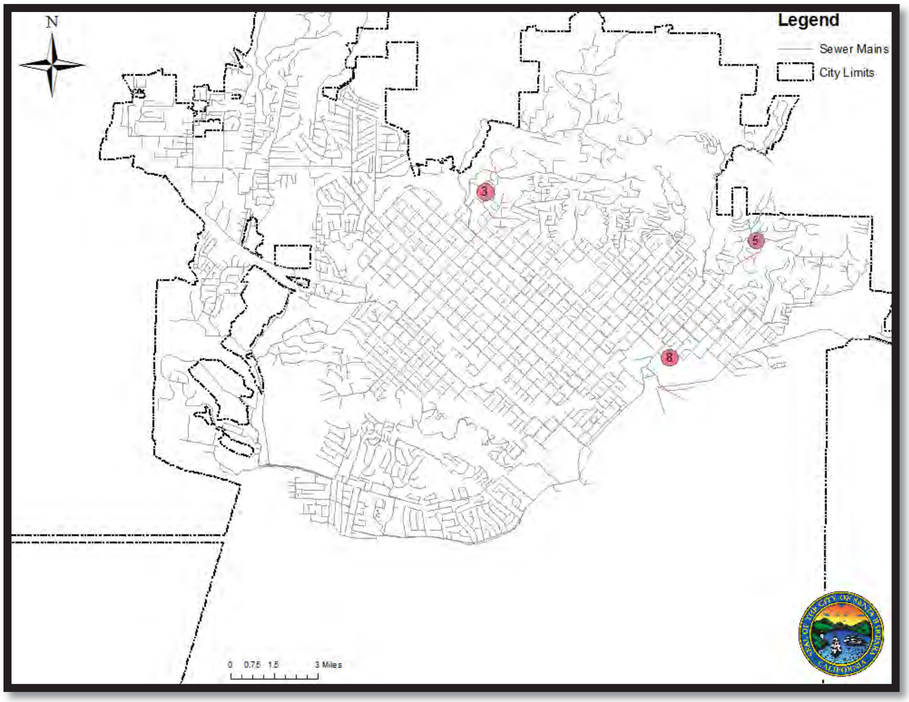


Figure 2-3. Debris Related SSO Location Map

2.3.3 Overflows due to Structural Failure

The City did not have any SSO Events that were due to structural failure in 2017. As noted above, SSO Events 6 and 10 were due to construction defects. For SSO Event 6, debris and paper were catching and accumulating on delaminated HDPE weld beads. The HDPE weld beads were successfully removed by staff on May 24, 2017. For SSO Event 10, a private contractor installed a sewer lateral liner incorrectly and blocked the entire sewer main. Changes have been made to the SLIP program to prevent this from happening in the future.

2.3.4 Overflows due to Grease

The City had one SSO Event that was due to fats, oil and grease (FOG) in 2017. Table 2-6 provides the location, Pipe ID, SSO Event Date, and cleaning frequencies, both before and after the SSO event. This information is also provided as an electronic table in Microsoft Excel format in Appendix F. An overview of the Grease related SSO Event is shown in Figure 2-4.

Table 2-6. Grease Related SSO Events

	Location	Pipe ID	SSO Date	Cleaning Frequency Before SSO (months)	Cleaning Frequency After SSO (months)
9	429 Orilla Del Mar	K9-19	7/18/17	12	6

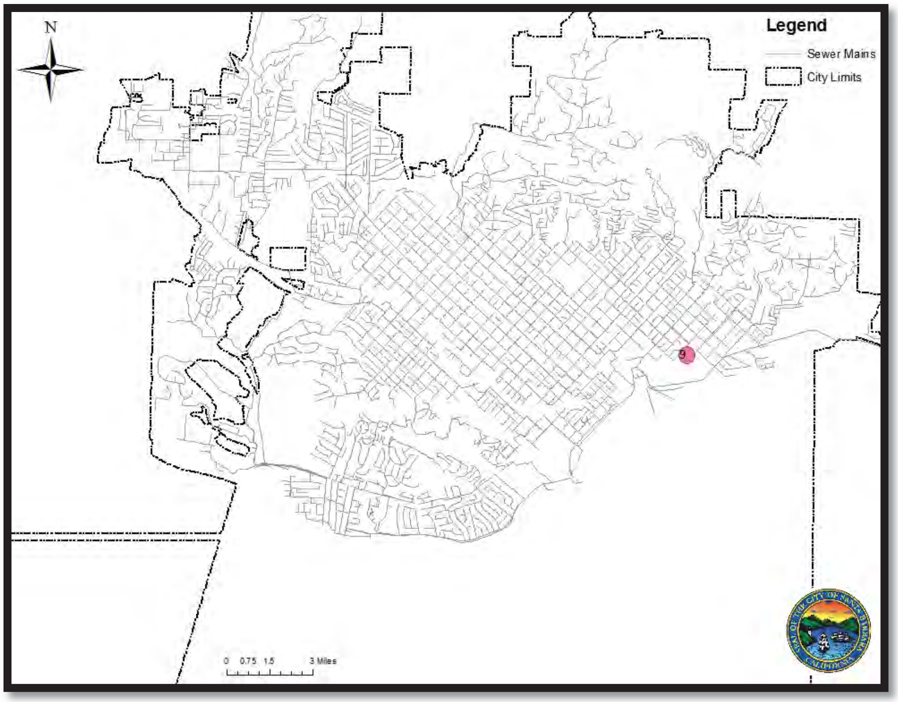


Figure 2-4. Grease Related SSO Location Map

2.4 Blockage History

In 2017, the City's system experienced three Blockages. A listing of the Blockage events, locations, causes and cleaning frequencies both before and after the blockage events are provided in Table 2-7 below. Blockage Analysis Reports can be found in Appendix C. Blockage related information is also provided as an electronic table in Microsoft Excel format in Appendix F. An overview of the Blockage Events are shown in Figure 2-5.

Table 2-7. Blockage Event Listing

	Location	Pipe ID	Date	Primary Cause	Cleaning Frequency Before Blockage (months)	Cleaning Frequency After Blockage (months)
1	607 State Street	G9-77	5/25/17	Grease	4	1
2	557 W. Mountain Ave	G4-24	7/17/17	Roots	12	6
3	2300 Bath Street	E7-68	11/7/17	Roots	12	6

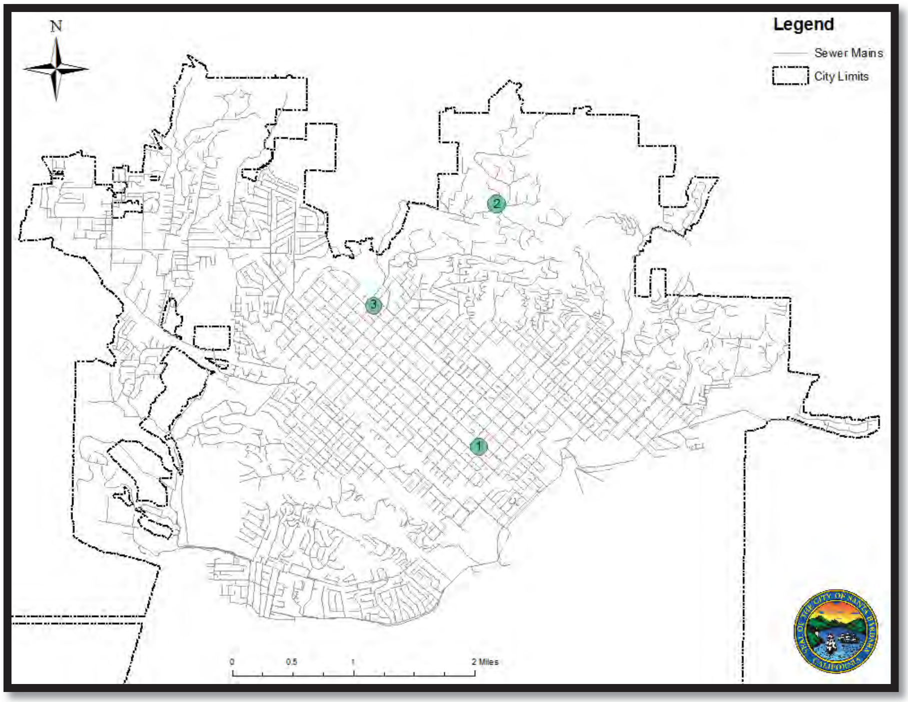


Figure 2-5. Blockage Event Location Map

2.5 Quantitative Analysis of 5-Year SSO Trends

A requirement of the Amended Consent Decree is to provide a quantitative analysis of the trends in spills over the previous 5-years, including spill causes and level of effort (in miles cleaned and pipe segments repaired and/or replaced) and the relationship, if any, between the level of effort and spill reduction.

The City contracted with Brown & Caldwell (BC) to perform the quantitative analysis. Overall, BC concluded the following:

- The small sample size limits conclusions that can be drawn from statistical analysis.
- In general, R-squared values and visual analysis of scatter plots indicates low correlation between SSO occurrences and operational and maintenance activities.
- R-squared value indicates potential correlation between grease SSOs and pipe root treatment, but this is probably coincidental with introduction of the Fats, Oils and Grease (FOG) program.

A copy of BC's technical memorandum is located in Appendix G.

2.6 Quantitative Analysis of Blockages

Since the 2016 Consent Decree Amendment (March 2017), the City's system experienced three Blockages. The City contracted with BC to perform the quantitative analysis as required by the Amended Consent Decree. Overall, BC concluded that there is not enough blockage data for analysis. However, as the City gathers additional blockage information, a quantitative analysis may be able to be performed.

A copy BC's technical Memorandum is located in Appendix G.

Section 3

Cleaning Program Activities, Analysis and Proposed Changes

3.1 Actions Taken to Achieve Compliance with SSO Reduction Performance Standards

The following section describes the cleaning program actions taken in 2017 that were designed to achieve compliance with the SSO Reduction Performance Standards.

3.1.1 Sewer Mains Cleaned

In 2017, the City cleaned approximately 254.9 miles of sewer mains. These sewer main cleaning activities resulted in 6,242 cleaning events being performed on 4,009 individual sewer mains. The tables below describe in detail these sewer main cleaning activities.

Key analyses contained in this report have produced the following results:

- 6,242 sewer main cleaning events were completed in 2017. These cleaning events represent approximately 254.9 miles of sewer mains.
- 4,009 individual sewer mains were cleaned, many of them several times in 2017.
    - These cleaned sewer mains represent approximately 162.2 geographic miles of the overall Wastewater Collection System, which is approximately 257 geographic miles. Thus, in 2017, the City cleaned nearly 63% of its entire wastewater collection system.

3.1.2 Condition Findings

Table 3-1 provides information related to the amount of materials found when cleaning events were performed in 2017. In summary, 94 percent of the sewer main cleaning events resulted in "Clear" or "Light" condition findings, which indicate that the cleaning schedules for these sewer mains are adequate and that they do not require more frequent cleaning. The condition findings for the remaining 6 percent of the cleaning events performed have resulted in the sewer main cleaning frequencies being adjusted so that these pipes are cleaned more frequently in the future. Sewer mains representing these Overall condition findings are shown in Figure 3-1.

Table 3-1. Sewer Main Cleaning Condition Findings Summary

Overall Condition Finding	Number of Mains	Number of Events	Cleaning Mileage
Heavy	111	111	5.0
Medium	227	238	10.6
Light	1,837	2,489	98.0
Clear	2,604	3,404	141.3
Total	4,009	6,242	254.9

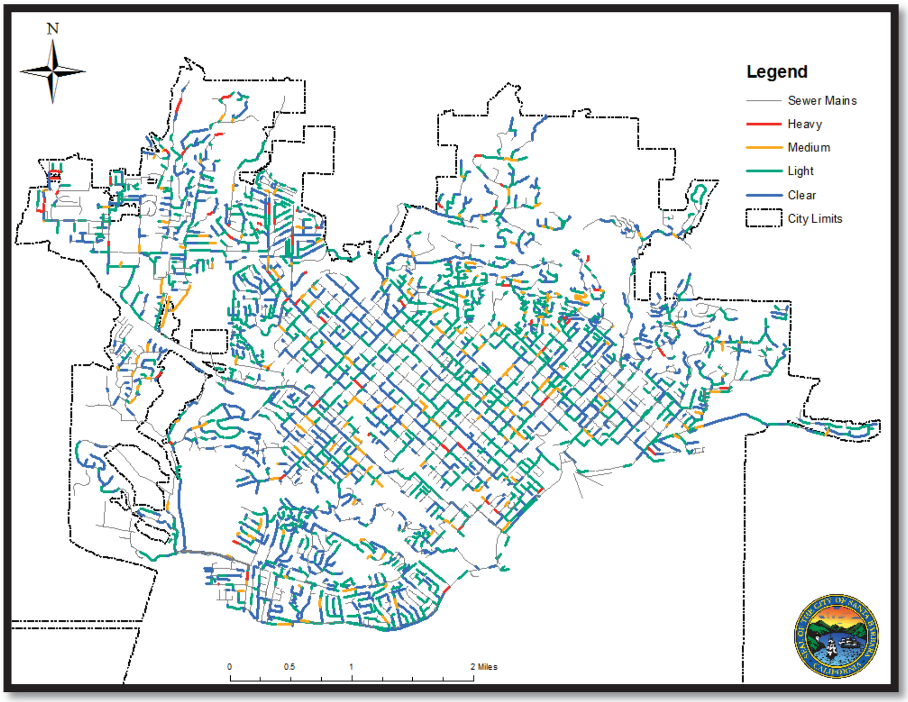


Figure 3-1. Overall Condition Findings

A more detailed examination of these condition findings can be made through a review of Table 3-2. It demonstrates that a small percentage of pipe cleaning events completed resulted in “heavy” or “medium” condition findings. Of these “heavy” and “medium” condition findings, roots, grease and debris constitute the primary contributors of blockage-forming materials in sewer mains. Sewer mains representing the standard condition findings are presented in Figures 3-2, 3-3 and 3-4.

Table 3-2. Cleaning Event Condition Finding Summary

Category	Grease	Roots	Debris	Other
Heavy:	17	63	48	2
Medium:	56	121	90	11
Light:	794	1,374	1,305	35
Clear:	5,375	4,684	4,799	6,194
Totals:	6,242	6,242	6,242	6,242

