

CERTIFIED 7/31/2010  
CIWAS



## ANGEL ISLAND STATE PARK

### SEWER SYSTEM MANAGEMENT PLAN (SSMP)

## TABLE OF CONTENTS

<b>INTRODUCTION .....</b>	<b>1</b>
Background For SSMP Requirement .....	1
Document Organization .....	1
Sewer System Location And Service Area.....	2
<b>ELEMENT 1: GOALS.....</b>	<b>3</b>
1.1 Regulatory Requirements For Goals .....	3
1.2 Goals Discussion .....	3
<b>ELEMENT 2: ORGANIZATIONAL STRUCTURE .....</b>	<b>4</b>
2.1 Regulatory Requirements For Organizational Structure.....	4
2.2 Organizational Structure Discussion .....	4
Department Organization .....	4
Description of General Responsibilities .....	6
Authorized Representative .....	8
Responsibility for SSMP Implementation.....	8
2.3 SSO Reporting Chain of Communication .....	8
<b>ELEMENT 3: LEGAL AUTHORITY.....</b>	<b>11</b>
3.1 Regulatory Requirements For Legal Authority .....	11
3.2 Legal Authority Discussion .....	11
<b>ELEMENT 4: OPERATIONS AND MAINTENANCE.....</b>	<b>13</b>
4.1 Regulatory Requirements For Operations And Maintenance .....	13
Collection System Map .....	13
Preventive Operations And Maintenance Program .....	13
Rehabilitation and Replacement Plan.....	13
Staff Training Plan .....	14
Contingency Equipment And Parts Inventories .....	14
4.2 Collection System Map Discussion .....	14
4.3 Preventive Operations and Maintenance Program Discussion .....	14
Sewer Cleaning .....	14
Root Control .....	14
Pump Station Maintenance .....	15
Septic Tanks .....	15
Maintenance Management And Work Orders .....	15
4.4 Rehabilitation and Replacement Plan Discussion .....	15
Pipeline Inspection .....	15
Manhole Inspection .....	16
Pump Station Inspection .....	16
Septic Tank Inspection .....	16
Rehabilitation And Replacement For Pipelines, Manholes, Pump Stations, Septic Tanks, And Appurtenances .....	16
4.5 Staff Training Plan Discussion .....	16

4.6 Contingency Equipment and Parts Inventories Discussion

**ELEMENT 5: DESIGN AND PERFORMANCE PROVISIONS .....**

5.1 Regulatory Requirements For Design And Performance Provisi.....  
5.2 Design And Performance Provisions Discussion .....  
5.3 Specification and Construction Standard For Sanitary Sewerage.....  
5.4 Specification and Construction Standard For Packaged Pumping Stations .  
5.5 Specification and Construction Standard For Piped Utilities ..... 50  
5.6 Specification and Construction Standard For High Performance Coatings . 55  
5.7 Specification and Construction Standard For Earthwork..... 65

**ELEMENT 6: OVERFLOW EMERGENCY RESPONSE PLAN ..... 72**

6.1 Regulatory Requirements For The Overflow Emergency Response Plan .. 72  
6.2 Discussion Of The Overflow Emergency Response Plan ..... 73  
    Flow Chart For SSO Response and Reporting ..... 73  
    Overflow Emergency Procedures ..... 73  
    Overflow Reports ..... 74  
    Immediate Notifications ..... 75  
    Public Notification ..... 76  
    Updates And Training ..... 76  
6.3 SSO Volume Estimation Procedures ..... 76  
    Method 1: Geometric Shapes..... 76  
    Method 2: Roadway Gutter ..... 77  
    Method 3: Flow Rate And Duration..... 78

**ELEMENT 7: FATS, OILS, AND GREASE (FOG) CONTROL PROGRAM .....**

7.1 Regulatory Requirements For The FOG Control Program ..... 85  
7.2 Nature And Extent Of FOG ..... 86

**ELEMENT 8: System Evaluation & Capacity Management Plan.....**

8.1 CAPACITY ASSESMENT.....86  
8.1(a) Goals for completing Capacity Assessment .....87  
8.1(b) System Evaluation and Capacity Assurance Plan Goals.....87

**ELEMENT 9: MONITORING, MEASUREMENT AND PROGRAM MODIFICATIONS**

STATEMENT.....88

**ELEMENT 10: SSMP AUDITS**

STATEMENT .....88

**ELEMENT 11: COMMUNICATIONS PROGRAM**

STATEMENT OF GOALS.....89



## INTRODUCTION

### Background For SSMP Requirement

The State Water Resources Control Board (SWRCB) adopted Statewide General Waste Discharge Requirements (GWDR) for Sanitary Sewer Systems on May 2, 2006. The GWDR was implemented with Water Quality Order No. 2006-0003-DWQ (Sanitary Sewer Order). The Monitoring And Reporting Requirements for the original Sanitary Sewer Order were subsequently amended on February 20, 2008 with Sanitary Sewer Order No. WQ-2008-EXEC.

The Sanitary Sewer Order requires public agencies that own or operate sanitary sewer systems with greater than one mile of pipe to develop and implement Sewer System Management Plans (SSMP) and report all Sewer System Overflows (SSO) to the SWRCB's online SSO database. This database is known as the California Integrated Water Quality System (CIWQS).

### Document Organization

This SSMP is intended to meet the requirements of Statewide General Waste Discharge Requirement for agencies with wastewater collection systems with more than one mile of sewers. The organization of this document is consistent with the SWRCB requirements. The SSMP includes eleven elements, as listed below. Each of these elements forms a section of this document.

1. Goals
2. Organizational Structure
3. Legal Authority
4. Operations And Maintenance Program
  - a. Collection system map
  - b. Preventive operation and maintenance program
  - c. Rehabilitation and replacement plan
  - d. Staff training plan
  - e. Contingency equipment and parts inventories
5. Design and Performance Provisions
  - a. Design and construction standards
  - b. Inspection and testing standards for construction, repairs, and rehabilitation
6. Overflow Emergency Response Plan
7. Fats, Oils, and Grease (FOG) Program
  - a. FOG program for public outreach
8. System Evaluation and Capacity Assurance Plan
9. Monitoring, Measurement, And Program Modifications

- 10. SSMP Audits
- 11. Communications Program

The sections for these elements are organized into sub-sections as follows:

- 1. Description of the SWRCB requirement for each element
- 2. A discussion of each element. The discussion may be split into multiple sub-sections depending on length and complexity of the subject matter.

Supporting information for each element may be included in an appendix associated with that section as applicable.

### **Sewer System Location And Service Area**

Angel Island State Park is located in Marin County approximately 1.5 miles southeast of Tiburon. The wastewater collection system for this park includes flows collected from 11 residences, 1 group use kitchen (Visitor Center) and 1 restaurant. Flows originate from toilets, wash basins, showers, public restrooms. The estimated peak daily population served by the wastewater collection systems is 1000 people.

The wastewater collection system consists of approximately 10 miles of pipe (force main and gravity) ranging from 2" to 6" inches in diameter, 7 pump stations, and 0 stream crossings. Wastewater is delivered to the Angel Island State Park Wastewater Treatment Plant for treatment via the Angel Island State Park septic system.

## **ELEMENT 1 GOALS**

## **1.1 Regulatory Requirements For Goals**

The collection system agency must develop goals to properly manage, operate, and maintain all parts of its wastewater collection system in order to reduce and prevent SSOs, as well as to mitigate any SSOs that occur.

## **1.2 Goals Discussion**

Our goal is to provide a safe and reliable wastewater collection system for the benefit of visitors to the park. In support of this goal, the staff at Angel Island State Park developed the following objectives for the operation and maintenance of the collection system.

1. Minimize sanitary sewer overflows
2. Prevent public health hazards
3. Minimize inconveniences by responsibly handling interruptions in service
4. Protect the large investment in the collection system by maintaining adequate capacity and extending the useful life of the system
5. Use funds available for sewer operations in the most efficient manner
6. Convey wastewater to treatment facilities with a minimum of infiltration, inflow and exfiltration
7. Provide adequate capacity to convey peak flows
8. Perform all operations in a safe manner to avoid personal injury and property damage

This SSMP will contribute to the proper management of the collection system and assist in minimizing the frequency and impacts of wastewater overflows by providing guidance for appropriate maintenance, capacity management, and emergency response.

## **ELEMENT 2 ORGANIZATIONAL STRUCTURE**

### **2.1 Regulatory Requirements For Organizational Structure**

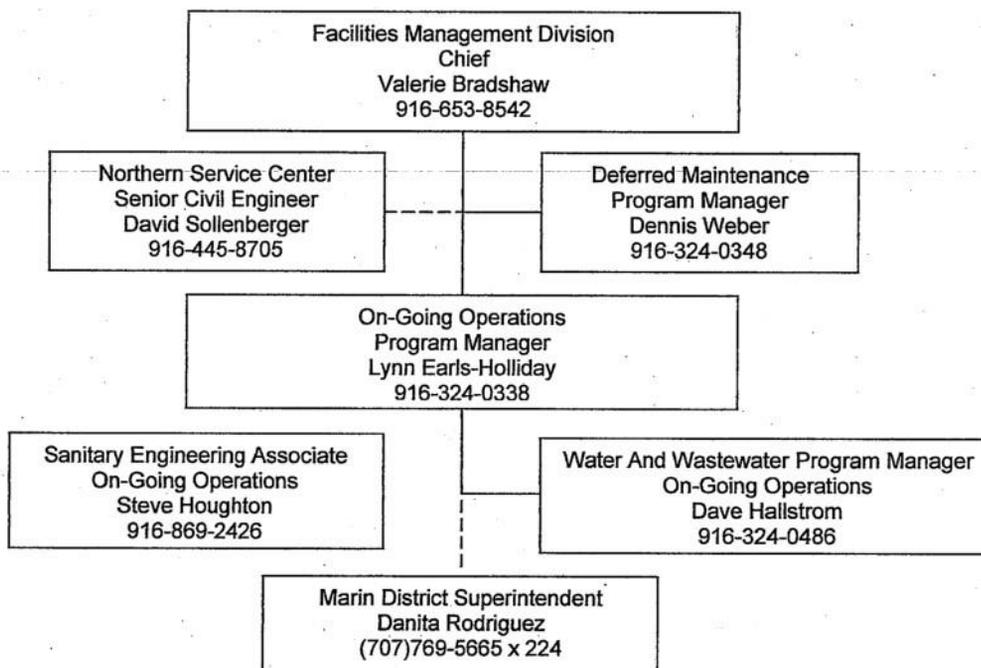
The agency's SSMP must identify:

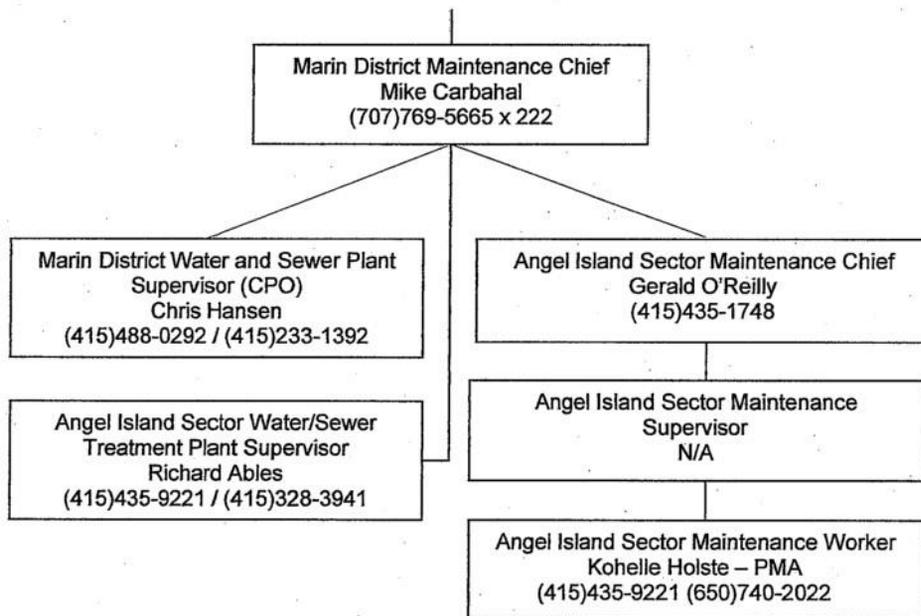
1. The name of the responsible or authorized representative
2. The names and telephone numbers for management, administrative, and maintenance positions responsible for implementing specific measures in the SSMP program. Include lines of authority as shown in an organization chart or similar document with a narrative explanation.
3. The chain of communication for reporting SSOs, from receipt of a complaint or other information, including the person responsible for reporting SSOs to the SWRCB, Regional Water Quality Control Board (RWQCB) and other agencies such as County Environmental Health and California Emergency Management Agency (Cal E•M•A).

## 2.2 Organizational Structure Discussion

### Department Organization

The organization chart for the management, operation, and maintenance of the wastewater collection system is shown on Figure 2-1.





{ Legally Responsible Official (LRO): Chris Hansen / CPO Marin District  
 Authorized Rep. For LRO: Richard Ables / WSPS / AISP }

**Figure 2-1. Organizational Chart of Staff**

**Description of General Responsibilities**

Facilities Management Division, Division Chief

Plans, organizes, directs, and supervises facilities and equipment management activities, including those related to wastewater collection systems, for the California Department of Parks and Recreation (State Parks). Prepares and controls the budget for facilities and equipment management activities. Advises Executive Staff on operations, maintenance, and equipment issues.

Service Center, Senior Civil Engineer

Plans engineering work and directs a staff of engineers in the design of projects and preparation of drawings, specifications, and cost estimates in connection with the construction of a variety of engineering projects, including wastewater collection systems and wastewater treatment systems. Directs coordination with State Parks maintenance staff on various project issues including those related to sanitary sewer systems. Directs coordination with contractors, consultants, and the public on engineering and construction issues.

Deferred Maintenance Program, Program Manager

Reviews proposed projects, including projects for wastewater collection systems, for eligibility for funding from the Deferred Maintenance Program. Makes recommendations for funding eligible projects. Coordinates with District and Service Center management staff to ensure timely and proper completion of approved projects.

On-Going Operations Program Manager

Plans, directs, and manages all facilities maintenance activities, including those related to wastewater collection systems. Reviews expenditures of budgeted funds. Responsible for the overall coordination of State Parks' Infrastructure Database Program (PID) and the Computerized Asset Management Program (CAMP). Coordinates and participates in training for maintenance staff.

Water And Wastewater Program Manager, On-Going Operations

Provides technical and regulatory support for the operation and maintenance of water and wastewater facilities. Advises operation and maintenance staff on the implementation of new State regulations. Reviews construction plans for proposed projects, including wastewater collection systems, for conformance with engineering, public health, and safety principles and practices and necessary elements required for proper operation and maintenance of the project. Periodically inspects construction of new projects, including wastewater collection systems, for conformance with plans and specifications.

Sanitary Engineering Associate

Provides technical and regulatory support for the operation and maintenance of water and wastewater facilities. Reviews construction plans for proposed projects, including wastewater collection systems, for conformance with engineering, public health, and safety principles and practices and necessary elements required for proper operation and maintenance of the project. Periodically inspects construction of new projects, including wastewater collection systems, for conformance with plans and specifications. Coordinates and assists with the redistribution of parts and equipment for water and wastewater facilities within State Parks from areas of salvage to areas of need. Provides advice to field staff on problematic equipment at water and wastewater facilities.

District Superintendent

Responsibilities include the protection and management of natural and cultural resources, public safety and law enforcement, visitor services, interpretation programs, real property management, and facilities maintenance, including wastewater collection systems.

District Maintenance Chief

Plans, supervises, and directs maintenance activities in a district, including maintenance for structures, electrical systems, plumbing, lighting, telecommunications, water and wastewater treatment systems, and wastewater collection systems. Responsible for scheduling work and documenting costs. Ensures wastewater collection systems are cleaned and monitored with closed circuit television according to the maintenance schedule and O & M Plan.

#### Water And Sewer Plant Supervisor

Under the direction of the District Maintenance Chief. Responsible for the operation and maintenance of water and wastewater treatment systems and wastewater collection systems throughout the Marin District of CA State Parks. Develops and updates an Operations and Maintenance (O & M) Manual for water and wastewater treatment systems and for wastewater collection systems. Ensures compliance with regulatory requirements including water quality testing, reporting, and record keeping. Reports and records wastewater spills. Purchases necessary equipment, tools, and supplies. Ensures safe working conditions. Participates in development of the budget for O & M of water and wastewater facilities.

#### Sector Maintenance Chief

Under the direction of the District Maintenance Chief. Plans, supervises, and directs maintenance activities in a sector, including maintenance for structures, electrical systems, plumbing, lighting, telecommunications, water and wastewater treatment systems, and wastewater collection systems. Responsible for scheduling work and documenting costs.

#### Sector Maintenance Supervisor

Under direction of the Sector Maintenance Chief. Plans, supervises, and directs maintenance activities in a sector. Supervises a small crew in maintaining park structures, equipment, facilities and grounds, including wastewater collection systems. Responds to wastewater spills. Instructs permanent and temporary employees in the proper and safe use of tools and equipment. Orders supplies and tools and keeps a running inventory of stock on hand. Prepares a variety of documents and reports. Supervises and directs the cleaning and repair of wastewater collection systems. Trains subordinates in specific tasks, as needed, including wastewater collection system preventive maintenance and sewer system overflow response.

#### Sector Maintenance Worker

Under direction of the Sector Maintenance Chief I. Works with and supervises a small crew in maintaining park structures, equipment, facilities and grounds. Lays out, assigns and reviews work. Instructs permanent and temporary employees in the proper and safe use of tools and equipment and ensures compliance with safety standards. Orders supplies and tools and keeps a running inventory of stock on hand. Prepares a variety of documents and reports. Supervises and directs the cleaning and repair of wastewater collection systems. Trains crew members in specific tasks, as needed, including wastewater collection system preventive maintenance and sewer system overflow response.

#### **Authorized Representative**

Richard Ables, Water/Sewer Treatment Plant Supervisor (AISP), is the authorized representative for all wastewater collection system matters for Angel Island State Park and is authorized to certify electronic spill reports submitted to the SWRCB.

### **Responsibility for SSMP Implementation**

Chris Hansen, Chief Plant Operator is the Legally Responsible Official (LRO) and is responsible for implementing all elements of this SSMP. The LRO is also responsible for assuming the duties of the AR when the AR is not available and training a replacement AR as needed.

### **2.3 SSO Reporting Chain of Communication**

Figure 2-2 is a flow chart depicting the chain of communication for responding to and reporting SSOs, from observation of an SSO to reporting the SSO to the appropriate regulatory agencies. Table 2-1 lists contact phone numbers for the parties included in Figure 2-2.

