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SAN FRANCISCO BAY REGIONAL WATER QUALITY CONTROL BOARD
in cooperation with
BAY AREA CLEAN WATER AGENCIES

Sewer System Management Plan (SSMP) Development Guide



San Francisco Bay Regional Water Quality Control Board,
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Sewer System Management Plan (SSMP) Development Guide

GENERAL INFORMATION

What is a Sewer System Management Plan?

A Sewer System Management Plan, also called an SSMP, is a document that describes the activities your agency uses to manage your wastewater collection system effectively.

Effective management of a wastewater collection system includes:

1. Maintaining or improving the condition of the collection system infrastructure in order to provide reliable service into the future.
2. Cost-effectively minimizing infiltration/inflow (I/I) and providing adequate sewer capacity to accommodate design storm flows; and
3. Minimizing the number and impact of sanitary sewer overflows (SSOs) that occur;

In order to achieve the above goals it is expected that each wastewater collection system agency develop and implement an SSMP.

Why are SSMPs Being Required Now?

Collection Systems are the last major component of the wastewater management system yet to be regulated. Treatment plants, including pretreatment programs, have been regulated for some time. In addition, other networks have been regulated as well, such as potable water, natural gas, electricity, and liquid fuels, among others. Yet a successful regulatory program for sanitary sewer systems has not yet been developed in the San Francisco Bay Area. While the federal government has developed unpublished draft regulations (sometimes referred to as the “CMOM” program, which stands for Capacity, Management, Operations, and Maintenance), this program has not been officially implemented for a variety of reasons, and Regional Water Boards in California have decided to move forward and implement their own SSO control programs now due to the growing emphasis on reducing overflows.

What Is Required of Your Agency?

This document contains a description of the required elements of an SSMP, as well as helpful information for you to consider in meeting the requirements. Each wastewater collection system is different, and some of the differences that affect the content of an SSMP include geographical terrain (hilly or flat), number and type of connections (residential, commercial, industrial), soil types, weather patterns, age of sewers, condition of sewers, materials of sewers, history of sewer management practices, number of SSOs, affordability of sewer rates, type of agency (municipal government or special district), and other factors.

The required information includes elements that most industry experts agree are necessary to effectively manage a wastewater collection system. For small communities, some of these requirements may not be productive or appropriate, as described in detail in later sections of this document.

In summary, the required elements of an SSMP include:

1. Collection system management goals
2. Organization of personnel, including the chain of command and communications
3. Overflow emergency response plan
4. Fats, oils, and grease (FOG) control program
5. Legal authority for permitting flows into the system, inflow/infiltration control as well as enforcement of proper design, installation, and testing standards, and inspection requirements for new and rehabilitated sewers
6. Measures and activities to maintain the wastewater collection system
7. Design and construction standards
8. Capacity management
9. Monitoring plan for SSMP program effectiveness
10. Periodic SSMP Audits, periodic SSMP updates, and implementation of program improvements

Data Management

Wastewater collection system agencies are not required to use computer-based maintenance management and GIS software to manage their wastewater collection systems, although there is a wide range of software currently available to match most agencies needs and budgets, both large and small. Collection system agencies may find that computer-based solutions are a more effective way to manage large numbers of wastewater collection system assets. Regardless of the method selected for managing information, operations, maintenance and capital improvement procedures should be documented in writing and an SSMP is intended to fulfill that role.

How to Use This Guide

The specific minimum SSMP requirements for wastewater collection system agencies are indicated as bold text in gray boxes in each section of this document. The minimum SSMP requirements are usually followed by the “Key Point” which summarizes the suggested content

for the section, and/or “Helpful Information” which elaborates on the content with introductory information and tips, including more detailed suggestions for content. Both of these sections are presented in plain text.

If your agency already has an existing sewer management program, and this program contains all the required elements of the SSMP, you may use your existing sewer management program to satisfy the requirement for an SSMP. If your existing program contains *some* elements of the SSMP, you may use your existing program and add those SSMP elements that are missing into your existing program.

All public wastewater collection system agencies in the San Francisco Bay Region are expected to document their wastewater collection system activities, as described more specifically in the remainder of this document. If you believe that any element of this program is not appropriate or applicable to your agency, your SSMP does not need to address it, but an explanation in the SSMP should be provided, indicating why that element of the SSMP is not applicable.

Terms That Appear in This Guide

Some terms and acronyms used in this document, along with their definitions, are as follows:

Bay Area Clean Water Agencies (BACWA) – The San Francisco Bay Area Joint Powers Authority comprised of wastewater treatment and collection system agencies. The BACWA vision is to: Develop a region-wide understanding of the watershed protection and enhancement needs through reliance on sound scientific, environmental and economic information and ensure that this understanding leads to long-term stewardship of the San Francisco Bay Estuary. BACWA worked in collaboration with the Regional Water Board to develop this SSMP development document.

Geographical Information System (GIS) – A database linked with mapping, which includes various layers of information used by government officials. Examples of information found on a GIS can include a sewer map; sewer features such as pipe location, diameter, material, condition, last date cleaned or repaired. The GIS also typically contains base information such as streets and parcels.

Infiltration/Inflow (I/I) – Infiltration is generally considered to be extraneous water that enters the sewer system over longer periods of time, such as groundwater seepage through cracks in the sewer. Inflow is generally considered to be extraneous water that enters the system as a direct result of a rain event, such as through improper connections to the sanitary sewer, through flooded manhole covers, or through defects in the sewer. While it is impossible to control all I/I, it is certainly desirable to reduce I/I when cost-effective.

Lateral – The portion of sewer that connects a home or business with the main line in the street. Sometimes sewer system agencies own or maintain a portion of the lateral.

