

City of Madera  
Public Works Department

# SSMP

2014 Sewer System Management Plan  
Update



City of Madera  
Public Works Department

SSMP  
Element 2  
Organization



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## Acronyms and Abbreviations

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BMP	Best Management Practices
OES	California Government's Office of Emergency Services
CCTV	Closed Circuit Television
CDFG	California Department of Fish & Game
CIP	Capital Improvement Plan
City	City of Madera
CIWQS	California Integrated Water Quality System
CWEA	California Water Environment Association
EPA	Environmental Protection Agency
FOG	Fats, Oil, and Grease
GIS	Geographical Information System
I/I	Inflow & Infiltration
IIPP	Injury and Illness Prevention program
LRO	Legally Responsible Official
mgd	Million Gallons per Day
MRP	Monitoring and Reporting Program (used in this SSMP to reference MRP Order No. WQ 2013-0058-EXEC, which is the MRP to WDR Order No. 2006-0003-DWQ)
OERP	Overflow Emergency Response Plan
OES	Office of Emergency Services
O&M	Operation & Maintenance
OSHA	Occupational Safety and Health Administration
RWQCB	Central Valley Regional Water Quality Control Board
SCADA	Supervisory Control & Data Acquisition
SSMP	Sewer System Management Plan
SSO	Sanitary Sewer Overflow
SWRCB	State Water Resources Control Board
WDR	Waste Discharge Requirements (WDR Order No. 2006-0003-DWQ)





## Executive Summary

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On May 2, 2006, the State Water Resources Control Board (SWRCB) adopted Order Number 2006-0003-DWQ, the Statewide General Waste Discharge Requirements for Sanitary Sewer Systems (WDRs), which requires all federal and state agencies, municipalities, counties, districts, and other public entities that own or operate a wastewater collection system greater than one mile in length to develop and implement a system specific Sewer System Management Plan (SSMP). The City of Madera's (City) 2009 SSMP documents how it manages its wastewater collection system. Pursuant to this Order, each agency must present the Development Plan and Schedule to its governing body at a public meeting prior to certifying the document. The 2009 SSMP was approved by the City Council in May 2009.

The 2009 SSMP was prepared by the City in compliance with the requirements of the WDRs, documents the City's system specific plans and programs to operate, maintain, and manage its wastewater collection system. Goals of the SSMP include:

- Minimizing the frequency and impact of sanitary sewer overflows (SSOs),
- Effectively and efficiently mitigating the impacts of SSOs should they occur,
- Providing adequate sewer capacity to convey peak flow,
- Maintaining and improving the condition of the collection system infrastructure to provide continual reliable service, and
- Engaging and educating the public regarding programs and issues related to the wastewater collection system.

Pursuant to Sub Section D. 14 PROVISIONS of the WDRs, the City is required to update the SSMP every five years. That relevant portion of the WDR is as follows:

“...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 Database and mail the form to the State Water Board...”

Hence, to remain compliant, the City has reviewed and updated the 2009 SSMP. This update satisfies the WDRs requirement.



## Record of Changes

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Section E.3 of the Monitoring and Reporting Program for the Statewide General Waste Discharge Requirements for Sanitary Sewer Systems (SWRCB Order No. WQ 2013-0058-EXEC) requires the City to maintain a record of changes to the SSMP for a minimum of five years, and the record of changes must be available for review by the State Water Resources Control Board during onsite inspection or through information request. The following is an excerpt of the new requirement:

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

The City's SSMP was last certified on May 20, 2009. The following table summarizes the changes to the SSMP since its last certification.