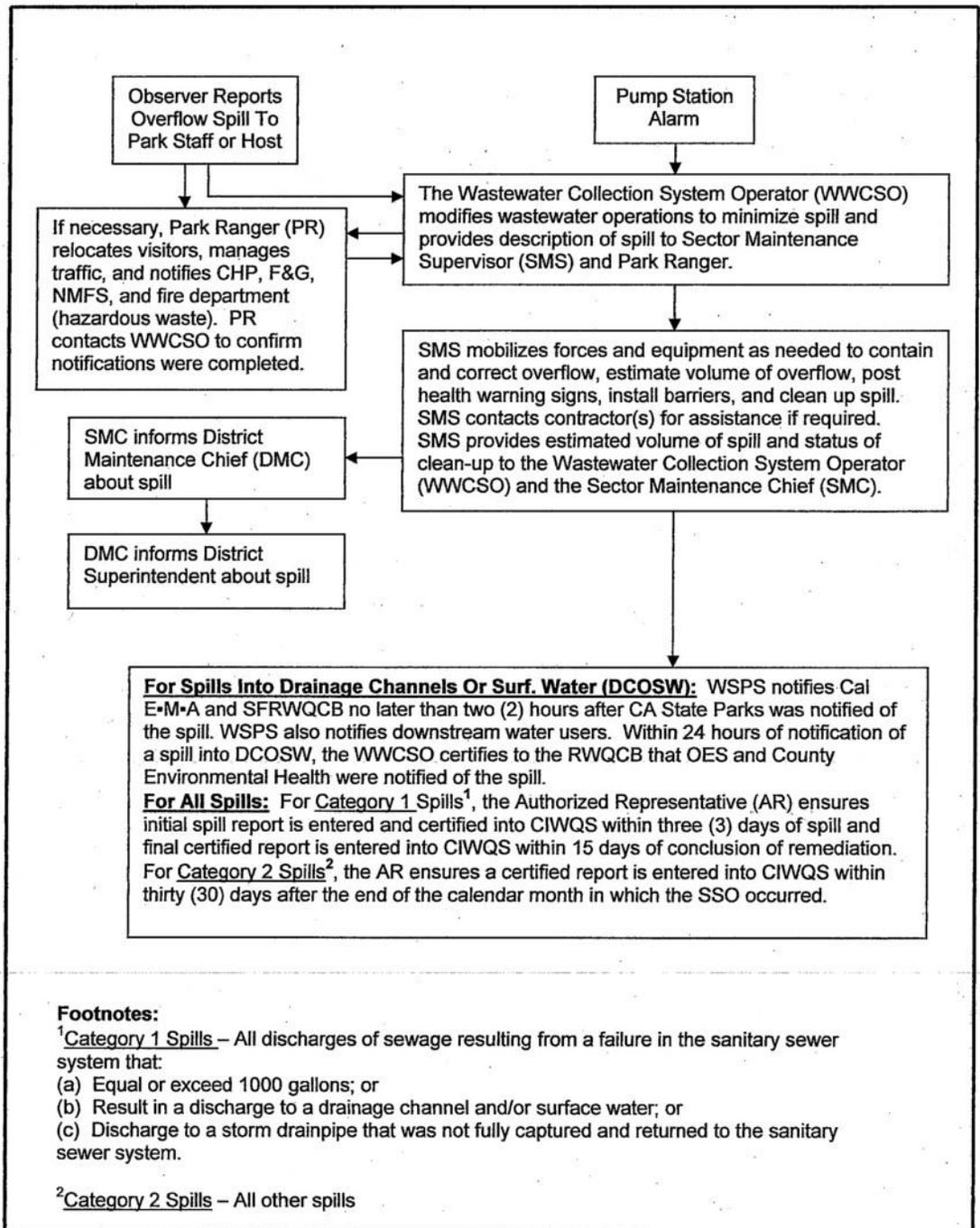


Figure 2-2. Flow Chart For SSO Response And Reporting

**Table 2-1. Contact Numbers for SSO Chain of Communication**

<b>AGENCY</b>	<b>CONTACT TITLE (if applicable)</b>	<b>NAME (if applicable)</b>	<b>PHONE NUMBER</b>
California Emergency Management Agency (Cal E•M•A)	Cal E•M•A Warning Center	N/A	(800) 852-7550 (for entire state)
RWQCB San Francisco Bay REGION (2)	SSO Reduction Program Coordinator	Michael Chee	(510 ) 622-2333 office (510) 622-2460 fax
Marin County Environmental Health	Cal E•M•A will notify appropriate agency's Per Cal E•M•A Fact Sheet dated March 2010	N/A	N/A
Tiburon Fire Department (hazardous waste)	Cal E•M•A will notify appropriate agency's Per Cal E•M•A Fact Sheet dated March 2010	N/A	N/A
Calif. Dept. Of Fish & Game (F&G)	Cal E•M•A will notify appropriate agency's Per Cal E•M•A Fact Sheet dated March 2010	N/A	N/A
National Marine Fisheries Service (NMFS)	Cal E•M•A will notify appropriate agency's Per Cal E•M•A Fact Sheet dated March 2010	N/A	N/A
Ca. Hwy. Patrol (CHP)	Cal E•M•A will notify appropriate agency's Per Cal E•M•A Fact Sheet dated March 2010	N/A	N/A
CA State Parks	State Park Peace Officer	State Park Peace Officer On Duty	(415) 435-5390 (916) 358-1310 Northern Communications (Dispatch)
CA State Parks	Legally Responsible Official (LRO)	Chris Hansen	(415) 488-0292 (415) 233-1392
CA State Parks	Authorized Representative for LRO	Richard Ables	(415) 328-3941 (916) 752-8932
CA State Parks	District Superintendent	Danita Rodriguez	(707) 769-5665 x224
CA State Parks	District Maintenance Chief	Mike Carbahal	(707) 769-5665 x222
CA State Parks	Sector Maintenance Chief	Gerald O'Reilly	(415) 435-1748 (415) 328-2036
CA State Parks	Sector Maintenance Worker / PMA	Kohelle Holste	(415) 435-9221 (650) 740-2022
CA State Parks	Water & Sewer Plant Supervisor(s)	Richard Ables, or Gordon Ramsey or Chris Hansen	(415 ) 328-3941 (415) 827-3714 (415) 233-1392

Coast Guard National Response Center	Cal E•M•A will notify appropriate agency's	N/A	1-800-424-8802
County Board of Supervisors	Cal E•M•A will notify appropriate agency's	N/A	N/A
CA State Parks	Angel Island Maintenance Volunteer (Island Resident)	Mike Holste	(650) 740-2023 East Garrison Res #4

## **ELEMENT 3 LEGAL AUTHORITY**

### **3.1 Regulatory Requirements for Legal Authority**

CA State Parks must demonstrate that it possesses the necessary legal authority to:

- (a) Prevent illicit discharges into its wastewater collection system (examples may include infiltration and inflow (I/I), storm water, 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 (FOG) and other debris that may cause blockages, and
- (e) Enforce any violation of its sewer ordinances.

### **3.2 Legal Authority Discussion**

Since the wastewater collection system is located within Angel Island State Park and CA State Parks is the legal owner of the collection system, it has total legal authority to:

- (a) Prevent the discharge or disposal of any material that it deems illicit into the collection system;
- (b) Ensure that sewers and connections are properly designed, constructed, and repaired;
- (c) Ensure access for maintenance, inspection, and repair of the system, and
- (d) Control discharges of FOG and other debris that may enter the system.

"Section 3.1, Regulatory Requirements for Legal Authority, (e) Enforce any violation of its sewer ordinances," is not applicable since CA State Parks has total enforcement authority over all activities in Angel Island State Park and utilizes CA State Parks Peace Officers to carry out its enforcement authority. State Park Peace Officers have the same authority as the California Highway Patrol, Fish and Game, and other state peace officers.

**OPTION 3 – USE THIS OPTION IF YOUR PARK HAS A CONCESSIONAIRE WITH FOOD SERVICE, WASTEWATER TREATMENT IS PERFORMED INSIDE THE PARK, AND THE NEW SECTION, DISCHARGE TO SEWER LINE FROM FOOD ESTABLISHMENTS, CANNOT BE ADDED TO THE CONTRACT WITH THE CONCESSIONAIRE UNTIL AFTER FEBRUARY 26, 2010.**

Additionally, in the contract between CA State Parks and the California Parks Company (concessionaire), a new section, Discharge to Sewer from Food Establishments, will be added to the contract and will prescribe practices to be performed by the concessionaire for the control of FOG and other debris that may enter the wastewater collection system. CA State Parks will then have enforcement authority for the control of FOG and other debris that may be discharged from food establishments by virtue of the fact that non-conformance with the practices prescribed in the new section in the contract will be a breach of the contract by the California Parks Company (concessionaire) and could result in termination of the contract. See Appendix A for a copy of the proposed new section, Discharge To Sewer From Food Establishments.

## **ELEMENT 4 OPERATIONS AND MAINTENANCE**

This element of the Sewer System Management Plan (SSMP) discusses CA State Parks activities for the proper operations and maintenance of the wastewater collection system in Angel Island State Park. This section fulfills the requirement for the State Water Resource Control Board's (SWRCB) Element 4 - Operations and Maintenance.

### **4.1 Regulatory Requirements for Operations and Maintenance**

#### **Collection System Map**

As appropriate and applicable to the system, the wastewater agency must maintain an up-to-date map of the sanitary sewer system, showing all gravity line segments, manholes, pumping facilities, pressure pipes, valves, and applicable storm water conveyance facilities.

#### **Preventive Operation And Maintenance Program**

As appropriate and applicable to the system, the wastewater agency must 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 preventive maintenance program should have a system to document scheduled and conducted activities, such as work orders.

#### **Rehabilitation And Replacement Plan**

As appropriate and applicable to the system, the wastewater agency must 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.

#### **Staff Training Plan**

As appropriate and applicable to the system, the wastewater agency must provide training on a regular basis for staff in sanitary sewer system operations and maintenance, and require contractors to be appropriately trained.

#### **Contingency Equipment and Parts Inventories**

As appropriate and applicable to the system, the wastewater agency must provide equipment and replacement part inventories, including identification of critical replacement parts.

### **4.2 Collection System Map Discussion**

The wastewater collection system map includes the location of gravity lines, force mains, manholes, lift stations, force main cleanouts, electrical panels, and control panels. The maps also identify flow direction, pipe diameters, and street names. The maps are updated as changes are made to the collection system. State Parks plans to enter detailed information about the waste water collection system into a GIS database, but no target date has been established at this time.

### **4.3 Preventive Operations And Maintenance Program Discussion**

CA State Parks WSPS staff prioritizes preventive maintenance activities. The preventive maintenance program includes scheduled and focused cleaning of the collection system, root control, and inspection of pump stations and septic tanks. The following subsections summarize CA State Parks preventive maintenance activities.

#### **Sewer Cleaning**

CA State Parks has both focused cleaning for areas that are problematic as well as cyclic scheduled cleaning for pipes and septic tanks. Approximately 2640 lineal feet of sewers are included in the focused cleaning program with

cleaning completed annually. The focused cleaning frequency depends on the history and causes of stoppages or overflows. Cyclic cleaning is scheduled annually, but periodic budget constraints may stretch this to semi-annual or as needed. Cleaning is followed by inspection of the pipes using closed circuit television (CCTV).

#### **Root Control**

A chemical agent is used as needed for root control. Additionally, if roots are determined to be an issue during the CCTV inspection, root cutting is performed with chain flail attachments on jetters or with mechanical cutters.

#### **Pump Station Maintenance**

CA State Parks staff performs daily inspections of the pump stations from the surface (no confined space entry) and performs minor maintenance as needed. Comprehensive pump station maintenance is performed by CA State Parks / Marin District / Water & Sewer Treatment Plant Supervisor's (WSPS) as needed and may include cleaning of the sump and removing pumps for inspection and repairs. All CA State Parks / WSPS staff must meet all requirements for confined space entry.

#### **Septic Tanks**

Septic tanks are inspected monthly (minimum), weekly (May to October) to determine if they need to be pumped out. Septic tanks are pumped as needed when any of the following conditions exist:

- The scum layer exceeds a thickness of twelve (12) inches; or
- The sludge blanket exceeds a thickness of twenty-four (24) inches; or
- The combined thickness of sludge and scum exceeds one-third of the tank depth of the second compartment; or
- The sludge layer is within eight inches of the outlet device

If applicable, septic tank effluent filters are removed and cleaned immediately after the tank is pumped so that filter wash water enters an empty compartment. Removing and cleaning the filter over the tank with a full tank is avoided since large pieces of biofilm removed from the filter could be discharged to the leach field through an unprotected effluent pipe and plug the leachfield.

#### **Maintenance Management and Work Orders**

CA State Parks utilizes the IBM database MAXIMO 5 for scheduling, tracking, and coordinating work orders for preventive maintenance. CA State Parks adaptation of MAXIMO 5 is called the Computerized Asset Management Program (CAMP).

#### **4.4 Rehabilitation And Replacement Plan Discussion**

A rehabilitation and replacement plan for the wastewater collection system is based on an evaluation of a CCTV inspection of pipes and visual inspections of manholes, pump stations, and septic tanks.

##### **Pipeline Inspection**

A CCTV inspection of pipelines is performed approximately once every year (annually) in general and more frequently for areas with a history of stoppages or overflows. The CCTV inspections are performed by outside contractors. The CCTV inspection will identify the number, types, and severity of structural defects in the pipeline. Typical structural defects are sags, offset joints, longitudinal cracks, and chemical and bacteriologically induced corrosion.

Defects in manholes include settlement, fractures, leakage around pipe joints, and chemical and bacteriologically induced corrosion.

##### **Manhole Inspection**

As part of the focused and cyclic cleaning programs, CA State Parks WSPS staff inspects manholes for settlement, corrosion, debris or damage around the base, cracks or holes, leakage around inlet and outlet pipes, and condition of manhole steps.

##### **Pump Station Inspection**

CA State Parks WSPS staff performs DAILY inspections of the pump stations from the surface (no confined space entry). Inspections include a visual check of the equipment, manual cycling of pumps, checking floats or sensors, recording hour meter readings, and ensuring equal rotation of pump use. Backup generators are tested monthly. For pump stations without a backup generator on site, portable generators can be brought to the site.

##### **Septic Tank Inspection**

After the septic tanks are pumped out, the tanks are inspected from the surface (no confined space entry) for the following items:

- (1) Deformation or cracking of the tank walls and floor;
- (2) Deformation or cracking of the inlet and outlet pipes;
- (3) Integrity of the baffle that separates solid waste from liquid waste;
- (4) Filter at the outlet is clean and securely attached to the outlet pipe and
- (4) Backflow into the tank from the outlet pipe.

Backflow from the outlet pipe subsequent to emptying the tank indicates the leach field is failing.

##### **Rehabilitation And Replacement For Pipelines, Manholes, Pump Stations, Septic Tanks, And Appurtenances (Wastewater Collection System Infrastructure)**

Based on a review of the inspections of these items, staff determines if rehabilitation or replacement is required. Funding for capital improvement projects for rehabilitation and replacement of wastewater collection system infrastructure is scheduled and prioritized in the Park Infrastructure Database (PID).

#### **4.5 Staff Training Plan Discussion**

CA State Parks budgets for training sewer maintenance staff to meet the demands of maintaining the wastewater collection system. In addition, staff is encouraged to become certified for collection system maintenance by the California Water Environment Association (CWEA). Funding is provided for training to enable staff to become certified by CWEA, pay for certification exams, and pay for continuing education. CA State Parks also provides in-house and on-the-job training for staff. For in-house training and reference material, CA State Parks uses the publications "Operation and Maintenance of Wastewater Collection Systems, Volumes I and II" (CSUS, Kenneth D. Kerri). All field training is supervised by an experienced staff member. New employees work with an experienced senior staff member for at least three months or until they can demonstrate competency.

To ensure that contractors involved in emergency wastewater responses have appropriate training, language is included in the agreements with contractors to ensure that contractors are adequately trained for working on sanitary sewer collection systems.

#### **4.6 Contingency Equipment and Parts Inventories Discussion**

CA State Parks maintains an inventory of equipment and replacement parts, which includes the identification of critical replacement parts. Staff stock spare and scheduled replacement parts to minimize downtime in the event of an unplanned failure. All sewer maintenance equipment and replacement parts are stored at CA State Park maintenance facilities. Equipment and replacement parts are periodically replaced based on the estimated useful life. Pump stations include redundant systems to reduce impacts of a failure of one system. Contingency equipment to support an effective response to an emergency includes a sewer bypass pump and piping and an emergency backup generator. Also, a vacuum truck is available on-call through an outside contractor. Additional details for emergency responses can be found in Element 6 – Overflow Emergency Response Plan.

## **ELEMENT 5 DESIGN AND PERFORMANCE PROVISIONS**

This section of the Sewer System Management Plan (SSMP) provides an overview and summary of the Design and Performance Provisions for Angel Island State Park.

### **5.1 Regulatory Requirements for Design & Performance Provisions**

Angel Island State Park must have design and construction standards and specifications for the installation of new sewer systems, pump stations and other appurtenances; and for the rehabilitation and repair of existing sewer systems. Angel Island State park must also have procedures and standards for inspecting and testing the installation of new sewers, pumps, and other appurtenances and for rehabilitation and repair projects.

### **5.2 Design & Performance Provisions Discussion**

Sewer system overflows 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 new sewers are properly designed and installed can minimize system deficiencies that could create or contribute to future overflows or operations and maintenance problems.

Due to the significant differences in topography, climate, and wastewater characteristics throughout CA State Parks, design standards are not applicable. However, specifications and construction standards are applicable and are included in Sections 5.3 through 5.7. Inspection and testing services are performed either by personnel from CA State Parks Northern Service

Center, CA State Parks Southern Service Center, or by private inspection services contractors. Procedures and standards for inspection and testing are included in the specifications and construction standards provided below.

### **5.3 Specification And Construction Standard For Sanitary Sewerage**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. This specification includes sanitary sewerage, sewer force main piping, and precast concrete manholes.
- B. See Specification and Construction Standard for Packaged Pumping Stations for lift station system piping.
- C. See Specification and Construction Standard for Piped Utilities for general piping.
- D. See Specification And Construction Standard for High Performance Coatings

##### **1.2 PERFORMANCE REQUIREMENTS**

- A. Gravity-Flow, non pressure-Piping Pressure Ratings: At least equal to system test pressure.
- B. Force-Main Pressure Ratings: At least equal to system operating pressure, but not less than 150 psig.

##### **1.3 SUBMITTALS**

- A. Product Data: For the following:
  - 1. Pipe material and fittings for sanitary sewerage and sewer force main piping, including transition couplings to connect new equipment with existing piping.
  - 2. Precast concrete manhole sections with joint seals.
  - 3. Watertight resilient boot connectors for PVC pipe penetrations through concrete.
- B. Shop Drawings: Include plans, elevations, details, and attachments for the following:

1. Precast concrete manholes conforming to the dimensions shown on the drawings, including anti-flotation provisions and pipe penetrations.

C. Field test reports.

#### 1.4 PROJECT CONDITIONS

- A. Site Information: Perform site survey, research public utility records, and verify existing utility locations.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
  1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

#### 2.2 PIPING MATERIALS

- A. Refer to Section 3.1, Installation, for applications of pipe and fitting materials.

#### 2.3 PIPES AND FITTINGS

- A. Hub-and-Spigot, Cast-Iron Soil Pipe and Fittings: ASTM A 74, gray iron, for gasketed joints.
  1. Gaskets: ASTM C 564, rubber, compression type, thickness to match class of pipe.
- B. Ductile-Iron Sewer Pipe: ASTM A 746, for push-on joints.
  1. Standard-Pattern, Ductile-Iron Fittings: AWWA C110, ductile or gray iron, for push-on joints.
  2. Compact-Pattern, Ductile-Iron Fittings: AWWA C153, for push-on joints.
  3. Gaskets: AWWA C111, rubber.

C. PVC Sewer Pipe and Fittings: According to the following:

1. PVC Sewer Pipe and Fittings, NPS 15" and Smaller: ASTM D 3034, SDR 35, for solvent-cemented or gasketed joints.
  - a. Gaskets: ASTM F 477, elastomeric seals.

2.4 PIPE CONNECTIONS

- A. PVC connections to existing vitrified clay sewer pipe shall be made using a flexible coupling, Fernco Series 1002, or equal. Ductile iron connections to PVC shall be made using a PVC flange adapter, by Cert-Lok/Certainteed Corporation, or equal.

2.5 MANHOLES

- A. Normal-Traffic Precast Concrete Manholes: ASTM C 478 and AASHTO No. M199, precast, reinforced concrete, of depth indicated, with provision for rubber gasketed joints.
1. Inside Diameter: 48 inches for valve sumps; 60 inches for the wet wells at LS-2 and LS-3; 96 inches for the wet well at LS-1; 72 inches for the wet well at the Reef Point Entrance Station.
  2. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
  3. Base Section: 8-inch minimum thickness for floor slab and 6-inch minimum thickness for walls and base riser section, and having a base section with integral floor. Base section shall be a monolithic 4-foot minimum section.
  4. Riser Sections: 6-inch minimum thickness and lengths to provide depth indicated.
  5. Gaskets: ASTM C-443, rubber.
  6. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to manhole section.
  7. Manufacturers: Jensen Precast, or approved equal.

2.6 CONCRETE

- A. General: Cast-in-place concrete according to ACI 318, ACI 350R, and the following:
1. Cement: ASTM C 150, Type II.

2. Fine Aggregate: ASTM C 33, sand.
  3. Coarse Aggregate: ASTM C 33, crushed gravel.
  4. Water: Potable.
- B. Portland cement Design Mix: 4000-psi minimum, with 0.45 maximum water-cementitious materials ratio.
1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
  2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.
- C. Ballast and Pipe Supports: Portland cement design mix, 3000-psi minimum, with 0.58 maximum water-cementitious materials ratio.
1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
  2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.

## 2.7 PROTECTIVE COATINGS

- A. See Specification and Construction Standard for High Performance Coatings.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. See Specification and Construction Standard for Earthwork for excavating, trenching, and backfilling.
- B. Identification: Materials and their installation are described in the Specification and Construction Standard for Piped Utilities. Arrange for installing green warning tapes directly over piping and at outside edges of underground structures.
1. Use warning tape or detectable warning tape over ferrous piping.
  2. Use detectable warning tape over nonferrous piping and over edges of underground structures.
- C. Piping Applications: Include watertight joints.

1. PVC sewer pipe and fittings, gaskets, and gasketed joints.
  2. PVC force main pipe and fittings.
- D. Sleeve-Type Pipe Couplings: Use where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.
- E. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewerage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical.
- F. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements. Maintain swab or drag in line, and pull past each joint as it is completed.
- G. Use proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- H. Install gravity-flow piping and connect to building's sanitary drains, of sizes and in locations indicated. Terminate piping as indicated.
1. Install piping pitched down in direction of flow, at minimum slope of 2 percent, unless otherwise indicated.
  2. Install piping with 36-inch minimum cover unless otherwise indicated.
- I. Extend sanitary sewerage piping and connect to building's sanitary drains, of sizes and in locations indicated. Terminate piping as indicated.
- J. Pipe Joint Construction and Installation: Join and install pipe and fittings according to installations indicated.
1. Refer to Specification and Construction Standard for Piped Utilities for basic piping joint construction and installation.
  2. Hub-and-Spigot, Cast-Iron Soil Pipe and Fittings: With rubber gaskets according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook." Use gaskets that match class of pipe and fittings.

3. Ductile-Iron Sewer Pipe with Ductile-Iron Fittings: According to AWWA C600.
  4. PE Pipe and Fittings: As follows:
    - a. Join pipe, tubing, and gasketed fittings with gaskets for watertight joints according to ASTM D 2321 and manufacturer's written instructions.
    - b. Install according to ASTM D 2321 and manufacturer's written instructions.
    - c. Install corrugated piping according to the Corrugated Polyethylene Pipe Association's "Recommended Installation Practices for Corrugated Polyethylene Pipe and Fittings."
  5. PVC Sewer Pipe and Fittings: As follows:
    - a. Join pipe and gasketed fittings with gaskets according to ASTM D 2321.
    - b. Install according to ASTM D 2321.
  6. Join piping made of different materials or dimensions with couplings made for this application. Use couplings that are compatible with and that fit both systems' materials and dimensions.
- K. Manhole Installation: Install complete with appurtenances and accessories indicated.
1. Install precast concrete manhole sections with gaskets according to ASTM C 891.
- L. Concrete Placement: Place cast-in-place concrete according to ACI 318 and ACI 350R.
- M. Make connections to existing piping and underground structures so finished Work complies as nearly as practical with requirements specified for new Work.
- N. Use commercially manufactured wye type fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
- O. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.