Regional Water Board – Short name for San Francisco Bay Regional Water Quality Control Board (also known as RWQCB). The mission of this state regulatory agency is to: preserve, enhance and restore the quality of California's water resources, and ensure their proper allocation and efficient use for the benefit of present and future generations. The Regional Water Board has worked in collaboration with BACWA to develop this SSMP development guide.

Sanitary Sewer Overflow (SSO) – For the San Francisco Bay SSO program, an SSO is defined as a spill, release, or unauthorized discharge of wastewater from a sanitary sewer system at any point upstream of a wastewater treatment facility that is caused by a problem in or with sewer system authorities' sewer lines including laterals owned by the authorities. For reporting purposes, overflows greater than 100 gallons are to be reported electronically to the Regional Water Board.

Sewer System Agency – The legal entity that owns and is ultimately responsible for the wastewater collection system. Also called wastewater collection system agency.

Stoppage – A build up of debris in the sewer which stops the flow of wastewater and allows the water to back up behind the stoppage, sometimes causing an overflow. Also called a blockage.

Blockage – A build up of debris in the sewer, which stops the flow of wastewater and allows the water to back up behind the stoppage, sometimes causing an overflow. Also called a stoppage.

Wastewater Collection System – All pipelines, pump stations, and other facilities upstream of the headworks of the wastewater treatment plant that transport wastewater from its source to the wastewater treatment plant.

Wastewater Collection System Agency – The legal entity that owns and is ultimately responsible for the wastewater collection system. Also called sewer system agency.

ELEMENTS OF AN SSMP

1. Goals

Requirement: Each wastewater collection system agency shall, at a minimum, develop goals for the Sewer System Management Plan as follows:

- To properly manage, operate, and maintain all parts of the wastewater collection system
- To provide adequate capacity to convey peak flows
- To minimize the frequency of SSOs
- To mitigate the impact of SSOs

This section is applicable to all wastewater collection systems.

Helpful Information

Goals are an important aspect of an SSMP because they provide focus for agency staff to continue good work and/or to implement improvements in management of the wastewater collection system. Goals may also reflect performance, safety, levels of service, resource use, and other considerations. The goals section of the SSMP may also refer to the SSMP as a supplement to an existing wastewater collection system management program, if one already exists.

2. Organization

Requirement: Each wastewater collection agency shall, at a minimum, provide information regarding organization:

- Identify agency staff responsible for implementing, managing, and updating the SSMP
- Identify chain of communication for responding to SSOs
- Identify chain of communication for reporting SSOs

This section is applicable to all wastewater collection systems.

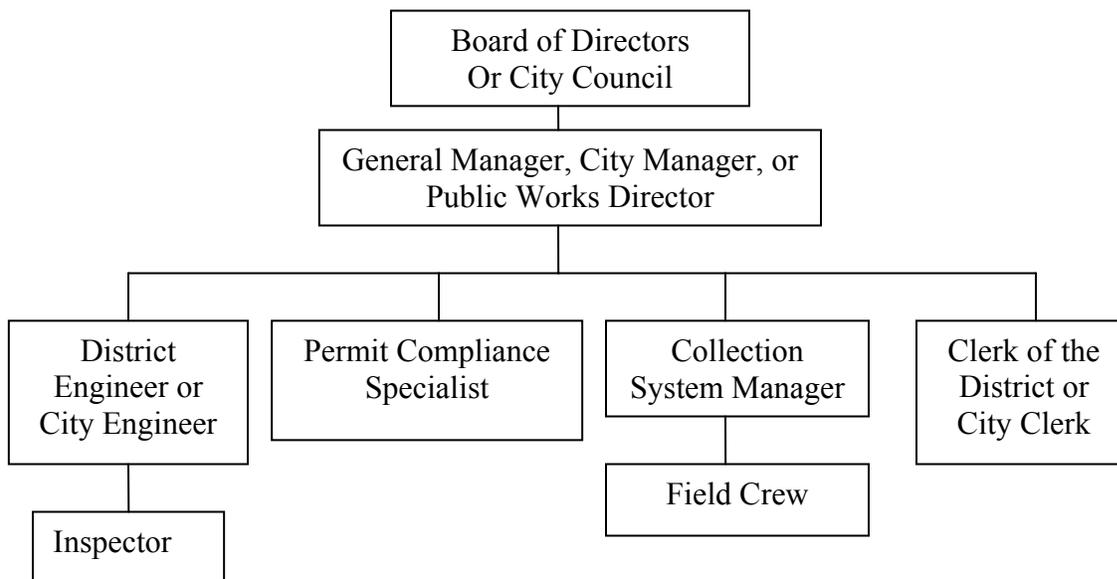
Key Point

The organization of a wastewater collection system agency can be provided in either a tabular form or as an organization chart and should be used to identify administrative and maintenance positions responsible for implementing the SSMP, including the chain of communication for reporting SSOs. An example organization chart, annotated at the bottom to identify responsibilities, is shown in Figure 1.

Helpful Information

The organization identifies those agency staff who are responsible for implementing, managing, and updating the SSMP. The communication plan identifies agency staff who are responsible for managing the SSO response, investigating the cause, and reporting the SSO to the appropriate parties. It also provides a consolidated list of contact information for key agency personnel. This portion of the SSMP should also describe lines of communication by which an SSO is reported to the wastewater collection system agency (for example by members of the public); how management staff is notified; and how maintenance staff, contractors, and equipment are mobilized.

Figure 1. Example Organization Chart for SSMP



Examples of SSMP Roles for wastewater collection system agency staff are:

General Manager, City Manager, or Public Works Director – Establishes policy, plans strategy, leads staff, allocates resources, delegates responsibility, authorizes outside contractors to perform services, and may serve as public information officer.