SSMP Element	Description of Change or Update	Authorized by	Date
All	Added Acronyms and Abbreviations Section; added SSMP Update and Adoption Record Section; added Executive Summary Section; added Record of Changes Section	Danny Martin	Sept. 2014
Introduction	Added Wastewater Collection System background information	Danny Martin	Sept. 2014
1 - Goal	No changes	Danny Martin	Sept. 2014
2 - Organization	Updated organization chart and added additional description of positions responsible for SSMP; added Chain of Communication for reporting SSOs	Danny Martin	Sept. 2014
3 - Legal Authority	No changes	Danny Martin	Sept. 2014
4 - Operations and Maintenance Program	CIP Table updated Personnel dedicated to maintenance of sewer system updated Sewer maintenance equipment inventory added Replacement parts inventory added	Danny Martin	Sept. 2014



<b>SSMP Element</b>	<b>Description of Change or Update</b>	<b>Authorized by</b>	<b>Date</b>
5 – Design and Performance Provisions	No changes	Danny Martin	Sept. 2014
6 – Overflow Emergency Response Plan	Updated Sewer Overflow Field Response Chart Clarified SSO response training for staff	Danny Martin	Sept. 2014
7 – FOG Control Program	Updated Public Outreach Section Control measures updated	Danny Martin	Sept. 2014
8 – System Evaluation and Capacity Assurance Plan	Updated map of Sewer Collection System Updated Trunk System Map Removed CIP Table and replaced with long term suggested expenditure plan Updated CIP Map Updated Evaluation Section with info from 2013 Sanitary Sewer System Master Plan Updated Design Criteria Section with info from 2013 Sanitary Sewer System Master Plan	Danny Martin	Sept. 2014
9 – Monitoring, Measurement, and Program Modifications	Updated SSO reporting section with information from calendar year 2013	Danny Martin	Sept. 2014
10 – SSMP Program Audits	No updates	Danny Martin	Sept. 2014
11- Communication Program	Included verbiage that the SSMP and all audits will be posted to the City's website	Danny Martin	Sept. 2014
12 – SSMP Completion and Certification	No updates	Danny Martin	Sept. 2014



## Introduction

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Sanitary sewer overflows are identified as a major threat to public health and water quality because of the pathogens, toxic pollutants and nutrients they contain and have become a focus of State water quality regulators over the past several years. On May 2, 2006, the State adopted *General Waste Discharge Requirements* for sanitary sewer systems to provide a consistent, statewide regulatory approach to address these overflows (State Water Resources Control Board, Order No. 2006-003). Public agencies, like the City of Madera, that own or operate a sanitary sewer system comprised of one mile or more of pipeline to transport sewage to a treatment facility must file a Notice of Intent to comply with the State Order. The requirements include two major components:

1. Reporting all sanitary sewer overflows in the statewide spill reporting database, and
2. Developing a Sewer System Management Plan with the intent to reduce the potential for or eliminate sanitary sewer overflows.

The City has complied with all the mandatory elements of the WDR. The City's first SSMP was completed in April 2009 and certified by the City Council in May 2009. This document constitutes the five-year update to the SSMP and reflects the most current information on the City's sewer system management, operation, and maintenance programs. A copy of the certified SSMP is available to all personnel involved in management, operation, and maintenance of the City's sanitary sewer system and to the public upon request.

## Document Organization

The SSMP includes twelve elements as listed below which forms a section of this document.

1. Goals
2. Organization
3. Legal Authority
4. Operation and Maintenance Program Organization
5. Design and Construction Standards
6. Overflow Emergency Response Plan
7. Fats, Oils and Grease (FOG) Control Program
8. System Evaluations and Capacity Assurance Plan
9. Monitoring, Measurement and Program Modifications
10. SSMP Program Audits
11. Communications Program
12. SSMP Completion and Certification



## **Wastewater Collection System Background**

Located on State Highway 99, in the San Joaquin Valley, the City of Madera has a 2013 population of approximately 63,040 and covers about 15.8 square miles. The City's existing sewer system is comprised of a network of approximately 130 miles of sewer pipelines ranging from 6 to 48 inches in diameter. The wastewater conveyed by the sewer system to the City's Wastewater Treatment Plant (WWTP), which is located west of town at the intersection of Avenue 13 and Road 21 ½. The City also conveys and treats wastewater flows from two areas outside of the City's limits: Madera County Service Area No. 3 (Parksdale), and the southern portion of the Parkwood area.

The oldest portions of the City's sewer system were constructed in the first half of the century to serve what is now the central portion of town. The City's original WWTP was located at the intersection of Howard Road and Schnoor Avenue. In 1970, a new WWTP was constructed at the current Avenue 13 site and an interceptor sewer was constructed from the old plant to the new WWTP, which was expanded in 2008.