- P. Protect existing piping and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.
- Q. Clear interior of piping and structures of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed.
  - 1. Place plug in end of incomplete piping at end of day and when work stops.
  - 2. Flush piping between manholes and other structures to remove collected debris, if required by authorities having jurisdiction.

### 3.2 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
  - 1. Defects requiring correction include the following:
    - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    - c. Crushed, broken, cracked, or otherwise damaged piping.
    - d. Infiltration: Water leakage into piping.
    - e. Exfiltration: Water leakage from or around piping.
  - 2. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
  - 3. Re-inspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
  - 1. Do not enclose, cover, or put into service before inspection and approval by State's representative.
  - 2. Schedule tests and inspections by State's representative with at least 24 hours' advance notice.
  - 3. Submit separate reports for each test.
  - 4. Perform tests as follows:
    - a. Sanitary Sewerage: Perform hydrostatic test.

- 1) Allowable leakage is maximum of 50 gal. per inch of nominal pipe size per mile of pipe, during 24-hour period.
  - 2) Close openings in system and fill with water.
  - 3) Purge air and refill with water.
  - 4) Disconnect water supply.
  - 5) Test and inspect joints for leaks.
  - 6) Option: Test ductile-iron piping according to AWWA C600, Section "Hydrostatic Testing." Use test pressure of at least 10 psig.
- b. Sanitary Sewerage (optional): Perform air test according to UNI-B-6.
5. Manholes: Perform hydraulic test according to ASTM C 969.
  6. Leaks and loss in test pressure constitute defects that must be repaired.
  7. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

## **5.4 Specification and Construction Standard for Packaged Pumping Stations**

### **Part 1-GENERAL**

#### **1.1 SUMMARY**

- A. Work under this section includes, but is not limited to furnishing and installing factory-built duplex pump stations as indicated on the project drawings and herein specified as necessary for proper and complete performance.
- B. Contractor shall provide one additional complete pump and motor as a spare.
- C. Contractor shall provide one skid-mounted engine-driven self-priming stand-by pump complete with suction hose and discharge hose with quick disconnect connection.

#### **1.2 REFERENCES**

- A. Publications listed below form part of this specification to extent referenced in the text by basic designation only. Consult latest edition of publication unless otherwise noted.

1. American National Std. Institute (ANSI) / American Water Works Assoc. (AWWA)
  - a. ANSI B16.1 Cast iron pipe flanges and flanged fittings.
  - b. ANSI/AWWA/C115/A21 Cast/ductile iron pipe with threaded flanges.
  - c. ANSI 253.1 Safety Color Code for Marking Hazards.
  - d. ANSI B40.1 Gauges, Pressure and Vacuum.
  - e. AWWA C508 Single Swing Check Valves.
  - f. AWWA C504 Plug Valves
2. American Society for Testing and Materials (ASTM)
  - a. ASTM A48 Gray Iron Casings.
  - b. ASTM A126 Valves, Flanges, and Pipe Fittings.
  - c. ASTM A307 Carbon Steel Bolts and Studs.
  - d. ASTM A36 Structural Steel.
3. Institute of Electrical and Electronics Engineers (IEEE)
  - a. ANSI/IEEE Std 100 Standard Dictionary of Electrical Terms.
  - b. ANSI/IEEE Std 112 Test Procedure for Polyphase Induction Motors.
  - c. IEEE Std 242 Protection of Industrial and Control Power Systems.
4. National Electric Code (NEC) / National Electrical Manufacturers Assoc. (NEMA)
  - a. NEC National Electric Code.
  - b. NEC 701 National Electric Code article 701.
  - c. NEMA Std MG1 Motors and Generators.
5. Miscellaneous References
  - a. Ten-State Standards Recommended Standards for Sewage Works.
  - b. Hydraulic Institute Std for Cent. Rotary and Recip. Pumps.
  - c. NMTBA and JIC Standards National Machine Tool Builders Association and Joint Council Standards
  - d. ISO 9001 Inter. Org. for Standardization.

### 1.3 SYSTEM DESCRIPTION

- A. The contractor shall furnish and install factory built automatic controlled submersible pump valve packages capable of handling raw unscreened sewage.
- B. The pumps and mechanical slide rail accessories shall be installed in the wet well as shown on the project plans.

- C. The pump control panel, liquid level control, valves and piping shall be installed within an above-ground factory built fiberglass enclosure.
- D. Factory built pump station design, including materials of construction, pump features, valves and piping, and motor controls shall be in accordance with requirements listed under Part 2, Products, of this specification.

#### 1.4 PERFORMANCE CRITERIA

- A. Each pump shall be designed to handle domestic sanitary sewage. Each pump shall be selected to deliver the flow at a design discharge head as shown on the plans.
- B. Each pump station shall be 480 Volt, 60 hertz, 3 phase.

#### 1.5 SUBMITTALS

##### A. Product Data

- 1. Submittal Procedures: Per Contract Provisions.
- 2. Prior to fabrication, pump station manufacturer shall submit six (6) copies of Submittal data for review and approval.
- 3. Submittal shall include shop drawings, electrical ladder logic drawings, and support data as follows: Catalog cuts sheets reflecting characteristics for major items of equipment, materials of construction, major dimensions, motor data, pump characteristic curves showing the design duty point capacity (GPM), head (FT), and hydraulic brake horsepower (BHP). Electrical components used in the motor branch and liquid level control shall be fully described.

- 4. Shop drawings shall provide layout of mechanical equipment and anchor bolt locations for slide rail components. Pipe penetrations and station access clearances shall be dimensioned relative to the station centerline. The electrical ladder logic drawings shall illustrate motor branch and liquid level control circuits to extent necessary to validate function and integration of circuits to form a complete working system.

##### 5. Field quality-control test reports.

##### B. Operation & Maintenance Manuals

- 1. Installation shall be in accordance with written instructions provided by the pump station manufacturer. Comprehensive instructions supplied

at time of shipment shall enable personnel to properly operate and maintain all equipment supplied. Content and instructions shall assume operating personnel are familiar with pumps, motors, piping and valves, but lack experience on exact equipment supplied.

2. Documentation shall be specific to the pump station supplied and collated in functional sections. Each section shall combine to form a complete system manual covering all aspects of equipment supplied by the station manufacturer. Support data for any equipment supplied by others, even if mounted or included in overall station design, shall be provided by those supplying the equipment. Instructions shall include the following as a minimum:
  - a. Functional description of each major component, complete with operating instructions.
  - b. Instructions for operating pumps and pump controls in all modes of operation.
  - c. Calibration and adjustment of equipment for initial start-up, replacement of level control components, or as required for routine maintenance.
  - d. Support data for commercially available components not produced by the station manufacturer, but supplied in accordance with the specifications, shall be supported by literature from the prime manufacturer and incorporated as appendices.
  - e. Electrical schematic diagram of the pump station circuits shall be in accordance with NFPA70. Schematics shall illustrate, to the extent of authorized repair, pump motor branch, control and alarm system circuits including interconnections. Wire numbers and legend symbols shall be shown. Schematic diagrams for individual components, not normally repairable by the station operator, need not be included. Details for such parts shall not be substituted for an overall system schematic. Partial schematics block diagrams, and simplified schematics shall not be provided in lieu of an overall system diagram.
  - f. Mechanical layout drawing of the pump station and components, prepared in accordance with good commercial practice, shall provide installation dimensions and location of all pumps, valves and piping.
3. Operation and maintenance instructions which rely on vendor cut-sheets and literature which include general configurations, or require operating personnel to selectively read portions of the manual shall not be acceptable. Operation and maintenance instructions must be specific to equipment supplied in accordance with these specifications.

## 1.6 QUALITY ASSURANCE

- A. The pumps and pump station manufacturer must be ISO 9001:2000 revision certified, with scope of registration including design control and service after sales activities.
- B. Installer Qualifications: A qualified electrician to install and test the pump systems, electrical controls and metering instrumentation.
- C. Manufacturer Qualifications: A qualified manufacturer.
- D. Testing Agency Qualifications: Testing agency as defined by OSHA in 29 CFR 1910.7.
- E. Product Options: Drawings indicate size, profiles, and dimensional requirements of packaged pumping stations and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
- F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- G. HI Compliance: Comply with HI 1.1-1.5 for sewage and sump pumps.
- H. NEMA Compliance: Comply with NEMA MG 1 for electric motors.
- I. UL Compliance: Comply with UL 778 for sewage and sump pumps.
- J. The manufacturer's technical representative shall inspect the completed installation, correct or supervise the correction of any defect or malfunction, and instruct operating personnel in the proper operation and maintenance of the equipment as described in Part 3 of this section.

#### 1.7 PROJECT CONDITIONS

- A. Existing utilities shall be protected per Execution Requirements in the contract.

#### 1.8 MANUFACTURER'S WARRANTY

- A. The pump station manufacturer shall warrant all equipment to be of quality construction, free of defects in material and workmanship. The pump station manufacturer's warranty shall be submitted in writing and shall be effective for a minimum duration of one year.
- B. Components failing to perform as specified by the engineer, or as represented by the manufacturer, or as proven defective in service during the warranty period, shall be replaced, repaired or satisfactorily modified by the manufacturer without cost of parts or labor to the State.

- C. The warranty shall become effective upon the acceptance by the purchaser or the purchaser's authorized agent, or sixty (60) days after installation, whichever occurs first.
- D. In order to unify responsibility for proper operation and service of the complete pumping station, it is the intent of these Specifications that all systems components be furnished by a single supplier (unitary source) to match supplier for the existing lift station. The pumping station must be of standard catalog design, totally warranted by the manufacturer.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURER

- A. The pump station system integrator shall have a quality management system in place and shall be ISO 9001 certified.
- B. The specifications and project drawings depict equipment and materials manufactured by the Gorman-Rupp Company which are deemed most suitable for the service anticipated. It is not intended, however, to eliminate other products and equal quality and performance.

### 2.2 STATION ENCLOSURE

- A. The station enclosure shall contain and enclose all valves, and associated controls and shall be constructed to enhance serviceability by incorporating the following design characteristics:
  - 1. Two access panels per side of station shall be provided. Panels shall be sized and placed to permit routine maintenance operations through the panel openings of the enclosure. For these purposes, routine maintenance shall include frequently performed adjustments and inspections of the electrical components, controls and valves.
  - 2. The access panels shall be provided with a hinge and latch. Hinge shall be the continuous type. Latch shall engage the enclosure at not less than three places, and shall be protected by a keyed lock.
  - 3. One enclosure side shall contain a screened vent to maximize air flow for enclosure ventilation.
  - 4. Station enclosure, less base, must be removable or able to be disassembled following the removal of reusable hardware.
  - 5. Removal or disassembly of the enclosure shall be accomplished without the use of lifting equipment.

- B. The station enclosure shall be manufactured of molded reinforced orthophthalic polyester resins with a minimum of 30% fiberglass, and a maximum of 70% resin. Resin fillers or extenders shall not be used.
- C. Glass fibers shall have a minimum average length of 1-1/4 inches. Major design considerations shall be given to structural stability, corrosion resistance, and watertight properties. The polyester laminates shall provide a balance of mechanical, chemical, and electrical properties to insure long life. They must be impervious to micro-organisms, mildew, mold, fungus, corrosive liquids, and gases which can reasonably be expected to be present in the environment surrounding the wet well.
- D. All interior surfaces of the housing shall be coated with a polyester resin-rich finish. It shall provide:
  - a. Maintenance-free service
  - b. Abrasion resistance
  - c. Protection from sewage, greases, oils, gasoline, and other common chemicals
  - d. The outside of the enclosure shall be coated with a suitable pigmented resin, compounded to insure long maintenance-free life.
- E. An exhaust blower shall be mounted in the roof of the enclosure. Blower capacity shall be sufficient to change station air a minimum of once every two minutes. Blower motor shall be operated automatically and shall be turned on at approximately 70 degrees F and shall be turned off at 55 degrees F. Blower motor and control circuit shall be protected by a thermal-magnetic air circuit breaker to provide over current and overload protection. Blower exhaust outlet shall be designed to prevent the entrance of rain, snow, rocks, and foreign materials.

### 2.3 STATION BASE

- A. Station base shall be constructed of pre-cast, reinforced concrete bonded inside a fiberglass form covering top and sides, and shall be designed to insure adequate strength to resist deformation of the structure during shipping, lifting, or handling. The enclosure base shall function at the wet well top and incorporate a duplex access lid, sized for the installation and removal of the specified pumps, and shall be of sufficient size to permit access to the wet well. Color used shall de-emphasize the presence of dirt, grease, etc., and shall be provided with a non-skid surface.
- B. A static wet well vent shall be mounted in the station base, and be housed in the station enclosure. The station enclosure shall provide a transition

area between the wet well and the vent outlet. The vent shall terminate through the station wall with a screened opening which shall be designed to prevent the entrance of rain, snow, rocks and foreign material.

- C. The station base shall incorporate a cable transition adapter for the pump cables, level controls, and associated wiring. The adapter shall provide for a vapor tight transition between the wet well and the lift station enclosure. The adapter shall incorporate cable grips for each cable and be provided with a gasket between the adapter and the station for a positive seal. Junction boxes shall not be considered for cable transition.
- D. The station base shall be furnished with elastomeric compression sealing devices for all piping penetrations to provide for a vapor tight transition between the wet well and lift station enclosure.

#### 2.4 PUMP DESIGN

- A. The pump(s) must be submersible slide rail type and be properly selected with the necessary characteristics to deliver the performance specified in the contract.
- B. Solids Pumps:
  - 1. The pump casing shall be of gray iron with a gray iron or ductile iron slide rail guide shoe attached to the discharge flange as an integral assembly. Casing shall be easily removable from the motor for full inspection of impeller.
  - 2. All pump openings and passages shall be of adequate size to pass 3.15 inch diameter spheres (minimum) and any trash or stringy material which can pass through an average house collection system. The impeller shall be recessed into the pump casing and shall not require flow of liquid through the impeller. The impeller and seal housing shall incorporate auxiliary vanes to hydraulically reduce pressure on the primary seal and force fibrous materials and solids away from the close axial clearance on the backside of the impeller. No impeller clearance adjustment or wear rings shall be required.
  - 3. The impeller shall be a multi-vane vortex type with integral winglets on each vane. The winglet shall form an L-shaped cross section at the face of the vane for improved hydrodynamic efficiency. Impeller shall be of ductile iron and precision balanced. Balancing shall not deform or weaken the impeller. The impeller shall have a tapered locking fit onto the shaft and further be secured by a key and locking bolt. Impeller fasteners shall be non-corroding.
  - 4. A hoisting bail shall provide for proper balance of pump and detente from the discharge connection while using a single lift cable.

5. All other major pump components such as stator housing, seal housing, and bearing brackets must be of structural grade steel or gray iron – Class 30. All external surfaces coming into contact with sewage shall be protected by an epoxy coating of 8 mils minimum thickness. All exposed fasteners and lock washers shall be of 304 stainless steel.
6. Submersible Pump Motor:
  - a. Pump Motor shall be of the submersible type rated as shown on the plans.
  - b. The submersible pump motor shall operate in accordance with the electrical power indicated. The motor and pump must be connected to form an integral unit. Motor shall be a squirrel-cage, induction type in an air-filled water tight enclosure. The motor shall conform to NEMA design Class B, and incorporate Class F insulation materials to withstand a continuous operating temperature of 311 degrees F. The pump and motor shall be capable of handling liquids with a maximum temperature of 104 degrees F.
  - c. Motor shall be capable of sustaining a minimum of 10 starts per hour. The motor shall operate while only partially submerged and not require a cooling jacket or any other means of auxiliary cooling during normal continuous operation.
  - d. Motor housing shall be of cast iron. The stator shall consist of copper windings with copper connectors applied to high grade electrical steel laminations. The stator shall be held securely in place by a heat-shrink fit into the motor housing. Any other means of securing the stator which would require penetration of the motor housing shall not be considered acceptable.
  - e. Rotor shall be solid cast and dynamically balanced for vibration-free operation. Rotor end bars and short circuit rings shall be of aluminum. The pump shaft shall be of ANSI type 329 stainless steel (or hardened alloy steel with protective stainless steel shaft sleeve which prevents contact of the shaft with the liquid). The shaft shall be machined with shoulders or snap ring grooves for positive placement of bearings. The upper and lower bearing shall be of heavy duty design, capable of supporting the shaft and rotor while under maximum radial and thrust loads. The bearings shall be permanently grease lubricated and sealed at the time of installation.
  - f. Watertight Integrity
    1. All static seals at water tight mating surfaces shall be of nitrile "O" ring type. Use of auxiliary sealing compounds shall not be required. The power and control cables shall enter the motor through a terminal housing. The entrance shall be sealed with a rubber grommet and clamp set which when compressed longitudinally causes a radial water tight seal. The clamp set shall prevent all slippage and rotation of cable while engaged, yet may be easily removed and reused during routine maintenance. Any other cable

entrance design requiring use of epoxies, silicones, or similar caulking materials shall be considered unacceptable.

2. The pump and electrical cables shall be capable of continuous submergence without loss of waterproof integrity to a depth of 65 feet.
3. The water tight integrity of the motor housing and shaft seal shall be tested during manufacture by pressurizing the motor cavity and submerging in water with motor operating.

C. Motor Protection

1. The motor shall be protected from thermal and moisture damage. Thermal protection shall consist of three separate thermostatic switches embedded into the stator windings. Each switch shall open independently and terminate motor operation if temperature of the protected winding reaches the high temperature set point. Any moisture in the motor housing shall be detected by a mechanically activated moisture sensing micro-switch. The switch shall be sensitive enough to detect airborne moisture and terminate operation of motor before liquid enters the cavity. Use of probes or floats that rely on the presence of liquid to initiate signal shall not be considered acceptable. The thermal and moisture sensing devices shall be connected to the pump control panel by the contractor.

D. Grinder Pumps:

1. Pumps shall be of the centrifugal type with an integrally built-in grinder unit and submersible type motor. The grinder unit shall be capable of macerating all material in normal domestic and commercial sewage including reasonable amounts of foreign objects such as small wood, sticks, plastic and the like to a fine slurry that will pass freely through the pump. Pump and motor assembly shall be UL listed for Class 1, Group D explosion-proof service.
2. Pump Motor shall be of the submersible type rated as specified on the plans.
  - a. Stator winding shall be of the open type with Class B insulation good for 266 degree F maximum operating temperature. Winding housing shall be filled with a clean high dielectric oil that lubricates bearings and seals and transfers heat from windings and rotor to outer shell. Air-filled motors which do not have the superior heat dissipating capabilities of oil-filled motors shall not be considered equal.
  - b. Motor shall have two heavy duty ball bearings to support pump shaft and take radial and thrust loads and a sleeve guide bushing directly above the lower seal to take radial load and act as flame path for seal chamber. Ball bearings shall be designed for 50,000 hours B-10 life. Stator shall be heat shrunk into motor housing.
  - c. A heat sensor thermostat shall be attached to top end of motor winding and shall be connected in series with the magnetic contactor coil in control box to stop motor if motor winding temperature reaches 221

degrees F. Thermostat to reset automatically when motor cools. Two heat sensors shall be used on 3-phase motors.

- d. The common motor pump and grinder shaft shall be of #416 stainless steel threaded to take pump impeller and grinder impeller.
3. Seals:
- a. Motor shall be protected by two mechanical seals mounted in tandem with a seal chamber between the seals. Seal chamber shall be oil filled to lubricate seal face and to transmit heat from shaft to outer shell.
  - b. Seal face shall be carbon and ceramic and lapped to a flatness of one light band. Lower seal faces shall be carbide.
  - c. A double electrode shall be mounted in the seal chamber to detect any water entering the chamber through the lower seal. Water in the chamber shall cause a red light to turn on at the control box. This signal shall not stop motor but shall act as a warning only, indicating service is required.
4. Pump Impeller:
- a. The pump impeller shall be of the recessed Myers type to provide an open unobstructed passage through the volute for the ground solids. Impeller shall be of 85-5-5-5 bronze and shall be threaded onto stainless steel shaft.
5. Grinder Construction:
- a. Grinder assembly shall consist of grinder impeller and shredding ring and shall be mounted directly below the volute passage. Grinder impeller to be threaded onto stainless shaft and be locked with screw and washer. The shredding ring shall be pressed into iron holding flange for easy removal. Flange shall be provided with tapped back-off holes so that screws can be used to push the shredding ring from housing. All grinding of solids shall be from action of the impeller against the shredding ring.
  - b. Both grinder impellers and shredding ring shall be of 440C stainless steel hardened to 58-60 Rockwell C.
6. Lift-out rail system shall consist of a cast iron discharge base, cast iron carrier and sealing plate, steel pump guide plate and cast iron elbow. All exposed nuts, bolts and fasteners shall be 300 series stainless steel.
7. An adequate length of stainless steel lifting chain shall be supplied for removing pump. The chain shall be of sufficient length to provide ease of pump removal from top of sump.