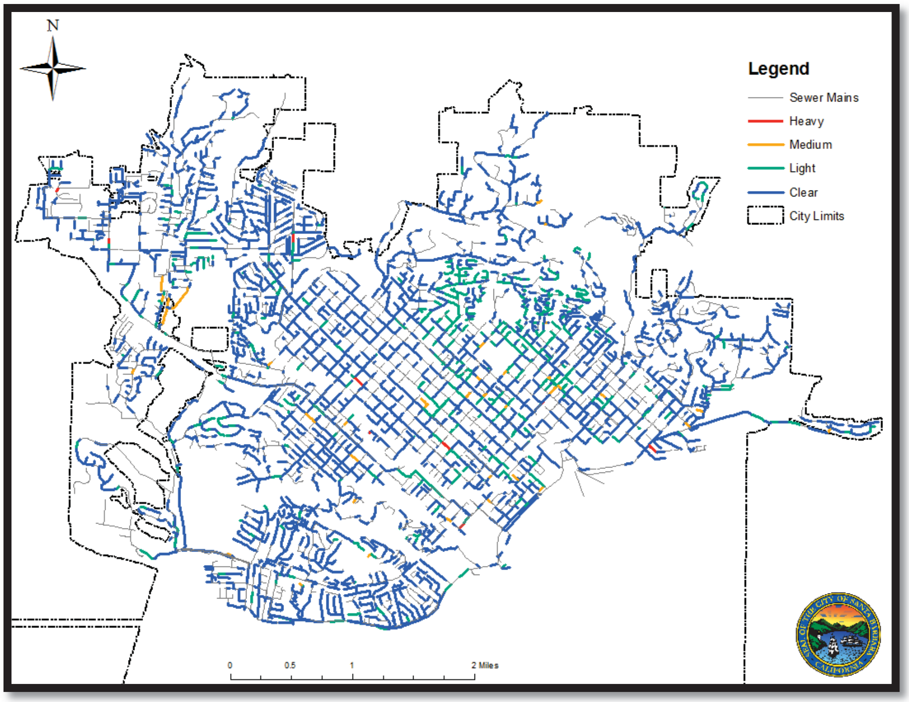


Figure 3-2. Grease Condition Findings

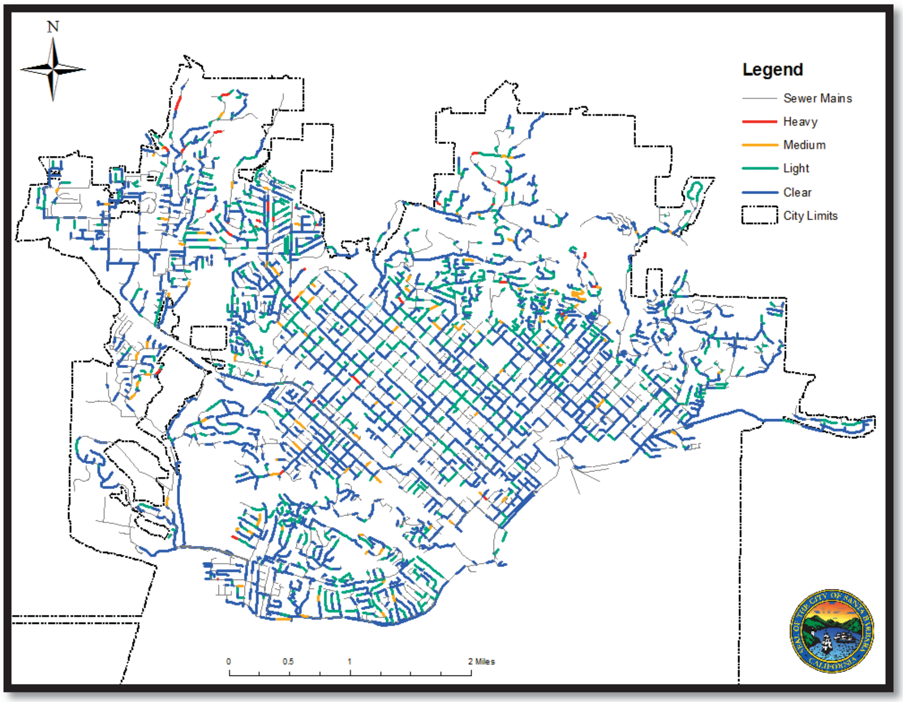


Figure 3-3. Roots Condition Findings

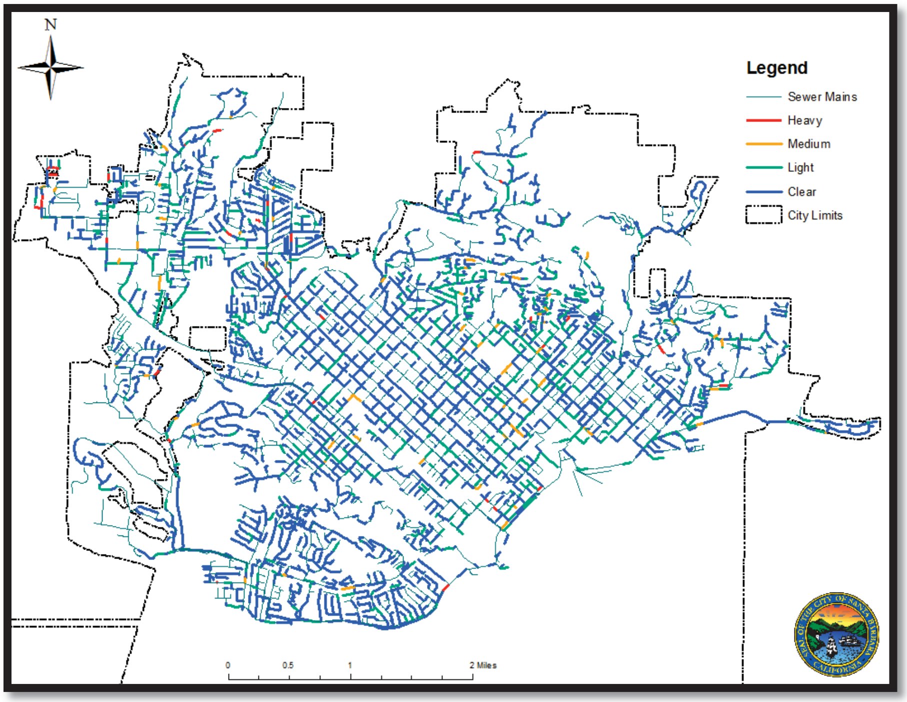


Figure 3-4. Debris Condition Findings

3.1.4 New Accelerated Root Control Program

The City continues to enhance its cleaning program with the goal of reducing SSO events. In early 2017, the City began implementing the Accelerated Root Cleaning Program (ARCP) to address sewer mains with a history of roots. Sewer mains placed in this program are assigned a static cleaning frequency as opposed to using the City's algorithm to adjust their cleaning frequency. Sewer mains with a history of root findings that were previously on a 60- or 24-month cleaning frequency were assigned a static cleaning frequency of 12 months. Sewer mains with a 12-month or more frequent cleaning cycle remained as currently assigned. Sewer mains assigned to the ARCP are not removed from the ARCP program unless they are placed into the Chemical Root Control Program (CRCP) or the cause of root intrusion is identified and eliminated.

Modifications to the Cartegraph database were made in February 2017, and all City sewer mains were placed into one of the City's four cleaning programs, as shown below in Table 3-3.

Table 3-3. Sewer Main Cleaning Program Summary

Cleaning Program	Number of Sewer Mains	Miles	Percent of System (by Number of Sewer Mains)
System Wide Cleaning	2,414	93.5	37%
Accelerated Cleaning	1,212	54.8	22%
Accelerated Root Cleaning	1,844	72.4	29%
Chemical Root Control	784	31.4	12%

3.1.5 Contract Cleaning

As mentioned above, the Accelerated Root Cleaning Program is a new program as of February 2017. In order to clear the backlog of cleaning, which occurred when sewer mains with a history of roots on either a 60- or 24-month cleaning frequency were placed into the ARCP and assigned a 12-month cleaning frequency, the City prepared bid documents for approximately 38 miles of contract cleaning work. This sewer main cleaning project was competitively bid and work started in August 2017. Work was completed in December 2017.

3.1.6 Chemical Root Control Program

The City has performed chemical root foaming services annually since 2014. Sewer mains in this program are treated with an herbicide to inhibit root growth in the sewer main. Approximately 12% of the City's system is assigned to the Chemical Root Control Program.

In 2017, the City contracted with Dukes Root Control and chemically treated approximately 13.5 miles. Per manufacturer's recommendations, sewer mains should be retreated 2-years after the initial treatment. Thereafter, sewer mains can be treated every 3-years. Sewer mains on this year's contract were initially treated in fall 2015, and therefore, were retreated in fall 2017 for their initial 2-year cycle. Figure 3-5 shows the 13.5 miles of sewer mains that were treated in fall 2017.

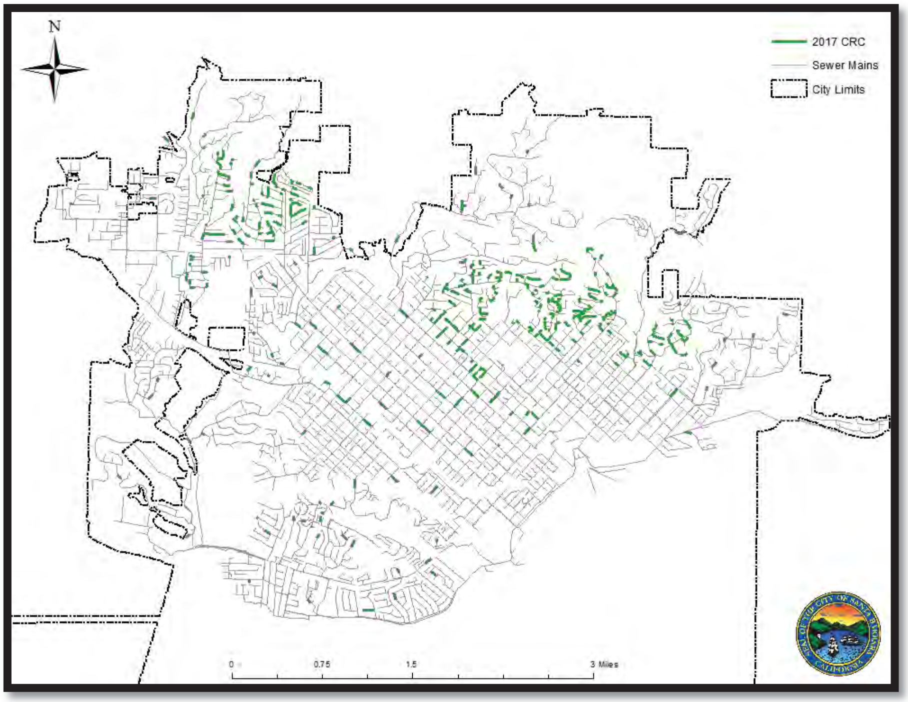


Figure 3-5. Chemical Root Control Program

3.1.7 FOG Management Program

The City has an inspector responsible for inspection of the 553 food service establishments (FSE) that produce Fats, Oils and Grease (FOG) in the City's service area. FSE's are inspected on a two-year cycle with the goal to inspect approximately 20-24 restaurants per month. In addition to inspection, the inspector provides public education and outreach to the FSE's. FOG related spills have trended down over the past few years, largely due to the success of the FOG program.

In 2017, 609 site visits were performed. Staff will continue to provide FOG inspections and site visits in 2018.

3.1.8 Sewer Lateral Inspection Program

The Sewer Lateral Inspection Program (SLIP) is focused on inspection of commercial properties, condominiums and other common interest developments, as well as residential properties whose sewer lateral or wye connection is in need of repair. In 2017, 728 SLIP letters were sent to property owners to inspect their sewer lateral and 262 wye connections were replaced. Staff will continue to focus on the SLIP program in an effort to reduce public and private SSOs.

3.2 Analysis of Cleaning Program

This section contains a qualitative analysis of trends in spills over the past six years (2012 through 2017) for roots, debris and FOG related spills and the relationship in level of effort in miles cleaned. As stated in Section 2, BC was contracted to perform the quantitative analysis required per the Amended Consent Decree and concluded that the small sample size limits conclusions that can be drawn from statistical analysis. However, the City also performed a qualitative analysis based on program changes and the effect on spills. This section also provides a review of existing and proposed changes to cleaning schedules with the goal of reducing root, FOG and/or debris related spills.

Since 2013, the City has made the following changes to its program to reduce root, debris and FOG related SSO Events:

- A mechanical root control program was designed and implemented in 2013, which changed cleaning schedules of sewer segments found to have heavy or medium root condition findings to a 6-month schedule;
- A new debris control program was designed and implemented in 2013 to change cleaning schedules of small-diameter sewer segments found to have heavy or medium debris condition findings to a new 12-month cleaning frequency;
- A chemical root control program was initiated in 2014;
- An acoustic sounding program was initiated in 2014;
- Contract consultant work was initiated in 2014 to provide Food Service Establishment (FSE) FOG control facility inspections, and to update the City's business process related to commercial facility inspection management; and
- A new accelerated root control program was implemented in 2017.

3.2.1 Analysis of Root Caused SSO Events

Roots are the leading cause for SSOs Events over the past 6-years, accounting for 41 SSO Events, or 48%. Figure 3-6 shows the number of root related SSO Events by year, along with the geographical and total cleaning miles per year, and miles of chemically treated sewer mains.

In reviewing Figure 3-6, the following observations can be made:

- Root related SSOs have been consistently trending downward over the five years. Increased total cleaning miles, due to implementation of the 2013 mechanical root control program, has been effective.
- The chemical root control program, initiated in 2014, is successful in reducing root related SSO Events. Currently, 12% of the City's sewer mains are in the Chemical Root Control program.
- The new accelerated root control program was implemented in spring 2017 and it is expected to reduce root related SSO Events in future years.

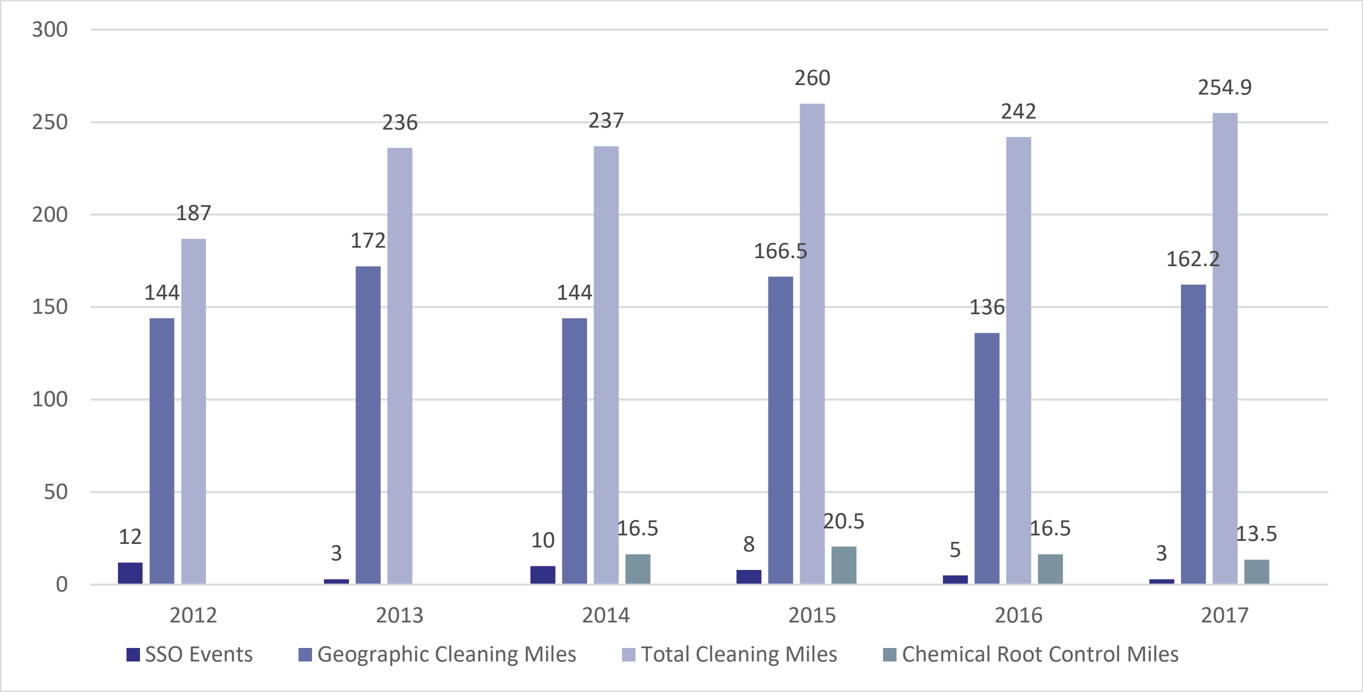


Figure 3-6. Root Related SSO Events and Cleaning Mileage

3.2.2 Analysis of Debris Caused SSO Events

Over the past 6-years, there have been 9 debris related SSO Events, accounting for 10.5% of the SSO Events. Figure 3-7 shows the number of debris related SSO Events by year, along with the geographical cleaning and total cleaning miles per year.

A review of Figure 3-7 yields the following observations:

- The debris control program designed and implemented in 2013 is effective. Debris related spills are minimal.

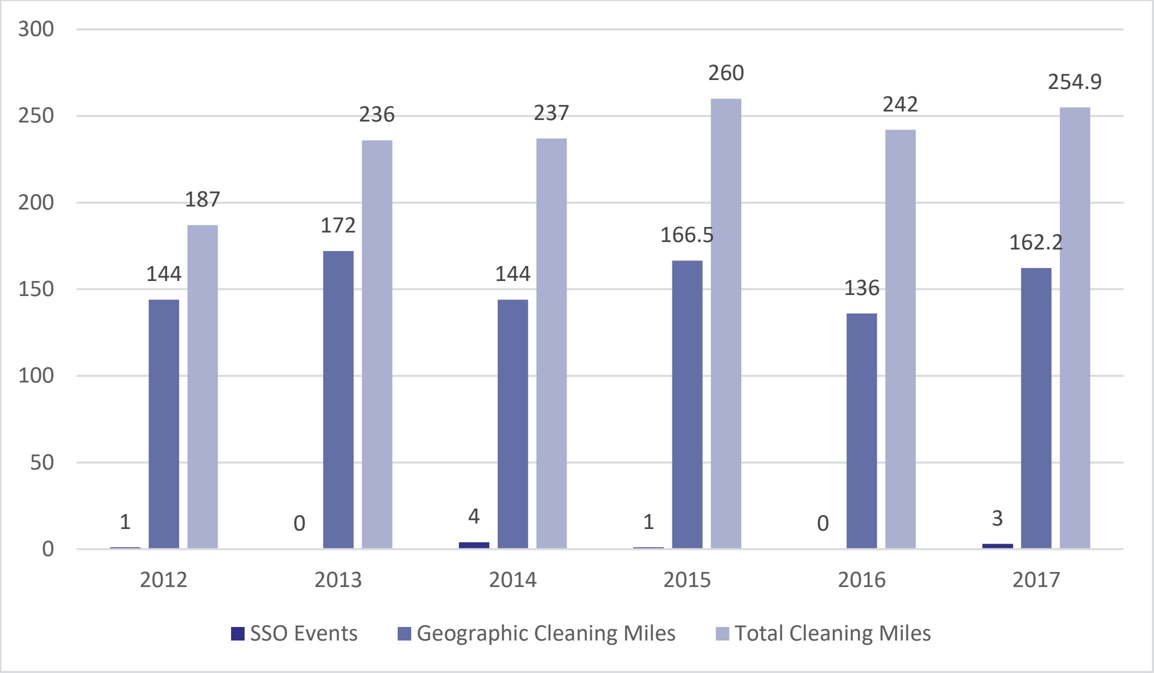


Figure 3-7. Debris Related SSO Events and Cleaning Mileage

3.2.3 Analysis of FOG Caused SSO Events

Over the 6-year analysis period, there were 10 FOG related SSOs, accounting for nearly 12% of the SSO Events. Figure 3-8 shows the number of FOG related SSO Events by year, along with the geographical cleaning and total cleaning miles per year, and number of food service establishment (FSE) inspections per year.

A review of Figure 3-8 shows the following:

- FOG related SSO Events have been consistently lower since 2014. This was the same year the City hired a consultant to manage and make changes to the program. City staff have taken over the program and have been highly successful in performing FSE inspections.
- A qualitative relationship between FSE inspections and SSO Events is observed. In the years leading up to 2014, the City on-average conducted approximately 140 inspections per year. The number of FSE inspections have more than tripled in recent years.