The City's collection system serves residential, commercial and industrial customers. Sewer service is provided only to properties within the city limits, with the exception of a few residential properties located just outside of the city limits. The number of service connections, or laterals, is estimated to be approximately 13,400. In the City, the entire sewer lateral to the service connection in the street is owned by the property owner.

The City's Utilities Department Wastewater Collection staff has developed a detailed database on the components of the collection system over the past 25 years. It includes detail on all gravity lines, force mains, flow basins, lift stations and their service areas. The database is utilized and updated daily by Wastewater Collection staff as part of their work (work order development/history, standardization of record keeping, organization, communication with the public, development/prioritization of future system upgrades). This database is connected to the City's geographic information system. The condition of more than half of the collection system has been documented by video inspection, as described in later in this SSMP.



## Element 1-Goals

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*Requirement:*

*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 occur.*

City of Madera SSMP will contribute to the proper management of the collection system; assist the City in minimizing the frequency and impacts of SSOs by providing guidance for appropriate maintenance, operation, capacity management and emergency response.

This plan also seeks to provide safe, reliable and cost-effective wastewater collection for its constituents by meeting following goals:

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 collection system by maintaining adequate capacities and extending useful life.
5. Prevent unnecessary damage to public and private property.
6. Use funds available for sewer operations in the most efficient manner.
7. Convey wastewater to treatment facilities with a minimum of infiltration, inflow and ex-filtration.
8. Provide adequate capacity to convey peak flows.
9. Perform all operations in a safe manner to avoid personal injury and property damage.
10. Implement regular, proactive maintenance of the system to remove roots, debris, and fats, oils and grease in areas prone to blockages that may cause sewer backups or SSOs.
11. Uphold the City's Standards and Specifications on newly constructed public and private sewers.



## Element 2-Organization

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*Requirement:*

*The SSMP must identify:*

- a. The name of the agency's responsible or authorized representative.*
- b. The names and telephone numbers for management, administrative, and maintenance positions 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)).*

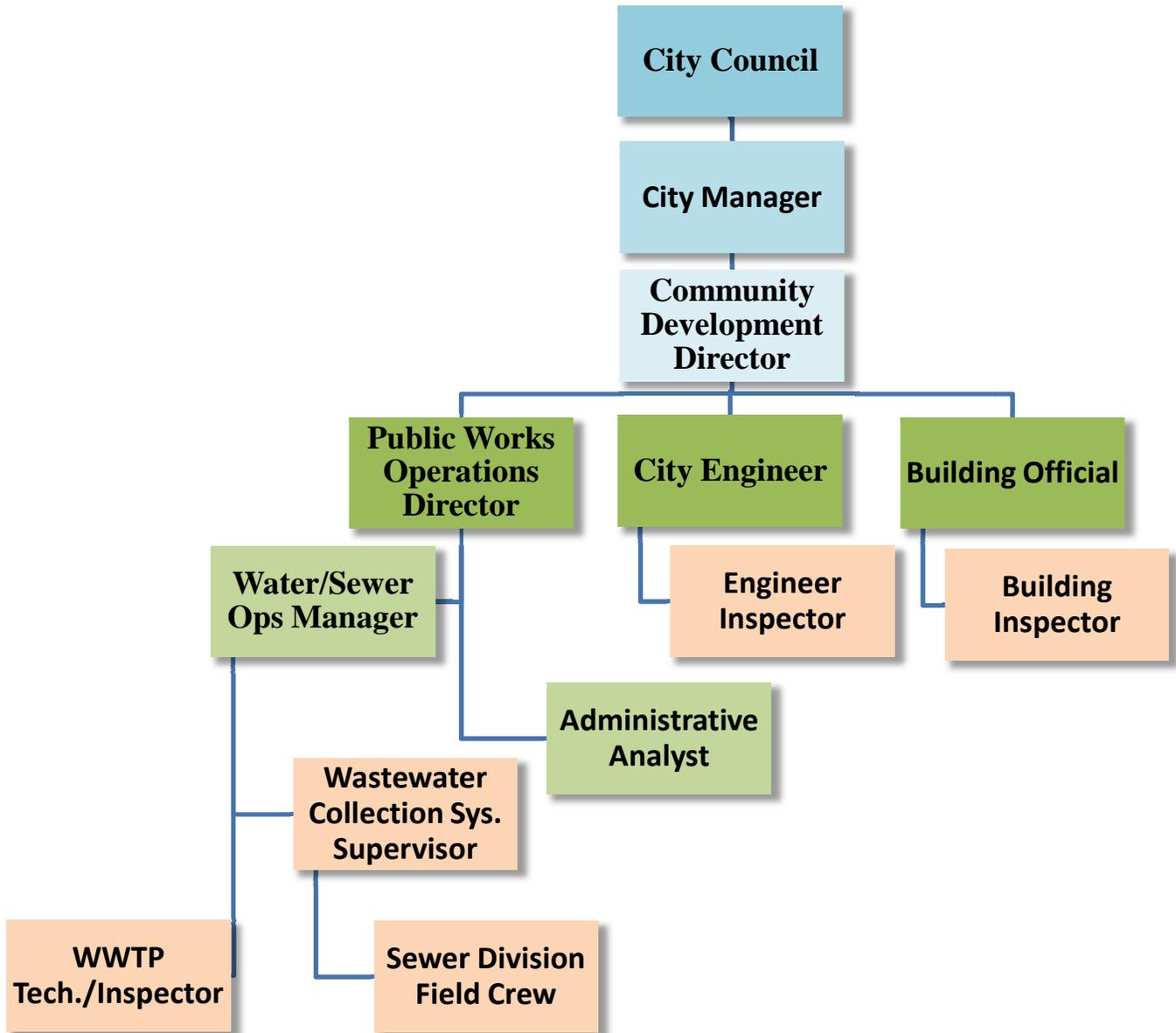
This section of the SSMP identifies City staff responsible for implementing certain measures of this SSMP, responding to SSO events and meeting the SSO requirements. It also includes the designation of the Authorized Representative to meet SWRCB requirements, completing and certifying spill reports.