## 2.5 AUTOMATIC DISCHARGE CONNECTION

- A. Each pump shall be furnished with a submersible discharge connection system to permit removal and installation of the pump without the necessity of an operator entering the wet well. The design must insure an automatic

and firm connection of the pump to the discharge piping when lowered into place.

- B. A fabricated stainless steel base plate with integral guide rail pilots shall be provided along with all hardware and anchor bolts required for permanent installation to the wet well floor. The base plate shall be designed with an integral 90° elbow, or adapt to a commercially available elbow for connection to the vertical discharge piping utilizing standard ANSI 125 lbs. flanges. Parts that cannot be provided in stainless steel shall be coated with an epoxy coating for corrosion resistance. The manufacturer shall provide all necessary drawings to insure proper installation and alignment of base plate within the sump.
- C. Each pump shall be provided with a replaceable stainless steel slide rail guide shoe attached to pump discharge flange. A replacement neoprene seal shall be provided as an integral part of the guide shoe to form a seal with the base plate connection and eliminate the possibility of leakage and erosive wear during operation. The seal shall contact mating faces in a static position and shall have adequate flexibility to flex under pumping pressure to increase seal efficiency. Metal-to-metal contact at the discharge connection shall not be acceptable.
- D. The contractor shall provide two lengths of schedule 40 stainless steel guide rail pipe for each pump. The diameter for the rails shall be as specified in the contract.
- E. Upper guide rail pilots, and a lifting cable shall be furnished for each pump. Bottom pilots shall be an integral part of the base plate for ease of installation and proper alignment.
- F. The guide shoe shall direct the pump down two vertical guide rails and onto the discharge connection in a simple lineal movement. The buildup of sludge and grease on guide rails shall not present problems during the lifting operation. The guide shoe shall be designed with integral hooks at the top to transmit full weight of the pump to the base plate flange. No portion of the pump shall be supported directly on the bottom of the wet well, guide rails, or lifting cable.
- G. Lifting cable shall consist of a 316 stainless steel braided wire cable attached to the pump lifting bail. A crimped ball end shall be provided at the upper end of this cable for attaching to the wet well access frame.
- H. All bolts, machine screws, nuts, washers, and lock washers for complete assembly of access cover, guide rails, and discharge elbow shall be stainless steel.

## 2.6 WET WELL ACCESS

- A. The wet well access shall be fabricated from welded aluminum sections. A hinged aluminum door shall be provided for each pump. The hinged door shall be fabricated from 1/4" thick aluminum with non-skid diamond tread on upper surface. All hardware on access assembly shall be stainless steel with a flush upper surface without protrusions. For safety, the door shall have a 300 lbs/sqft. rating and be fitted with a recessed staple for padlock. Door shall be furnished with a flush aluminum drop handle and automatic hold open arm.

## 2.7 VALVES AND PIPING

- A. Check Valve: Each pump shall be equipped with a full flow type check valve. Valve shall be constructed with flanged ends and fitted with an external lever and torsional spring. Valve seat shall be constructed of stainless steel, secured to the body to ensure concentricity, sealed by an O-ring, and shall be replaceable. The valve body shall be cast iron incorporating a clean-out port large enough to allow removal and/or replacement of the valve clapper without removing valve or piping from the line. Valve clapper shall have a molded neoprene seating surface incorporating low pressure sealing rings. Valve hinge pin and internal hinge arm shall be stainless steel supported on each end in brass bushings. Shaft nut shall have double O-rings which shall be easily replaceable without requiring access to interior of valve body. All internal hardware shall be stainless steel. Valve shall be rated at 175 PSI water working pressure, 350 PSI hydrostatic test pressure. Valves other than full flow type or valves mounted in such a manner that prevents the passage of a 3" spherical solid shall not be acceptable.
- B. Plug Valve: The plug valve shall be non-lubricated type. Valve body shall be semi-steel with flanged end connections drilled to 125 pound standard. Valve shall be furnished with a drip-tight shutoff plug mounted in stainless steel or Teflon over phenolic bearings, and shall have a resilient facing bonded to the sealing surface. Valves shall have ports designed to pass 3" spherical solids.
- C. Piping
  - 1. Flanged header pipe shall be centrifugally cast, ductile iron, complying with ANSI/AWWA A21.51/C115 and class 53 thickness.
  - 2. Flanges shall be cast iron class 125 and Comply with ANSI B16.1.
  - 3. Pipe and flanges shall be threaded and suitable thread sealant applied before assembling flange to pipe.
  - 4. Bolts holes shall be in angular alignment within 1/2° between flanges. Flanges shall be faced and a gasket finish applied.

5. All piping connected to the pump station shall be supported according to good commercial practice.

D. Discharge Gauge Kit

1. The pump station shall be equipped with a glycerin-filled pressure gauge to monitor discharge pressures. Gauge shall be a minimum of 4 inches in diameter, and shall be graduated in pounds per square inch (psi). Rated accuracy shall be 1 percent of full scale reading. Pressure gauge shall be graduated 0 to 60 psi minimum. Gauge kit shall be mounted and complete with all hoses and stainless steel fittings and shall include a shutoff valve installed in each connection to discharge piping and a three way valve to monitor either pump.

E. Vacuum Break / Air Release Valves

1. The header piping shall be equipped with ball type check valves on the discharge side of each pump to allow a vacuum break to occur, as well as assist purging air from the system in the event that there is insufficient atmospheric pressure available to support the resultant water column. A ball valve and PVC line extending through the pump station base for drainage back to the wet well shall be installed in each pump discharge line.

## 2.8 ELECTRICAL CONTROL COMPONENTS

- A. The pump station control panel will be tested as integral unit by the pump station manufacturer.

B. Panel Enclosure

1. The electrical control equipment shall be mounted within a 36"x30"x14" NEMA 1 stainless steel, dead front type control enclosure. The enclosure door shall be hinged and sealed with a neoprene gasket. It shall include a removable plated steel back panel on which control components shall be mounted. Back panel shall be secured to enclosure with collar studs. Operator controls shall be mounted on the enclosure door. The enclosure shall be mounted within the fiberglass valve enclosure. The control panel shall be equipped with vapor emission type corrosion inhibitors.
2. All components shall be of the highest industrial quality, securely fastened to a removable sub-plate with screws and lock washers. The sub-plate shall be tapped to accept all mounting screws. Self-tapping screws shall be used to mount any component. All operating controls and instruments shall be securely mounted and shall be clearly labeled to indicate function.
3. A main terminal block and ground bar shall be furnished for field connection of the electrical supply. The connections shall be designed to

accept copper conductors of sufficient size to serve the pump station loads. The main terminal block shall be mounted to allow incoming wire bending space in accordance with Article 373 of the National Electrical Code (NEC).

4. UL Label Requirement:

- a. Pump station controls shall conform to third party safety certification. The panel shall bear a serialized UL label listed for "Enclosed Industrial Control Panels". The enclosure, and all components mounted on the sub-panel or control cover shall conform to UL descriptions and procedures.

5. Auxiliary Power Transformer:

- a. The lift station shall be equipped with a 3 KVA step-down transformer to supply 115 volt, AC, single phase for the control and auxiliary equipment. The primary and secondary side of the transformer to be protected by a thermal magnetic circuit breaker, sized to meet the power requirements of the transformer. An operating mechanism shall penetrate the control panel door and a padlock able operator handle shall be secured on the exterior surface. Interlocks must prevent opening the door until circuit breakers are in "OFF" position.

6. Phase Monitor

- a. The control panel shall be equipped to monitor the incoming power and shut down the pump motors when required to protect the motor(s) from damage caused by phase reversal, phase loss, voltage unbalance, high voltage, and low voltage. An adjustable time delay shall be provided to minimize nuisance trips. The motor(s) shall automatically restart, following an adjustable time delay, when power conditions return to normal.

7. Transient Voltage Surge Suppressor

- a. The control panel shall be equipped with a transient voltage surge suppressor to minimize damage to the pump motors and control from transient voltage surges. The suppressor shall utilize silicon-oxide varistors encapsulated in a non-conductive housing. The arrester shall have a current rating of 60,000 Amps, and a Joule rating of 1,500.

8. Panel Heater

- a. The control panel shall be equipped with a panel heater to minimize the effects of humidity and condensation. The heater shall include a thermostat.

C. Motor Branch Components

1. A properly sized heavy duty air circuit breaker shall be furnished for each pump motor, and shall have a symmetrical RMS interrupting rating of 25,000 amperes at 460 volts. All circuit breakers shall be sealed by the manufacturer after calibration to prevent tampering. A padlocking operating mechanism shall be installed on each motor circuit breaker. Operator handles for the mechanisms shall be located on the door, with interlocks which permit the door to be opened only when circuit breakers are in the "OFF" position.
2. An open frame, across-the-line, NEMA rated magnetic motor starter shall be furnished for each pump motor. Starters of NEMA size 1 and above shall be designed for addition of at least two auxiliary contacts. Starters rated "O", "OO", or fractional size shall not be acceptable. Power contacts shall be double-break and made of cadmium oxide silver. Coils shall be epoxy molded for protection from moisture and corrosive atmospheres. The starter assembly shall be equipped with metal mounting plate for durability. All motor starters shall be equipped to provide under-voltage release and overload protection on all three phases. Motor starter contacts and coils shall be easily replaceable without removing the motor starter from its mounted position.
3. Overload relays shall be solid-state block type, having visual trip indication with trip-free operation. Electrically resetting the overload will cause one (1) normally open and one (1) normally closed isolated alarm/control contact to reset, thus re-establishing a control circuit. Trip setting shall be governed by solid-state circuitry and adjustable current setting. Trip classes shall be 10, 15 and 20. Additional features to include phase loss protection, selectable jam/stall protection and selectable ground fault protection. A reset pushbutton, mounted through the control panel door, shall permit resetting the overload relays without opening the door.

#### D. Other Control Components

1. The pump control panel shall be equipped to terminate pump operation due to high motor winding temperature or moisture in the motor housing, utilizing contacts in the pump motor housing. If either event should occur, the motor starter will drop out and a mechanical indicator visible on the door shall indicate that the pump motor has been shut down. The pump motor and the mechanical indicator shall require manual reset. Dry contacts, wired to terminal blocks, shall be furnished for each pump for thermal/moisture shutdown.
2. The control circuit shall be protected by a normal duty thermal-magnetic air circuit breaker which shall be connected in such a manner as to allow control power to be disconnected from all control circuits.
3. Pump mode selector switches shall be connected to permit manual start and manual stop for each pump individually, and to select automatic operation of each pump under control of the liquid level control system.

Manual operation shall override the liquid level control system. Selector switches shall be heavy duty, oil-tight design, with contacts rated NEMA A300 minimum.

4. Pump alternation shall be integral to the liquid level controller. Provisions for automatic alternation or manual selection shall also be integral to the liquid level controller.
5. Control panel shall be equipped with one oil-tight pilot light for each pump motor. Light shall be wired in parallel with the related pump motor starter to indicate that the motor is on or should be running.
6. Six digit elapsed time indicators (non-reset type) shall be connected to each motor starter to indicate the total running time of each pump in "hours" and "tenth of hours".
7. A switch shall be provided to permit the station operator to select automatic alternation of the pumps, to select pump number one to be the lead pump for each pumping cycle or to select pump number two to be the lead pump for each pumping cycle. Selector switch shall be oil-tight design, with contacts rated NEMA A300 minimum.
8. Control panel shall be equipped with an "Off/Auto" oil-tight switch and one oil-tight indicator light for the telemetry system. The light shall be wired in parallel with the switch and telemetry system to indicate when the telemetry system is in the "Auto" position and operating.
9. A duplex ground fault indicating utility receptacle providing 115 VAC, 60 Hertz, single phase current, shall be mounted on the door panel of the control enclosure. Receptacle circuit shall be protected by a 15 ampere thermal-magnetic circuit breaker.

#### E. Wiring

1. The control panel, as furnished by the manufacturer, shall be completely wired. The contractor shall field connect the power feeder lines to the main terminal block, final connections to the remote alarm devices, and the connections between the pump and the pump motor control. All wiring, workmanship, and schematic wiring diagrams shall be in compliance with applicable standards and specifications set forth by the National Electric Code (NEC).
2. All user serviceable wiring shall be type MTW or THW, 600 volts, and shall be color coded as follows:
  - a. Line and load circuits, AC or DC power      Black
  - b. AC control circuit less than line voltage      Red
  - c. DC control circuit      Blue
  - d. Interlock control circuit, from external source      Yellow

e.	Equipment grounding conductor	Green
f.	Current carrying ground	White
g.	Hot with circuit breaker open	Orange

3. Control circuit wiring inside the panel, with the exception of internal wiring of individual components, shall be of 16 gauge minimum, type MTW or THW, 600 volts. Power wiring shall be 14 gauge minimum.
4. Motor branch and other power conductors shall not be loaded above the temperature rating of the connected termination. Wires shall be clearly numbered at each end in accordance with the electrical diagrams. All wires on the sub-plate shall be bundled and tied.
5. Wires connected to components mounted on the enclosure door shall be bundled and tied in accordance with good commercial practice. Bundles shall be made flexible at the hinged side of the enclosure. Adequate length and flex shall be provided to allow the door to swing to its full open position without undue stress or abrasion on the wire or insulation. Bundles shall be held in place on each side of the hinge by mechanical fastening devices.

F. Conduit requirements are as follows:

1. All conduit and fittings shall be UL listed.
2. Liquid tight flexible metal conduit shall be constructed of smooth, flexible galvanized steel core with smooth abrasion resistant, liquid tight, polyvinyl chloride cover.
3. Conduit shall be supported in accordance with articles 346, 347, and 350 of the National Electric Code.
4. Conduit shall be sized according to the National Electric Code.
5. Seal ends of conduit with an approved sealant.

G. Grounding

1. The pump control manufacturer shall provide a common ground bar mounted on the enclosure back plate. The mounting surface of the ground bar shall have any paint removed before making final connections.
2. The contractor shall make the field connections to the main ground lug and each pump motor in accordance with the National Electric Code.

H. Identification

1. A permanent corrosion resistant name plate(s) shall be attached to the control and include the following information:

- a. Equipment serial number
  - b. Supply voltage, phase and frequency
  - c. Current rating of the minimum main conductor
  - d. Electrical wiring diagram number
  - e. Motor horsepower and full load current
  - f. Motor overload heater element
  - g. Motor circuit breaker trip current rating
  - h. Name and location of equipment manufacturer
2. Control components shall be permanently marked using the same identification shown on the electrical diagram. Identification label shall be mounted adjacent to the device.
  3. Switches, indicators, and instruments shall be plainly marked to indicate function, position, etc. Marking shall be mounted adjacent to and above the device.

## 2.9 LIQUID LEVEL CONTROL

- A. The manufacturer of the liquid level control system shall have a quality management system in place and shall be ISO 9001 certified.
  - B. The level control system shall start and stop the pump motors in response to changes in wet well level, as set forth herein.
  - C. The level control system shall be capable of operating as an air bubbler type level control system.
  - D. The level control system shall utilize the alternator relay to select first one pump, then the second pump, to run as lead pump for a pumping cycle. Alternation shall occur at the end of a pumping cycle.
  - E. The level control system shall utilize an electronic pressure switch which shall continuously monitor the wet well level, permitting the operator to read wet well level at any time. Upon operator selection of automatic operation, the electronic pressure switch shall start the motor for one pump when the liquid level in the wet well rises to the "lead pump start level". When the liquid is lowered to the "lead pump stop level", the electronic pressure switch shall stop this pump. These actions shall constitute one pumping cycle. Should the wet well level continue to rise, the electronic pressure switch shall start the second pump when the liquid reaches the "lag pump start level" so that both pumps are operating. These levels shall be adjustable as described below.
1. The electronic pressure switch shall include integral components to perform all pressure sensing, signal conditioning, EMI and RFI suppression, DC power supply and 120 volt outputs. Comparators shall

be solid state, and shall be integrated with other components to perform as described below.

2. The electronic pressure switch shall be capable of operating on a supply voltage of 12VDC in an ambient temperature range of 14 degrees F through 131 degrees F. Control range shall be 0 to 12.0 feet of water with an overall repeat accuracy of (plus/minus) 0.1 feet of water. Memory shall be retained using a non-volatile lithium battery back-up.
3. The electronic pressure switch shall consist of the following integral components: pressure sensor, display, electronic comparators and output relays.
  - a. The internal pressure sensor shall be a strain gauge transducer and shall receive an input pressure from the air bubbler system. The transducer shall convert the input to a proportional electrical signal for distribution to the display and electronic comparators. The transducer output shall be filtered to prevent control response to level pulsations or surges. The transducer range shall be 0-15 PSI, temperature compensated from -40 degrees F through 185 degrees F, with a repeat accuracy of (plus/minus) 0.25% full scale about a fixed temperature. Transducer overpressure rating shall be 3 times scale.
  - b. The electronic pressure switch shall incorporate a digital back lighted LCD panel display which, upon operator selection, shall indicate liquid level in the wet well, and the preset start and stop level for both lead and lag pump. The display shall include twenty (20), 0.19" high alpha-numeric characters calibrated to read out directly in feet of water, accurate to within one-tenth foot (0.1 foot), with a full scale indication of not less than 12 feet. The display shall be easily convertible to indicate English or metric units.
  - c. Level adjustments shall be electronic comparator set-points to control the levels at which the lead and lag pumps start and stop. Each of the level settings shall be easily adjustable with the use of membrane type switches, and accessible to the operator without opening any cover panel on the electronic pressure switch. Controls shall be provided to permit the operator to read the selected levels on the display. Such adjustments shall not require hard wiring, the use of electronic test equipment, artificial level simulation or introduction of pressure to the electronic pressure switch.
  - d. Each output relay in the electronic pressure switch shall be solid state. Each relay input shall be optically isolated from its output and shall incorporate zero crossover switching to provide high immunity to electrical noise. The "ON" state of each relay shall be indicated by illumination of a light emitting diode. The output of each relay shall be individually fused providing overload and short circuit

protection. Each output relay shall have an inductive load rating equivalent to one NEMA size 4 contactor. A pilot relay shall be incorporated for loads greater than a size 4 contactor.

4. The electronic pressure switch shall be equipped with an output board which shall include LED status indicators and a connector with cable for connection to the main unit.
5. The electronic pressure switch shall be equipped with pump start delay(s) preset at a fixed delay time of five (5) seconds.
6. Circuit design in which application of power to the lag pump motor starter is contingent upon completion of the lead pump circuit shall not be acceptable.
7. The electronic pressure switch shall be equipped with a simulator system capable of performing system cycle testing functions.
8. The electronic pressure switch shall be capable of controlling liquid levels in either a pump up or pump down application.
9. The electronic pressure switch shall be equipped with a security access code to prevent accidental set-up changes and provide liquid level set-point lock-out.
10. The electronic pressure switch shall be equipped with one (1) 0-33 ft. W.C. input, one (1) scalable analog input of either 0-5VDC, 0-10VDC, or 4-20mA, and one (1) 4-20mA scalable output. Output is powered by 10VDC supply. Load resistance for 4-20mA output shall be 100-400 ohms.
11. The electronic pressure switch shall include a DC power supply to convert 120VAC control power to 12VDC EPS power. The power supply shall be 500mA (6W) minimum and be UL listed Class II power limited power supply.
12. The electronic pressure switch shall be equipped with an electronic comparator and solid state output relay to alert maintenance personnel to a high liquid level in the wet well. An indicator, visible on the front of the control panel, shall indicate that a high wet well level exists. The alarm signal shall be maintained until the wet well level has been lowered and the circuit has been manually reset. High water alarm shall be furnished with a dry contact wired to terminal blocks.
13. The electronic pressure switch shall be equipped with an electronic comparator and solid state output relay to alert maintenance personnel to a low liquid level in the wet well. An indicator, visible on the front of the control panel, shall indicate that a low wet well level exists. The alarm signal shall be maintained until the cause for the low wet well level has been corrected and the circuit has been manually reset. A low liquid level

condition shall disable both pump motors. When the wet well rises above the low level point, both pump motors shall be automatically enabled. Low water alarm shall be furnished with a dry contact wired to terminal blocks.

- F. An alarm silence pushbutton and relay shall be provided to permit maintenance personnel to de-energize the audible alarm device while corrective actions are underway. After silencing the alarm device, manual reset of the alarm condition shall clear the alarm silence relay automatically. The pushbutton shall be oil tight design with contacts rated NEMA A300 minimum.

G. Air Bubbler System

1. The level control system shall be the air bubbler type, containing air bubbler piping which extends into the wet well. A pressure sensor contained within the electronic pressure switch shall sense the air pressure in this piping to provide wet well level signals for the remainder of the level control system.
2. Two vibrating reed, industrial rated, air pumps shall be furnished to deliver free air at a rate of approximately 5 cubic feet per hour and a pressure not to exceed 7 psi. Liquid level control systems utilizing air compressors delivering greater quantities of air at higher pressure, requiring pressure reducing valves, air storage reservoirs, and other maintenance nuisance items will not be acceptable. A selector switch shall be furnished to provide manual alternation of the air pumps. The switch shall be connected in such a manner that either pump may be selected to operate continuously. The selector switch shall be oil-tight design with contacts rated NEMA A300 minimum.
3. An air bell constructed of PVC 3 inches in diameter shall be provided for installation at the outlet of the air bubbler line in the wet well. The air bell shall have a 3/8" NPT tapped fitting for connection to the bubbler line.
4. An air flow indicator gauge shall be provided and connected to the air bubbler piping to provide a visual indication of rate of flow in standard cubic feet per hour.