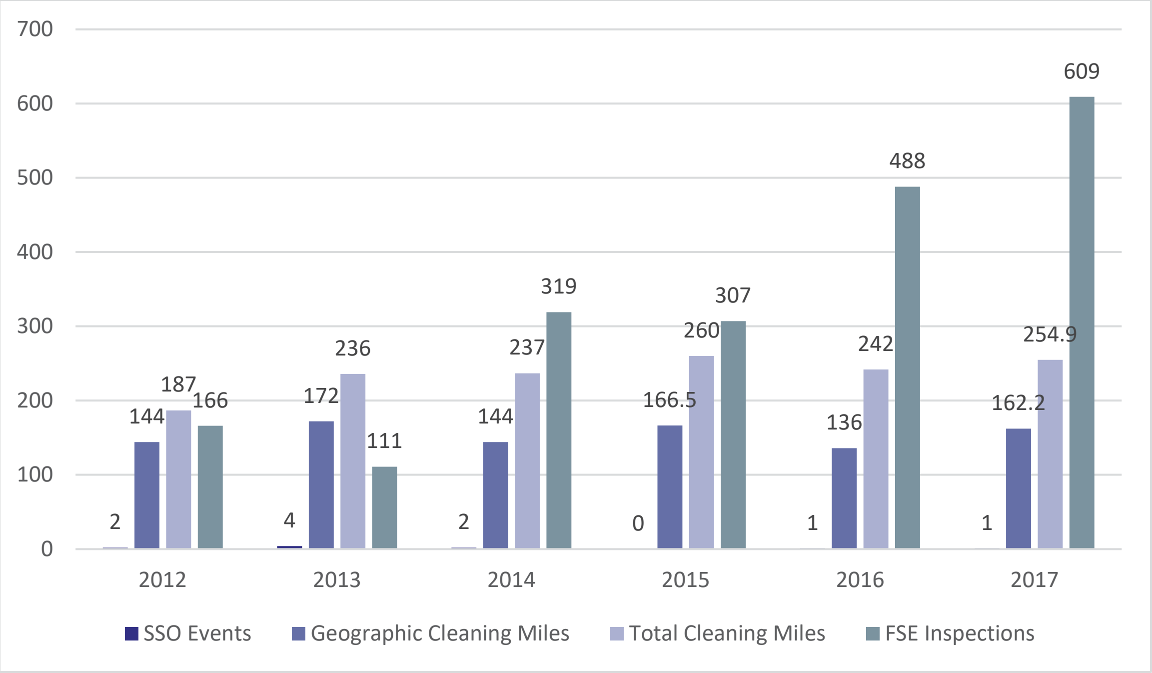


Figure 3-8. FOG Related SSO Events and Cleaning Mileage

3.3 Proposed Changes to Cleaning Program

Based on the 6-year analysis, the City proposes to modify its cleaning program as described below.

3.3.1 System Wide Cleaning Program

The System Wide Cleaning Program is intended for those sewer mains without a history of heavy or medium findings. They are sewer mains that can be cleaned on a longer frequency. Approximately 37% of the City's sanitary sewer system is on the System Wide Cleaning Program.

Sewer mains in the System Wide Cleaning Program are currently cleaned on a 60-month cleaning frequency. However, analysis of SSO events and historic cleaning data supports increasing the cleaning frequency of sewer mains 8-inch in diameter or less as an effort to reduce future SSO events. Sewer mains, 8-inch in diameter or less, in the System Wide Cleaning Program will be increased to a 36-month cleaning frequency. Sewer mains larger than 8-inch in diameter will remain on a 60-month cleaning frequency. The City will fully implement these changes by the end of 2018.

3.3.2 Accelerated Cleaning Program

The Accelerated Cleaning Program is for sewer mains with a history of debris or grease findings that require a more frequent cleaning than the System Wide Program. Sewer mains in this program are cleaned at least every 24-months. Approximately 22% of the City's system is assigned to the Accelerated Cleaning Program.

Current cleaning frequencies for the Accelerated Cleaning Program are 24, 12, 6, 4, and 1-month. A new 2-month cleaning frequency will be added to allow for greater flexibility when scheduling future cleaning events.

3.3.3 Accelerated Root Cleaning Program (ARCP)

The Accelerated Root Cleaning Program is for sewer mains with a history of root findings. Sewer mains in this program are cleaned at least every 12-months and are not removed from the program until the source of root intrusion is identified and eliminated, or they may be placed in the Chemical Root Control program. Approximately 29% of the City's system is assigned to the ARCP.

Current cleaning frequencies for the Accelerated Cleaning Program are 24, 12, 6, 4, and 1-month. A new 2-month cleaning frequency will be added to allow for greater flexibility when scheduling future cleaning events. The 2-month cleaning frequency will be used when decreasing the cleaning frequency from 1- month to 4-month; however, it will not be used when increasing the cleaning frequency from 4-months to 1-month, i.e., when cleaning findings are heavy or medium. In that case, the sewer main will go directly to a 1-month cleaning frequency.

3.3.4 Chemical Root Control Program

The City will also implement changes to the cleaning frequencies of pipes in the Chemical Root Control Program to include a 36-month frequency. This will allow the City to align with manufacturer's recommendations. Cleaning frequencies for sewer mains assigned to the Chemical Root Control Program will be 6, 12, 24 or 36 months.

3.3.5 Cleaning Mileage Projections

Cleaning mileage projections for the next several years are presented in Table 3-7. For this analysis, it assumes that half of the one-month frequency sewer mains will move to a two-month cleaning frequency, 60-month sewer mains, 8-inch in diameter or less, will be changed to a 36-month cleaning frequency, and all other cleaning frequencies will be unchanged in future years.

Table 3-3 Projected Minimum Cleaning Mileage Requirements

Year	1 month	2 month	4 month	6 month	12 month	24 month	36 month	60 month	Total
2018	16.8	8.4	35.1	59.6	79.2	17.8	25.7	3.5	246.1
2019	16.8	8.4	35.1	59.6	79.2	17.8	25.7	3.5	246.1
2020	16.8	8.4	35.1	59.6	79.2	17.8	25.7	3.5	246.1

3.3.5.1 Contract Cleaning

City has designed and bid an "On-Call" contract for cleaning services. The contractor will perform approximately 10 miles of contract cleaning each quarter (roughly every three months) to augment City staff cleaning. This work will be initiated in Spring 2018.

3.3.6 Organizational Changes to Cleaning Program

In July 2017, staff received authorization for organizational changes to the Collection System program and has implemented them. These changes are intended to create technical positions in the program, thereby allowing staff to more efficiently and effectively operate and maintain the collection system. It is expected that technical staff will have the expertise to perform data analysis and generate real time response to field work, thereby bridging the gap between field and supervisory staff. The organizational changes included the following new positions:

- Collection System Supervisor. The Collection System Supervisor will oversee the day to day supervision of field staff. The staff person will provide the Collection System Superintendent the support needed to manage the collection system program. This position was filled in August 2017.
- Collection System Project Coordinator – SLIP Program. Duties for this position were previously performed by administrative staff. By reclassifying the position to a Project Coordinator position, technical staff will now oversee the SLIP program, which involves tasks such as reviewing lateral inspections, identifying sewer lateral repairs and defective sewer taps on sewer mains, and coordinating with plumbers. This position is intended to provide a much stronger residential component to the SLIP program, with the intent of reducing both private and public spills. This position was filled in July 2017.

3.3.7 Public Outreach

In 2018, the City will develop and begin implementation of a public outreach program to provide valuable information for residents and businesses to help reduce private and public spills. It will be articles distributed in the City's electronic newsletter, "City News in Brief" and the Water Resources quarterly newsletter.

Section 4

Capital Improvement Program Activities, Analysis and Proposed Changes

4.1 Actions Taken to Achieve Compliance with SSO Reduction Performance Standards

The following sections describe the condition assessment and capital improvement work conducted in 2017 that was designed to achieve compliance with the SSO Reduction Performance Standards.

4.1.1 Completed Condition Assessment Work

In 2017, approximately 31.7 miles of sewer mains were televised. The CCTV inspection work that was completed over the time period produced the information which appears in Table 4-1 below, with the PACP results of CCTV inspections summarized in Table 4-2. Sewer segment locations inspected are shown in Figure 4-1. Since 2012, CCTV data is placed into the POSM (Pipeline Observation System Management) software system for storage and condition assessment work.

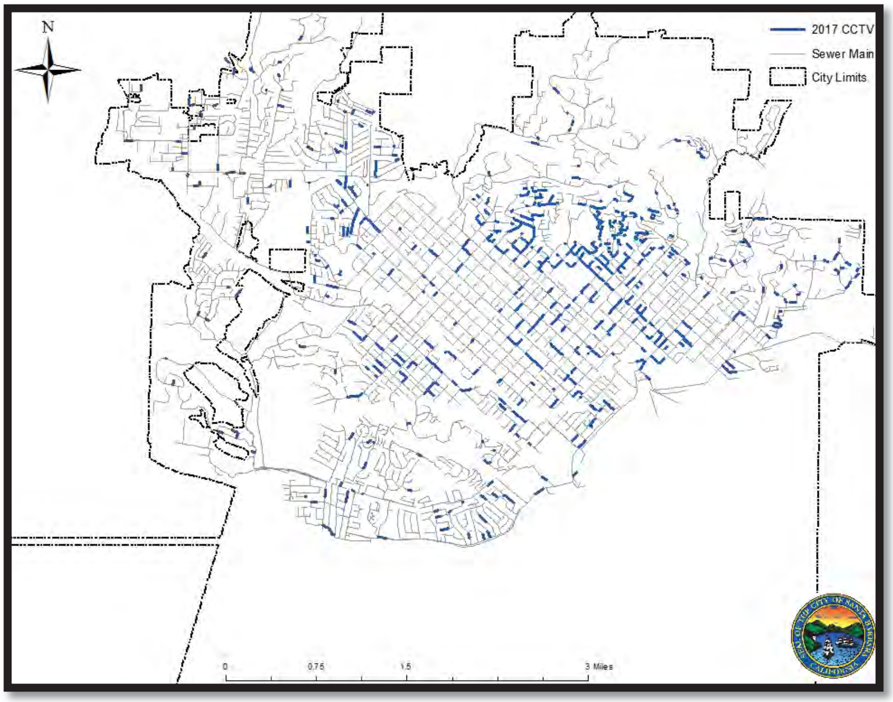


Figure 4-1. CCTV Inspection Events

Table 4-1. CCTV Events Mileage Summary	
CCTV Source	Total Mileage
City	13.3
Contract	18.4
Total	31.7

Table 4-2. CCTV Inspection Results	
PACP Score	Mileage Receiving Each Score
5	10.9
4	4.6
3	3.6
2	2.0
1	0.1
0	10.5
Total	31.7

4.1.2 Planned Condition Assessment Work

The City is currently designing and will bid a CCTV contract with work starting in Spring 2018. The planned scope of work involves cleaning and subsequent CCTV inspection of sewer mains, generally 6” and 8” diameter. The CCTV contract is intended to be an “On-Call” type of contract, where the contractor will perform CCTV inspection on a quarterly basis to augment staff inspection work and ensure timely reinspection of pipes identified with defects.

The contractor will clean City sewer mains in conformance with applicable Work Plan policies and related Wastewater Section Standard Operating Procedures. The contractor will report its sewer main cleaning condition findings in a format that allows for the City to enter the results into its CMMS software for determination of next cleaning frequency schedules and required future cleaning events for all sewer mains cleaned under this contract in 2018.

All City sewer mains televised will be assessed by the Contractor according to PACP Code standards. The resulting CCTV data and related reporting information will be transmitted to the City and uploaded into the City’s CCTV software, POSM. City certified inspectors will check the Contractor’s PACP coded-video to ensure that the video is of appropriate quality and that the PACP code results are accurate and representative of the City sewer mains being assessed.

The City owns one CCTV truck with televising hardware that functions with POSM software. City staff will continue its televising work of City sewer mains needed for response to: SSO events, system blockages, customer complaints, quality control review of contracted sewer main cleaning, and ad-hoc organizational needs.

City staff will also participate in planned annual system-wide CCTV scheduled work as needed. It is estimated that this City televising work will result in approximately 20 miles or more of City sewer main being assessed in 2018. Table 4-3 summarizes the planned CCTV work for 2018. A graphical representation of City sewer mains planned to be televised by contract work is shown in Figure 4-2 below. A listing of these individual sewer mains is provided in the Appendix D.

Table 4-3. Planned CCTV Assessment

CCTV Source	Pipe Mileage
City	20+
Contractor	10
Total	30+

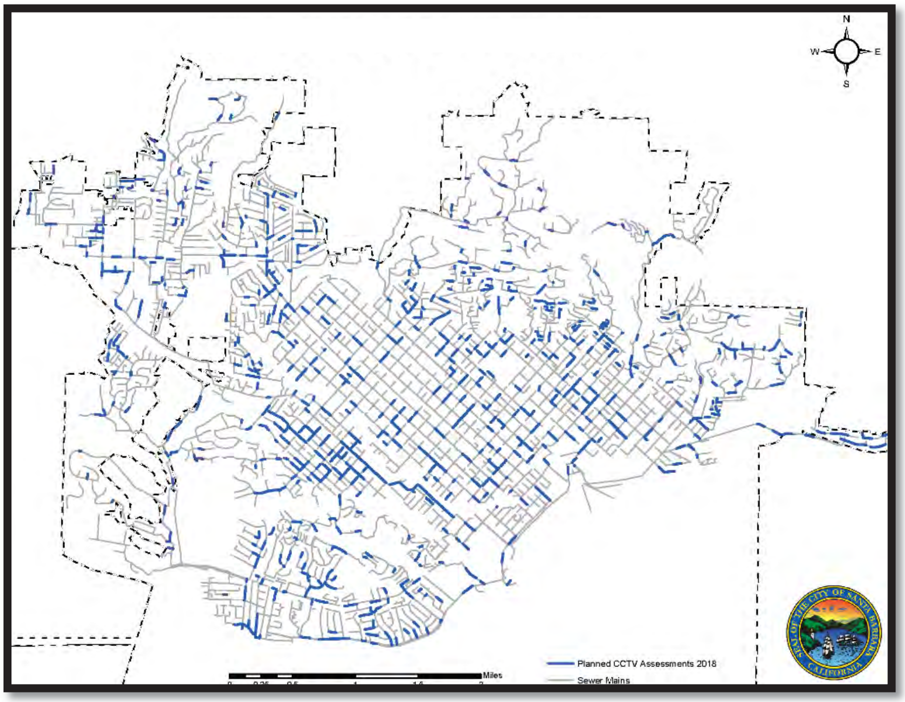


Figure 4-2. Planned CCTV Activities

4.1.3 Completed Rehabilitation, Repair and/or Replacement Work

The City completed CIP construction project pipe mileage totaling 3.56 miles in 2017. Project-related information is shown in Figure 4-3 and Table 4-4 below.

Table 4-4. CIP Project Pipe Mileage Completed

Project Type	Type of Work	Segments	Miles
Sewer Main Rehabilitation Projects	Rehab	20	0.93
Sewer Main Repairs Project	Repair	56	2.63
	Total	76	3.56

[1] A segment of pipe is the distance from manhole to manhole or manhole to clean-out.

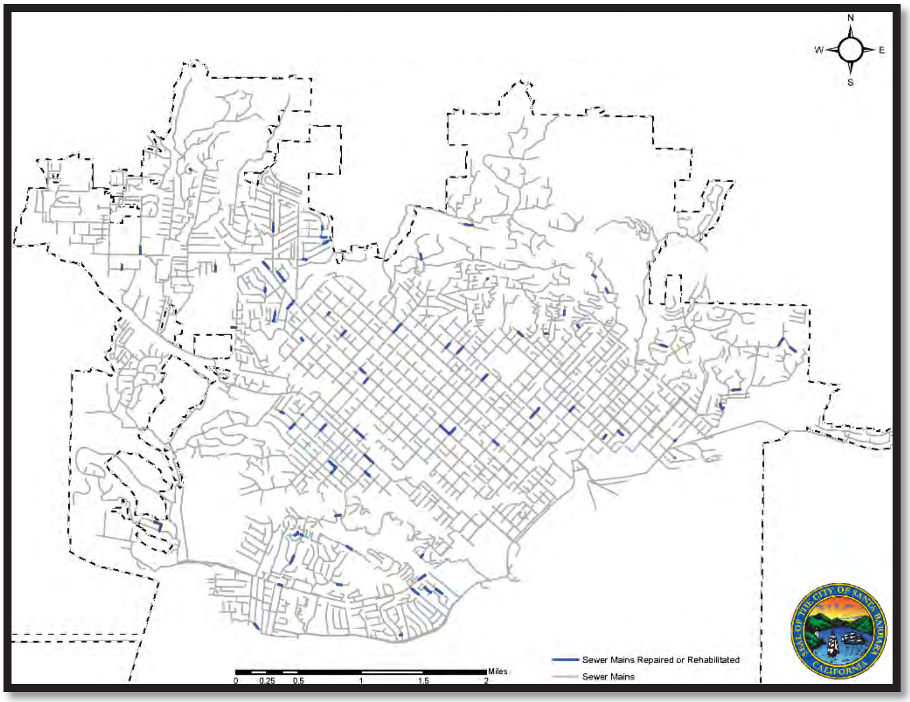


Figure 4-3. CIP Pipe Mileage Completed

The Consent Decree provides pipe rehabilitation, replacement, and/or repair in excess of the required miles shall be credited to the following year. The following table summarizes construction pipe mileage for 2012 through 2017. Previous High Risk Pipe (HRP) mileage is shown for clarity and completeness, but will no longer be tracked separately per the Amended Consent Decree.