District Engineer or City Engineer – Prepares wastewater collection system planning documents; manages capital improvement delivery system; documents new and rehabilitated assets; and coordinates development and implementation of SSMP.

Inspector – Ensures that new and rehabilitated assets meet agency standards, works with field crews to handle emergencies when contractors are involved; and provides verbal reports to District Engineer.

Permit Compliance Specialist – Works as needed on applicable permits, laws, and regulations; provides support to all parts of operation.

Collection System Manager –Manages field operations and maintenance activities, provides relevant information to agency management, prepares and implements contingency plans, leads emergency response, investigates and reports SSOs, and trains field crews.

Field Crew – Staff preventive maintenance activities, mobilize and respond to notification of stoppages and SSOs (mobilize sewer cleaning equipment, by-pass pumping equipment, and portable generators).

Clerk of the District or City Clerk – Provides information updates to Board or City Council. Arranges for emergency meetings if necessary.

It is suggested that job titles be used instead of individual names, in order to accommodate staff changes.

A separate document developed jointly by the Regional Water Board and BACWA describes the procedures for reporting an SSO through the web-based reporting system that is maintained by the Regional Water Board. This document is located at https://www.r2esmr.net/data/ssorp/SSO_User_Guide_11-23-2004.pdf, or can be accessed from the Regional Water Board's Home Page using the Quick Link.

3. Overflow Emergency Response Plan

Requirement: Each wastewater collection system agency shall develop an overflow emergency response plan with the following elements:

- Notification – Provide SSO notification procedures.
- Response – Develop and implement a plan to respond to SSOs.
- Reporting – Develop procedures to report and notify SSOs per SSO Monitoring and Reporting Program.
- Impact Mitigation – Develop steps to contain wastewater, to prevent overflows from reaching surface waters, and to minimize or correct any adverse impact from SSOs.

This section is applicable to all wastewater collection systems.

Key Point

The response plan should be developed as a stand-alone document and summarized in the SSMP, and updated as necessary to reflect any changes in staffing or notification requirements, including contact numbers.

Helpful Information

An overflow emergency response plan provides a standardized course of action for wastewater collection system personnel to follow in the event of an SSO, and ensures that the sewer system agency is adequately prepared to respond to SSO events. The plan does not need to be organized specifically into sections corresponding to the required elements, but the plan should address each of the required elements.

Further information on each of the required elements of an emergency response plan is shown below:

- **Notification** – This element includes information on how the agency could be notified of an SSO through a complaint or a report from outside the agency or within the agency, and also the internal agency chain of communication leading up to the response to the overflow. Internal communication responsibilities during and after the overflow should also be included.
- **Response** – The plan for responding to SSOs should describe the staff and expected response time for SSOs, and any details associated with mobilizing for the response.
- **Reporting** – This element includes a procedure for evaluating whether an overflow event triggers 24-hour reporting (such as in the case of an SSO that is 1,000 gallons or more; if the SSO may imminently and substantially endanger human health; or if the SSO causes a fish kill). This element would also include the individuals expected to do the reporting and identify the external agencies receiving the reports. The transmission media options should also be identified. The document “San Francisco Bay Area Sanitary Sewer Overflow Monitoring and Reporting Program for Sewer System Authorities” prepared by the Regional Water Board (dated November 15, 2004) should also be consulted for further reporting requirements, such as entering the information into the web-based reporting system.
- **Impact Mitigation** – The plan should describe potential system failures in order to be prepared for potential overflow situations, and strategies and emergency operations for responding to these potential system failures.

Many sewer system agencies may already have an overflow emergency response plan in place. If the existing overflow emergency response plan contains all the elements required by the SSMP, the wastewater water collection agencies can just refer to the documentation that already exists. If a plan does not currently exist for your sewer system agency, you may wish to consult a publication by the American Public Works Association (APWA), Preparing Sewer Overflow Response Plans: A Guidebook for Local Governments, published in 1998. This 55-page document is a step-by-step guide to developing a plan, including agency coordination strategies, strategies for minimizing private property damage, public notification, and follow-up cleaning and reporting. Training of agency personnel on the emergency response plan is important. Conducting periodic exercises to ensure that both training and emergency equipment are relevant and functional is important.

4. Fats, Oils and Grease (FOG) Control Program

Requirement: Each wastewater collection system agency shall evaluate its service area to determine whether a FOG control program is needed. If so, a FOG control program shall be developed as part of the SSMP. If an agency determines that a FOG program is not needed, the agency must provide justification for why it is not needed.

This section is applicable to all wastewater collection systems.

Key Point

A FOG control program should identify sections of the sewer system subject to grease blockages and establish a cleaning maintenance schedule for each section. Identification of these blockage “hot spots” and their causes is usually based on blockage history, line investigation, and inspection of FOG dischargers (such as restaurants). Hot spots can then be addressed through more frequent cleaning, targeted outreach, and additional regulation on FOG discharges.

Helpful Information

Grease can be a significant source of sewer blockages in some communities, potentially leading to SSOs. If grease is a source of SSOs in your community, recommended elements of a FOG control program include the following:

- Identification & Sewer Cleaning – Identify areas or line segments of the wastewater collection system subject to grease stoppages and establish a prioritized preventive cleaning schedule for each area or line segment.
- Source Control – Develop and implement source control measures for each area of the wastewater collection system identified, for all sources of grease that may be discharged.
- Facility Inspection – Inspect grease-producing facilities, with priority given to previously identified problem areas.
- Legal Authority – Ensure legal authority to prohibit discharges to collection system, as appropriate.