H. The Wet-Well Sump:

1. The wet-well sumps shall be provided by the Contractor. The size of the pump station sump inside diameter and depth shall be as shown on the plans. The material of the sumps shall be reinforced concrete with an epoxy coating inside. The bottom of the sump shall be anchored in a concrete base or have other means to prevent the effects of buoyancy due to high groundwater elevations.

## 2.10 STANDBY PUMP DESIGN

- A. The pump must be gasoline engine driven self-priming and be properly selected to deliver the performance specified in the contract.
- B. The pump shall be skid-mounted with roll cage and rubber feet. The standby pump shall be able to be lifted onto a pickup truck bed by two persons.
- C. The pump shall be equipped with strainer and 90-degree discharge elbow. It shall be delivered with suction hose and strainer, and discharge hose with quick disconnect that matches the discharge bypass connection at each lift station.
- D. The standby pump shall be Gorman-Rupp Model 12D1-11, or approved equal.

## Part 3 - EXECUTION

### 3.1 EARTHWORK

- A. Excavation, trenching, and backfilling shall be according to the Specification And Construction Standard For Earthwork.

### 3.2 INSTALLATION

- A. Install, level, align, and lubricate pump station as indicated on project drawings. Installation must be in accordance with written instructions supplied by the manufacturer at time of delivery.
- B. Check motor and control data plates for compatibility to site voltage. Install and test the station ground prior to connecting line voltage to station control panel.
- C. Prior to applying electrical power to any motors or control equipment, check all wiring for tight connection. Verify that protective devices (fuses and circuit breakers) conform to project design documents. Manually operate circuit breakers and switches to ensure operation without binding. Open all circuit breakers and disconnects before connecting utility power. Verify line voltage, phase sequence and ground before actual start-up.

### 3.3 IDENTIFICATION

- A. Install identification and warning tape per Specification And Construction Standard For Earthwork.

- B. Install identifying labels permanently attached to equipment.
- C. Install operating instruction signs permanently attached to equipment and inside control panel cabinet.

#### 3.4 CONNECTIONS

- A. Sanitary sewer piping installation requirements are specified in the Specification And Construction Standard For Sanitary Sewerage. Contract drawings indicate general arrangement of piping.
- B. Electrical power and wiring shall be as specified in the contract.

#### 3.5 PAINTING

- A. Prepare and paint ferrous piping in wet wells, structural-steel supports, and anchor devices with coal-tar epoxy-polyamide paint according to SSPC-Paint 16.
- B. Paint field-welded areas to match factory coating.

#### 3.6 FIELD QUALITY CONTROL

- A. Notify the State's Representative a minimum of 24 hours before testing and start-up operations.
- B. Operational Test
  1. Prior to acceptance by State representative, an operational test of all pumps, and control systems shall be conducted to determine if the installed equipment meets the purpose and intent of the specifications. Tests shall demonstrate that all equipment is electrically, mechanically, structurally, and otherwise acceptable; it is safe and in optimum working condition; and conforms to the specified operating characteristics.
  2. After construction debris and foreign material has been removed from the wet well, contractor shall supply clear water volume adequate to operate station through several pumping cycles. Observe and record operation of pumps, suction and discharge gage readings, ampere draw, pump controls, and liquid level controls. Check calibration of all instrumentation equipment, test manual control devices, and automatic control systems.
  3. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.

#### C. Manufacturers Start-up Services

1. Coordinate station start-up with manufacturer's technical representative. The representative or factory service technician will inspect the completed installation, calibrate and adjust instrumentation, correct or supervise correction of defects or malfunctions, and instruct operating personnel in proper operation and maintenance procedures.

### 3.7 CLEANING

- A. Prior to acceptance, inspect interior and exterior of pump station for dirt, splashed material or damaged paint. Clean or repair accordingly. Remove from the job site all tools, surplus materials, scrap and debris.

### B. PROTECTION

1. The pump station should be placed into service immediately. If operation is delayed, station is to be stored and maintained per manufacturer's written instructions.

## 5.5 Specification And Construction Standard For Piped Utilities

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Specification And Construction Standard includes the following:
  1. Piping materials and installation instructions common to most piping systems.
  2. Transition fittings.
  3. Dielectric fittings.
  4. Sleeves.
  5. Identification devices.
  6. Piped utility demolition.
  7. Metal supports and anchorages.

#### 1.2 DEFINITIONS

- A. Exposed Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions.
- B. Concealed Installations: Concealed from view and protected from weather conditions, but subject to outdoor ambient temperatures. Examples include valve assembly installations within unheated valve enclosure buildings.

### 1.3 SUBMITTALS

- A. Welding certificates.

### 1.4 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

## PART 2 - PRODUCTS

### 2.1 JOINING MATERIALS

- A. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.
- B. Solvent Cements for Joining Plastic Piping:
  - 1. ABS Piping: ASTM D 2235.
  - 2. CPVC Piping: ASTM F 493.
  - 3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
  - 4. PVC to ABS Piping Transition: ASTM D 3138.
- C. AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.

### 2.2 SLEEVES

- A. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

- B. PVC Pipe: ASTM D 1785, Schedule 40.

### 2.3 IDENTIFICATION DEVICES

- A. Plastic Tape: Manufacturer's standard color-coded, pressure-sensitive, self-adhesive vinyl tape, at least 3 mils thick.
  - 1. Width: 1-1/2 inches on pipes with OD, including insulation, less than 6 inches; 2-1/2 inches for larger pipes.
  - 2. Color: Comply with ASME A13.1, unless otherwise indicated.
- B. Valve Tags: Stamped or engraved with 1/4-inch (6.4-mm) letters for piping system abbreviation and 1/2-inch sequenced numbers. Include 5/32-inch hole for fastener.
  - 1. Material: 0.032-inch-thick, polished brass or aluminum.
  - 2. Valve Tag Fasteners: Brass, wire-link or beaded chain; or brass S-hooks.

## PART 3 - EXECUTION

### 3.1 PIPED UTILITY DEMOLITION

- A. Disconnect, demolish, and remove piped utility systems, equipment, and components indicated to be removed.
  - 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
  - 2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
- B. If pipe, and/or insulation to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

### 3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and as specified in the contract.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and

arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved by the State's Representative.

- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping to permit valve servicing.
- E. Install piping at indicated slopes.
- F. Install piping free of sags and bends.
- G. Install fittings for changes in direction and branch connections.
- H. Select system components with pressure rating equal to or greater than system operating pressure.
- I. Verify final equipment locations for roughing-in.

### 3.3 PIPING JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- D. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
  - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.

2. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
3. PVC Nonpressure Piping: Join according to ASTM D 2855.

### 3.4 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Edit dielectric connection types in two subparagraphs below for each fluid.
3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

### 3.5 IDENTIFICATION

A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.

1. Plastic markers, with application systems. Install on insulation segment if required for hot non-insulated piping.
2. Locate pipe markers on exposed piping according to the following:
  - a. Near each valve and control device.
  - b. Near each branch, excluding short takeoffs for equipment and terminal units. Mark each pipe at branch if flow pattern is not obvious.
  - c. Near locations where pipes pass through walls or floors or enter inaccessible enclosures.
  - d. At manholes and similar access points that permit view of concealed piping.
  - e. Near major equipment items and other points of origination and termination.

B. Adjusting: Relocate identifying devices that become visually blocked by work of this or other Divisions.

### 3.6 PIPE RESTRAINTS

- A. Concrete Restraints: Concrete pipe restraints are to be installed where underground pipe changes in direction, to prevent damage to pipe systems from water hammer effects.
  - 1. Construct concrete restraints to dimensions indicated in the plans and at the locations shown.
  - 2. Use 3000-psi, 28-day compressive-strength concrete.
- B. Steel pipe restraints above ground are to be installed as indicated in the plans. Use ASTM A-36 steel for the pipe restraint material.
- C. Steel pipe restraints inside wet wells are to be installed as indicated in the plans and as recommended by the pump manufacturer. All restraint materials inside wet wells shall be stainless steel.

### 3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor utility piping.
- B. Field Welding: Comply with AWS D1.1.

## 5.6 Specification And Construction Standard For High Performance Coatings

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This specification and construction standard covers work, materials and equipment required for coating the interior of concrete manholes/sumps and rehabilitating the interior of existing concrete vaults by monolithic spray-application of a high-build, solvent-free epoxy coating to eliminate infiltration, provide corrosion protection, repair voids and enhance structural integrity. Procedures for surface preparation, cleaning, application and testing are described herein.

#### 1.2 SECTION INCLUDES

- A. Requirements for surface preparation, repairs and solvent-free epoxy coating application to specified surfaces.

1.3 RELATED SPECIFICATIONS AND STANDARDS

- A. Specification And Construction Standard For Piped Utilities.
- B. Specification And Construction Standard For Packaged Pumping Stations.

1.4 REFERENCES

- A. ASTM D638 - Tensile Properties of Plastics.
- B. ASTM D790 - Flexural Properties of Unreinforced and Reinforced Plastics.
- C. ASTM D695 - Compressive Properties of Rigid Plastics.
- D. ASTM D4541 - Pull-off Strength of Coatings Using a Portable Adhesion Tester.
- E. ASTM D2584 - Volatile Matter Content.
- F. ASTM D2240 - Durometer Hardness, Type D.
- G. ASTM D543 - Resistance of Plastics to Chemical Reagents.
- H. ASTM C109 - Compressive Strength Hydraulic Cement Mortars.
- I. ACI 506.2-77 - Specifications for Materials, Proportioning, and Application of Shotcrete.
- J. ASTM C579 - Compressive Strength of Chemically Setting Silicate and Silica Chemical Resistant Mortars.
- K. ASTM - The published standards of the American Society for Testing and Materials, West Conshohocken, PA.
- L. NACE - The published standards of National Association of Corrosion Engineers (NACE International), Houston, TX.
- M. SSPC - The published standards of the Society of Protective Coatings, Pittsburgh, PA.
- N. Los Angeles County Sanitation District - Evaluation of Protective Coatings for Concrete.
- O. SSPWC 210-2.3.3 - Chemical resistance testing published in the Standard Specifications for Public Works Construction, 1997 edition (otherwise known as "The Greenbook").

## 1.5 SUBMITTALS

- A. Submittal Procedures: As required by the contract provisions.
- B. The following items shall be submitted:
  - 1. Technical data sheet on each product used, including ASTM test results indicating the product conforms to and is suitable for its intended use per these specifications.
  - 2. Material Safety Data Sheets (MSDS) for each product used.
  - 3. Project specific guidelines and recommendations.
  - 4. Applicator Qualifications:
    - a. Manufacturer certification that Applicator has been trained and approved in the handling, mixing and application of the products to be used. Letter of certification shall be current and validated by manufacturer with a date to reflect specific bid or proposal submittal.
    - b. Certification that the equipment to be used for applying the products has been manufactured or approved by the epoxy coating manufacturer and Applicator personnel have been trained and certified for proper use of the equipment.
    - c. Five (5) recent references of Applicator indicating successful applications of a high-build solvent-free epoxy coating by heated plural component spray applications.
    - d. Proof of any required federal, state or local permits or licenses necessary for the project.
  - 5. Or Equal Submittal: In order to be considered as an equal product, said product will have to meet the minimum physical properties of the approved products as referenced in paragraph 2.4 as measured by the applicable ASTM standards referenced in paragraph 1.4. Testing results shall be performed and presented by a third-party testing laboratory.
  - 6. In order for a product to be considered equal the submitted product must provide proof of successfully passing the Los Angeles County Sanitation Districts Coating Evaluation Study or evidence from the City of Los Angeles Department of General Services Standards Division indicating the Department tested and the product "passed" SSPWC Section 210-2.3 Chemical Resistance Test. An applicator that has been trained and certified by the manufacturer must install all products.

## 1.6 QUALITY ASSURANCE

- A. Applicator shall initiate and enforce quality control procedures consistent with applicable ASTM, NACE and SSPC standards and the epoxy coating manufacturer's recommendations.
- B. A NACE certified coating inspector ("Inspector") shall be provided by Contractor. The Inspector will observe surface preparation, application and material handling procedures to ensure adherence to the specifications.

1.7 STORAGE AND HANDLING

- A. Products are to be kept dry, protected from weather and stored under cover.
- B. Products are to be stored and handled according to their material safety data sheets.

1.8 SITE CONDITIONS

- A. Applicator shall conform to all local, state and federal regulations including those set forth by OSHA, RCRA and the EPA and any other applicable authorities.

1.9 WARRANTY

- A. Applicator shall warrant all work against defects in materials and workmanship for a period of one (1) year, unless otherwise noted, from the date of final acceptance of the project. Applicator shall, within a reasonable time after receipt of written notice thereof, repair defects in materials or workmanship which may develop during said one (1) year period, and any damage to other work caused by such defects or the repairing of same, at their own expense and without cost to the State.

1.10 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. High-Performance Coatings: Full, unused containers equal to 5 percent of each material and color applied, but not less than 1 gallon or 1 case, as appropriate.

PART 2 - PRODUCTS

## 2.1 EXISTING PRODUCTS

- A. Standard Portland cement or new concrete (not quick setting high strength cement) must be well cured prior to application of the epoxy coating.
- B. Cementitious patching and repair materials shall not be used unless proof of suitability and procedures for topcoating with an epoxy coating are approved by the repair materials manufacturer or epoxy coating manufacturer. Project specific submittals should be provided including application, cure time and surface preparation procedures which permit optimum bond strength with the epoxy coating.
- C. Remove existing coatings prior to application of the new epoxy coating. Applicator is to maintain strict adherence to applicable NACE and SSPC recommendations with regard to proper surface preparation and compatibility with existing coatings.

## 2.2 EPOXY COATING MANUFACTURER

- A. Raven Lining Systems, Inc., Tulsa, Oklahoma 800-324-2810 or 918-615-0020 or FAX 918-615-0140.
- B. Approved equal.

## 2.3 REPAIR MATERIALS

- A. Repair materials shall be used to fill voids, structurally reinforce and/or rebuild surfaces, etc. as determined necessary by the State and epoxy coating applicator. Repair materials shall be compatible with the specified epoxy coating and shall be applied in accordance with the manufacturer's recommendations.
- B. The following products may be accepted and approved as compatible repair basecoat materials for epoxy topcoating for use within the specifications:
  - 1. 100% solids, solvent-free epoxy grout specifically formulated for epoxy topcoating compatibility. The epoxy grout manufacturer shall provide instructions for trowel or spray application and for epoxy topcoating procedures.
  - 2. Factory blended, rapid setting, high early strength, non-shrink repair mortar that can be trowelled or pneumatically spray applied may be approved if specifically formulated to be suitable for epoxy topcoating.

2.4 EPOXY COATING

- A. Raven Lining Systems' Raven 405 epoxy coating system - a 100% solids, solvent-free two-component epoxy resin system thixotropic in nature and filled with select fillers to minimize permeability and provide sag resistance acceptable to these specifications.

Product type	Amine cured epoxy
Color	Light Blue
Solids Content (vol %)	100
Mix Ratio	3:1
Compressive Strength, psi	18,000
Tensile Strength, psi	7,600
Tensile Elongation, %	1.50
Flexural Modulus, psi	600,000
Hardness, Type D	88
Bond Strength - Concrete	>Tensile Strength of Concrete
Chemical Resistance:	
Severe Municipal Sewer:	All types of service
Successful Pass:	Sanitation District of L.A. County Coating Evaluations Study or SSPWC 210.2.3.3

2.5 EPOXY COATING APPLICATION EQUIPMENT

- A. Manufacturer approved heated plural component spray equipment shall be used in the application of the specified epoxy coating.

2.6 REPAIR MATERIAL SPRAY APPLICATION EQUIPMENT (if spray applied)

- A. Spray applied repair materials shall be applied with manufacturer approved equipment.

PART 3 - EXECUTION

3.1 ACCEPTABLE APPLICATORS

- A. Repair material applicators shall be trained to properly apply the cementitious mortar according to manufacturer's recommendations.

- B. Epoxy coating must be applied by a Certified Applicator of the epoxy coating manufacturer and according to manufacturer specifications.

### 3.2 EXAMINATION

- A. All structures to be coated shall be readily accessible to Applicator.
- B. Appropriate actions shall be taken to comply with local, state and federal regulatory and other applicable agencies with regard to environment, health and safety.
- C. Any active flows shall be dammed, plugged or diverted as required to ensure that the liquid flow is maintained below the surfaces to be coated. Flows should be totally plugged and/or diverted when coating the invert. All extraneous flows into the manhole or vaults at or above the area coated shall be plugged and/or diverted until the epoxy has set hard to the touch.
- D. Installation of the epoxy coating shall not commence until the concrete substrate has properly cured in accordance with these specifications.
- E. Temperature of the surface to be coated should be maintained between 40 deg F and 120 deg F during application. Prior to and during application, care should be taken to avoid exposure of direct sunlight or other intense heat source to the structure being coated.

### 3.3 SURFACE PREPARATION

- A. Applicator shall inspect all specified surfaces prior to surface preparation. Applicator shall notify State Representative of any noticeable disparity in the surfaces which may interfere with the proper preparation or application of the repair material and/or epoxy coating.
- B. Applicator shall perform all surface preparation and epoxy coating installation.
- C. All contaminants including: oils, grease, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, or other contaminants shall be removed. All concrete or mortar that is not sound or has been damaged by chemical exposure shall be removed to a sound concrete surface or replaced.
- D. Surface preparation method(s) should be based upon the conditions of the substrate, service environment and the requirements of the repair materials and/or epoxy coating to be applied. Surfaces to receive repair materials and/or epoxy coating shall be cleaned and abraded to produce a sound surface with adequate profile and

porosity to provide a strong bond between the repair materials and/or epoxy coating and the substrate.

- E. Surfaces to receive protective coating shall be cleaned and abraded to produce a sound concrete surface with adequate profile and porosity to provide a strong bond between the protective coating and the substrate. Generally, this can be achieved with low pressure water cleaning using equipment capable of 5,000 psi at 5 gpm, using a zero degree rotating nozzle. Other methods such as high pressure water jetting (refer to NACE Standard No. 5/SSPC-SP12), abrasive blasting, shotblasting, grinding, scarifying or acid etching may also be used. Detergent water cleaning and hot water blasting may be necessary to remove oils, grease or other hydrocarbon residues from the concrete. Whichever method(s) are used, they shall be performed in a manner that provides a uniform, sound clean neutralized surface that is not excessively damaged.
- F. Infiltration shall be stopped by using a material which is compatible with the repair materials and is suitable for topcoating with the epoxy coating.
- G. All surfaces should be inspected by the Inspector during and after preparation and before the repair material is applied.

#### 3.4 APPLICATION OF REPAIR MATERIALS

- A. Areas where structural steel has been exposed or removed shall be repaired in accordance with the State's recommendations.
- B. Repair materials shall meet the specifications herein. The materials shall be trowel or spray applied utilizing proper equipment on to specified surfaces. The material thickness shall be specified in accordance with the project's requirements and manufacturer's recommendations.
- C. Cementitious repair materials shall be trowelled to provide a smooth surface with an average profile equivalent to coarse sandpaper to optimally receive the epoxy coating. No bugholes or honeycomb surfaces shall remain.
- D. The repair materials shall be permitted to cure according to manufacturer recommendations. Curing compounds shall not be used unless approved for compatibility with the specified epoxy coating.
- E. After abrasive blast and leak repair is performed, all surfaces shall be inspected for remaining laitance prior to epoxy coating application. Any evidence of remaining contamination or laitance shall be removed by additional abrasive blast, shotblast or other approved method. If

repair materials are used, refer to these specifications for surface preparation. Areas to be coated must also be prepared in accordance with these specifications after receiving a cementitious repair material and prior to application of the epoxy coating.

- F. All surfaces shall be inspected by Inspector during and after preparation and before the epoxy coating is applied.

### 3.5 APPLICATION OF EPOXY COATING

- A. Application procedures shall conform to the recommendations of the epoxy coating manufacturer, including material handling, mixing, environmental controls during application, safety, and spray equipment.
- B. The spray equipment shall be specifically designed to accurately ratio and apply the specified epoxy coating materials and shall be regularly maintained and in proper working order.
- C. The epoxy coating material must be spray applied by a Certified Applicator of the epoxy coating manufacturer.
- D. Specified surfaces shall be coated by spray application of a moisture tolerant, solvent-free, 100% solids, epoxy coating as further described herein. Spray application shall be to a minimum 125 mil wet and dry film
- E. If necessary, subsequent topcoating or additional coats of the epoxy coating should occur as soon as the basecoat becomes tack free, but no later than the recoat window for the specified products. Additional surface preparation procedures will be required if this recoat window is exceeded.
- F. Surface of finished coating shall be smooth to prevent sewage residues from adhering to the interior vault surfaces.

### 3.6 TESTING AND INSPECTION

- A. Mill Gauge Test. During application, Applicator shall regularly perform and record epoxy coating thickness readings with a wet film thickness gage, such as those available through Paul N. Gardner Company, Inc. meeting ASTM D4414 - Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages, to ensure a monolithic coating and uniform thickness during application. A minimum of three readings per 200 square foot area shall be recorded. Applicator shall submit all documentation on thickness

readings to Inspector on a daily basis when coating application occurs.