Table 4-5. CIP Pipe Mileage Summary

Calendar year	HRP (Miles)	Non-HRP (Miles)	Total (Miles)
2012	1.0	4.1	5.1
2013	2.4	1.7	4.1
2014	2.3	3.4	5.7
2015	2.0	4.1	6.1
2016	2.0	3.8	5.8
2017*	0.3	3.3	3.6
Total	10.0	20.4	30.4

4.1.4 Planned Rehabilitation, Repair and/or Replacement Work

The Wastewater Main Rehabilitation and Repair Project was competitively bid and work started in August 2017. This project will rehabilitate, repair or replace approximately 5.5-miles of sewer mains.

Completion is scheduled for June 2018. Approximately 0.8 miles was complete in 2017 (mileage listed in Table 4-4 above) and the remaining 4.7 miles will be completed in 2018. The City has also initiated design for the next Wastewater Rehabilitation Project, which will be competitively bid in

Spring 2018. This project will rehabilitate approximately 4.2 miles of sewer mains and is expected to start construction in late summer. It is anticipated that approximately 2 miles of sewer mains on this contract will be rehabilitated in 2018, with the remaining 2.2 miles to be completed in 2019. The 2018 mileage is listed in Table 4-6 and shown in Figure 4-4 below. The sewer mains' identification may be found in Appendix E.

The Upper State Street Wet Weather Sewer Capacity Project preliminary design work is now complete. This project was split into two projects. The first project was competitively bid in January 2018 and is expected to start construction in Spring 2018. This first project will intercept existing wastewater flows at the State and Hitchcock Way intersection and divert them southerly down Hitchcock Way. This will reduce the amount of wastewater that crosses Arroyo Burro Creek at two locations. The second project will be designed in a future year as part of the Via Lucero Lift Station Rehabilitation Project.

In addition to the CIP rehabilitation and repair contract outlined in the Table 4-6 below, the City has an on-call sewer main repair construction contract in place to provide for repairs of sewer mains to be performed on an as-needed basis. This work will be directed to repair pipes throughout the system, as prioritized by the City's condition assessment work. Work completed will be credited to 2018 and will ensure that the City continues to meet the Amended Consent Decree requirement of repairing, replacing or rehabilitating 3.56 miles of sewer main each year.

Table 4-6. Planned CIP Work

CIP Projects	Project Total Mileage
Wastewater Main Rehabilitation and Repairs FY17	4.7
Wastewater Main Rehabilitation and Repairs FY18*	2.0
Total	6.7

* Approximately 50% of this project is expected to be completed in 2018. Remaining work to be complete in 2019.

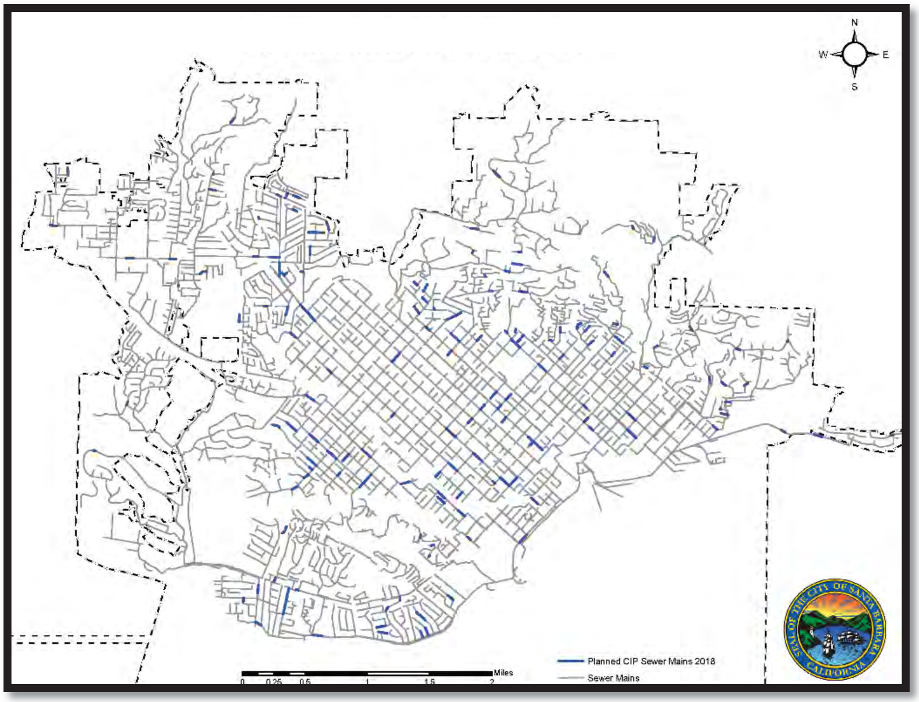


Figure 4-4. Planned CIP Work

4.2 Proposed Changes to CIP Program

The City does not propose to make changes to the CIP program. It is effective and spill related events are minimal.

4.2.2 Organizational Changes to CIP Program

In July 2017, the City initiated organizational changes to the Collection System program. These changes are intended to create technical positions in the program, thereby allowing staff to more efficiently and effectively operate and maintain the collection system. The organizational changes include the following new positions:

- CCTV Planner/Scheduler. This position will schedule and review CCTV inspections and perform QA/QC on CCTV inspections and manage CCTV contract work. Having a dedicated planner/scheduler for the CCTV program will provide critical scheduling and review of this work to ensure sewer mains are being inspected on the proper interval and inspection work is being performed per PACP standards. This position was filled in October 2017.
- Collection System Project Coordinator – CIP Program. This position will focus on reviewing CCTV inspections, prioritizing repair work, and managing emergency contract work. The Collection System Project Coordinator will serve as the liaison to engineering for all CIP work, including review of contract work for workmanship and contract compliance. This position was filled in September 2017.

Section 5

Summary and Implementation Schedule

The plans, activities and actions provided in this SSO Reduction Action Plan demonstrate the City of Santa Barbara's commitment to providing the highest level of environmental service to its citizens at a budgetary cost consistent with provisions of the Amended Consent Decree. By so doing, the City now is undertaking important new measures which are designed to achieve compliance with SSO Reduction Goals outlined in the Amended Consent Decree.

In summary, the City has implemented the following changes to its program with the goal of reducing SSOs:

- 2013, the following changes to the cleaning program were made:
    - A mechanical root control program was designed and implemented, which changed cleaning schedules of sewer segments found to have heavy or medium root condition findings to a 6-month schedule;
    - A new debris control program was designed and implemented to change cleaning schedules of small-diameter sewer segments found to have heavy or medium debris condition findings to a new 12-month cleaning frequency;
- 2014, the following programs were initiated and/or modified:
    - Initiation of new chemical root control program;
    - Initiation of new acoustic sounding program;
    - Contract consultant work was performed to provide Food Service Establishment (FSE) FOG control facility inspections, and to update the City's business process related to commercial facility inspection management;
- 2017, the following changes were made:
    - A new accelerated root control program was implemented which increased cleaning of all pipes with a history of roots to 12-month cleaning frequency.
    - Organization changes which added a Collection System Supervisor, Project Coordinator for SLIP, Project Coordinator for CIP, and CCTV Planner/Scheduler.
- 2018, the following changes are proposed:
    - Increase frequency in sewer mains 8-inches in diameter or less in the System Wide Cleaning Program to a 36-month frequency;
    - New 2-month cleaning frequency for the Accelerated Root Cleaning and Accelerated Cleaning Programs;
    - "On-Call" cleaning and CCTV contracts to augment City staff cleaning and CCTV programs;
    - Develop and implement a Public Outreach Program;

A schedule which summarizes the City's commitment to continued progress in this regard is provided below in Tables 5-1 and 5-2.

Table 5-1. Summary Schedule for Proposed Actions.

Proposed Action	Start Date	Completion Date
CCTV Contract Work for Capital Projects	January 2018	On-going
CCTV City Staff Work	January 2018	On-going
CIP Condition Assessment Work	January 2018	On-going
CIP Pipeline Construction Work	January 2018	On-going
Cleaning City Staff Work	January 2018	On-going
Cleaning Contract Work – “On-Call”	Spring 2018	As-needed
CCTV Contract Work – “On-Call”	Spring 2018	As-needed

Table 5-2. Schedule for Additional Actions Designed to Further Reduce SSO Events.

Proposed Action	Start Date	Completion Date
Chemical Root Control Contract Work	October 2018	December 2018
Acoustic Sounding City Staff Work	January 2018	On-going
Cleaning Program Changes	January 2018	December 2018
Public Outreach	January 2018	On-going

Appendix K1 2020 SSMP Audit (Draft Report in Progress)

Final SSMP Program Audit

City of Santa Barbara SSMP Audit Services

Santa Barbara, CA
October 12, 2020

Contents

Tables

Figures

1 Purpose

The purpose of this document is to report the results of the Sewer System Management Plan (SSMP) Program Audit conducted for the City of Santa Barbara (City) covering July 2018 to June 2020. This report was prepared pursuant to the requirements included in the State Water Resources Control Board Order No. 2006-0003 – Statewide General Waste Discharge Requirements for Sanitary Sewer Systems (WDR). The audit requirements are:

"As part of the Sewer System Management Plan (SSMP), the Enrollee shall conduct periodic internal audits, appropriate to the size of the system and the number of SSOs. At a minimum, these audits must occur every two years and a report must be prepared and kept on file. This audit shall focus on evaluating the effectiveness of the SSMP and the Enrollee's compliance with the SSMP requirements identified in this subsection (D.13), including identification of any deficiencies in the SSMP and steps to correct them."

This audit serves as the City's 2020 SSMP Program Audit. This audit was scheduled and completed within two years from the prior SSMP Program Audit finalized in June 2018.

2 Background

The City of Santa Barbara operates and maintains approximately 258 miles of gravity sewer pipelines, two (2) miles of sewer force mains, seven (7) lift stations, eleven (11) inverted siphons, twenty five (25) creek crossing, and over 6,000 access structures (manholes and cleanouts). Property owners are responsible for the condition and maintenance of their sewer service lateral from the building drain to the sewer main, including the portion in the public right-of-way.

There is one satellite collection system serving the Mission Canyon area, which is owned, operated, and maintained by the Santa Barbara County Public Works Department. It consists of approximately 11 miles of gravity sewers and two lift stations, Andante and Vista Elevada. Santa Barbara County is responsible for preparing a Sewer System Management Plan for this collection system. In addition, the City receives wastewater flow from the City of Montecito, but does not maintain any of the Montecito wastewater infrastructure. The City's sanitary sewers operate as one system conveying wastewater flow to El Estero Wastewater Treatment Plant.

The City of Santa Barbara is registered with the State Water Resources Control Board California Integrated Water Quality System (CIWQS).

CITY OF SANTA BARBARA - CIWQS FACILITY-AT-A-GLANCE REPORT DATA

- **CIWQS WDID**: 3SSO10265
- **CIWQS Collection System Name**: El Estero CS
- **Onsite Managers**: Rebecca Bjork, Joshua Haggmark, Amanda Flesse, Bradley Rahrer
- **Data Submitters**: Rebecca Bjork, Esteban Zambrano

3 SSMP Program Audit Interviews

This audit reviews the period between July 2018 and June 2020 and is the fifth SSMP Program Audit performed to meet Provision D.13(x) of the WDR requiring completion of an SSMP Program Audit at least once every two years. The previous audit was completed in June 2018. This audit assesses the current state of SSMP compliance with the provisions included in the WDR including Provision D.13, identifies any deficiencies found in the SSMP, and recommends corrective actions. In addition, the audit provides an evaluation of SSMP effectiveness. The City intends to use the audit results to improve SSMP compliance and performance in reducing sewer overflows.

HDR conducted the audit on behalf of the City through a series of meetings with staff involved with implementation of activities required by provisions included in Provision D.13 of the WDR. The HDR Audit Team members and staff supporting the audit interviews and audit process are identified in **Table 1** and **Table 2**.

Table 1: Audit Team Members

Team Member	Organization	Role
Michael Flores	HDR	Lead Auditor
Tom McCormack	HDR	Technical Expert

Table 2: Audit Interviewees

Name	Title
Amanda Flesse	Wastewater System Manager
Bradley Rahrer	Wastewater Collection System Superintendent
Esteban Zambrano	Wastewater Collection Supervisor
Ramon Bravo	Wastewater Collection System Lead Operator
Matthew Lombardi	Wastewater Planner/Scheduler (CCTV Program)
Robert Johns	Wastewater Planner/Scheduler (Cleaning)
Tom Mozako	Wastewater Compliance Specialist (FOG)
Isaac Garcia	Wastewater Collection System Operator I/II
Todd Heldoorn	Wastewater Treatment Plant Superintendent

Herman Escalante	Wastewater Treatment Supervisor
Ignacio Just	Senior Control Systems Operator Specialist
Joaquin Ortega	Senior Treatment Plant Technician
Gaylen Fair	Laboratory Supervisor
Trace Martin	Laboratory Analyst Coordinator

SSMP audit interviews were performed on June 22, June 23, June 25, July 7 and July 8. The order of the audit interviews, WDR provisions audited, and City staff interviewed is documented in **Table 3**.

Table 3: SSMP Audit Participants

Date	WDR Provision Section	Topics	Participants
6/22/2020	D.13.i; D.13.ii; D.13.x	Goal for SSMP and Audit Process; Changes to Organization; Review of Previous Audit Findings and Actions Taken	Bradley Rahrer Esteban Zambrano Amanda Flesse Ramon Bravo
6/22/2020	D.13.iii	Legal Authorities	Bradley Rahrer Esteban Zambrano Amanda Flesse Ramon Bravo
6/22/2020	D.13.x	Communication Program	Bradley Rahrer Esteban Zambrano Amanda Flesse Ramon Bravo
6/22/2020	D.11; D.13.ix; D.14	Monitoring, Measurement, and Program Modifications	Bradley Rahrer Esteban Zambrano Amanda Flesse Ramon Bravo
6/23/2020	D.3; D.8; D.13.iv	Operations and Maintenance Program Training	Bradley Rahrer Esteban Zambrano Matthew Lombardi Robert Johns
6/25/2020	D.13.vii	FOG Control Program	Bradley Rahrer Tom Mozako
7/7/2020	D.3; D.13.vi	Overflow Emergency Response Plan	Bradley Rahrer Amanda Flesse Gaylen Fair Trace Martin Todd Heldoorn Herman Escalante Ignacio Just Joaquin Ortega
7/8/2020	D.10; D.13.viii	System Evaluation and Capacity Assurance Plan	Bradley Rahrer Amanda Flesse Matthew Lombardi Ramon Bravo Isaac Garcia
7/8/2020	D.9; D.13.iv.c	Rehabilitation and Replacement Plan and Funding	Bradley Rahrer Amanda Flesse Matthew Lombardi Ramon Bravo Isaac Garcia
7/8/2020	D.13.v	Design and Performance Provisions	Bradley Rahrer Amanda Flesse Matthew Lombardi Ramon Bravo Isaac Garcia

4 Evaluation of SSMP Effectiveness

Overall, based on analysis of the sanitary sewer overflow (SSO) trends between July 2018 to June 2020 and the results of the SSMP Program audit, the overall program for managing the sewer systems is very effective and continues to operate at a high level of performance. The City has actively planned and implemented process improvements to improve program performance.

4.1 Sewer Overflow Performance

The primary measure of the effectiveness of the SSMP is sewer overflow performance. The primary measures of sewer overflow performance include:

- **SSO Rate**: Number of SSOs per 100 miles per Year
- **Spills Impacting Surface Waters**: Number of SSOs and Spill Volume Reaching Surface Waters
- **High Volume SSO Events**: Number of High Volume SSO Events and associated Spill Volume

This section reviews the City's recent sewer overflow performance through analysis of the sewer overflow data reported to the State Water Resource Control Board (SWRCB) California Integrated Water Quality System (CIWQS) SSO database.

4.1.1 Sanitary Sewer Overflow Rate

The SSO rates of the City places them in the category of high-performing sewer systems. Over the last five years, the City has consistently operated below 1.99 SSOs per 100 miles per year as shown in **Figure 1**.

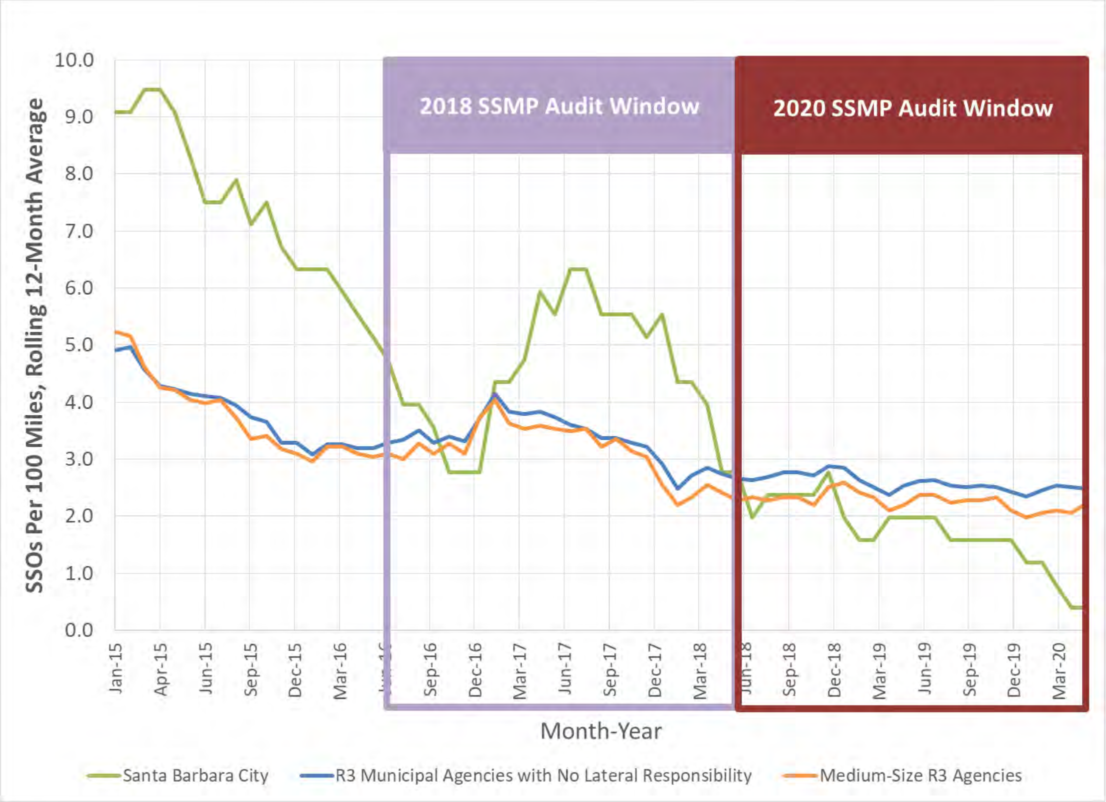
CITY OF SANTA BARBARA COLLECTION SYSTEM

- Only experienced **six (6)** sanitary sewer overflow since the last SSMP Program Audit during the period between July 2018 and June 2020.
- Has maintained a 12-month rolling average of 1.7 SSOs per 100 miles per year since the last SSMP Program Audit during the period between July 2018 and May 2020.