Some communities already have a FOG control program in place, and in that case, the SSMP can refer to the documentation that already exists. If a sewer system agency is developing a FOG control program for the first time, several resources exist, and neighboring agencies with existing programs can provide information for consideration in developing a program that meets the specific needs of your sewer system agency.

Another resource is the California FOG Work Group, a special group organized within Tri-TAC. (Tri-TAC is a technical advisory committee representing municipal wastewater management agencies. Members include the California Association of Sanitation Agencies, the League of California Cities, and the California Water and Environment Association.) CalFOG works to compile information about FOG for sewer system authorities. CalFOG also works on specific FOG issues of interest to the wastewater industry. Information compiled by CalFOG includes best management practices for restaurants and residents, public information and outreach materials, technical guides, laws and regulations, and technology resources. This information can be found at www.calfog.org.

If discharger-specific blockages or permit violations persist, additional source control or installation of grease removal devices may be warranted. Outreach to residences can also be helpful in reducing the total FOG load to the collection system.

5. Legal Authority

Requirement: Each wastewater collection system agency shall, at a minimum, describe its legal authority, through sewer use ordinances, services agreements, or other legally binding procedures to:

- Control infiltration/inflow (I/I) from satellite wastewater collection systems and laterals
- Require proper design and construction of new and rehabilitated sewers and connections
- Require proper installation, testing, and inspection of new and rehabilitated sewers

This section can be waived for collection systems that serve a population of 10,000 or less.

Key Point

The specific legal mechanisms applicable to the sewer system agency should be described in this section of the SSMP, with citations of names and code numbers of ordinances. If legal authority does not currently exist for one of the required elements listed in the box above, the SSMP should indicate a schedule of activities to obtain the proper legal authority.

Helpful Information

Legal authority refers to powers granted to the wastewater collection system agency to provide services to the public, typically through sewer use ordinances, service agreements, and other mechanisms.

Using this legal authority, the wastewater collection system agency can require system users to meet performance standards, maintain user-owned elements of the system, and pay penalties for non-compliance. The specific type of legal authority available to wastewater collection system authorities varies widely based on their existing legal designation (for example, special district, satellite wastewater collection system agency, general purpose government). As with other sections of the SSMP, if documentation of legal authority (such as ordinances or regulations) already exists for an agency, the agency can simply list the legal mechanisms already in place, in order to meet the requirements for the SSMP.

Points to remember when documenting legal authority:

- Legal agreements, discharge permits, and ordinances should include the proper authority to require system users to comply with standards of design, construction, use, and maintenance.
- The wastewater collection system agency should have the ability to ultimately disconnect the user if they fail to comply with the established conditions of use. Other civil or criminal recourse should be available to the wastewater collection system agency in cases where deliberate and significant violations of these conditions occur and there is a substantial impact to a receiving water or endangerment of human health.

- Illegal discharges should be subject to corrective response action using any existing laws prohibiting a type of discharge, regardless of the user class (for example, domestic, commercial, or industrial).
- Many wastewater collection system agencies have enforceable regulations prohibiting downspout, roof drain and area drain connections to their sanitary sewer systems.
- Building codes normally provide legal authority for the proper construction of privately-owned sewer lines.
- Sometimes wastewater collection system agencies require laterals to be inspected when a property is sold. If damage is identified, the property owner could be required to repair or replace their lateral. In any event, construction and installation requirements for laterals can be included in the local building code.

6. Measures and Activities

a. Collection System Map

Requirement: Each wastewater collection system agency shall maintain up-to-date maps of its wastewater collection system facilities.

This section is applicable to all wastewater collection systems.

Key Point

The SSMP should describe the type of maps currently being used by the sewer system agency, along with procedures for updating the maps with new and rehabilitated facilities.

Helpful Information

Knowledge of the location of all wastewater collection system facilities is essential to effective management. This requires the maintenance of up-to-date collection system maps. The maps can be available in hard copy or electronic format. The benefit of an electronic format is that it provides a more sophisticated tool for prioritizing repair, replacement, or rehabilitation projects, and for producing work orders for sewer cleaning and other maintenance activities. Sewer maps should include at least the basic information shown in the table below. Additional attributes which may be useful to the agency are shown in the column to the right of the basic attributes. Some of this basic information may be included as part of the GIS database linked to the map instead of on the map itself. Pump stations should also be indicated on the map, although their technical information can be too complex to display on a map sheet, and it may be more appropriate to place it in the GIS database. Service lateral data can optionally be included.

Facility Type	Basic Map Information	Additional Map Information
Manholes	<ul style="list-style-type: none"> - ID number or other unique identifier - Location, with reference to streets and property lines - Depth 	<ul style="list-style-type: none"> - GPS coordinates - Date built - Rim elevation - Invert elevation - Size - Material Type - Worker safety information
Pipes	<ul style="list-style-type: none"> - ID number or other unique identifier - Location, with reference to streets and property lines - Size - Direction of flow - Length - Material type 	<ul style="list-style-type: none"> - Date built - Slope - Pipe invert elevations - Plan or as-built ID number
Pump Stations	<ul style="list-style-type: none"> - ID number - Location 	<ul style="list-style-type: none"> - Additional information would normally be available on drawings, or a GIS if available

b. Resources and Budget

Requirement: Each wastewater collection system agency shall allocate adequate resources for the operation, maintenance, and repair of its collection system.

This section is applicable to all wastewater collection systems.

Key Point

The funding and budgetary support for operating the collection system is the foundation of the entire agency. The SSMP should demonstrate that the resources are adequate for an acceptable delivery of the agency's services to the public, including capital replacement.