### **Organizational Chart**

Within the City of Madera's Public Works Department, the Sewer Division oversees operation and maintenance of the system with a Wastewater Collection System Supervisor and five operators. Sewer Division staff conduct maintenance, inspection, and construction and repair operations. Additionally, staff responds to all sewage spills seven days a week, 24 hours a day.

The authorized representative, or *legally responsible official* (LRO), for the implementation and administration of the City's SSMP is Dave Randall, Public Works Operations Director. Mr. Randall is responsible for the development and oversight of this program and ensuring that the City is in compliance with the GWDR.

The following organizational chart shows City representatives responsible for management, operation, inspection and maintenance of City's wastewater collection system.





## **Description of General Responsibilities**

**City Council** – Establishes Policy, approves SSMP, appropriates funds to implement SSMP activities.

**City Manager** – Provides information updates to City Council and arranges for emergency meetings if necessary. Implements City Council policy.

**Community Development Director**- Oversees Public Works, Engineering and Building Departments.

**Building Official** – Under general direction from Community Development Director, the Building Official ensures all on-site sewer systems, including grease interceptors, are in compliance with approved plans and enforces City regulations relating to their construction.

**City Engineer** – Under general direction from Community Development Director, the City Engineer plans, organizes, administers and directs the maintenance, repair, installation and upgrading of the City's wastewater collection system infrastructure. The City Engineer provides highly technical professional assistance to the Community Development Director. The City Engineer performs the full range of civil engineering and office work of a routine to complex nature, including development review, design, management, upgrading, inspection of physical facilities and related project work. The City Engineer provides engineering services to City staff, including field operations and maintenance personnel and performs related duties as assigned.

**Public Works Operations Director** – The Public Works Operations Director is the City's authorized representative and registered with the California Integrated Water Quality System (CIWQS) to certify SSO reports. The Director plans, organizes, directs and supervises the City Public Works activities, advises the City Council and Planning Commission on Public Works matters, including those related to the collection system. Coordinates development and implementation of SSMP, enforces policy, certifies all electronic reporting to State Water Resources Control Board, plans strategy, leads staff, allocates resources, delegates responsibility, authorizes outside contractors to perform services and may serve as Public Information Officer.