The City operates within the Regional Water Quality Control Board's Central Coast Region, otherwise known as Region 3. The SSO rate of the City is below the average annual SSO rate during the same period of the other seventy-two (72) active municipal agencies operating in Region 3 that do not have sewer lateral responsibility. Figure 1 shows the 12-month rolling average of SSOs per 100 miles of pipelines per year from January 2015 through May 2020.

This excellent level of SSO performance in the City's collections system is accomplished through a combination of the following activities: an aggressive system-wide cleaning cycle; FOG source control inspections; pipeline closed circuit television (CCTV) inspection and condition assessment, aggressive repair and rehabilitation of structural defects and use of data from the City's CMMS to focus maintenance and inspection on system issues.

Figure 1: 12-Month Rolling Average of SSOs per 100 Miles of Sewer Pipelines per Year



4.1.2 Spills Impacting Surface Waters

The City collection system has exhibited a high level of improved performance with regards to spills impacting surface waters. Between January 1, 2015 and June 30, 2020, twelve (12) SSO events resulted in spills reaching surface waters with a total of 11,714 gallons spilled. During the SSMP audit window of July 2018 and June 2020, only three (3) SSO events resulted in spills reaching surface waters totaling 276 gallons with 154 gallons recovered and returned to the sewer system.

4.1.3 Number and Size of Sewer Overflows

Since January 1, 2015, the City has experienced forty-eight (48) SSOs. Measuring from the previous audit, the City has experience only six (6) SSOs compared to twenty-three (23) the two years prior. One (1) was approximately 2,727 gallons and was fully recovered. The other five (5) City SSOs averaged 136 gallons per SSO and spilled a total of 822 gallons with 679 gallons recovered. **Table 4** shows the number of SSOs by size category for the City.

Table 4: Number and Size of SSOS (1/1/2015 – 6/30/2020) in City of Santa Barbara

Size of SSO (gallons)	2015	2016	2017	2018	2019	2020 To Date	TOTAL
Greater than 10,000	0	0	0	0	0	0	0
From 1,000 to 9,999	2	1	4	2	0	0	9
From 100 to 999	7	4	4	5	2	0	22
From 10 to 99	7	1	4	0	2	0	14
From 1 to 9	1	1	1	0	0	0	3
Total	17	7	13	7	4	0	48

4.1.4 Causes of SSOs

SSOs caused by blockages (33 incidents), twenty-three (23) attributed to roots, three (3) to grease and seven (7) to debris, accounted for approximately 69 percent of SSOs occurring from the City’s sewer systems over the previous 5 years between January 1, 2015 and June 30, 2020 as shown in **Table 6**. Of the remaining fifteen (15) SSOs, four (4) were caused by structural issues, three (3) by operator error, two (2) by capacity issues, two (2) by pipe construction, two (2) by non-dispersables, one (1) by a water main break, and one (1) by construction diversion failure. **Table 6** shows that in the past five (5) years the thirty-three (33) spills caused by a blockage account for 67 percent of the total spill volume during that time period and the five (5) spills caused by either a structural issue or a main break accounted for 21 percent.

Table 5: Causes of SSOs by Count (1/1/2015 – 6/30/2020)

Cause of SSO	City of Santa Barbara SSO Count	Percent of Total Count
Blockage:		
Roots	16	33%
Roots - Private Lateral	7	15%
Grease	3	6%
Debris	7	15%
Subtotal for Blockage	33	**69%**
Non-Dispersables	2	4%
Operator Error	3	6%
Structural	4	8%
Capacity - Rain Event Exceeded Design	2	4%
Construction Diversion Failure	1	2%
Pipe Construction	2	4%
Other - Water Main Break Flooded Manhole	1	2%
TOTAL (ALL)	**48**	**100%**

Table 6: Causes of SSOs by Volume (1/1/2015 – 6/30/2020)

Cause of SSO	City of Santa Barbara SSO Volume	Percent of SSO Volume
Blockage:		
Roots	4093	14%
Roots - Private Lateral	2966	10%
Grease	7491	26%
Debris	4721	17%
Subtotal for Blockage	19271	**67%**
Non-Dispersables	150	1%
Operator Error	1285	4%
Structural	3283	11%
Capacity - Rain Event Exceeded Design	610	2%
Construction Diversion Failure	3	0%
Pipe Construction	976	3%
Other - Water Main Break Flooded Manhole	3000	10%
TOTAL (ALL)	**28,578**	**100%**

4.2 Review of Effectiveness of SSMP Elements

The City updated the 2013 SSMP in June 2018 and recertified it in January 2019. This audit will focus on and review the updated version of the document. This version has been approved by City Council, and is the current version of the document. The following sections focus on evaluating the effectiveness of each element of the SSMP.

4.2.1 Element 1 - Goal

WDR Requirement: *The goal of the Sewer System Management Plan (SSMP) is to provide a plan and schedule to properly manage, operate, and maintain all parts of the sanitary sewer system. This will help reduce and prevent SSOs, as well as mitigate any SSOs that do occur.*

Audit Finding: The SSMP includes goals for the City. The goal section acknowledges the WDR's overall goal for the SSMP as well as specific goals for the City to properly manage, operate, and maintain the system; provide adequate capacity, minimize SSOs, mitigate SSO impacts when events occur, and meet regulatory requirements for notification and reporting. These goals are aligned with the intent of the WDR. The City may want to document the specific measures built into the SSMP and SSMP program implementation contributing to each goal being addressed. This is not a requirement from the WDR, however, would further improve and take the SSMP another step further in clarity and effectiveness.

4.2.2 Element 2 – Organization

WDR Requirement: The Sewer System Management Plan (SSMP) must identify:

a. *The name of the responsible or authorized representative as described in Section J of this Order.*

b. The names and telephone numbers for management, administrative, and maintenance positions responsible for implementing specific measures in the SSMP program. The SSMP must identify lines of authority through an organization chart or similar document with a narrative explanation; and

c. The chain of communication for reporting SSOs, from receipt of a complaint or other information, including the person responsible for reporting SSOs to the State and Regional Water Board and other agencies if applicable (such as County Health Officer, County Environmental Health Agency, Regional Water Board, and/or State Office of Emergency Services (OES)).

Audit Finding: The *Authorized Representative* section in the 2018 SSMP indicates the Santa Barbara City Wastewater Collection System Superintendent is designated as the primary authorized representative for the City of Santa Barbara. The City may want to add a sentence indicating the names of secondary authorized representatives and discuss what happens when the primary authorized representative is not available. Appendix C1 list the City's Legally Responsible Officials and staff able to submit data to CIWQS. The City may want to add additional text describing the roles of each individual as designated and shown in CIWQS. The City may also want to clarify the order of responsibility for submitting data into CIWQS in Appendix C1.

The *Responsibilities for SSMP Implementation* section includes an organization chart with clear lines of authority for the City's management, administrative, and maintenance positions involved with the sewer system shown in Appendix C3. The City may want to expand upon this organization chart to include Public Works up to the Mayor and City Council. The SSMP contains a narrative explanation of the responsibilities of each position shown in the organization chart. Included in Appendix C2 is a list of City Staff responsible for developing, implementing, and maintaining specific elements of the City's SSMP, along with their job titles and contact information. The City may want to add an additional column to this table linking staff responsibilities to specific elements or measures of the SSMP and SSMP program implementation.

The *SSO Reporting Chain of Communication* section explains how the SSO reporting chain of communication follows the Organization Chart shown in Appendix C3 and explains that the City's Overflow Emergency Response Plan (OERP) describes the process and procedures that the City follows to respond to an SSO event, is located Appendix G1. The City should point directly to Figure 3-1 of the OERP and reference Section 3 of the OERP directly as detailing the process from notification through reporting. The City should consider pulling in a summarized high level flow chart of Figure 3-1 from the OERP into this section of the document. The City has adequately addressed identification of the chain of communication and identification of the person(s) responsible for SSO reporting to the State and Regional Water Board and other agencies.

4.2.3 Element 3 – Legal Authority

WDR Requirement: *Each Enrollee must demonstrate, through sanitary sewer system use ordinances, service agreements, or other legally binding procedures, that it possesses the necessary legal authority to:*

a. Prevent illicit discharges into its sanitary sewer system (examples may include I/I, stormwater, chemical dumping, unauthorized debris and cut roots, etc.);

b. Require that sewers and connections be properly designed and constructed;

c. Ensure access for maintenance, inspection, or repairs for portions of the lateral owned or maintained by the Public Agency;

d. Limit the discharge of fats, oils, and grease and other debris that may cause blockages, and

e. Enforce any violation of its sewer ordinances.

Audit Finding:

The City of Santa Barbara has the appropriate legal authorities to meet the requirements of the WDR. Chapter 3 of the SSMP details the City's compliance with the WDR requirement for legal authority. The City of Santa Barbara's Municipal Code is the source of legal authority for the City of Santa Barbara. **Table 7** summarizes legal authorities for the City along with appropriate references to the City of Santa Barbara's Municipal Code. The City should consider incorporating the process for updating the City's Municipal Code as well as when the last updates occurred.

The City may want to incorporate a table similar to **Table 7** into the Legal Authority sections of the SSMP to summarize the narrative portion of the Legal Authority sections and clearly show how the City complies with this Order requirement.

Table 7: Summary of Legal Authority

Requirement	Reference in Santa Barbara Municipal Code	Meets WDR Requirements?	Last Updated
PREVENT ILLICIT DISCHARGES			
Prevent illicit discharges into the wastewater collection system	Chapter 16.04.010	Yes	1/3/2020
Limit the discharge of fats, oils, and grease and other debris that may cause blockages	Chapter 16.04.100	Yes	1/3/2020
Control infiltration and inflow (I/I) from private service laterals	Chapter 14.44.160	Yes	1/3/2020
PROPER DESIGN AND CONSTRUCTION			

Require that sewers and connection be properly designed and constructed	Chapter 14.36.030	Yes	1/3/2020
Require proper installation, testing, and inspection of new and rehabilitated sewers	14.36.040	Yes	1/3/2020
ACCESS TO LATERALS			
Clearly define City responsibility and policies	Chapter 14.44	Yes	1/3/2020
Ensure access for maintenance, inspection, or repairs for portions of the service lateral owned or maintained by the Agency	Chapter 14.46.030	Yes	1/3/2020
FOG SOURCE CONTROL			
Requirements to install grease removal devices (such as traps or interceptors)	Chapter 16.04.080	Yes	1/3/2020
Design standards for the grease removal devices	Chapter 16.04.080	Yes	1/3/2020
Maintenance requirements, BMP requirements, record keeping and reporting requirements for grease removal devices	Chapter 16.08.120	Yes	1/3/2020
Record keeping and reporting	Chapter 16.08.140	Yes	1/3/2020
Authority to inspect grease producing facilities	Chapter 16.08.150	Yes	1/3/2020
ENFORCEMENT			
Enforce any violations of its sewer ordinances	Chapter 16.12	Yes	1/3/2020

4.2.4 Element 4 – Operation and Maintenance Program

WDR Requirement: *The Sewer System Management Plan (SSMP) must include those elements listed below that are appropriate and applicable to the Enrollee's system:*

a. Maintain an up-to-date map of the sanitary sewer system, showing all gravity line segments and manholes, pumping facilities, pressure pipes and valves, and applicable stormwater conveyance facilities;

b. Describe routine preventive operation and maintenance activities by staff and contractors, including a system for scheduling regular maintenance and cleaning of the sanitary sewer system with more frequent cleaning and maintenance targeted at known problem areas. The Preventative Maintenance (PM) program should have a system to document scheduled and conducted activities, such as work orders;

c. Develop a rehabilitation and replacement plan to identify and prioritize system deficiencies and implement short-term and long-term rehabilitation actions to address each deficiency. The program should include regular visual and TV inspections of manholes and sewer pipes, and a system for ranking the condition of sewer pipes and scheduling rehabilitation. Rehabilitation and replacement should focus on sewer pipes that are at risk of collapse or prone to more frequent blockages due to pipe defects. Finally, the rehabilitation and replacement plan should include a capital improvement plan that addresses proper management and protection of the infrastructure assets. The plan shall include a time schedule for implementing the short- and long-term plans plus a schedule for developing the funds needed for the capital improvement plan;

d. Provide training on a regular basis for staff in sanitary sewer system operations and maintenance, and require contractors to be appropriately trained; and

e. Provide equipment and replacement part inventories, including identification of critical replacement parts.

Audit Finding: Overall, the City is in compliance with the Operation and Maintenance Program element of WDR Provision D.13(iv). The primary measure of the effectiveness of the operation and maintenance program is SSO performance. The City operates within the Central Coast Regional Water Quality Control Board, otherwise known as Region 3. Over the timeframe of this audit, July 2018 through June 2020, the City experienced six (6) SSOs. Over the audit period, the City maintained a spill rate of less than 1.7 SSOs per 100 miles per year over the past two years, compared to approximately 2.6 SSOs per 100 miles per year experienced by all other Region 3 agencies with no lateral responsibility during that same period.

Mapping

- City sewer system GIS mapping is highly accurate. GIS updates and additions for collection system assets are performed according to the procedures specified in the Collection System Information Technology (IT) Governance Plan, which is provided in SSMP Volume II, Appendix E1. The documentation of the sewer GIS development and update process in the Collection System IT Governance Plan is considered a best management practice. The GIS data in linked to the City's CMMS, Cartegraph OMS, so that data can be easily shared and displayed between the two systems. The City transitioned to Cartegraph OMS in June 2018, which resulted in an overall simplification of planning, tracking, and cleaning of the City's sewer system. The City should add a description of the sources of updates into the SSMP.
- The City periodically uploads GIS to the City's CCTV inspection software program, POSM. The City is currently in the process of selection a new CCTV software. When this is complete, the City will need to update the SSMP to reflect this change.
- Field crews have access to iPads connected to OMS and show gravity mains and manholes. The City has access to the stormwater system for use during a spill to help prevent the spill from entering a storm drain.
- Valves are maintained in the Treatment Plant's CMMS, Maintenance Connection. It is recommended that the City document this in the mapping section of the SSMP.

- The City's IT Governance Plan is a very detailed and excellent summary of how GIS updates and additions for the collection system assets take place. It is recommended that the City update Figure 3-1 to break to first business workflow swim lane into two separate swim lanes and remove Field Staff from having the ability to change spatial data. Field staff can only make changes to attribute data.

Preventive Maintenance

- The City's preventative maintenance program is documented in the wastewater collection system Cleaning and Inspection Program, the Lift Station Condition Assessment report, and the Flow Monitoring Program Plan. It is recommended that the City move the Flow Monitoring Program Plan to Element 8 – System Evaluation and Capacity Assurance Program.
- The City could consider bringing in the entire Cleaning and Inspection Program document into the main body of the SSMP, as this contains very detailed and high quality program documentation.
- The City has four distinct pipe cleaning programs designed to focus on problem areas while not over-cleaning less problematized pipes, and prevent maintenance-related spills and blockages. The City's four cleaning programs are:
    - System-Wide Cleaning Program
    - Accelerated Cleaning Program
    - Chemical Root Control Program
    - Accelerated Root Cleaning Program
- During the Audit, it was noted that chemical root control is not a cleaning program and is more closely aligned with a source control strategy to increase duration between maintenance events. If the City has any pre-cleaning and/or post-cleaning associated with the chemical root control application, then it is appropriate to include as a specialized cleaning/source control strategy and left as is. It is recommended that City update the Cleaning and Inspection Program to document this.
- Each time a pipe segment is cleaned, the cleaning frequency is evaluated by the Cleaning Program Planner/Scheduler and it is based on the cleaning results documented by field staff. This allows the time interval between cleanings to be adjusted to reach an optimal cleaning frequency for each pipe. All changes to the cleaning frequency are documented in Cartegraph OMS by use of a cleaning frequency change code. This process is working well for the City, and has helped reduce SSOs.
- The City implements a "zone defense" approach to cleaning the system which has reduced the amount of SSOs. The City should document this strategy in the SSMP.
- The City currently has event driven cleaning throughout their system. Each year in early August, the City holds what is called the "Old Spanish Days Fiesta", which last for five days. During this week, the City experiences an increase in visitors, and the collection system plans for pre cleaning of select pipelines that are impacted by the event. The City should incorporate this into the Cleaning and Inspection Program.