Helpful Information

The resources required for effective wastewater collection system operations, maintenance, and repair include:

- A reliable, consistent, and sufficient funding source for both the operating budget and capital replacement plan.

The strongest funding mechanism is a user-supported rate-paying structure, commonly known as an enterprise fund, which is separate from general fund revenue sources.

- A formal operating budget and expenditure plan.

This is the annual cost of running the collection system, for example operations

and maintenance including staff, equipment, tools, consumables, contract services, spare parts, and support facilities such as corporation yards or utility service centers.

- A capital improvement plan (CIP) sufficient to ensure the continued longevity of the system.

This is the on-going funding for major rehabilitation or replacement of the collection system as the system wears out, or upgrading of the system because of expansion. Costs include planning, design, construction, and inspection of new or rehabilitated facilities.

In the event that operations and maintenance are provided through contract service, the scope of those services should be described.

c. Prioritized Preventive Maintenance

Requirement: Each wastewater collection system agency shall prioritize its preventive maintenance activities.

This section is applicable to all wastewater collection systems.

Key Point

This section of the SSMP should describe the system currently in use for prioritized preventive maintenance, and any plans for improving the system, as needed, to maintain the integrity of the system and reduce the frequency of SSOs. The program should address criteria and results for short-term and long-term prioritization of corrective actions based on structural or other deficiencies identified during preventive maintenance activities.

Helpful Information

A good preventive maintenance program is one component in keeping a system in good repair and preventing excessive infiltration/inflow (I/I), service interruptions, and system failures, which can result in SSOs. A preventive maintenance program can also help in protecting the capital investment in the collection system.

Preventive maintenance activities can include some or all of the following activities:

- Scheduled cleaning of gravity sewers, with a higher frequency in those areas with a history of stoppages due to debris and fats, oils, and grease in order to minimize SSOs. (See also Section 4 above for FOG control information.)

- Root control in areas that are known to have recurring SSOs or premature structural damage due to root intrusion.
- Investigation and resolution of customer complaints.
- Odor control including the maintenance of chemical injection systems, carbon filters, etc.
- Scheduled cleaning of force mains - although at a longer interval than gravity sewers - to increase pump station efficiency and prevent backups.
- Maintenance activity records to support appropriate analysis and reporting

Prioritization of preventive maintenance activities can occur through the use of verbal communications (especially for smaller agencies), the use of work orders to track progress, and/or routine operations such as sewer cleaning based on experience with known problem areas. Data on stoppages or other operational problems can be collected in field logs or computer-based information systems and reviewed regularly by system managers for prioritization.

Larger sewer system agencies will likely use a formal condition assessment process that relies on television inspection of sewers as part of its prioritization process. For more sophisticated systems, the prioritization of preventive maintenance activities can be coupled with the prioritization of correcting structural deficiencies, as described in Section 6.d. below. If this is the case, Sections 6.c. and 6.d. can be described in the SSMP together.

d. Scheduled Inspections and Condition Assessment

Requirement: Each wastewater collection system agency shall identify and prioritize structural deficiencies and implement a program of prioritized short-term and long-term actions to address them.

Key Point

This section of the SSMP should describe the approach currently used for scheduled inspections and condition assessment of the sewer collection system. The approach should address criteria and results for short-term and long-term prioritization of corrective actions based on identified structural or other deficiencies. This should be consistent with the overall goal of maintaining the integrity of the system and reducing the frequency of SSOs.

Helpful Information

A good inspection program is one component for keeping a system in good repair and preventing excessive inflow/infiltration (I/I), service interruptions, and system failures, which can result in SSOs. When combined with an adequate condition assessment plan, inspections can also help protect the capital investment in the collection system.

There are at least two methods to manage structural deficiencies in a wastewater collection system: *reactive* and *proactive*.

In the reactive method structural deficiencies are identified by waiting for system failures (e.g. stoppage, SSO, equipment failure) to appear. Corrective actions are then taken in response to the failure. This may be adequate for a wastewater collection system that is somewhat new and/or has relatively few SSOs. This is a short-term strategy, however, and may not be cost-effective in the long term. It is likely that as the wastewater collection system ages, however, a “proactive” approach to system management would be more appropriate.

Using a “proactive” method, collection system performance and physical integrity can be substantially improved by actively seeking out and correcting structural deficiencies prior to system failure. Under the “proactive” mode, periodic condition assessments are performed for each sewer facility (manhole, main line, service lateral, etc.) to determine the location and extent of problem areas.

There are many methods for conducting inspections, evaluating results, and establishing condition assessments. For smaller agencies, very simple criteria (high, medium, and low) can be applied to the severity of defects and a prioritized list of repair activities can be established. For larger agencies, sophisticated computer models that combine large quantities of data to form capital management plans can be used.

Inspection activities can include some or all of the following activities:

- Routine inspections of the collection system facilities, including pump stations, with a process to address defects, damage, or other identified problems.
- Flow monitoring for capacity analysis.
- Smoke testing, dye testing, and exfiltration testing to monitor/reduce inflow and infiltration (I/I).
- Uniform condition assessment based on inspection data.
- Implementation of short-term and long-term rehabilitation actions to address each deficiency.
- Maintenance of records to support appropriate analysis and reporting.

Many sewer system agencies will likely use a formal condition assessment process that relies on television inspection of sewers as part of its condition assessment process. For more sophisticated systems, the prioritization of preventive maintenance activities can be

coupled with the prioritization of correcting structural deficiencies, as described above. If this is the case, Sections 6.c. and 6.d. can be described in the SSMP together.

e. Contingency Equipment and Replacement Inventories

Requirement: Each wastewater collection system agency shall provide contingency equipment to handle emergencies, and spare/replacement parts intended to minimize equipment/ facility downtime.