**Administrative Analyst** – Responsible for establishing sewer operating and capital budgets.

**Building and Engineering Inspectors**- Under direction from Building Official or City Engineer, Inspectors perform inspections to ensure compliance with approved plans and enforcement of City regulations relating to construction of public and private sewers, collection system pumping stations, and related appurtenances.

**WWTP Technician/Inspector**- Responsible for inspecting grease interceptor traps that have been installed at non-residential locations and enforcing discharge regulations, as needed.

**Water/Sewer Operations Manager** – Under general direction from Public Works Operations Director, the Water/Sewer Operations Manager manages field operations and maintenance activities, provides relevant information to agency management, prepares,



implements contingency plans, leads emergency response, investigates and reports SSO and trains field crews.

**Wastewater Collection System Supervisor** – Supervise Sewer Division field crew personnel; assign and track completion of work. Support planning, scheduling, dispatch, and tracking of sewer maintenance activities.

**Sewer Division Field Crew** – Under general supervision from Sewer Division Lead Worker, the Sewer Division Workers maintain, clean and repair the City’s wastewater collection system, sewer lift stations, and related appurtenances, mobilize and respond to notification of stoppages and SSOs.

## **Responsibilities for SSMP Elements**

### **Element 1 - Goals**

The Public Works Operations Director is responsible for leading staff in the implementation of the City’s goals.

### **Element 2 – Organization**

The Public Works Operations Director is responsible for updating the organizational structure, SSMP implementation assignments, and SSO responding and reporting chains of communication, as needed.

### **Element 3 – Legal Authority**

The Public Works Operations Director is responsible for upholding the City’s Sanitary Code and drafting new ordinances, with review and input from the City Attorney, as needed.

### **Element 4 –Operations and Maintenance Program**

The Public Works Operations Director and Public Works Engineering Technician are responsible for maintaining up to date maps of wastewater collection system. The Water and Sewer Operations Manager is responsible for prioritized preventive maintenance, contingency equipment and replacement inventories, and training for Sewer Division Maintenance Workers. The Public Works Operations Director, City Engineering and Planning are responsible for developing a rehabilitation and replacement plan to address short and long term collection system deficiencies.

### **Element 5 –Design and Performance Provisions**

The City Engineer is responsible for reviewing design and construction documents to ensure that all construction projects meet the City’s standards. The City Engineer is also responsible for updating standards for installation, rehabilitation and repair, as needed. The Engineering and Building Inspectors are responsible for inspecting all construction projects to ensure the City’s construction standards have been followed.

### **Element 6 – Overflow Emergency Response Plan**

The Water/Sewer Operations Manager is responsible for implementation of the Overflow Emergency Response Plan, including revisions to the plan and annual trainings for maintenance crew members.



**Element 7 – Fats, Oils, and Grease Controls**

The Water/Sewer Operations Manager is responsible for identifying grease hot spots and maintaining an effective cleaning program for grease problem sewers. The WWTP Technician/Inspector is responsible for inspecting grease interceptor traps that have been installed at non-residential locations at the Public Works Operations Director's direction, and for enforcing discharge regulations, as needed.

**Element 8 – System Evaluation and Capacity Assurance**

The City Engineer is responsible for establishing and assessing capacity requirements for the City's collection system and for preparation and implementation of the City's System Evaluation and Capacity Assurance Plan. He is also responsible for development and implementation of the City's long-term Capital Improvement Plan including updating budgets and schedules.

**Element 9 – Monitoring, Measurement and Program Modifications**

The Public Works Operations Director is responsible for monitoring implementation and assessing success of the overall SSMP program elements with the assistance of staff. The Water/Sewer Operations Manager is responsible for identifying trends in SSO occurrences and providing recommendations to the Public Works Operations Director.

**Element 10 – SSMP Audits**

The Public Works Operations Director is responsible for overseeing annual SSMP Audits.