- The City also has in place a wet weather procedure as another event driven cleaning that focuses on cleaning specific areas in order to increase capacity to handle the rain event. These areas typically focus, but are not limited to, syphons throughout the system. The City should incorporate this into the Cleaning and Inspection Program.
- The City does not have any easement cleaning procedures, however, plans to meet with Cartegraph OMS on how to incorporate this into their work plan. If a plan is agreed upon and implemented, the City should incorporate this into their Cleaning and Inspection Plan.
    - The City has a contract in place for maintaining access to large easements so that staff have accessible routes to maintain sewer assets within easements.
- The City has implemented a new approach to verify the cleaning needs of pipes with difficult access. A CCTV truck inspected these pipes and determined if there were defects and what steps would take place after the information was gathered and reviewed. The City changed this scheduled event from a cleaning event to an inspection event in Cartegraph OMS and documented this inspection activity in the place of a cleaning event.
- The City has two flow level sensors in the system and is evaluating replacement of older float systems, installed at wet-weather monitoring points, with ultrasonic level sensors (i.e. Smartcovers). There is a plan in place to begin to create and practice a Smartcover cleaning plan. The City plans to place these new Smartcovers strategically at higher-maintenance pipes such as one-month pipes that have historically had excessive build up.
- Lift Station operations and maintenance
    - The City's lift stations are operated and maintained by El Estero Treatment Plant staff. Staff use Maintenance Connection CMMS to document preventive maintenance activities using work orders.
    - The treatment plant is in the process of established SOPs for bypassing Lift Stations in the event of an SSO.
    - The may want to consider developing improved documentation of lift station maintenance program, strategies and activities. Once this documentation is complete, the City should incorporate this documentation into the SSMP either directly or by reference. The document could consist of:
        - Description of the overall strategy on how the City is maintaining the lift stations, documentation of established PM tasks, documentation of standard data collection forms for inspection, preventive maintenance and corrective maintenance.
        - Documenting alarms at each lift station and how the City is notified or can access to help prevent SSOs.
        - The City should consider using the level of documentation provided in the Cleaning and Inspection Plan as an example for Lift Station maintenance program documentation.

Pipeline Rehabilitation and Replacement

- The current approach the City utilizes for R&R programs includes evaluation of data and information from a number of different sources. This process primarily addresses structural and maintenance defects identified through CCTV inspections. These sources include:
    - CCTV and other inspections
    - O&M information
    - Flow monitoring data
    - Known access issues
    - Other factors (exfiltration)
- Other data sources are incorporated and discussed in the capital improvement planning process. This process is divided into four distinct components:
    - CCTV Inspection Quality Assurance
    - CCTV Inspection Initial Data Screening
    - Repair Prioritization using InfoMaster
    - Engineering Review
- The City utilizes CCTV and acoustic sounding to assess the condition of the wastewater sewer pipes. Contractor services are also used to perform these activities to supplement in-house staff. Structural and operational defects are categorized using the Pipeline Assessment and Certification Program (PACP) methodology. The PACP methodology is an industry standard pipeline defect coding procedure established by the National Association of Sewer Services Companies (NASSCO).
- The current process and prioritization of the City's system-wide CCTV inspection is based on a risk assessment on each pipe in the City's service area. Pipes with a high criticality rating are inspected first. After the high priority pipes have been inspected, sewer basins are prioritized for more efficient inspections based on the average pipe criticality rating. Following the initial inspection and assessment, a new inspection priority and schedule is established based on the pipe's PACP structural score (likelihood of failure) and the impacts if the pipe were to fail (consequence of failure). The City has documented the reinspection frequencies in the SSMP and continues to meet the reinspection frequencies to monitor the condition of the pipe until the condition is improved through repair, rehabilitation, or replacement.
- The City prioritizes inspecting pipes with PACP 5's and 4's first, and will monitor 3's and 2's as they worsen over time. Pipes with PACP 5 are fixed every 2 years or inspected yearly. It is recommended that the City update Table 2-1 in Appendix E6 of the SSMP to show that new inspection frequencies for pipes with PACP 5's being inspected every two years, 4's being inspected every four years, 3's being inspected every five years, and 2's and 1's being inspected either every five or ten years.
- The City has completed a rehabilitation plan that has identified sewer mains for rehabilitation that was implemented in FY17 and runs through FY20.

- The City currently targets performing approximately 3.5 miles of gravity sewer main repair, rehabilitation and replacement per year and has rehabilitation plans identified for construction completion through FY2021.
- The City has developed a set of guidelines for selecting pipe segments for condition remediation. The City has developed a decision logic to apply the guidelines and has programmed the decision logic into software to perform analysis of GIS, rehabilitation plans, and CCTV inspection data. The City has calculated the decision outcomes using this approach and is in the process of reviewing the results.
- The City has recently configured Innovyze InfoMaster to apply the decision guidelines to PACP coded CCTV to develop a preliminary recommendation for selecting a pipe for condition remediation and for choosing the type of remediation. The City will also use InfoMaster to review the results and document the final decision upon review. The City plans to continue this work in the FY21.
- Section 3.2.4 of Appendix E6 documents the City's Repair/Renewal Prioritization of pipelines throughout the system. The City should consider bring in documentation from the InfoMaster Implementation analysis and recommendation document completed in July 2019. The City should also update this section to coordinate with CIP planning work and coordination with other departments.
- The City has a process in place for inspecting VCP pipes in close proximity to storm drains, as these are high-risk pipes prone to potential failures. The City may want to consider documenting criteria by which the City will prioritize addressing or monitoring these pipes near storm drains based on specific defects.

Lift Station Rehabilitation and Replacement

- In January 2012, the City contracted with Brown and Caldwell (B&C) to investigate the City's lift stations, perform a condition assessment and identify recommended improvements. The scope of work also included a review of available lift station force main information and recommendations for additional investigations. The City completed lift station and force main investigations in March and April 2012. The original 2012 B&C Lift Station Assessment document was used as a guide for capital planning and was cited in the 2012 and 2013 SSMP certifications as well as amended in the 2015 audit. In the 2018 audit, the City reviewed the resulting recommendation and documented the status of completed items from the initial assessment.
- During the 2020 audit, the City discussed this lift station and force main condition assessment document.
  - The Braemar Lift Station and La Colina Lift Station have both been updated with secondary/redundant force mains due to their COF and LOF.
  - The Via Lucero Lift Station dual force main project is in the design stage for FY21, and is projected to be completed in FY23.
- Based on the results of the condition assessment performed by B&C, a list of improvements and additional investigations were recommended. Recommendations were prioritized into three categories: Urgent; High Priority; Low Priority. Urgent

recommendations should be implemented as soon as possible (within two years). High priority recommendations should be implemented in the next 2-5 years. Low priority recommendations can be implemented in the future as needed. The following tables were created from documentation in Appendex E4 – Lift Station and Force Main Condition Assessment, and includes urgent and high priority items. It is recommended that the City incorporate this table or something similar, along with a schedule to complete these items if they have not already been addressed. For low priority items, the City should manage risk associated with these recommendations through monitoring and preventative maintenance activities.

Table 8: Lift Station and Force Main Condition Assessment Repair Recommendations

Name	Repair Recommendations	Priority
Lift Stations		
All	Sites with standby generators should all have spill containment provided on site.	Urgent
All	None of the lift stations have fall protection devices for the wet well and dry well entrances. It is recommended that fall protection devices for the dry wells and wet wells be installed.	Urgent
All	The lift stations that have dry wells and only one sump pump should be provided with a second sump pump.	Urgent
El Camino De La Luz	The 2008 Condition Assessment Report indicated that the dry well has significant damage to the floor and sump. If this work has not been completed, complete the repairs as indicated in the 2008 Condition Assessment Report	High Priority
Tallant Road	The check valve and isolation valve are located in a vault. The piping for the valves is located at an intermediate high point. Air can accumulate at this high point and reduce capacity if it is not removed. Recommend installing an air release valve or manual valve to vent air from the pipe.	High Priority
Tallant Road	The electrical enclosure is located next to the sidewalk close to the street. The electrical enclosure is not protected by bollards. Recommend installing bollards around the electrical enclosure.	High Priority
Tallant Road	The lift station is located near residential housing and there have been some odor complaints. Recommend installing an odor control system at this lift station. This could include an appropriate chemical addition solution such as Bioxide.	High Priority
Force Mains		
Linda Road	Replace the force main discharge manhole with a new manhole with HDPE liner	Urgent
El Camino De La Luz	This short force main is approaching 40 years old and is constructed of a corrosive material. In lieu of expending significant funds for a comprehensive investigation, the City should consider constructing a redundant parallel force main. Following installation of the new force main, the City can rehabilitate the original force main if needed.	High Priority

Table 9: Lift Station and Force Main Condition Assessment Additional Investigations and Future Condition Assessment Recommendations

Name	Recommendations for Additional Investigations and Future Condition Assessments	Priority
Lift Stations		
All	A capacity and pump performance analysis of each pump should be completed to confirm the pumping capacity. City staff indicated that each of the lift stations has adequate capacity for current and future flows but this should be verified with a capacity analysis. None of the lift stations have flow meters; therefore temporary flow meters will need to be installed or the flow will need to be estimated from a wet well draw down test. This could be performed in-house or with a consultant	Urgent
All	All sites with standby generators do not have fuel storage capacity for generator operation of 24 hours. An analysis on standby generator fuel storage capacity should be completed.	Urgent
All	An analysis of the ventilation of the dry wells and wet wells should be completed at each lift station. Ventilation with positive supply and exhaust fans should be provided. This work to test fans and visually confirm that the duct work will provide a sweeping of the entire space can be performed by a consultant specializing in HVAC balancing. The analysis should also include NFPA 820 requirements and gas detection equipment.	Urgent
All	None of the lift stations have flow meters. Consider installing flow meters at each of the lift stations. The flow meters can provide input into trouble shooting pump performance. Flow meter installation can be prioritized based on a risk assessment. Meters may not be necessary some of the small lift stations.	High Priority
Force Mains		
Skofield Lift Station	This force main has a high risk of near-term failure based on its age and material. Also, it is located in a park along an extremely steep alignment and, in the event of a failure, repair would be difficult. The City should move forward with a detailed investigation of this force main including an evaluation of potential internal and external corrosion failure mechanisms. One technology, the See Snake, may be appropriate for measuring internal pipe corrosion.	Urgent

Training

- The City uses a combination of in-house classes, on-the-job training, conferences, seminars, and other training opportunities to train its wastewater collection system staff. Training is tracked in Cartegraph OMS.
- The City requires its wastewater collection system employees to be certified in Collect System Maintenance by the California Water Environment Association (CWEA). These certificates are renewed every two years by showing staff has participated in twelve hours of training over this time period.
- The City also trains staff on the technical applications within the system such as excel and Cartegraph OMS.
- The City has biweekly OSHA required trainings, as well as general trainings that staff participate in.

Equipment and Replacement Part Inventories

- The City documents the wastewater collection system equipment list and replacement parts list in Appendix E7 and E8 respectfully.
- The City uses Cartegraph OMS to track labor, materials, and the inventory of equipment throughout the system. It is recommended that the City add a note regarding the use case or purpose for each piece of equipment in Appendix E7. Examples include:
  - Large capacity, production cleaning and removal of material
  - Smaller vehicle providing ability to navigate alleys and smaller roadways
  - Supervisor vehicle
- The City documents bypass pump equipment in Appendix E7. It is recommend the City perform an analysis to determine which lift stations and pipelines can be bypassed using the equipment the City current has. For pump stations that cannot be bypassed, the City should document what their approach is to bypassing these pipes and lift stations.

4.2.5 Element 5 – Design and Performance Provisions

WDR Requirement:

a. *Design and construction standards and specifications for the installation of new sanitary sewer systems, pump stations and other appurtenances; and for the rehabilitation and repair of existing sanitary sewer systems; and*

b. Procedures and standards for inspecting and testing the installation of new sewers, pumps, and other appurtenances and for rehabilitation and repair projects.

Audit Finding: The City of Santa Barbara has developed design standards which are used by the Public Works Engineering Division for the design of new and rehabilitated sewer system facilities. The City's construction standards are addressed in its specifications for sewer construction projects, project-specific amendments to the specifications, and Standard Specifications for Public Works Construction (also known as the Greenbook).

The City is in compliance with the Design and Performance Provisions elements of WDR Provision D.13 and has appropriate design and construction standards and specifications as well as procedures and standards for inspection and testing of new sewers and rehabilitation and repair projects.

4.2.6 Element 6 – Overflow Emergency Response Plan

WDR Requirement: *Each Enrollee shall develop and implement an overflow emergency response plan that identifies measures to protect public health and the environment. At a minimum, this plan must include the following:*

a. Proper notification procedures so that the primary responders and regulatory agencies are informed of all SSOs in a timely manner;

b. A program to ensure an appropriate response to all overflows;

c. Procedures to ensure prompt notification to appropriate regulatory agencies and other potentially affected entities (e.g. health agencies, Regional Water Boards, water *suppliers, etc.) of all SSOs that potentially affect public health or reach the waters of the State in accordance with the MRP. All SSOs shall be reported in accordance with this MRP, the California Water Code, other State Law, and other applicable Regional Water Board WDRs or NPDES permit requirements. The Sewer System Management Plan (SSMP) should identify the officials who will receive immediate notification;*

d. Procedures to ensure that appropriate staff and contractor personnel are aware of and follow the Emergency Response Plan and are appropriately trained;

e. Procedures to address emergency operations, such as traffic and crowd control and other necessary response activities; and

f. A program to ensure that all reasonable steps are taken to contain and prevent the discharge of untreated and partially treated wastewater to waters of the United States and to minimize or correct any adverse impact on the environment resulting from the SSOs, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the discharge.

Audit Finding: The City is in compliance with this element. Findings include:

- ***Notification Procedures***: The City has up-to-date notification procedures in place. The supervisory staff responsible for internal and external notifications is highly experienced in performing notifications.
- ***Program to Ensure Appropriate Response***: The City has a detailed Overflow and Emergency Response Plan in place, as well as a Lift Station and Waterfront Department SSO Response Plan documented in the SSMP.
- ***Appropriate Training on Overflow Emergency Response Plan***: The City participates in periodic training drills that cover scenarios typically observed during sewer related emergencies (e.g. mainline blockage, mainline failure, force main failure, lift station failure, and lateral blockages or PLSDs). These trainings are documented in Cartegraph OMS.
- ***Procedures to Address Emergency Operations***: The City has an appropriate program in place to address emergency operations in the event of an SSO.
- ***Program to Ensure Reasonable Steps Taken***: The City has an appropriate program in place to ensure reasonable steps are taken to contain and prevent SSO discharges.

Other key findings from the audit interviews include:

- The City should consider moving all of Section 2 of the OERP to the main body of the SSMP.
- All sewer cleaning crews have nozzle cameras on their trucks. The City has been utilizing nozzle cameras to inspect a pipe after a blockage is cleared and before full pipe cleaning is performed to determine the cause and location of the blockage. Once this is completed, the City will fully clean the pipe, and will then use the nozzle camera to scan the pipe to ensure all obstructions were properly removed.
- Section 3.1.2 of the OERP discusses the City's dispatch of crews in the event of an SSO and the response times during normal working hours and after hours. It is recommend the City update these times to read 30 minutes and 60 minutes respectfully.
- Section 3.3 of the OERP discusses the City's Water Quality Sampling and Testing. The City currently does not have adequate documentation that addresses the requirements of the WDR. It is recommended that the City update this section to meet

the requirements for a Water Quality Monitoring Program, and rename this section to "Water Quality Monitoring Program."

  - The OERP documents that for spills over 50,000 gallons that reach surface water, the City will perform water quality monitoring. The OERP should document who triggers this response and how the timeframe for which this occurs. Water quality monitoring needs to occur for spills over 50,000 gallons within a specific timeframe, therefore this needs to be determined and triggered well within the established timeframe to enable monitoring to occur appropriately.
  - The City has an internal water quality lab that works directly with the collection system to take samples and test water quality when necessary. It is recommended that the City establish protocols for when this group samples or monitor regardless of the spill size and if it enters surface waters.
  - It is recommend that the City has a procedure that shows what to do when an SSO reaches a water line, whether it is dry or wet, and how the water quality lab will have to sample.
- The City has determined that not all contractors have completed or provide a Spill Response Plan. What is most important for the City is to have contractors immediately contact them in the event of a spill. The City should considering creating of a video discussing the necessary steps to take in the event of an SSO and providing this to all contractors in the future. Once a plan is put into place, the City should document this and update Section 3.6.2.
- The City has a Lift Station Overflow Emergency Response Plan that is referenced in Appendix G2.
  - Overall, this document provides response crews with a summary table of pump station attributes and flows, location maps and troubleshooting/bypass protocol. The City should continue to build upon this documentation to add elements to it to further enhance the program. For example, a future update could include documentation of where the spill will go and site-specific protocols for containment.
  - The City should consider including protocols for after-action review when lift station failure occurs to add any site-specific details useful in a future response.
  - The City should consider including a section on response preparedness training and incorporating training activities into future overflow response training activities.
  - For each lift station, the City could add discharge locations as well as valves on the maps within the document.