This section can be waived for collection systems serving a population of 10,000 or less.

Key Point

For this section of the SSMP, wastewater collection system agencies should summarize their critical spare parts inventory and list major equipment used for sewer system operation and maintenance. Specific aspects of the replacement parts inventories can also be described (e.g. use of the same model pumps at multiple locations to reduce needed replacements).

Helpful Information

Contingency equipment (e.g. portable pumps, generators) supports an effective response to emergency conditions. Spare/replacement parts can be kept in inventory to minimize equipment/facility downtime in the event of an unplanned failure. Replacement parts for pumps, motors, and vehicles and appropriately maintained emergency response equipment and accessories allow field crews to effectively respond to incidents and efficiently perform routine maintenance. Without an adequate inventory of replacement parts, the collection system may experience high volume and/or extended overflow events in the event of a breakdown or malfunction.

Providing adequate maintenance facilities and equipment typically includes a process for identifying critical parts needed for system operation and maintenance and establishing an adequate inventory of replacement parts. The process for identifying critical parts can be based on a review of equipment and manufacturer's recommendations, supplemented by the experience of the maintenance staff and local availability.

f. Training

Requirement: Each wastewater collection system agency shall provide training on a regular basis for its staff in collection system operations, maintenance, and monitoring.

Key Point

The SSMP should include a description of the agency's training program and whether any changes or improvements are anticipated in the near future.

Helpful Information

An ongoing training program should address the skills necessary to perform proper operations and maintenance, to provide timely and effective emergency response, and to incorporate recognized safety practices.

Training can take on many forms. It can include special classes or seminars, certification programs, such as through the California Water Environment Association (CWEA), on-the-job training, and informal training through mentoring of experienced personnel with those new to collection systems.

CWEA's program provides a mechanism for employee education as well as establishing the technical competence at each level of certification. In addition, there is a program for registering the continuing education activities of employees, which is part of the process for maintaining certification.

g. Outreach to Plumbers and Building Contractors

Requirement: Implement an outreach program to educate commercial entities involved in sewer construction or maintenance about the proper practices for preventing blockages in private laterals. This requirement can be met by participating in a region-wide outreach program.

This section can be waived for collection systems serving a population of 10,000 or less.

Helpful Information

Sometimes commercial entities involved in construction or maintenance of sewers are not aware of the ramifications of their actions which can sometimes result in sanitary sewer overflows. The actions can result in problems such as blockages in the private lateral, or blockages in the main line caused by actions taken in the private lateral (such as pushing debris from the lateral into the main line). An ongoing outreach program to these entities, and others as appropriate, should be implemented to encourage the use of proper practices for preventing blockages. For example, information can be disseminated on construction standards, proper operations and maintenance activities, and effective measures for removing blockages.

7. Design and Construction Standards

a. Standards for Installation, Rehabilitation and Repair

Requirement: Each wastewater collection system agency shall identify minimum design and construction standards and specifications for the installation of new sewer systems and for the rehabilitation and repair of existing sewer systems.

This section is applicable to all wastewater collection systems.

Key Point

Wastewater collection system agencies should evaluate if the existing design standards are appropriate and up to date. If the agency believes its current standards are appropriate, the agency can refer to the documentation that already exists, and provide a discussion in the SSMP.

Helpful Information

SSOs and operating problems are, in some cases, attributable to poor design and/or improper construction for both newly constructed and rehabilitated sewers. An effective program that ensures that new sewers are properly designed and installed can minimize system deficiencies that could create or contribute to future overflows or operations and maintenance problems.

Using the legal authorities outlined in Section 5 above, specific design and construction standards should be required for new construction and for rehabilitation. Design criteria include specifications such as pipe materials, minimum sizes, minimum cover, strength, minimum slope, trench and backfill, structure standards, and other factors.

Many communities already have specific standards in place. If design and construction standards need to be developed, neighboring agencies with existing programs can be a valuable resource in developing a program that meets the specific needs of your sewer system agency. Additional resources are listed in the references to this document.

b. Standards for Inspection and Testing of New and Rehabilitated Facilities

Requirement: Each wastewater collection system agency shall identify procedures and standards for inspecting and testing the installation of new sewers, pump stations, and other appurtenances; and for rehabilitation and repair projects.

This section is applicable to all wastewater collection systems.

Key Point

As with design and construction standards, many communities already have specific standards for inspection and testing in place, and in that case, the SSMP should refer to the documentation that already exists.

Helpful Information

Inspection and testing of new facilities is important, to ensure that the standards established as described in Section 7.a. above are actually implemented in the field. It's important that completed construction not be accepted by the wastewater collection system agency until inspection and testing have been completed. This approach helps ensure proper operation and maximum life expectancy.

Using the legal authority set up as outlined in Section 5 above, specific inspection and testing should be required. Installation and testing of facilities is sometimes conducted by the contractor while an inspector representing the wastewater collection system agency makes sure the installation and testing meets the agency standards. Inspections are usually performed during and at the completion of construction. Acceptance testing for gravity sewers can include: low pressure air test or water test to identify leakage, mandrel test to identify deflection in flexible pipe, water or vacuum test of manholes to identify leakage, television inspection to identify grade variations or other construction defects.

If inspection and testing standards need to be developed for the agency, other agencies with existing programs can be a valuable resource in developing a program that meets the specific needs of your sewer system agency.

8. Capacity Management

a. Capacity Assessment

Requirement: Each wastewater collection system agency shall establish a process to assess the current and future capacity requirements for the collection system facilities.

This section can be waived for collection systems serving a population of 10,000 or less.