B. High Voltage Spark Test. Applicator shall perform holiday detection on all surfaces coated with the epoxy coating in the presence of Inspector. After the epoxy coating has set hard to the touch, surfaces shall first be dried, an induced holiday shall then be made on to the coated concrete surface and shall serve to determine the minimum/maximum voltage to be used to test the coating for holidays at that particular area. The spark tester shall be initially set at 100 volts per 1 mil (25 microns) of film thickness applied but may be adjusted as necessary to detect the induced holiday (refer to NACE RPO188-99). All detected holidays shall be marked and repaired by abrading the coating surface with grit disk paper or other hand tooling method. After abrading and cleaning, additional epoxy coating material can be hand applied to the repair area. All touch-up/repair procedures shall follow the epoxy coating manufacturer's recommendations. (Note: This procedure is sometimes difficult or impossible to perform in tight manhole or vault structures or may provide unreliable readings when testing coatings applied to concrete.)

C. Adhesion Testing. The adhesion tests shall be performed on a minimum of one or 15% of all rehabilitated structures, whichever is greater, or as shown on the Plan and/or specified in the Special Provisions. Adhesion testing shall be conducted after the liner system has cured per manufacturer instruction and in accordance with ASTM D4541 as modified herein. A minimum of one 20 mm dolly shall be affixed to the lined surface of the structure at the upper section or cone area, mid section and at the bottom, unless otherwise specified in the Special Provisions. Each testing location shall be identified by the Engineer. The adhesive used to attach the dollies to the liner shall be rapid setting with tensile strength in excess of the liner material and permitted to cure in accordance with manufacturer recommendations. The lining material and dollies shall be adequately prepared to receive the adhesive. Prior to pull test, the Contractor shall utilize a scoring device to cut through the coating until the substrate is reached. Extreme care shall be required while scoring to prevent micro cracking in the coating, since cracks may cause failures at diminished strengths. Failure due to improper dolly adhesive or scoring shall require retesting. The pull tests in each area shall meet or exceed 200 psi. and shall include subbase adhered to the back of the dolly or no visual signs of coating material in the test hole. Pull tests with results between a minimum 150 psi and 200 psi shall be acceptable if more than 50% of the subsurface is adhered to the back of the dolly. A test result can be discarded, as determined by the Engineer, if there is a valid nonstatistical reason for discarding the test results as directed by Sections 8.4 and 8.5 of ASTM D4541. If any test fails, a minimum of

three additional locations in the section of the failure shall be tested, as directed by the Engineer. If any of the retests fail all loosely adhered or unadhered liner in the failed area, as determined by the Engineer, shall be removed and replaced at the Contractor's expense. If a structure fails the adhesion test, one additional structure or 10% of the initial number of structures selected for testing shall be tested at the discretion of the Engineer and/or as specified in the Special Provisions.

- D. A final visual inspection shall be made by the Inspector and Applicator. Any deficiencies in the finished coating shall be marked and repaired by Applicator according to the procedures set forth herein.
- E. The municipal sewer system may be put back into non-severe operational service as soon as the final inspection has taken place. Consult epoxy coating manufacturer for further recommendations.

## **5.7 Specification And Construction Standard For Earthwork**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Specification and Construction Standard includes the following:
  - 1. Preparing subgrades.
  - 2. Excavating and backfilling.
  - 3. Base course for concrete pads and roadways.

#### **1.2 RELATED WORK SPECIFIED ELSEWHERE IN THE CONTRACT**

- A. Constraints and Mitigations
- B. Water Pollution Control

#### **1.3 DEFINITIONS**

- A. Backfill: Soil materials used to fill an excavation.
- B. Base Course: Layer placed between the subbase course and asphalt paving.

- C. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Excavation: Removal of material encountered above subgrade elevations.
  - 1. Additional Excavation: Excavation below subgrade elevations as directed by State's Representative. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
  - 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by State's Representative. Unauthorized excavation, as well as remedial work directed by State's Representative, shall be without additional compensation.
- F. Fill: Soil materials used to raise existing grades.
- G. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- H. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below base, or topsoil materials.
- I. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.
- J. Initial Backfill: From the haunches to 6" above the top of the pipe.
- K. Final Backfill: Trench backfill measured from the top of the pipe embedment material to the subgrade or finished grade.

#### 1.4 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by State or others unless permitted in writing by State's Representative and then only after arranging to provide temporary utility services according to requirements indicated.

#### 1.5 GUARANTEE

- A. Any backfill placed under this contract which subsides or settles below adjacent ground level during the guarantee period shall be brought to grade by the Contractor by adding compacted backfill or additional paving in paved areas.

## PART 2 - PRODUCTS

### 2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM, or a combination of these group symbols; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: ASTM D 2487 Soil Classification Groups GC, SC, ML, MH, CL, CH, OL, OH, and PT, or a combination of these group symbols.
- D. Backfill and Fill: Satisfactory soil materials.
- E. Base: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 9 percent passing a No. 200 sieve.
- F. Bedding: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 90 to 100 percent passing a No. 4 sieve and not more than 5 percent passing a No. 200 sieve.
- G. Select backfill shall be imported, clean sand that does not exceed 3/8 inches in any dimension, and be free from vegetable matter and debris.
- H. Native backfill shall be from either the excavation or an approved source, free from rocks or clods larger than 6 inches, vegetable matter, and debris.
- I. Select backfill for trenches in paved areas shall be 2-sack cement-sand slurry.
- J. Detectable Warning Tape: Polyethylene film warning tape encasing a metallic core, minimum 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, freezing temperatures or frost, and other hazards created by earthwork operations. Provide protective insulating materials as necessary.
- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- D. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

### 3.2 EXCAVATION

- A. Trenching near pipelines, services, buildings, or structures shall be done using methods that will not result in damage to the pipelines, services, buildings, or structures. Damage caused by Contractor shall be repaired or replaced by the Contractor at Contractor's expense and to the satisfaction of the State, including the disinfecting of any damaged potable waterline.
- B. In planted areas, care should be exercised to avoid unnecessary damage to ground cover or foliage. Any unnecessarily injured vegetation shall be re-established with like kind upon completion of backfill operations as directed by the State's Representative.
- C. The Contractor shall remove any water that may be found or accumulates in the trenches, and shall do all work required to keep clear of water while the utility is being installed and until final tests are completed.
- D. Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.
  - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

- E. Excavate for structures, pavements, and walks to indicated elevations and dimensions. Extend excavations for placing and removing concrete formwork, for installing services and other construction, and for inspections. Trim bottoms to required lines and grades to leave solid base to receive other work.
- F. Excavate utility trenches to indicated gradients, lines, depths, and invert elevations of uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit.
  - 1. Excavate trenches deeper than bottom of pipe elevation, 6 inches deeper in rock, 4 inches deeper elsewhere, to allow for bedding course. Hand excavate for bell of pipe.
- G. Proof roll subgrades, before filling or placing aggregate courses, with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated subgrades.
- H. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities.
- I. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used when approved by State's Representative.
  - 1. Fill unauthorized excavations under other construction or utility pipe as directed by State's Representative.
- J. Stockpile borrow materials and satisfactory soil materials, without intermixing, in shaped, graded, drained, and covered stockpiles. Stockpile soil materials away from edge of excavations and outside drip line of remaining trees.

### 3.3 BACKFILLS AND FILLS

- A. Time intervals between excavation or trenching and backfilling operations shall be kept minimal; however, backfill shall not be placed until the work has been inspected, tested, and/or approved by the State's Representative.
- B. Backfill of trenches beneath the dripline of trees shall not be compacted, except as a road bed. Backfill shall be added in 8-inch layers and each layer shall be thoroughly saturated with water.

- C. **Utility Trench Backfill:** Place, compact, and shape bedding course to provide continuous support for pipes and conduits over rock and other unyielding bearing surfaces and to fill unauthorized excavations.
  - 1. Place and compact initial trench backfill to a height of 12 inches over the utility pipe or conduit. Place and compact final backfill of satisfactory soil material to final subgrade.
  - 2. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.
- D. **Fill:** Place fill material in layers to required elevations. Compact each layer to 85 percent minimum relative compaction.
- E. **Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.**
- F. **Compaction:** Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- G. **Compact soil to not less than the following percentages of maximum dry density according to ASTM D 1557:**
  - 1. Under structures, slabs, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill material at 95 percent.
  - 2. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 85 percent.
- H. **Grading:** Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated. Grade lawns, walks, and unpaved subgrades to tolerances of plus or minus 1 inch and pavements and areas within building lines to plus or minus 1/2 inch.
- I. **Base Courses:** Under pavements, walks, and where used as a surface course. Place base course material over subbase. Compact to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

- J. Under slabs-on-grade: Compact to required cross sections and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

#### 3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor shall engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports. Contractor shall provide for a maximum of two tests for the roadway, and one test for the overflow chamber or pump station structure.
- B. Allow testing agency to test and inspect subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- C. When testing agency reports that subgrades, fills, or backfills have not achieved the degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

#### 3.5 PROTECTION AND DISPOSAL

- A. Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
- D. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

## **ELEMENT 6 OVERFLOW EMERGENCY RESPONSE PLAN**

This section of the Sewer System Management Plan (SSMP) provides an overview and summary of the emergency response documents and procedures for sanitary sewer overflows (SSOs) within the Angel Island State Park Collection System.

### **6.1 Regulatory Requirements for the Overflow Emergency Response Plan**

The applicable required items in the Statewide General Waste Discharge Requirements for the Overflow Emergency Response Plan are as follows:

The collection system agency 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 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 the MRP, the California Water Code, other State Laws, and other applicable Regional Water Board Waste Discharge Requirements (WDR) or National Pollutant Discharge Elimination System (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 untreated wastewater and prevent discharge of untreated wastewater to waters of the United States and 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.

## 6.2 Discussion Of The Overflow Emergency Response Plan

### Flow Chart For SSO Response and Reporting

In Element 2, Organizational Structure, Figure 2-2, Flow Chart For SSO Response and Reporting (page 9) provides guidance for SSO response and reporting from the receipt of a sewer overflow complaint, through response and cleanup, to reporting of the overflow to the appropriate government agencies. The flow chart is relevant to anyone involved in the overflow response process, including the person initially receiving information about a SSO, the response field crew and supervisor, the person responsible for submitting overflow reports, and other emergency responders who could potentially be involved in the process such as police and fire departments. Phone numbers for contacts identified in the flow chart are listed in Table 2-1, Contact Numbers for SSO Chain of Communication (page 10).

### Overflow Emergency Procedures

The Overflow Emergency Procedures in Table 6-1 provide detailed response procedures for the first responder and field crew responsible for identifying the source of the problem, correcting the cause of the overflow, and cleaning the surrounding area. These procedures are most relevant to maintenance staff responsible for responding to overflows.

**Table 6-1 Overflow Emergency Procedures**

1. Get Help. Take manhole tools, shovels, and sewer rodder to spill site.
2. Contain the spill immediately. Trench or berm the area as needed.
3. Protect the public and environment by diverting wastewater to a downstream manhole or by pumping wastewater into a pumper truck.

4. Shut off all upstream sources of sewage. Get help closing restrooms (maintenance phone no. 435-9221, headquarters phone no. 435-5390). Turn off lift station that has direct influence on gravity line/service access location.
5. Begin unplugging the blockage with a sewer rodder or hand rodder or begin repairs on the broken sewage line.
6. Protect the public by isolating the area. Use warning tape, barricades, and vehicles to keep the public away from the area. Warning signs are stored at the Maintenance Shop. Post the signs at all entry points to the affected areas.
7. If the spill enters a stream, obtain water samples upstream and downstream from the spill site for bacteriological and BOD testing.
8. Begin notification and reporting procedures prescribed in Figure 2-2 on page 9 of this Sewer System Management Plan.
9. Clean up the spill area by removing contaminated duff, soil or other material contaminated with sewage. Properly dispose of material as hazardous waste and spray the area with a chlorine bleach solution.
10. Maintain isolation of the area for at least 48 hours or longer as required for proper drying.
11. Modify the collection system to prevent future overflows.
<b><u>IMPORTANT INTERNAL PHONE NUMBERS</u></b>
Maintenance Shop: (415) 435-9221 (for visitor notification, facilities closure, portable facilities, clean up and mitigation)
Water and Sewer Plant Supervisor: Richard Ables (415) 328-3941
Maintenance Supervisor: N/A
Maintenance Chief: Gerald O'Reilly (415) 435-1748
State Park Peace Officer (on duty) (415) 435-5390 or (916) 358-1310 Northern Communications / State Park Peace Officers dispatch / com center

Overflow Reports The authorized representative must enter initial and final reports of the spill into the on-line California Integrated Water Quality System (CIWQS) database as outlined in Figure 2-2, Flow Chart For SSO Response and Reporting (page 9). Also, a written account of the overflow must be included in the monthly report that is mailed to the Regional Water Quality Control Board (this will not apply to some parks that have a collection system with an unregulated septic treatment system or wastewater that is treated by an outside utility).

Immediate Notifications

Officials requiring immediate notification of the SSO vary depending on the size of the spill, whether it impacted surface waters, or has the potential to impact human health. Table 6-2 lists these officials, and the circumstances under which they are notified immediately.

**Table 6-2. Officials Receiving Immediate Notification of SSOs**

CONTACT	CIRCUMSTANCE FOR IMMEDIATE NOTIFICATION
Chris Hansen – Water/Sewer Treatment Plant Supervisor / Chief Plant Operator  Richard Ables –Water/Sewer Plant Supervisor Gordon Ramsey – Water/Sewer Treatment Plant Supervisor	All spills
<b>Cal E•M•A – per the fact sheet dated March 2010, all notifications to effected agency’s are made by the Cal E•M•A Warning Center</b>	Overflows $\geq$ 1000 gallons <b>AND/OR</b> overflows that reach a drainage channel or surface water
<b>Cal E•M•A – per the fact sheet dated March 2010, all notifications to effected agency’s are made by the Cal E•M•A Warning Center</b>	SSO overflows that reach a drainage channel <b>and/or</b> surface water <b>or</b> storm drainpipe that was not fully captured and returned to the sanitary sewer system

For phone numbers, see Table 2-1, Contact Numbers for SSO Chain of Communication (page 10).

#### Public Notification

Potential public notification measures include temporary signage to indicate any spill, polluted surface water, or groundwater due to an SSO and notification through media outlets. The District Maintenance Chief is responsible for determining whether temporary signage and further notification are necessary. The District Superintendent is the contact person for all media notification.

#### Updates and Training

The SSO response plan should be reviewed annually and modified as needed. Also, staff and any on-call contractors should receive annual training on the Emergency Response Plan.

### **6.3 SSO Volume Estimation Procedures**

A variety of approaches exist for the estimation of the volume of sanitary sewer overflows. This section documents three methods that can be used for estimating overflow volumes. Other methods are also acceptable. Every effort shall be made to estimate the overflow volume as accurately as possible.

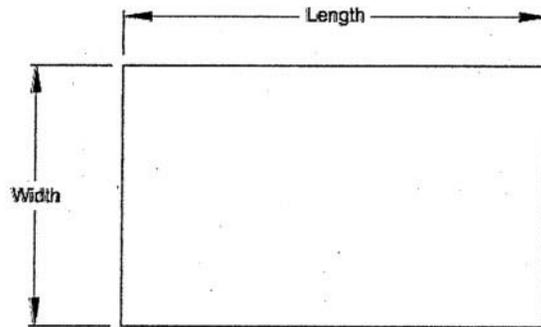
#### **METHOD 1**

The volume of some small overflows can be estimated if the overflow is contained in one area. The shape and dimensions are used to calculate the area of the overflow and the depth is used to estimate the volume. Follow the steps below to estimate a contained volume:

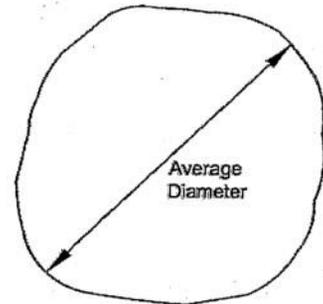
1. Sketch the shape of the contained sewage.
2. Measure or pace off the dimensions.
3. Measure the depth at several locations.
4. Calculate an average depth for the entire area by adding all measured depths together and dividing by the number of measurements taken.
5. Convert all dimensions, including depth, to feet.
6. Calculate the volume using the following formulas. Refer to drawings below for dimensions.

a. Rectangular Shape (gallons)= length x width x depth x 7.48

b. Circular Shape (gallons) = diameter x diameter x depth x 5.87



Rectangular Shape

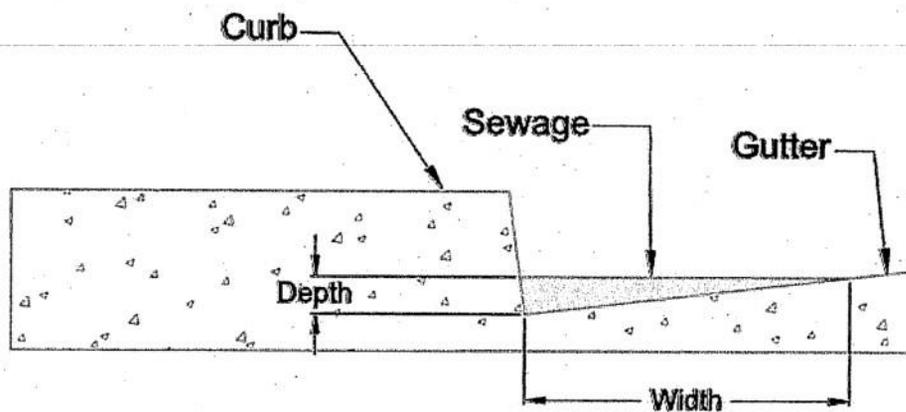


Circular Shape

### METHOD TWO

The volume of an overflow contained in a roadway gutter can be estimated by following these steps:

1. Measure the length of gutter containing the overflow.
2. Measure the depth and width of the overflow in the gutter. Refer to the drawing below.



3. Convert all measurements to feet.

4. Calculate the overflow volume using the following equation:

$$\text{Volume (gal)} = \text{length} \times \text{width} \times \text{depth} \times 3.74$$

**METHOD THREE**

In this method, separate estimates are made for the overflow duration and flow rate. Below are four options for estimating the overflow rate:

1. SSO Flow Estimation Photographs: Figure 6-1, Flow Estimation Photographs, show sewage flowing from manholes at different flow rates. For this option, the observations of staff members are used to select the appropriate overflow rate from the photographs below.

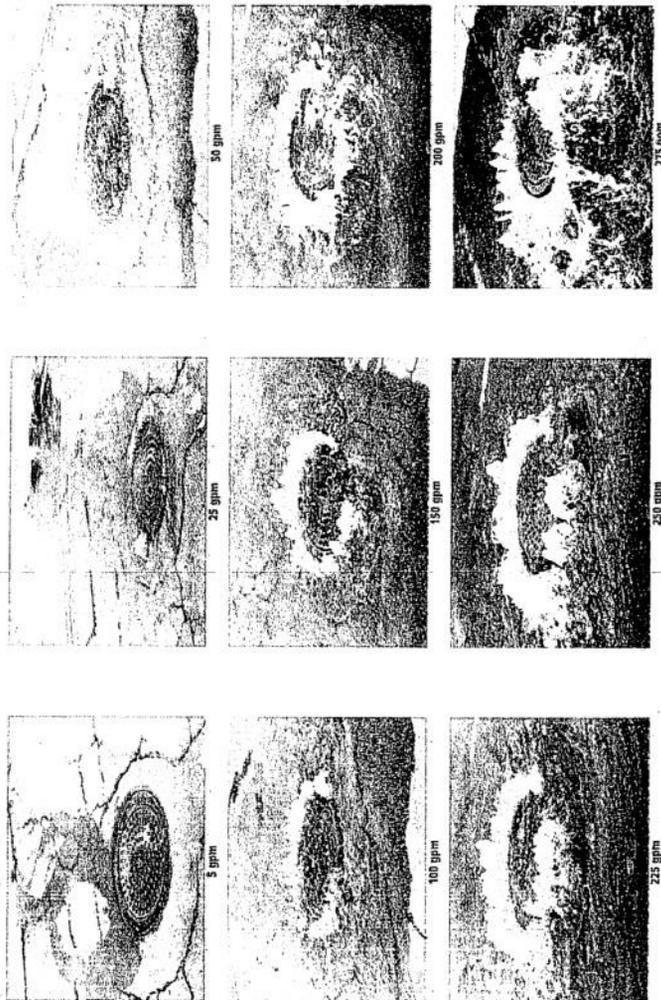


Figure 6-1 Flow Estimation Photographs

2. Tabulated Values: For this option, Tables 6-3, 6-4, and 6-5 contain tabulated flows from manholes. Flows were determined by Ed Euyen, Civil Engineer.