4.2.7 Element 7 – FOG Control Program Plan

WDR Requirement: *Each Enrollee shall evaluate its service area to determine whether a FOG control program is needed. If an Enrollee determines that a FOG program is not needed, the Enrollee must provide justification for why it is not needed. If FOG is found to be a problem, the Enrollee must prepare and implement a FOG source control program to reduce the amount of these substances discharged to the sanitary sewer system. This plan shall include the following as appropriate:*

a. An implementation plan and schedule for a public education outreach program that promotes proper disposal of FOG;

b. A plan and schedule for the disposal of FOG generated within the sanitary sewer system service area. This may include a list of acceptable disposal facilities and/or additional facilities needed to adequately dispose of FOG generated within a sanitary sewer system service area;

c. The legal authority to prohibit discharges to the system and identify measures to prevent SSOs and blockages caused by FOG;

d. Requirements to install grease removal devices (such as traps or interceptors), design standards for the removal devices, maintenance requirements, BMP requirements, record keeping and reporting requirements;

e. Authority to inspect grease producing facilities, enforcement authorities, and whether the Enrollee has sufficient staff to inspect and enforce the FOG ordinance;

f. An identification of sanitary sewer system sections subject to FOG blockages and establishment of a cleaning maintenance schedule for each section; and

g. Development and implementation of source control measures for all sources of FOG discharged to the sanitary sewer system for each section identified in (f) above.

Audit Finding: The City is in compliance with the fats, oils, and grease (FOG) element of WDR Provision D.13. The last SSO clearly related to FOG accumulation was in 2017, although was determined to occur due to negligence on the part of the owner.

- Overall, FOG accumulation is either not occurring or is more likely being managed and mitigated through City staff food service establishment (FSEs) inspections, a standardized educational program, and review of building plans of new restaurants to ensure proper connections and an understanding of the FOG program occurs.
- There are approximately 574 FSEs within the City service area. The City has one full time equivalent (FTE) employee responsible for inspection of the FOG-producing facilities. The restaurants are inspected on a maximum frequency of two years. Occasionally inspections are scheduled around a grease hauler visit in order to get a complete view of a grease control device (GCD). When pumping, the City also conducts unplanned inspections of facilities in the event of an SSO caused by FOG to determine if a restaurant has some responsibility in the blockage. The restaurants are required to keep grease records which are subject to review during inspections. The restaurant passes the inspection if the grease and solids layer(s) are less than 25 percent of the total liquid depth and a properly working GCD.
- The City’s current business process includes scheduling inspections and recording inspection results in Cartegraph OMS. Reactive or ad-hoc inspections are documented using the standard inspection form and then entered into Cartegraph OMS when complete. Once the Wastewater Compliance Specialist completes an inspection, the next inspection is determined and entered into Cartegraph OMS.
- Items are tracked in Cartegraph OMS with a status. Each inspection results in one of the two following FOG Status (compliance) categories:
    - **Compliant** – The FSE meets the requirements of Title 16 and the FSE does not pose a significant concern to discharging fats, oils or grease to the collection system.

  - **In-Progress** – one or more violations were observed during the inspection and the w Wastewater Compliance Specialist will be monitoring the violation during future inspections and working with the FSE Representative to correct the deficiencies documented under the Correction Notice section on the Inspection Form.
- The City has noted that there is a lack of need to exercise authority due to the education and communication provided by staff to FSEs.
  - During the audit, the City described the education process. The Wastewater Compliance Specialist will begin with pictures and describe what a GCD is and how it is cleaned. Choke points are identified, and a discussion on how the FSE can be in compliance is reviewed along with best management practices.
  - In the event of a spill from a blockage caused by an FSE, the City will follow up with physical door hangers or paper postings. The City will begin to use the online notification application called NextDoor to notify the public regarding proper disposal of FOG.
- The City should expand on Section 2.5 and create a new section 2.5.9 of Appendix H1 to document and explain the Wastewater Compliance Specialist's support during the building review process and that proper installation of new FSEs occurs.
- If a sewer main has FOG accumulation, the City's Wastewater Compliance Specialist will complete a comprehensive review to understand what the source of the FOG is and how it occurred.

4.2.8 Element 8 – System Evaluation and Capacity Assurance Plan

WDR Requirement: *The Enrollee shall prepare and implement a capital improvement plan (CIP) that will provide hydraulic capacity of key sanitary sewer system elements for dry weather peak flow conditions, as well as the appropriate design storm or wet weather event. At a minimum, the plan must include:*

a. Evaluation: Actions needed to evaluate those portions of the sanitary sewer system that are experiencing or contributing to an SSO discharge caused by hydraulic deficiency. The evaluation must provide estimates of peak flows (including flows from SSOs that escape from the system) associated with conditions similar to those causing overflow events, estimates of the capacity of key system components, hydraulic deficiencies (including components of the system with limiting capacity) and the major sources that contribute to the peak flows associated with overflow events;

b. Design Criteria: Where design criteria do not exist or are deficient, undertake the evaluation identified in (a) above to establish appropriate design criteria; and

c. Capacity Enhancement Measures: The steps needed to establish a short- and long-term CIP to address identified hydraulic deficiencies, including prioritization, alternatives analysis, and schedules. The CIP may include increases in pipe size, I/I reduction programs, increases and redundancy in pumping capacity, and storage facilities. The CIP shall include an implementation schedule and shall identify sources of funding.

d. Schedule: The Enrollee shall develop a schedule of completion dates for all portions of the capital improvement program developed in (a)-(c) above. This schedule shall be reviewed and updated consistent with the Sewer System Management Plan (SSMP) review and update requirements as described in Section D. 14.

Audit Finding: Overall, the City's approach to system evaluation and capacity assurance has proven to be effective. Of the 239 SSOs reported to have occurred within the service area since January 2007, only five (5) of the reports identified capacity as a cause. The most recent capacity related SSO occurred in 2017 and was the result of a 25-year storm event. The City is in compliance with the System Evaluation and Capacity Assurance element of WDR provision D.13 and is meeting its capacity-oriented goals to have adequate capacity to convey peak wastewater flows, to control inflow and infiltration (I&I) to minimize peak flows, and to minimize sanitary sewer overflows (SSOs).

The City hired a consultant in December of 2014 to perform a Wastewater Collection System Master Plan. The plan was developed to identify and mitigate existing and future capacity deficiencies, and included a capacity evaluation, system performance and design criteria, and proposed capacity enhancements. It is recommended that the City identify these specific sections within the Wastewater Collection System Master Plan and document this in a table in the main body of the SSMP.

The City plans to complete an update to this Master Plan in FY21/22.

The City's sewer demand is based on population density and there is a push from state and local legislation to support the Affordable Dwelling Unit (ADU) which the City plans to address.

The sewer system mileage is not growing, however, there are more people within the service area and the City has seen an overall increase in flow over time. To address this, the City is working at building out their level system program but adding smart covers in select locations.

The City has implemented an informal Manhole Level Monitoring Program which helps prioritize where staff goes during rain events. Level sensors, such as Smartcovers or float-style sensors at predetermined manholes will trigger an alarm when flow rises past a certain level so staff can be onsite to prevent an SSO from occurring. The City has a field in Cartegraph OMS that tracks the location of these impacted areas and this information is available to staff.

The City's implementation of the Sewer Lateral Inspection Program (SLIP) has helped reduced capacity issues throughout the system.

The City tracks alerts of level sensors during rain events or times of high flow. Documenting this in Element 8 of the SSMP, is above and beyond what is deemed necessary, however, would further enhance the City's approach to managing capacity issues in the system.

The City has not performed flow monitoring since 2012, however, with the addition of Smartcovers and level sensors being added to the system the City believes this will help determine how this program is reintroduced and used in the future.

Figure 2 is an excerpt showing Table 13 of the Wastewater Collection System Master Plan, which identifies ten (10) pipelines within the City to address existing capacity constraints. It is recommended that the City review this table and include this in the main body of the SSMP.

Figure 2: Excerpt of Table 13 from the Wastewater Collection System Master Plan

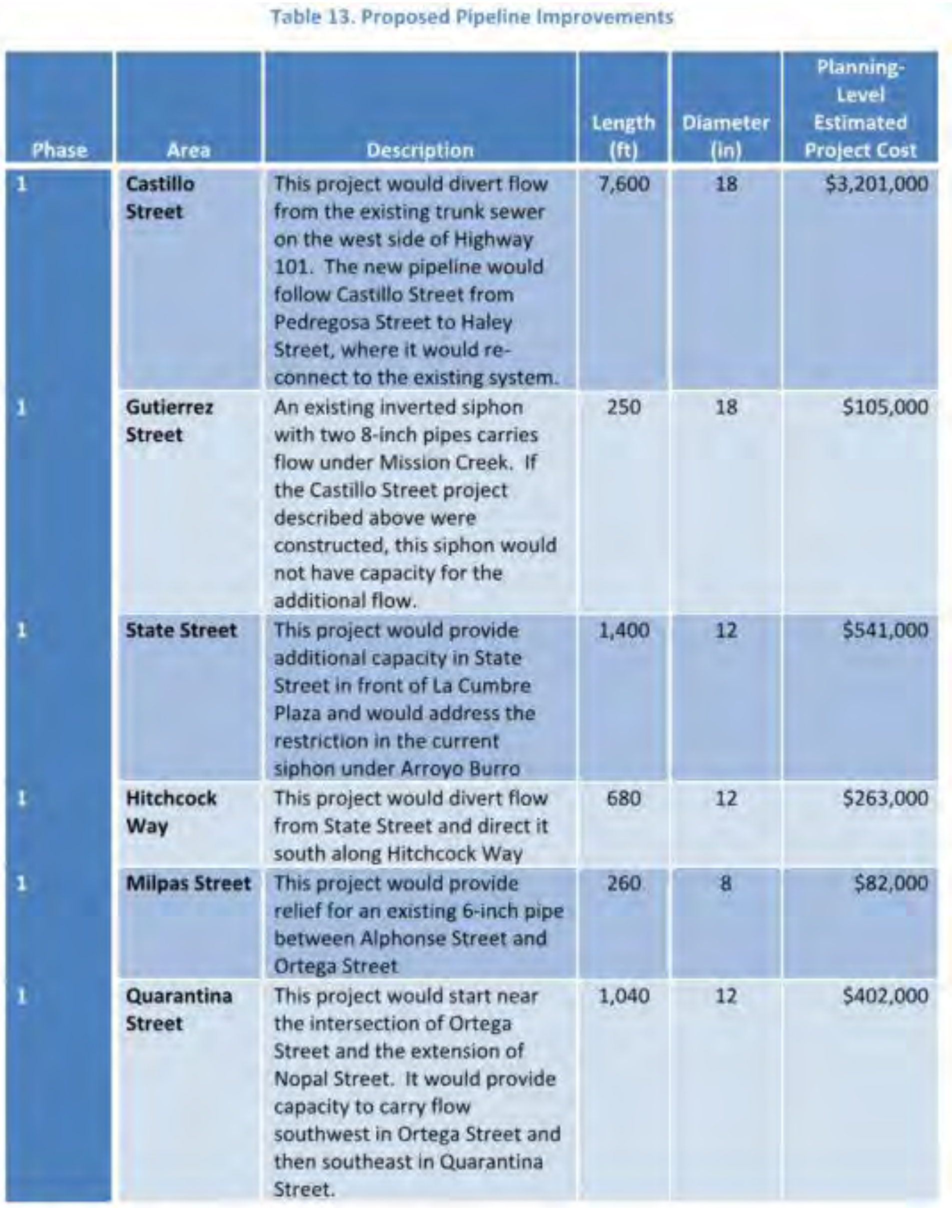
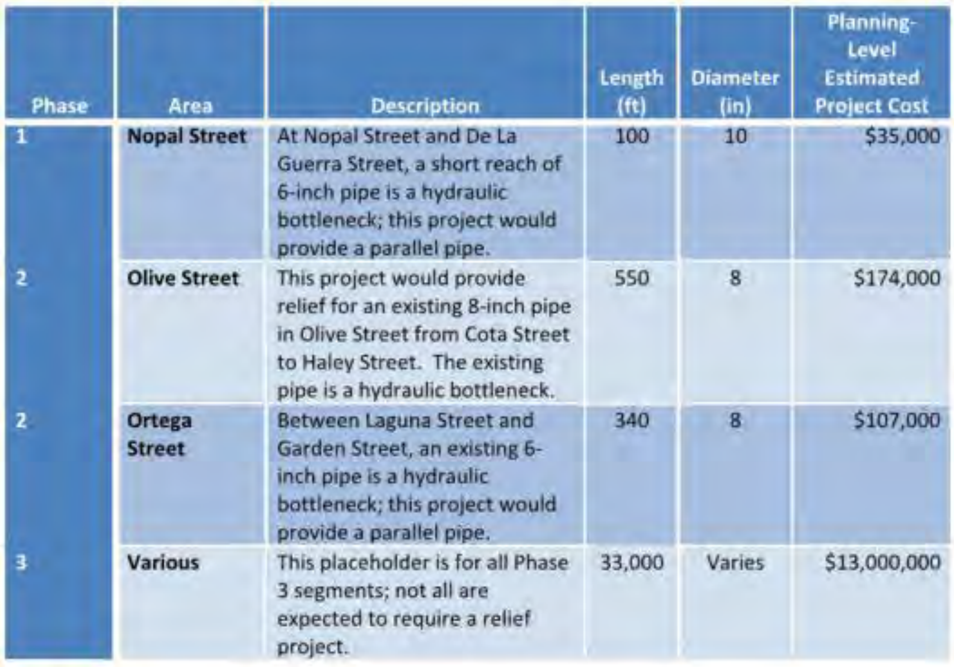


Table 13. Proposed Pipeline Improvements

Phase	Area	Description	Length (ft)	Diameter (in)	Planning-Level Estimated Project Cost
1	**Castillo Street**	This project would divert flow from the existing trunk sewer on the west side of Highway 101. The new pipeline would follow Castillo Street from Pedregosa Street to Haley Street, where it would re-connect to the existing system.	7,600	18	$3,201,000
1	**Gutierrez Street**	An existing inverted siphon with two 8-inch pipes carries flow under Mission Creek. If the Castillo Street project described above were constructed, this siphon would not have capacity for the additional flow.	250	18	$105,000
1	**State Street**	This project would provide additional capacity in State Street in front of La Cumbre Plaza and would address the restriction in the current siphon under Arroyo Burro	1,400	12	$541,000
1	**Hitchcock Way**	This project would divert flow from State Street and direct it south along Hitchcock Way	680	12	$263,000
1	**Milpas Street**	This project would provide relief for an existing 6-inch pipe between Alphonse Street and Ortega Street	260	8	$82,000
1	**Quarantina Street**	This project would start near the intersection of Ortega Street and the extension of Nopal Street. It would provide capacity to carry flow southwest in Ortega Street and then southeast in Quarantina Street.	1,040	12	$402,000



Phase	Area	Description	Length (ft)	Diameter (in)	Planning-Level Estimated Project Cost
1	**Nopal Street**	At Nopal Street and De La Guerra Street, a short reach of 6-inch pipe is a hydraulic bottleneck; this project would provide a parallel pipe.	100	10	$35,000
2	**Olive Street**	This project would provide relief for an existing 8-inch pipe in Olive Street from Cota Street to Haley Street. The existing pipe is a hydraulic bottleneck.	550	8	$174,000
2	**Ortega Street**	Between Laguna Street and Garden Street, an existing 6-inch pipe is a hydraulic bottleneck; this project would provide a parallel pipe.	340	8	$107,000
3	**Various**	This placeholder is for all Phase 3 segments; not all are expected to require a relief project.	33,000	Varies	$13,000,000

During the 2020 audit, the City provided a status update on the projects from the proposed pipeline improvements shown in **Figure 2**. Hitchcock Way was completed in December 2019. Both Nopel Street and Quarantina Street are part of the Santa Barbara Junior High Capacity Improvement Project which is scheduled to be completed in 2023 at the earliest. This project's completion date is being driven by coordination with other projects, and the City is currently identifying funding mechanisms to implement this.

The City prepares an annual list of capital improvement projects that includes projects to address known collection system capacity issues and defective pipes. The City's current Capital Improvement Plan and schedule is provided in SSMP Volume II, Appendix I2. This schedule appears to be a sample schedule of the coordination with engineering and not a schedule for how to accomplish these projects. It is recommended the City put together a more attainable schedule that looks out more than 18 months for CIP projects.

- The City discussed that they have a 6-year horizon for projects. Every 2 years, the City refines this budget for the following two years with much defined scopes for projects and funding needs. For projects outside of the current 2 year timeline or plan, the City should document that they are monitoring these accordingly.

4.2.9 Element 9 – Monitoring, Measurement, and Program Modifications

WDR Requirement: *The Enrollee shall:*

a. Maintain relevant information that can be used to establish and prioritize appropriate Sewer System Management Plan (SSMP) activities;

b. Monitor the implementation and, where appropriate, measure the effectiveness of each element of the SSMP;

c. Assess the success of the preventative maintenance program;

d. Update program elements, as appropriate, based on monitoring or performance evaluations; and *e. Identify and illustrate SSO trends, including: frequency, location, and volume.*

Audit Finding: The City monitors the effectiveness of the SSMP and overall program and are in compliance with the Monitoring, Measurement, and Program Modification element of the WDR.

The City maintains the relevant information required for analysis in the SWRCB CIWQS SSO database, CMMS database, CCTV database, and GIS database. The City primarily utilizes a number of key performance indicators (KPIs) and the SSMP elements to measure performance of its wastewater collection system and the effectiveness of established programs. KPIs are tracked for evaluation and analysis, and reports are prepared at least quarterly and reviewed by the management team. The KPIs are compared to established goals so that program modifications can be made if needed.

The City additionally prepares Annual Reports, which evaluate the effectiveness of the program, examines trends in SSOs, and identifies changes to the program with the goal to decrease the number and frequency of SSOs.