Key Point

The SSMP should describe whether a current capacity assessment of the wastewater collection system has been prepared, and if not, provide a schedule of activities for completing such an assessment.

Helpful Information

A critical function of a wastewater collection system is to provide adequate capacity to handle peak, typically wet weather, flows. The purpose of a capacity assessment is to ensure that adequate capacity exists in all portions of the collection system and that the downstream portions that will receive wastewater from new connections can handle the additional flow.

A sewer system master plan normally serves the purpose of determining whether there are any capacity-related issues that need to be addressed, but other evaluations may also be used. A master plan would generally include an evaluation of the sewer system capacity through sewer mapping, flow monitoring of major trunk sewers, and modeling to identify hydraulic bottlenecks.

For the purposes of the capacity assessment, it is appropriate to establish the design storm under which various components of the collection system are expected to perform, to make sure that those design storms are consistent with the conceptual approach for wet weather overflows contained in the San Francisco Bay Water Quality Control Plan (2005 Basin Plan), Chapter 4, Table 4-8.

b. System Evaluation and Capacity Assurance Plan

Requirement: Each wastewater collection system agency shall prepare and implement a capital improvement plan to provide hydraulic capacity of key sewer system elements under peak flow conditions.

This section can be waived for collection systems that serve a population of 10,000 or less.

Key Point

Once the capacity assessment (as described in Section 8.a. above) has been completed and capacity needs have been identified, a capital improvement program must be implemented to address capacity needs, if there are any. The SSMP should briefly describe the capital improvements anticipated in the next 1-5 years, 5-10 years, and 10-20 years, and be updated as implementation occurs and priorities change.

Helpful Information

The recommended elements of a capital improvement plan are as follows:

- Evaluation Steps – Evaluate portions of the collection system experiencing SSOs due to hydraulic deficiency.

- Capacity Enhancement Measures – Establish a short- and long-term capital improvement program to address identified hydraulic deficiencies.
- Plan updates – Update the plan on a regular basis as specified in the SSMP.

The capital improvement activities outlined in this section should be coordinated with the identification and prioritization of structural deficiencies identified in Section 6.d. above, because structural and hydraulic problems can be closely related.

Short-term capital improvement programs should replace or repair critical elements of the system that are near failure as soon as possible. An optimized replacement schedule prioritizes specific elements of the collection system to provide the most benefit.

9. Monitoring, Measurement, and Program Modifications

Requirement: Each wastewater collection system agency shall monitor the effectiveness of each SSMP element and update and modify SSMP elements to keep them current, accurate, and available for audit as appropriate.

This section is applicable to all wastewater collection systems.

Key Point

This section of the SSMP should discuss how your agency monitors implementation of the SSMP elements, and measures the effectiveness of SSMP elements in reducing SSOs. Effectiveness should be measured by developing and tracking performance indicators on a regular basis. Performance indicators should be selected to meet the goals of the wastewater collection system agency.

Helpful Information

Some examples of performance indicators include:

- Number of SSOs over the past 12 months, distinguishing between dry weather overflows and wet weather overflows
- Volume distribution of SSOs (e.g. number of SSOs < 100 gallons, 100 to 999 gallons, 1,000 to 9,999 gallons, > 10,000 gallons)
- Volume of SSOs that was contained in relation to total volume of SSOs
- SSOs by cause (e.g. roots, grease, debris, pipe failure, pump station failure, capacity, other).
- Number of stoppages over the past 12 months
- Stoppages by cause
- Average time to respond to an SSO
- Relationship of capacity-related SSOs to storm event return frequency
- Ratio of planned sewer cleaning to unplanned sewer cleaning
- Backlog of repair, rehabilitation, and replacement projects

- Plans developed for, or implementation of, activities to target specific problems identified, such as roots, structural deficiencies, or fats, oil, and grease (FOG)

This section of the SSMP should also contain a description of what the wastewater collection system agency plans to do to make sure the SSMP remains current and useful over time. Examples of changes that could occur include new or modified infrastructure, increased system demand, new or modified operations and maintenance protocols, or changed organizational structure.

There are several ways the SSMP can be kept up to date. Examples of actions, which could be used to meet this requirement, include:

- Obtain specific funding to carry out periodic reviews and to participate in any related coordinating meetings.
- Assign a staff person to review the SSMP periodically to check effectiveness and timeliness.
- Check in with collection systems staff at periodic intervals to review the effectiveness and identify potential areas for improvement, either individually or through meetings.
- Prepare progress reports documenting effectiveness, potential changes, and/or a summary of program activities on a periodic basis.
- Obtain internal approval to update the SSMP with specific revisions.
- Solicit peer review by another collection system agency

If major changes are proposed for the sewer system management program, they may need to be approved by a Board of Directors in the case of a sewer district, or similar higher levels of governmental officials for a city or county. In addition, if changes are identified for implementation in the SSMP, other related documentation may also be affected and need to be revised as well.

10. SSMP Audits

Requirement: Each wastewater collection system agency shall conduct an annual audit of their SSMP which includes any deficiencies and steps to correct them (if applicable), appropriate to the size of the system and the number of overflows, and submit a report of such audit.

This section can be waived for collection systems serving a population of 10,000 or less.

Key Point

The audit should cover the most recent calendar year, and be submitted to the Regional Water Board by March 15 of the year following the calendar year for which the analysis applies.