**OVERFLOW OUT OF MANHOLE WITH COVER IN PLACE**

24 - Inch Cover

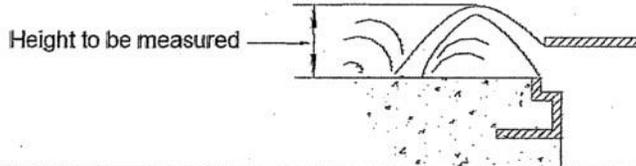
Height of spout above M/H rim H in inches	S S O FLOW Q		Min. Sewer size in which these flows are possible
	in gpm	in MGD	
1/4	1	0.001	
1/2	3	0.004	
3/4	6	0.008	
1	9	0.013	
1 1/4	12	0.018	
1 1/2	16	0.024	
1 3/4	21	0.030	
2	25	0.037	
2 1/4	31	0.045	
2 1/2	38	0.054	
2 3/4	45	0.065	
3	54	0.077	
3 1/4	64	0.092	
3 1/2	75	0.107	
3 3/4	87	0.125	
4	100	0.145	
4 1/4	115	0.166	
4 1/2	131	0.189	
4 3/4	148	0.214	
5	166	0.240	
5 1/4	185	0.266	
5 1/2	204	0.294	
5 3/4	224	0.322	6"
6	244	0.352	
6 1/4	265	0.382	
6 1/2	286	0.412	
6 3/4	308	0.444	
7	331	0.476	
7 1/4	354	0.509	
7 1/2	377	0.543	
7 3/4	401	0.578	8"
8	426	0.613	
8 1/4	451	0.649	
8 1/2	476	0.686	
8 3/4	502	0.723	
9	529	0.761	

36 - Inch Cover

Height of spout above M/H rim H in inches	S S O FLOW Q		Min. Sewer size in which these flows are possible
	in gpm	in MGD	
1/4	1	0.002	
1/2	4	0.006	
3/4	8	0.012	
1	13	0.019	
1 1/4	18	0.026	
1 1/2	24	0.035	
1 3/4	31	0.044	
2	37	0.054	
2 1/4	45	0.065	
2 1/2	55	0.079	
2 3/4	66	0.095	
3	78	0.113	
3 1/4	93	0.134	
3 1/2	109	0.157	
3 3/4	127	0.183	
4	147	0.211	
4 1/4	169	0.243	
4 1/2	192	0.276	
4 3/4	217	0.312	6"
5	243	0.350	
5 1/4	270	0.389	
5 1/2	299	0.430	
5 3/4	327	0.471	
6	357	0.514	
6 1/4	387	0.558	8"
6 1/2	419	0.603	
6 3/4	451	0.649	
7	483	0.696	
7 1/4	517	0.744	
7 1/2	551	0.794	
7 3/4	587	0.845	10"
8	622	0.896	
8 1/4	659	0.949	
8 1/2	697	1.003	
8 3/4	734	1.057	
9	773	1.113	

**Table 6-3 Overflow Out Of Manhole With Cover In Place**

**Example** - The maximum height of the flow above the rim of a 24" MH is 5 1/4 inches. From Table 6-3, the overflow is 185 gallons per minute.



**OVERFLOW OUT OF MANHOLE WITH COVER REMOVED**

**24 - Inch Frame**

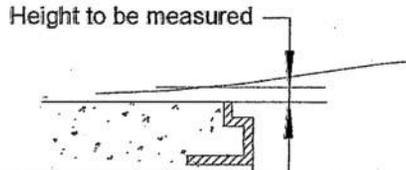
Water Height above M/H frame H in inches	S S O FLOW Q		Min. Sewer size in which these flows are possible
	in gpm	in MGD	
1/8	28	0.04	
1/4	62	0.09	
3/8	111	0.16	
1/2	160	0.23	
5/8	215	0.31	6"
3/4	354	0.51	8"
7/8	569	0.82	10"
1	799	1.15	12"
1 1/8	1,035	1.49	
1 1/4	1,340	1.93	15"
1 3/8	1,660	2.39	
1 1/2	1,986	2.86	
1 5/8	2,396	3.45	18"
1 3/4	2,799	4.03	
1 7/8	3,132	4.51	
2	3,444	4.96	21"
2 1/8	3,750	5.4	
2 1/4	3,986	5.74	
2 3/8	4,215	6.07	
2 1/2	4,437	6.39	
2 5/8	4,569	6.58	24"
2 3/4	4,687	6.75	
2 7/8	4,799	6.91	
3	4,910	7.07	

**36 - Inch Frame**

Water Height above M/H frame H in inches	S S O FLOW Q		Min. Sewer size in which these flows are possible
	in gpm	in MGD	
1/8	49	0.07	
1/4	111	0.16	
3/8	187	0.27	6"
1/2	271	0.39	
5/8	361	0.52	8"
3/4	458	0.66	
7/8	556	0.8	10"
1	660	0.95	12"
1 1/8	1,035	1.49	
1 1/4	1,486	2.14	15"
1 3/8	1,951	2.81	
1 1/2	2,424	3.49	18"
1 5/8	2,903	4.18	
1 3/4	3,362	4.87	
1 7/8	3,917	5.64	21"
2	4,458	6.42	
2 1/8	5,000	7.2	24"
2 1/4	5,556	8	
2 3/8	6,118	8.81	
2 1/2	6,764	9.74	
2 5/8	7,403	10.66	
2 3/4	7,972	11.48	30"
2 7/8	8,521	12.27	
3	9,062	13.05	
3 1/8	9,604	13.83	
3 1/4	10,139	14.6	
3 3/8	10,625	15.3	36"
3 1/2	11,097	15.98	
3 5/8	11,569	16.66	
3 3/4	12,035	17.33	
3 7/8	12,486	17.98	
4	12,861	18.52	
4 1/8	13,076	18.83	
4 1/4	13,285	19.13	
4 3/8	13,486	19.42	

**Table 6-4 Overflow Out Of Manhole With Cover Removed**

**Example** – For manhole cover removed from a 36" frame and the height of flow at one inch, the overflow from Table 6-4 is 660 gallons per minute.



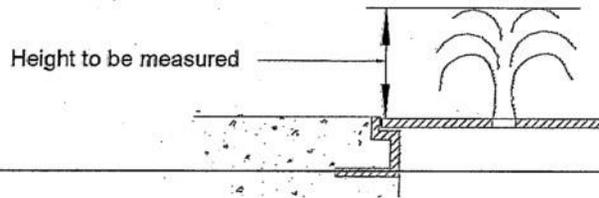
**OVERFLOW OUT OF A MH COVER PICK HOLE (7/8 - inch pick hole)**  
(dia. of manhole cover not relevant)

Height of spout above M/H cover H in inches	SSO FLOW Q in gpm	Height of spout above M/H cover H in inches	SSO FLOW Q in gpm
1/8	1.0	5 1/8	6.2
1/4	1.4	5 1/4	6.3
3/8	1.7	5 3/8	6.3
1/2	1.9	5 1/2	6.4
5/8	2.2	5 5/8	6.5
3/4	2.4	5 3/4	6.6
7/8	2.6	5 7/8	6.6
1	2.7	6	6.7
1 1/8	2.9	6 1/8	6.8
1 1/4	3.1	6 1/4	6.8
1 3/8	3.2	6 3/8	6.9
1 1/2	3.4	6 1/2	7.0
1 5/8	3.5	6 5/8	7.0
1 3/4	3.6	6 3/4	7.1
1 7/8	3.7	6 7/8	7.2
2	3.9	7	7.2
2 1/8	4.0	7 1/8	7.3
2 1/4	4.1	7 1/4	7.4
2 3/8	4.2	7 3/8	7.4
2 1/2	4.3	7 1/2	7.5
2 5/8	4.4	7 5/8	7.6
2 3/4	4.5	7 3/4	7.6
2 7/8	4.6	7 7/8	7.7
3	4.7	8	7.7
3 1/8	4.8	8 1/8	7.8
3 1/4	4.9	8 1/4	7.9
3 3/8	5.0	8 3/8	7.9
3 1/2	5.1	8 1/2	8.0
3 5/8	5.2	8 5/8	8.0
3 3/4	5.3	8 3/4	8.1
3 7/8	5.4	8 7/8	8.1
4	5.5	9	8.2
4 1/8	5.6	9 1/8	8.3
4 1/4	5.6	9 1/4	8.3
4 3/8	5.7	9 3/8	8.4
4 1/2	5.8	9 1/2	8.4
4 5/8	5.9	9 5/8	8.5
4 3/4	6.0	9 3/4	8.5
4 7/8	6.0	9 7/8	8.6
5	6.1	10	8.7

Unrestrained  
M/H cover will  
start to lift

Table 6-5 Overflow Out Of A MH Cover Pick Hole

**Example:** For a manhole cover in place with a 3-inch height of flow coming out of a 7/8 -inch dia. pick hole, the overflow from Table 6-5 is 4.7 gallons per minute.



### 3. Channel Hydraulics

Overflows often run into nearby ditches, gutters, etc. Overflow can be quantified using this option by measuring the cross sectional area and velocity of the overflow in these channels. First, measure the depth of flow and the dimensions of the channel. Then measure the velocity by dropping a floating object into the flow and measuring the time it takes to travel a set distance. The resulting velocity will be in the units of feet per second. Several measurements should be taken and the average flow rate should be used in volume estimates. Calculate the flow in the channel using the following formula:

$$\text{Flow (gal/min)} = \text{Velocity (ft/sec)} \times \text{Area (ft)}^2 \times 449$$

### 4. Wastewater Lift Stations

For this option, wastewater lift stations may have flow and pump run time data available from a SCADA or other system.

**Overflow Duration - Applicable To All Four Flow Options** - The start and end times of the overflow can be estimated by when the overflow was reported and stopped or by recorded data that may show significant changes in pressure for force mains, a sudden decrease in influent flow to the treatment plant, loss of power to lift stations, or other recorded data.

**Volume Calculation - Applicable To All Four Flow Options** - The overflow volume can be estimated with the following equation:  $\text{Volume (gal)} = \text{Flow Rate (gal/min)} \times \text{Duration (min)}$ .

## **ELEMENT 7 FOG CONTROL PROGRAM**

This section of the Sewer System Management Plan (SSMP) presents the results of an evaluation of the extent and nature of Sewer System Overflows (SSOs) related to Fats, Oils, and Grease (FOG) and the need for a FOG Control Program.

### **7.1 Regulatory Requirements for The FOG Control Program**

The Statewide General Waste Discharge Requirements for the FOG Control Program are as follows:

The collection system agency shall evaluate its service area to determine whether a FOG Control Program is needed. If the collection system agency determines that a FOG Program is not needed, the collection system agency must provide justification for why it is not needed.

- An implementation plan and schedule for a public education outreach program that promotes proper disposal of FOG;
  - A plan and schedule for the disposal of FOG generated within the sanitary sewer system service area, including a list of acceptable disposal facilities and/or additional facilities needed to adequately dispose of FOG generated within a sanitary sewer system service area;
  - The legal authority to prohibit discharges to the system and identify measures to prevent SSOs and blockages caused by FOG;
  - Requirements to install grease removal devices (such as traps or interceptors), design standards for the grease removal devices, maintenance requirements, best management practices (BMP) requirements, record keeping and reporting requirements;
  - Authority to inspect grease producing facilities, enforcement authorities, and determination of whether the collection system agency has sufficient staff to inspect and enforce the FOG ordinance;
  - An identification of sewer system sections subject to FOG blockages and the establishment of a cleaning maintenance schedule for each section; and
- 
- Development and implementation of source control measures for all sources of FOG discharged to the sewer system, for each sewer system section identified in (f) above.

## **7.2 Nature and Extent of FOG**

There are no significant sources of FOG in Angel Island State Park since sources of wastewater are limited to toilets, showers, and sanitary dump stations. Therefore, a FOG Control Program is not necessary for the wastewater collection system located within Angel Island State Park.

**Justification:**

No (zero) incidents of FOG-related SSOs indicates that Angel Island State Parks' historical management of FOG, combined with the Angel Island State Park sewer system preventive maintenance program, have been effective and that there is no basis for increasing current FOG control activities. State Parks' will continue to gather information on any FOG-related SSOs and evaluate the need for any additional FOG control measures during the next update of its SSMP. There is no basis at this time to support undertaking a public education or outreach program for FOG control.

### **Table 7.1 FOG-Related Spill Data**

(since January 1, 2006)

**No FOG related SSO's to report @ time of document creation.**

---

## **ELEMENT 8 SYSTEM EVALUATION & CAPACITY ASSSURANCE PLAN**

### **8.1 Capacity Assessment**

**No capacity assessment plan is in place @ time of document creation.**

### **8.1(a) - Goals for completing Capacity Assessment for 2010/2011**

- Monitor, assess and document collection system(s) ability to handle peak, wet weather flows.
- Monitor, assess and document adequate capacity exists in all portions of the collection system
- Monitor, assess and document downstream portions of collection system can receive and convey wastewater effluent created by additional, increased flow.
- Identify and document any collection system capacity-related issues when identified.
- Monitor, assess and document wastewater pumping station(s) ability to convey effluent during peak, wet weather flows.

### **8.1(b) - System Evaluation and Capacity Assurance Plan Goals for 2010/2011 based on Capacity Assessment goals achieved throughout the year**

- Evaluate portions of collection system that show signs of potential Sanitary Sewer Overflow conditions and take immediate steps to address and mitigate any hydraulic deficiencies that exist (if any).
- Establish a short and long term capital improvement program to address identified flow capacity deficiencies.
- Update plan as needed based on system observations.
- Identify, repair and/or replace critical elements of collection system that show signs of impending failure resulting in potential SSO's.
- Identify portions of wastewater collection system in need of repair and/or replacement that will provide

the most immediate benefit to the collection system(s) ability to convey wastewater effluent safely.

### **ELEMENT 9 MONITORING, MEASUREMENT AND PROGRAM MODIFICATIONS**

- Maintain relevant information that can be used to establish and prioritize appropriate SSMP activities and identify areas of concern and/or elements of the Angel Island State Park SSMP that are performing well. Collection system staff shall maintain records on all activities and use that information to evaluate progress and deficiencies to include, but are not limited to, the following items:
  1. Sanitary Sewer Overflow's
  2. Potential SSO' trouble spots within the collection system
  3. Any increase in FOG activity throughout the collection system
  4. Maintenance and inspections of all collection systems infrastructure.
  5. Assess the effectiveness of identified preventive maintenance program
  6. Update SSMP program elements as needed based on monitoring and collection system(s) performance evaluation(s)
  7. Identify and illustrate SSO trends including frequency, potential, location and volume.

### **ELEMENT 10 SSMP AUDITS**

Angel Island State Park Staff will complete SSMP Audits yearly to be included in annual reports identifying deficiencies, if any, and the appropriate steps to correct, how individual SSMP elements were implemented, descriptions and additions to to the Angel Island State Park collection systems throughout the year and finally a description of planned improvements and/or repairs scheduled for the upcoming reporting year w/ planned start and completion dates for identified, funded capital improvements.

## **ELEMENT 11 COMMUNICATIONS**

All relevant communication re condition and/or limitations of the Angel Island State Park wastewater collection system will be done on an as needed basis throughout reporting the year. This includes communication to Angel Island State Park Staff and residents dependants, guests, volunteers, contractors, day use visitors, campers and both day use boaters and overnight boaters. All contacts and/or communications w/ the aforementioned "customers" served by the Angel Island State Park wastewater collection system will be documented by Water/Sewer Treatment Plant Supervisor staff. Those documents will be maintained, reviewed and included in the upcoming years SSMP audit. All complaints will addressed and a response will be given to the "customer" pending investigation and final resolution including appropriate mitigation steps that were taken to resolve any concerns.



## PLEASE POST

### SANITARY SEWER OVERFLOW (SSO) RESPONSE PROCEDURES & SFRWQCB REPORTING REQUIREMENTS PROTOCOL ◀ FOR ALL MARIN DISTRICT COLLECTION SYSTEMS

1. STOP / ISOLATE SOURCE OF DISCHARGE AND CONTAIN OVERFLOW AREA IF SAFE TO DO SO.
2. PUBLIC HEALTH AND SAFETY IS YOUR PRIMARY CONCERN; SECURE AREA AS NEEDED TO PREVENT PUBLIC CONTACT W/ DISCHARGE EFFLUENT.
3. PREVENT DISCHARGE EFFLUENT FROM ENTERING RECEIVING WATERS (Ocean, Bay Waters, Drainage Canal Potable Water Supply, etc.) WHENEVER IT IS POSSIBLE TO DO SO SAFELY
4. IF TREATMENT PLANT OPERATOR IS NOT ON SCENE, CONTACT THE SHIFT OPERATOR IMMEDIATELY via WORK CELL PHONE OR STATE PARK RADIO.

#### ON SCENE TREATMENT PLANT OPERATOR PROTOCOL

1. ESTIMATE QUANTITY OF SPILL FOR REPORTING PURPOSES\*\*\*\* see attachment D – Sample Templates for SSO Volume Estimation
2. FOR ANY DISCHARGE OF SEWAGE THAT REACHES SURFACE WATER OR STORM DRAINPIPE (THAT WAS NOT FULLY CAPTURED AND RETURNED TO SANITARY SEWER SYSTEM) OR IS ESTIMATED TO BE ≥ 1000 GALLONS (CATEGORY 1)\* CONTACT OFFICE of EMERGENCY SERVICES (Cal E-M-A) @ (800) 852-7550<sup>1</sup> AS SOON AS POSSIBLE, BUT NOT LATER THAN TWO (2) HOURS AFTER KNOWLEDGE OF DISCHARGE. ADDITIONALLY, AS SOON AS POSSIBLE, BUT NO LATER THAN TWENTY-FOUR (24) HOURS AFTER KNOWLEDGE OF DISCHARGE, CERTIFICATION TO THE SFRWQCB<sup>2</sup> THAT Cal E-M-A WAS NOTIFIED OF DISCHARGE<sup>3</sup>. CERTIFICATION OF Cal E-M-A NOTIFICATION TO SFRWQCB<sup>2</sup> AS FOLLOWS:
  - (1) CIWQS\*\*\* ONLINE SSO SYSTEM <http://ciwqs.waterboards.ca.gov/ciwqs/index.jsp>  
OR
  - (2) TELEPHONE NOTIFICATION @ (510) 622-2333 Attn.: MICHAEL CHEE  
OR
  - (3) FAX NOTIFICATION @ (510) 622-2460 \*\*
3. IF DISCHARGE IS ESTIMATED TO BE ≤ 1000 (CATEGORY 2)\*. REPORTS MUST BE SUBMITTED TO THE SFRWQCB<sup>2</sup> via the CIWQS\*\*\* SSO ONLINE DATABASE <http://ciwqs.waterboards.ca.gov/ciwqs/index.jsp> WITHIN THIRTY (30) DAYS AFTER THE END OF THE CALENDAR MONTH OF IN WHICH THE SSO OCCURED\*
4. PRINT COPIES OF ALL ELECTRONIC SSO CERTIFICATIONS MADE TO THE SFRWQCB<sup>2</sup> FOR SUBMISSION W/ SSO ANNUAL REPORTS FOR ALL COLLECTION SYSTEMS LOCATED WITHIN THE MARIN DISTRICT OF CA STATE PARKS.

#### FOOTNOTES / ATTACHMENTS:

- ◀ - CA State Water resources Control Board Order No. WQ 2008-002-EXEC (attached)
- <sup>1</sup> - California Emergency Management Agency / Cal E-M-A (formerly referred to as OES) / Fact Sheet dated March 2010 / attached
- <sup>2</sup> - San Francisco Bay (2) Regional Water Quality Control Board (SFRWQCB)
- <sup>3</sup> - Pg. 1 / attachment A / Notification / Page 1 of 5 / paragraph 2.
- \* - Attachment A / pages 1 & 2 of 5 / SSO Categories / Paragraph 2. / Category 2
- \*\* - Order No. WQ 2008-002-EXEC/pages 2 & 3 of 5 / SSO Reporting Timeframes / paragraph 8.
- \*\*\* - Cal EPA / State Water Resources Control Board / CA Integrated Water Quality System (CIWQS)
- \*\*\*\* - Attachment D – Sample Templates for SSO Volume Estimation

Chris Hansen / Chief Plant Operator / Marin District / CA State Parks

Cc: SP Taylor SP, Marconi Conference Center, Angel Island SP, China Camp SP, Olompali SHP, Mt Tamalpais SP, Tomales Bay SP

Effective 08/01/2010



**Cal EMA**  
CALIFORNIA EMERGENCY  
MANAGEMENT AGENCY

# FACT SHEET

## Reporting Sewage Releases

March 2010

### REPORTING SEWAGE RELEASES:

In the past, there have been occurrences where untreated sewage was released into drinking water sources and was not properly reported to the California Emergency Management Agency (Cal EMA). Proper and timely notification is imperative to allow government agencies and downstream users to take prompt action to protect public health and safety, the environment, and drinking water supplies. The purpose of this Fact Sheet is to help clarify the reporting requirements for sewage releases in California, under California Water Code §13271, *et seq.* and California Health and Safety Code §5411, *et seq.*

State Law requires that an unauthorized discharge of sewage [as defined in 23 California Code of Regulations (CCR) 2250 (b)] into or onto state waters must be reported to Cal EMA. Upon such notification, Cal EMA will then immediately notify the appropriate **Regional Water Quality Control Board (RWQCB)**, the **local public health department**, and **local office of environmental health**. These offices are responsible for determining appropriate public and environmental safety measures.

### Report Sewage Releases to:

California Emergency Management Agency  
Warning Center  
**(800) 852-7550**

The Reportable Quantity for sewage spills is **1000 gallons or more**, as established in regulation [23 CCR 2250 (a)]

**Please note that the Regional Water Quality Control Boards and Local Health Departments may have additional reporting requirements – please contact them to see what requirements apply to you!**

### ARE THERE ANY EXCEPTIONS?

Notification of an unauthorized discharge of sewage or hazardous substances, under section 13271 (b) of the State Water Code, is not required if the discharge is in compliance with waste discharge requirements.

### PENALTIES FOR NOT REPORTING:

Any person who fails to provide the proper notifications is guilty of a misdemeanor and may be punished by a fine of not more than \$20,000 dollars or imprisonment for not more than 1 year or both, per section 13271 (c) of the State Water Code. Additional penalties can be administered under Health and Safety Code §5411, *et seq.*

### ADDITIONAL INFORMATION:

Further information on reporting requirements can be located on the Cal EMA Website at [www.calema.ca.gov](http://www.calema.ca.gov) in the *California Hazardous Material Spill/Release Notification Guidance* booklet. Please call the Cal EMA Hazardous Materials Unit at **(916) 845-8788** to answer any further questions.