Located in section 2.2 of the Cleaning and Inspection Program is documentation of indicators that the City uses to measure the performance of its wastewater collection system and the effectiveness of its cleaning program. The City should consider bringing this into Element 9 of the SSMP and add to the current list of KPIs.

The City revised the 2013 version of the SSMP in June 2018 based on the findings of the July 2018 audit and recent changes to the program. The 2013 Monitoring and Reporting Requirements requires the City to keep a record of changes made to the SSMP since last certification (2013 MRP E.3). As the City begins updating the SSMP, the City may want to consider compiling a list of modifications to the 2018 version of the SSMP in a change log. The log should specify which section changed, when the change was made, and who authorized the change. Once the SSMP is recertified, the City should then clear the change log and start documenting new changes from that point forward.

4.2.10 Element 10 – SSMP Program Audits

WDR Requirement: *As part of the SSMP, the Enrollee shall conduct periodic internal audits, appropriate to the size of the system and the number of SSOs. At a minimum, these audits must occur every two years and a report must be prepared and kept on file. This audit shall focus on evaluating the effectiveness of the SSMP and the Enrollee's compliance with the SSMP requirements identified in this subsection (D.13), including identification of any deficiencies in the SSMP and steps to correct them.*

Audit Finding: The last SSMP audit was conducted in June 2018. The City initiated this current SSMP audit process in June 2020, approximately two (2) years after the previous 2018 SSMP audit.

In 2017, the City spent several months performing a detailed review of its business practices in conjunction with its Computerized Maintenance Management System (CMMS) upgrade. This effort effectively served as the City's 2017 SSMP program audit effort. As a result, changes were made to the City's business practices as part of the software upgrade, which was launched in January 2018. In addition, an analysis of the trends of SSOs over the past six years was performed to look at the effectiveness of the City's Operation and Maintenance Programs. Due to these two work efforts, the City postponed the formal 2017 SSMP audit to occur in 2018 to incorporate the changes into the SSMP. City Council recertified the last update to the City's SSMP on January 29, 2019.

4.2.11 Element 11 – Communication Program

WDR Requirement: *The Enrollee shall communicate on a regular basis with the public on the development, implementation, and performance of its SSMP. The communication system shall provide the public the opportunity to provide input to the Enrollee as the program is developed and implemented.*

The Enrollee shall also create a plan of communication with systems that are tributary and/or satellite to the Enrollee's sanitary sewer system.

Audit Finding: The City maintains a website to keep the general public informed on SSMP activates and performance. The website provides general information about City wastewater collection system activities and is also used to communicate the following City wastewater collection systems programs:

- Sewer Lateral Inspection Program (SLIP)
- Fog Control Program
- Other Programs to Prevent Spills

Following the completion of SSMP updates, the most current document is posted to this website:

https://www.santabarbaraca.gov/gov/depts/pw/resources/wastewater/collectsys/default.asp

The City regularly communicates with the Regional Water Quality Control Board (RWQCB) as issues related to its wastewater collection system arise.

The City notifies the Santa Barbara County Health Department when SSO events occur that meet pre-established conditions.

The Mission Canyon sewer district discharges to the City but is not maintained by the City of Santa Barbara. The Santa Barbara County Laguna County Sanitation District has been in charge of operations and maintenance of the Mission Canyon sewer district since July 1, 2015, and maintains an on-call contract with local sewer contractor to respond to emergencies. The City has regular and ongoing communications with the County to exchange information on the performance of the collection system.

There is a small section of the Montecito Collection System where there is a flow exchange between the City of Santa Barbara and the City of Montecito. There are about forty homes in Montecito that discharge to Santa Barbara's collection system and about twenty Santa Barbara homes that discharge to the Montecito system. Montecito Sanitary District maintains their own infrastructure and communication is on an ad-hoc basis as situations arise.

5 Strengths and Implementation Accomplishments

Documenting the strengths and implementation accomplishments of the SSMP is as important as determining the deficiencies and corrective actions. The City should both recognize the areas of strength in sewer system management as well as continue building upon success in these areas. **Table 11** includes the strengths and implementation accomplishment that were identified during the audit.

Table 10: Strengths and Implementation Accomplishments

WDR Provision	Strengths and Implementation Accomplishments
Overall SSO Performance	The City of Santa Barbara has experienced six (6) SSOs over the past two (2) years. This level of SSO performance ranks the City of Santa Barbara the top performing agencies in the Central Coast Region.
D.13.ii - Organization	The City has established roles and responsibilities that have helped staff take ownership of the various sections of the SSMP. This was reflected during the various interviews and participation from staff demonstrating a comprehensive understanding of the City's system and how each contribute to minimizing SSOs.
D.13.iv.b – Operations and Maintenance – Mapping	The City's IT Governance Plan is a very detailed and excellent summary of how GIS updates and additions for the collection system assets take place.
D.13.iv.b – Operations and Maintenance – Pipeline Preventative Maintenance Program	The City has adopted Cartegraph OMS as their CMMS program and is utilizing it to update changes in cleaning frequency when evaluated by the Cleaning Program Planner/Scheduler. This allows the time interval between cleanings to be adjusted to reach an optimal cleaning frequency for each pipe. All changes to the cleaning frequency are documented in Cartegraph OMS by use of a cleaning frequency change code. This process is working well for the City, and has helped reduce SSOs.

D.13.iv.c – Operations and Maintenance Program – Pipeline Inspection and Renewal Plan	The City has developed a set of guidelines for selection of pipe segments requiring condition remediation. The City has also developed a set of guidelines for selecting an appropriate condition remediation strategy. The City has created a decision logic from the guidelines and programmed the logic into a tool that analyzes GIS, rehabilitation plans, and CCTV inspection data to create a preliminary selection of pipelines for condition remediation and a preliminarily specific remediation solution. The results were incorporated into the InfoMaster Implementation Technical Memorandum that will be used to create a work plan for fiscal year capital projects in FY2021. The City has recently configured Innovyze InfoMaster to apply the decision guidelines to PACP coded CCTV to develop a preliminary recommendation for selecting a pipe for condition remediation and for choosing the type of remediation. The City will also use InfoMaster to review the results and document the final decision upon review. The City plans to continue this work in the FY21. The City has completed a rehabilitation plan that has identified sewer mains for rehabilitation that was implemented in FY17 and runs through FY20. From this plan, the City currently targets performing approximately 3.5 miles of gravity sewer main repair, rehabilitation and replacement per year and has rehabilitation plans identified for construction completion through FY2021.
D.13.vi – Overflow Emergency Response Plan	The City has been utilizing nozzle cameras after an overflow occurs in a pipe after it has been drained to determine the reason for the spill. Once this is completed, the City will clean the pipe, and will then use the nozzle camera to scan the pipe to ensure all obstructions of causes of the SSO was properly removed.
D.13.vii – FOG Control Program	The City has noted that there is a lack of need to exercise authority due to the education and communication provided by staff to FSEs. The Wastewater Compliance Specialist will begin with pictures and describe what a GCD is and how it is cleaned. Choke points are identified, and a discussion on how the FSE can be in compliance is reviewed along with best management practices. The City has not experienced a FOG-related SSO since July 2017.

D. 13.viii – System Evaluation and Capacity Assurance Program	The City's implementation of the Sewer Lateral Inspection Program (SLIP) has helped reduced capacity issues throughout the system. The City has been actively working to implement projects from the 2014 Wastewater Collection System Master Plan that would divert flow to help deal with capacity related issues. In 2019, the City completed Hitchcock Way which will divert flow from State Street and direct I south along Hitchcock Way. Prior to 2017 SSO which occurred due to a 25 year storm event, the City has not had a capacity related SSO since 2011.
D.13.ix – Monitoring, Measurement, and Program Modification	The City additionally prepares Annual Reports, which evaluate the effectiveness of the program, examines trends in SSOs, and identifies changes to the program with the goal to decrease the number and frequency of SSOs. The City developed a revised SSMP document in 2018, documented a significant change to their CMMS which is now Cartegraph OMS. This document was approved by Council in 2019.
D. 13.x – SSMP Program Audit	The City performed an SSMP Program Audit in June 2018. This SSMP Program Audit will be finalized in September 2020, in compliance with the WDR requirement for a biennial audit.

6 SSMP Audit Finding and Recommended Actions

Several findings were identified during the audit and are in this Section along with recommended corrective actions. Findings are divided into three categories and coded with a letter. The Finding type categories are coded and defined in **Table 12**. No compliance deficiencies were identified as a result of this audit, therefore, this audit finds the City of Santa Barbara in compliance with the WDR. Major and minor non-conformance deficiencies and recommended corrective actions are included in **Table 13**.

Table 11: Finding Type Definitions

Finding Type Code	Finding Type Name	Finding Type Definition
A	Non-Compliance	A process or outcome resulting in the SSMP or SSMP Program implementation not currently being in compliance with the WDR/SSMP requirements.
B-major	Major Non-Conformance	Moderate to high risk that a statement in the SSMP is not fully conformed to the WDR. Moderate to high risk to the effectiveness of the SSMP implementation.
B-minor	Minor Non-Conformance	Low risk that a statement in the SSMP or SSMP Program implementation is not fully conformed to the WDR. Low risk to the effectiveness of the SSMP implementation.
Opportunity	Opportunity for Continual Improvement	Not required for WDR compliance, yet could improve program documentation or effectiveness.

Table 12: Audit Findings and Recommended Actions

WDR Provision	Identified Deficiency or Opportunity	Recommended Action to Correct Deficiency or Implement Opportunity	Deficiency Type
D.13.i - Goal	The City should consider creating a linkage between SSMP goals and SSMP elements and specific measures.	Create a table or matrix linking SSMP goals to specific SSMP elements or measures. The purpose is to link specific measures and actions the City is taking accomplish SSMP goals. This could further be linked with objectives, measures and targets built into the Monitoring and Measurement program to create line-of-sight alignment between program goals, objectives, measures and activities.	**Opportunity**
D.13.ii - Organization	The *Responsibilities for SSMP* Implementation section includes an organization chart with clear lines of authority for the City's management, administrative, and maintenance positions involved with the sewer system shown in Appendix C3.	Update the organization chart to include to expand upon this organization chart to include Public Works up to the Mayor and City Council (i.e. governing board).	**B – minor**
D.13.ii – Organization	The SSMP generally describes SSMP implementation roles and responsibilities of staff, yet does not clearly identify staff responsible for specific elements or measures of the SSMP.	Update the SSMP to clearly indicate the staff person responsible for specific SSMP elements or measures of the SSMP and SSMP program implementation. This could be a table listing SSMP elements or specific SSMP measures and the name or position of the staff person responsible for that specific element or measure.	**B – minor**

WDR Provision	Identified Deficiency or Opportunity	Recommended Action to Correct Deficiency or Implement Opportunity	Deficiency Type
D.13.ii – Organization	Secondary authorized representatives: Multiple authorized representatives are added to CIWQS, which is a best practice. The SSMP does not describe the role of the secondary authorized representatives and protocols for designating a secondary representative to act or perform duties as the primary authorized representative.	Update the SSMP to identify backup or secondary authorized representatives and their associated responsibilities. Describe the protocols for designating changes in responsibilities for a secondary representative and how this is communicated within the organization.	**Opportunity**
D.13.ii – Organization	The SSMP references a flow chart in the Overflow Emergency Response Plan for describing the chain of communication. The Overflow Response Plan flow chart provides way more detail than required to communicate the SSO Reporting Chain of Communication.	Create a high-level flow chart of Figure 3-1 from the Overflow Emergency Response Plan indicating the “chain of communication” clearly and succinctly. The SSMP can still refer to the Overflow Emergency Response Plan for a detailed workflow, while at the same time clearly and succinctly communicating the chain of communication in the SSMP.	**Opportunity**
D.13.iii – Legal Authorities	The legal authorities section would benefit from a summary table indicating the various requirements for legal authorities in the WDR along with the specific sections of the Municipal Codes, ordinances, permits or standards that provide the authorities documented in the remainder of the section.	Include a table in the SSMP similar to Table 7 of this SSMP Program Audit that identifies the WDR requirements for legal authorities along with a reference to the code or ordinances providing the City with the required authorities.	**Opportunity**

WDR Provision	Identified Deficiency or Opportunity	Recommended Action to Correct Deficiency or Implement Opportunity	Deficiency Type
D.13.iv – Operations and Maintenance – Pipeline Inspection	The City currently has event driven cleaning throughout their system. Each year in early August, the City holds what is called the "Old Spanish Days Fiesta", which last for five days. During this week, the City experiences an increase in visitors, and the collection system plans for pre cleaning of select pipelines that are impacted by the event. The City also has in place a wet weather procedure as another event driven cleaning that focuses on cleaning specific areas in order to increase capacity to handle the rain event. These areas typically focus, but are not limited to, siphons throughout the system.	Incorporate these event driven cleaning approaches into the Cleaning and Inspection plan documentation.	**B - minor**
D.13.iv – Operations and Maintenance – Pipeline Inspection	The City does not have any easement cleaning procedures, however, plans to meet with Cartegraph OMS on how to incorporate this into their work plan.	If a plan is agreed upon and implemented, the City should incorporate this into their Cleaning and Inspection Plan.	**B - minor**
D.13.iv – Operations and Maintenance – Pipeline Rehabilitation and Replacement	The City has a process in place for inspecting VCP pipes that are close to storm drains as these are high risk pipes prone to potential failures, but there is little documentation in the SSMP. . It is recommended that the City have documentation in place that establishes criteria by which the City will prioritize addressing or monitoring these pipes near storm drains based on specific defects.	Include a brief paragraph summarizing the approach in place that establishes criteria by which the City will prioritize addressing or monitoring these pipes near storm drains based on specific defects.	**B - minor**

WDR Provision	Identified Deficiency or Opportunity	Recommended Action to Correct Deficiency or Implement Opportunity	Deficiency Type
D.13.iv – Operations and Maintenance	Valves are maintained in the Treatment Plant's CMMS, Maintenance Connection.	It is recommended that the City document this in the mapping section of the SSMP.	**B - minor**
D.13.iv – Operations and Maintenance – Lift Station Maintenance	The SSMP does not include adequate documentation of the lift station maintenance program, strategies and activities.	Develop improved documentation of lift station maintenance program, strategies and activities. Once this documentation is complete, incorporate this documentation into the SSMP either directly or by reference. The document could consist of: Describe the overall strategy on how the City is maintaining the lift stations, documentation of established PM tasks, documentation of standard data collection forms for inspection, preventive maintenance and corrective maintenance. Documenting alarms at each lift station and how the City is notified or can access to help prevent SSOs. Use Section 3 of the Cleaning and Inspection Plan as an example of the type and level of documentation.	**B - major**
D.13.iv – Operations and Maintenance – Pipeline Inspection	The City is performing condition assessment and remediation of pump station facilities, but there is little documentation in the SSMP.	Include a brief paragraph summarizing the approach for pump station condition assessment and remediation, such as the information documented in this SSMP Audit Report findings	**B - minor**

WDR Provision	Identified Deficiency or Opportunity	Recommended Action to Correct Deficiency or Implement Opportunity	Deficiency Type
D.13.iv – Operations and Maintenance - Equipment	The City documents bypass pump equipment in Appendix E7, however, it is not clear how this is used and what is required at each lift station.	The City may want to perform an analysis to determine which lift stations and pipelines can be bypassed using the equipment the City current has. For pump stations that cannot be bypassed, the City should document what their approach is to bypassing these pipes and lift stations.	**B - minor**
D.13.vi.b – Overflow Emergency Response Plans	Section 3.3 of the OERP discusses the City's Water Quality Sampling and Testing. The City currently does not have adequate documentation addressing the requirements of the 2013 Monitoring and Reporting Program Section D.	Update this section of the SSMP to meet the requirements for a Water Quality Monitoring Program, and rename this section to "Water Quality Monitoring Program."	**B - major**
D.13.vi.b – Overflow Emergency Response Plans	The City does not require all contractors working on the sewer system to provide a Spill Response Plan. What is most important for the City is to have contractors immediately contact them in the event of a spill.	Consider creating a video discussing the necessary steps to take in the event of an SSO and providing this to all contractors in the future. Once a plan is put into place, the City should document this and update Section 3.6.2.	**B - minor**
D.13.vi. – Overflow Emergency Response Plan	The City has a Lift Station Overflow Emergency Response Plan that is referenced in Appendix G2. Overall, this document provides response crews with a summary table of pump station attributes and flows, location maps and troubleshooting/bypass protocol. The City should continue to build upon this documentation to add elements to it to further enhance lift station failure response preparedness.	Consider including documentation of where a lift station spill will travel along with site-specific containment protocols. Consider including protocols for after-action review when lift station failure occurs to add any site-specific details useful in a future response. Consider adding discharge locations as well as valves on the maps within the document.	**Opportunity**

WDR Provision	Identified Deficiency or Opportunity	Recommended Action to Correct Deficiency or Implement Opportunity	Deficiency Type
D.13.vii – FOG Control Program	The City briefly touches on the role the Wastewater Compliance Specialist uses when new FSEs are established, but there is little documentation in the SSMP on the review process.	Add a section 2.5.9 of Appendix H1 to document and explain the Wastewater Compliance Specialist's support during the building review process and that proper installation of new FSEs occurs.	**B - minor**
D.13.viii – System Evaluation and Capacity Assurance Plan	The City prepares an annual list of capital improvement projects that includes projects to address known collection system capacity issues and defective pipes. The City's current Capital Improvement Plan and schedule is provided in SSMP Volume II, Appendix I2. This schedule appears to be a sample schedule of the coordination with engineering and not a schedule for how to accomplish these projects.	The City should consider creating a more attainable schedule that looks out more than 18 months for CIP projects.	**B - minor**