Helpful Information

The audit can contain information about successes in implementing the most recent version of the SSMP, and identify revisions that may be needed for a more effective program. Information collected as part of Section 9 above can be used in preparing the audit. Tables and figures or

charts can be used to summarize information about these indicators. An explanation of the SSMP development, and accomplishments in improving the sewer system, should be included in the audit, including:

- Progress made on development of SSMP elements, and if the sewer system agency is on schedule in development of the SSMP. Provide justification on the delay if the sewer system agency is behind schedule on development of the SSMP;
- How the sewer system agency implemented SSMP elements in the past year;
- The effectiveness of implementing SSMP elements;
- A description of the additions and improvements made to the sanitary sewer collection system in the past reporting year; and
- A description of the additions and improvements planned for the upcoming reporting year with an estimated schedule for implementation.

Additional Tips

Helpful Information

- You may want to include a section up front entitled “System Overview,” which describes the size and physical features of the system, to put the rest of the document into context.
- When you prepare the SSMP for the first time, you may want to include a “Sewer Overflow History” to give you a place to start from in evaluating any trends for SSOs in the future.

Resources

Publications

- American Public Works Association, 1998, *Preparing Sewer Overflow Response Plans: A Guidebook for Local Governments*.
- American Society of Civil Engineers, 1982, *Gravity Sanitary Sewer Design and Construction*, ASCE Manual and Report on Engineering Practice No. 60 and WPCF Manual of Practice No. FD-5.
- American Society of Civil Engineers, 1994, *Existing Sewer Evaluation & Rehabilitation*, WEF Manual of Practice FD-6, ASCE Manual and Report on Engineering Practice No. 62.
- American Society of Civil Engineers, 1997, *Manhole Inspection and Rehabilitation*, ASCE Manuals and Report on Engineering Practice No. 92.
- American Society of Civil Engineers, 1999, *Optimization of Collection System Maintenance Frequencies and System Performance*.
- American Society of Civil Engineers, 2000, *Protocols for Identifying Sanitary Sewer Overflows* (draft as of April 2000).
- California State University, Sacramento, 1998, *Collection System: Methods for Evaluating and Improving Performance*.
- Collection System Collaborative Benchmarking Group, 2001, *Hydroflush Cleaning of Small-Diameter Sewers*, available from the California Water Environment Association (CWEA) website, at http://www.cwea.org/book_ocb.shtml.
- Collection System Collaborative Benchmarking Group, 2004, *Best Practices for Sanitary Sewer Overflow Prevention and Response Plan*, available from the California Water Environment Association (CWEA) website, at http://www.cwea.org/book_ocb.shtml.
- Collection System Collaborative Benchmarking Group, expected publication in 2005, *Best Practices for Integrated Root Control*, will be available from the California Water Environment Association (CWEA) website, at http://www.cwea.org/book_ocb.shtml.
- Metcalf & Eddy, Inc., 1981, *Wastewater Engineering: Collection and Pumping of Wastewater*, McGraw-Hill.
- NASSCO, 1993, *Inspector Handbook for Sewer collection System Maintenance and Rehabilitation*.
- NASSCO, 1995, *Manual of Practices – Wastewater Collection Systems*.

- NASSCO, 1996, *Specification Guidelines for Wastewater Collection Systems Maintenance and Rehabilitation*, 9th edition.
- San Francisco Bay Regional Water Quality Control Board, 1995, *San Francisco Bay Basin (Region 2) Water Quality Control Plan* (also known as “The Basin Plan”).
- San Francisco Bay Regional Water Quality Control Board, 2004, “San Francisco Bay Area Sanitary Sewer Overflow Monitoring and Reporting Program for Sewer System Authorities.”
- Sanks, 1998, *Pumping Station Design*, second edition.
- Stamaker, R. and Riggsy, M., 1997, “Evaluating the Effectiveness of Wastewater Collection System Maintenance,” *Water Engineering Management*, January 1997.
- U.S. Environmental Protection Agency, 1975, *Handbook for Sewer System Evaluation and Rehabilitation*, Document No. EPA/430/9-75/021.
- U.S. Environmental Protection Agency, 1985, *Demonstration of Service Lateral Testing and Rehabilitation Techniques*.
- U.S. Environmental Protection Agency, 1985, *Design Manual for Odor and Corrosion Control in Sanitary Sewerage Systems and Treatment Plants*, Document No. EPA/625/1-85/018.
- U.S. Environmental Protection Agency, 1991, *Sewer System Infrastructure Analysis and Rehabilitation Handbook*.
- U.S. Environmental Protection Agency, 1992, *Detection, Control and Correction of Hydrogen Sulfide Corrosion in Existing Wastewater Systems*, Document No. EPA-832-R-92-001, September 1992.
- Uniform Plumbing Code or California State Plumbing Code.
- Water Environment Federation, 1993, *Design of Wastewater and Stormwater Pumping Stations*, MOP FD-4.
- Water Environment Federation, 1999, *Control of Infiltration and Inflow in Private Building Sewer Connections*.
- Water Environment Federation, 1999, *Prevention and Control of Sewer System Overflows*, Second Edition, Manual of Practice FD-17.
- Water Environment Federation, 1999, *Wastewater Collection Systems Management*, 5th Edition, Manual of Practice No. 7.
- Water Environment Research Foundation, 1997, *Benchmarking Wastewater Operations – Collection, Treatment and Biosolids Management*, Project 96-CTS-5.

Water Pollution Control Federation, 1969, *Design and Construction of Sanitary & Storm Sewers*, MOP 9.

Water Research Centre, 1993, *Manual of Sewer Condition Classification*.

Water Research Centre, 1994, *Sewerage Rehabilitation Manual*, Third Edition.

Website Resources

California Water Environment Association: certification program for collection system maintenance. Visit <http://www.cwea.org/cert.shtml>, or call (510) 382-7800.

California FOG Work Group. Visit <http://www.calfog.org>.