STATE OF CALIFORNIA  
STATE WATER RESOURCES CONTROL BOARD

ORDER NO. WQ 2008-0002-EXEC

ADOPTING AMENDED MONITORING AND REPORTING REQUIREMENTS FOR  
STATEWIDE GENERAL WASTE DISCHARGE REQUIREMENTS FOR SANITARY SEWER  
SYSTEMS

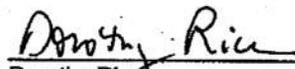
The State of California, Water Resources Control Board (State Water Board) finds:

1. The State Water Board is authorized to prescribe statewide general waste discharge requirements for categories of discharges that involve the same or similar operations and the same or similar types of waste pursuant to Water Code 13263, subdivision (i).
2. The State Water Board on May 2, 2006, adopted Statewide General Waste Discharge Requirements for Sanitary Sewer Systems, Order No. 2006-0003-DWQ, pursuant to that authority.
3. The State Water Board on May 2, 2006, adopted Monitoring and Reporting Requirements to implement the General Waste Discharge Requirements for Sanitary Sewer Systems.
4. State Water Board Order No. 2006-0003-DWQ, paragraph G.2., and the Monitoring and Reporting Requirements, both provide that the Executive Director may modify the terms of the Monitoring and Reporting Requirements at any time.
5. The time allowed in those Monitoring and Reporting Requirements for the filing of the initial report of an overflow is too long to adequately protect the public health and safety or the beneficial uses of the waters of the state when there is a sewage collection system spill. An additional notification requirement is necessary and appropriate to ensure the Office of Emergency Services, local public health officials, and the applicable regional water quality control board are apprised of a spill that reaches a drainage channel or surface water.
6. Further, the burden of providing a notification as soon as possible is de minimis and will allow response agencies to take action as soon as possible to protect public health and safety and beneficial uses of the waters of the state.

IT IS HEREBY ORDERED THAT:

Pursuant to the authority delegated by Resolution No. 2002-0104 and Order No. 2006-0003-DWQ, the Monitoring and Reporting Requirements for Statewide General Waste Discharge Requirements for Sanitary Sewer Systems No. 2006-0003-DWQ is hereby amended as shown in Attachment A, with new text indicated by double-underline.

Dated: February 20, 2008

  
Dorothy Rice  
Executive Director

ATTACHMENT A

**STATE WATER RESOURCES CONTROL BOARD  
MONITORING AND REPORTING PROGRAM NO. 2006-0003-DWQ  
(AS REVISED BY ORDER NO. WQ 2008-0002-EXEC)**

**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 No. 2006-2003-DWQ, "Statewide General Waste Discharge Requirements for Sanitary Sewer Systems." Revisions to this MRP may be made at any time by the Executive Director, and may include a reduction or increase in the monitoring and reporting.

**NOTIFICATION**

Although State and Regional Water Board staff do not have duties as first responders, this Monitoring and Reporting Program is an appropriate mechanism to ensure that the agencies that do have first responder duties are notified in a timely manner in order to protect public health and beneficial uses.

1. For any discharges of sewage that results in a discharge to a drainage channel or a surface water, the Discharger shall, as soon as possible, but not later than two (2) hours after becoming aware of the discharge, notify the State Office of Emergency Services, the local health officer or directors of environmental health with jurisdiction over affected water bodies, and the appropriate Regional Water Quality Control Board.
2. As soon as possible, but no later than twenty-four (24) hours after becoming aware of a discharge to a drainage channel or a surface water, the Discharger shall submit to the appropriate Regional Water Quality Control Board a certification that the State Office of Emergency Services and the local health officer or directors of environmental health with jurisdiction over the affected water bodies have been notified of the discharge.

**A. SANITARY SEWER OVERFLOW REPORTING**

**SSO Categories**

1. Category 1 - All discharges of sewage resulting from a failure in the Enrollee's sanitary sewer system that:
  - A. Equal or exceed 1000 gallons, or
  - B. Result in a discharge to a drainage channel and/or surface water; or
  - C. Discharge to a storm drainpipe that was not fully captured and returned to the sanitary sewer system.

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.

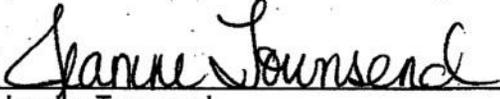
**C. Certification**

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  
Clerk to the Board

**Collection System Collaborative Benchmarking Group  
Best Practices for Sanitary Sewer Overflow (SSO) Prevention and  
Response Plan**

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**Attachment D - Sample Templates for SSO Volume Estimation**

**TABLE 'A'  
ESTIMATED SSO FLOW OUT OF M/H WITH COVER IN PLACE**

24" COVER				36" COVER			
Height of spout above M/H rim H in inches	S S O FLOW Q		Min. Sewer size in which these flows are possible	Height of spout above M/H rim H in inches	S S O FLOW Q		Min. Sewer size in which these flows are possible
	in gpm	in MGD			in gpm	in MGD	
1/4	1	0.001		1/4	1	0.002	
1/2	3	0.004		1/2	4	0.006	
3/4	6	0.008		3/4	8	0.012	
1	9	0.013		1	13	0.019	
1 1/4	12	0.018		1 1/4	18	0.026	
1 1/2	16	0.024		1 1/2	24	0.035	
1 3/4	21	0.030		1 3/4	31	0.044	
2	25	0.037		2	37	0.054	
2 1/4	31	0.045		2 1/4	45	0.065	
2 1/2	38	0.054		2 1/2	55	0.079	
2 3/4	45	0.065		2 3/4	66	0.095	
3	54	0.077		3	78	0.113	
3 1/4	64	0.092		3 1/4	93	0.134	
3 1/2	75	0.107		3 1/2	109	0.157	
3 3/4	87	0.125		3 3/4	127	0.183	
4	100	0.145		4	147	0.211	
4 1/4	115	0.166		4 1/4	169	0.243	
4 1/2	131	0.189		4 1/2	192	0.276	
4 3/4	148	0.214		4 3/4	217	0.312	6"
5	166	0.240		5	243	0.350	
5 1/4	185	0.266		5 1/4	270	0.389	
5 1/2	204	0.294		5 1/2	299	0.430	
5 3/4	224	0.322	6"	5 3/4	327	0.471	
6	244	0.352		6	357	0.514	
6 1/4	265	0.382		6 1/4	387	0.558	8"
6 1/2	286	0.412		6 1/2	419	0.603	
6 3/4	308	0.444		6 3/4	451	0.649	
7	331	0.476		7	483	0.696	
7 1/4	354	0.509		7 1/4	517	0.744	
7 1/2	377	0.543		7 1/2	551	0.794	
7 3/4	401	0.578	8"	7 3/4	587	0.845	10"
8	426	0.613		8	622	0.896	
8 1/4	451	0.649		8 1/4	659	0.949	
8 1/2	476	0.686		8 1/2	697	1.003	
8 3/4	502	0.723		8 3/4	734	1.057	
9	529	0.761		9	773	1.113	

**Disclaimer:**

This sanitary sewer overflow table was developed by Ed Euyen, Civil Engineer, P.E. No. 33955, California, for County Sanitation District 1. This table is provided as an example. Other Agencies may want to develop their own estimating tables.

**Collection System Collaborative Benchmarking Group  
Best Practices for Sanitary Sewer Overflow (SSO) Prevention and  
Response Plan**

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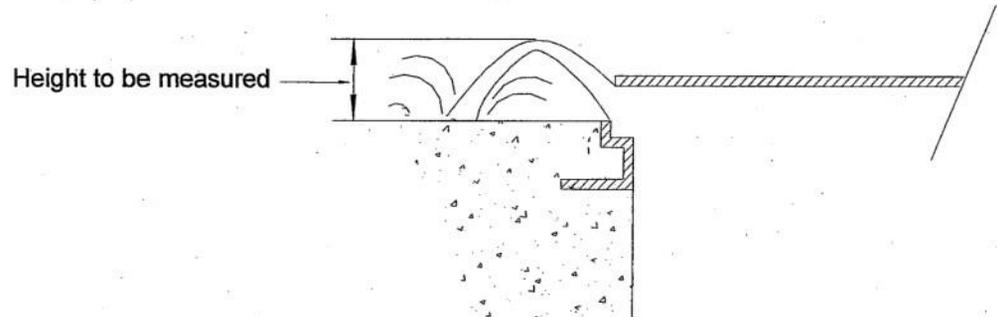
The formula used to develop Table A measures the maximum height of the water coming out of the maintenance hole above the rim. The formula was taken from hydraulics and its application by A.H. Gibson (Constable & Co. Limited).

**Example Overflow Estimation:**

The maintenance hole cover is unseated and slightly elevated on a 24" casting. The maximum height of the discharge above the rim is 5 ¼ inches. According to Table A, these conditions would yield an SSO of 185 gallons per minute.

**FLOW OUT OF M/H WITH COVER IN PLACE**

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This sanitary sewer overflow drawing was developed by Debbie Myers, Principal Engineering Technician, for Ed Euyen, Civil Engineer, P.E. No. 33955, California, of County Sanitation District 1.

**Collection System Collaborative Benchmarking Group  
Best Practices for Sanitary Sewer Overflow (SSO) Prevention and  
Response Plan**

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**TABLE 'B'  
ESTIMATED SSO FLOW OUT OF M/H WITH COVER REMOVED**

**24" FRAME**

Water Height above M/H frame H in inches	S S O FLOW Q		Min. Sewer size in which these flows are possible
	in gpm	in MGD	
1/8	28	0.04	
1/4	62	0.09	
3/8	111	0.16	
1/2	160	0.23	
5/8	215	0.31	6"
3/4	354	0.51	8"
7/8	569	0.82	10"
1	799	1.15	12"
1 1/8	1,035	1.49	
1 1/4	1,340	1.93	15"
1 3/8	1,660	2.39	
1 1/2	1,986	2.86	
1 5/8	2,396	3.45	18"
1 3/4	2,799	4.03	
1 7/8	3,132	4.51	
2	3,444	4.96	21"
2 1/8	3,750	5.4	
2 1/4	3,986	5.74	
2 3/8	4,215	6.07	
2 1/2	4,437	6.39	
2 5/8	4,569	6.58	24"
2 3/4	4,687	6.75	
2 7/8	4,799	6.91	
3	4,910	7.07	

**36" FRAME**

Water Height above M/H frame H in inches	S S O FLOW Q		Min. Sewer size in which these flows are possible
	in gpm	in MGD	
1/8	49	0.07	
1/4	111	0.16	
3/8	187	0.27	6"
1/2	271	0.39	
5/8	361	0.52	8"
3/4	458	0.66	
7/8	556	0.8	10"
1	660	0.95	12"
1 1/8	1,035	1.49	
1 1/4	1,486	2.14	15"
1 3/8	1,951	2.81	
1 1/2	2,424	3.49	18"
1 5/8	2,903	4.18	
1 3/4	3,382	4.87	
1 7/8	3,917	5.64	21"
2	4,458	6.42	
2 1/8	5,000	7.2	24"
2 1/4	5,556	8	
2 3/8	6,118	8.81	
2 1/2	6,764	9.74	
2 5/8	7,403	10.66	
2 3/4	7,972	11.48	30"
2 7/8	8,521	12.27	
3	9,062	13.05	
3 1/8	9,604	13.83	
3 1/4	10,139	14.6	
3 3/8	10,625	15.3	36"
3 1/2	11,097	15.98	
3 5/8	11,569	16.66	
3 3/4	12,035	17.33	
3 7/8	12,486	17.98	
4	12,861	18.52	
4 1/8	13,076	18.83	
4 1/4	13,285	19.13	
4 3/8	13,486	19.42	

**Disclaimer:**

This sanitary sewer overflow table was developed by Ed Euyen, Civil Engineer, P.E. No. 33955, California, for County Sanitation District 1. This table is provided as an example. Other Agencies may want to develop their own estimating tables.

**Collection System Collaborative Benchmarking Group  
Best Practices for Sanitary Sewer Overflow (SSO) Prevention and  
Response Plan**

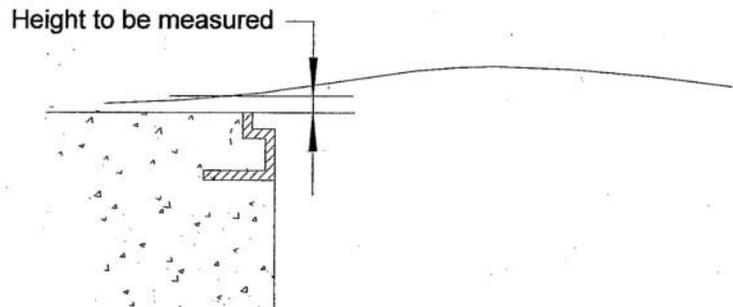
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The formula used to develop Table B for estimating SSO's out of maintenance holes without covers is based on discharge over curved weir -- bell mouth spillways for 2" to 12" diameter pipes. The formula was taken from hydraulics and its application by A.H. Gibson (Constable & Co. Limited).

**Example Overflow Estimation:**

The maintenance hole cover is off and the flow coming out of a 36" frame maintenance hole at one inch (1") height will be approximately 660 gallons per minute.

**FLOW OUT OF M/H WITH COVER REMOVED (TABLE "B")**



This sanitary sewer overflow drawing was developed by Debbie Myers, Principal Engineering Technician, for Ed Euyen, Civil Engineer, P.E. No. 33955, California, of County Sanitation District 1.

**Collection System Collaborative Benchmarking Group  
Best Practices for Sanitary Sewer Overflow (SSO) Prevention and  
Response Plan**

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**TABLE 'C'  
ESTIMATED SSO FLOW OUT OF M/H PICK HOLE**

Height of spout above M/H cover H in inches	SSO FLOW Q in gpm	Height of spout above M/H cover H in inches	SSO FLOW Q in gpm
1/8	1.0	5 1/8	6.2
1/4	1.4	5 1/4	6.3
3/8	1.7	5 3/8	6.3
1/2	1.9	5 1/2	6.4
5/8	2.2	5 5/8	6.5
3/4	2.4	5 3/4	6.6
7/8	2.6	5 7/8	6.6
1	2.7	6	6.7
1 1/8	2.9	6 1/8	6.8
1 1/4	3.1	6 1/4	6.8
1 3/8	3.2	6 3/8	6.9
1 1/2	3.4	6 1/2	7.0
1 5/8	3.5	6 5/8	7.0
1 3/4	3.6	6 3/4	7.1
1 7/8	3.7	6 7/8	7.2
2	3.9	7	7.2
2 1/8	4.0	7 1/8	7.3
2 1/4	4.1	7 1/4	7.4
2 3/8	4.2	7 3/8	7.4
2 1/2	4.3	7 1/2	7.5
2 5/8	4.4	7 5/8	7.6
2 3/4	4.5	7 3/4	7.6
2 7/8	4.6	7 7/8	7.7
3	4.7	8	7.7
3 1/8	4.8	8 1/8	7.8
3 1/4	4.9	8 1/4	7.9
3 3/8	5.0	8 3/8	7.9
3 1/2	5.1	8 1/2	8.0
3 5/8	5.2	8 5/8	8.0
3 3/4	5.3	8 3/4	8.1
3 7/8	5.4	8 7/8	8.1
4	5.5	9	8.2
4 1/8	5.6	9 1/8	8.3
4 1/4	5.6	9 1/4	8.3
4 3/8	5.7	9 3/8	8.4
4 1/2	5.8	9 1/2	8.4
4 5/8	5.9	9 5/8	8.5
4 3/4	6.0	9 3/4	8.5
4 7/8	6.0	9 7/8	8.6
5	6.1	10	8.7

Unrestrained  
M/H cover will  
start to lift

Note: This chart is based on a 7/8 inch diameter pick hole

Disclaimer: This sanitary sewer overflow table was developed by Ed Euyen, Civil Engineer, P.E. No. 33955, California, for County Sanitation District 1. This table is provided as an example. Other Agencies may want to develop their own estimating tables.

**Collection System Collaborative Benchmarking Group  
Best Practices for Sanitary Sewer Overflow (SSO) Prevention and  
Response Plan**

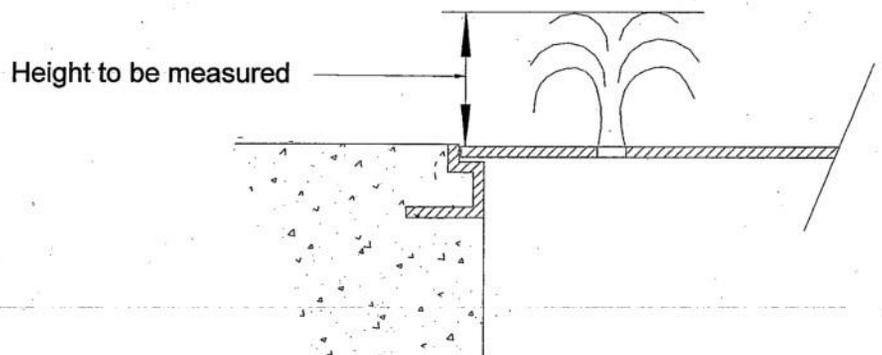
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The formula used to develop Table C is  $Q=CcVA$ , where Q is equal to the quantity of the flow in gallons per minute, Cc is equal to the coefficient of contraction (.63), V is equal to the velocity of the overflow, and A is equal to the area of the pick hole.<sup>2</sup> If all units are in feet, the quantity will be calculated in cubic feet per second, which when multiplied by 448.8 will give the answer in gallons per minute. (One cubic foot per second is equal to 448.8 gallons per minute, hence this conversion method).

**Example Overflow Estimation:**

The maintenance hole cover is in place and the height of water coming out of the pick hole seven-eighths of an inch in diameter (7/8") is 3 inches (3"). This will produce an SSO flow of approximately 4.7 gallons per minute.

**FLOW OUT OF VENT OR PICK HOLE (TABLE "C")**



This sanitary sewer overflow drawing was developed by Debbie Myers, Principal Engineering Technician, for Ed Euyen, Civil Engineer, P.E. No. 33955, California, of County Sanitation District 1.

<sup>2</sup> Velocity for the purposes of this formula is calculated by using the formula  $h = v^2 / 2G$ , where h is equal to the height of the overflow, v is equal to velocity, and G is equal to the acceleration of gravity.

**Collection System Collaborative Benchmarking Group  
Best Practices for Sanitary Sewer Overflow (SSO) Prevention and  
Response Plan**



Wastewater Collection Division  
(619) 654-4160

**Flow Estimation Pictures**



rev. 4/99

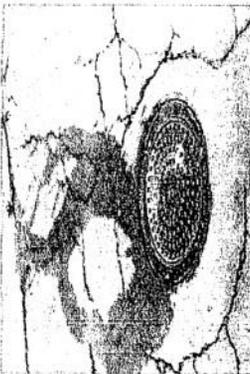
**Reference Sheet for Estimating Sewer Spills  
from Overflowing Sewer Manholes**  
*All estimates are calculated in gallons per minute (gpm)*



All photos were taken during a demonstration using metered water from a hydrant in cooperation with the City of San Diego's Water Department.



City of San Diego  
Metropolitan Wastewater Department



**STATE WATER RESOURCES CONTROL BOARD**

**MONITORING AND REPORTING PROGRAM NO. 2006-0003-DWQ  
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 No. 2006-2003-DWQ, "Statewide General Waste Discharge Requirements for Sanitary Sewer Systems." Revisions to this MRP may be made at any time by the Executive Director, and may include a reduction or increase in the monitoring and reporting.

**A. SANITARY SEWER OVERFLOW REPORTING**

**SSO Categories**

1. Category 1 - All discharges of sewage resulting from a failure in the Enrollee's sanitary sewer system that:
  - A. Equal or exceed 1000 gallons, or
  - B. Result in a discharge to a drainage channel and/or surface water; or
  - C. Discharge to a storm drainpipe that was not fully captured and returned to the sanitary sewer system.
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 - 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 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 to 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.
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.

**CERTIFICATION**

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



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Song Her  
Clerk to the Board

**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 <b>Section C</b>	6 months after WDRs Adoption			
Reporting Program <b>Section G</b>	6 months after WDRs Adoption <sup>1</sup>			
SSMP Development Plan and Schedule <b>No specific Section</b>	9 months after WDRs Adoption <sup>2</sup>	12 months after WDRs Adoption <sup>2</sup>	15 months after WDRs Adoption <sup>2</sup>	18 months after WDRs Adoption <sup>2</sup>
Goals and Organization Structure <b>Section D 13 (i) &amp; (ii)</b>	12 months after WDRs Adoption <sup>2</sup>		18 months after WDRs Adoption <sup>2</sup>	
Overflow Emergency Response Program <b>Section D 13 (vi)</b>	24 months after WDRs Adoption <sup>2</sup>	30 months after WDRs Adoption <sup>2</sup>	36 months after WDRs Adoption <sup>2</sup>	39 months after WDRs Adoption <sup>2</sup>
Legal Authority <b>Section D 13 (iii)</b>				
Operation and Maintenance Program <b>Section D 13 (iv)</b>				
Grease Control Program <b>Section D 13 (vii)</b>				
Design and Performance <b>Section D 13 (v)</b>	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 <b>Section D 13 (viii)</b>				
Final SSMP, incorporating all of the SSMP requirements <b>Section D 13</b>				

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 <b>Section G</b>	
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 30 days 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