**Element 11 – Communication Plan**

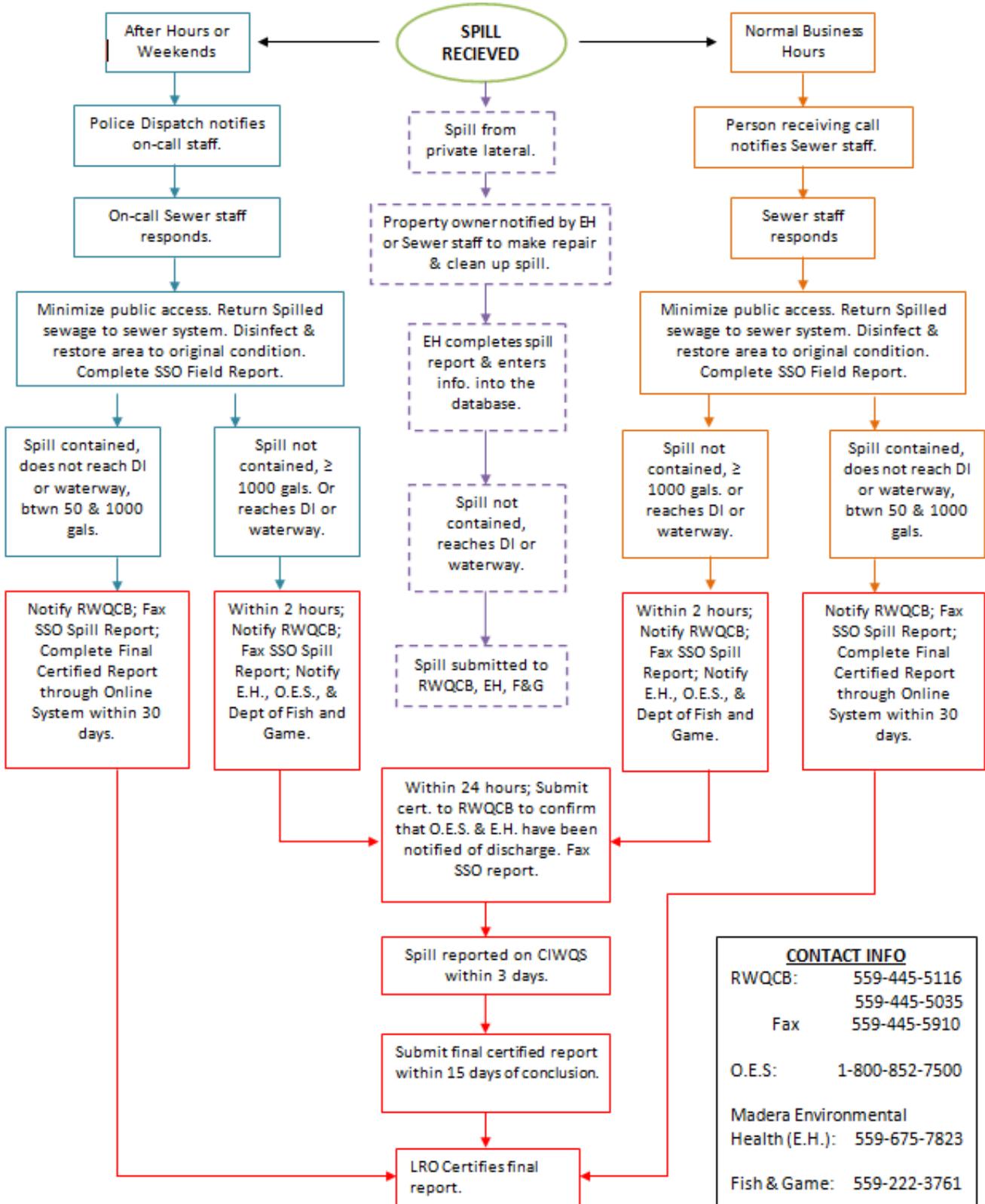
The Public Works Operations Director is responsible for communicating with the public and nearby agencies the status of the City's SSMP.

**Element 12 – SSMP Completion and Certification**

The Public Works Operations Director is responsible for presenting SSMP to the governing board for approval at a public meeting and certifying that the SSMP and subparts thereof, are in compliance with the general WDRs.



**Chain of Communication for Reporting SSOs Table 2-1**





### Element 3-Legal Authority:

*Requirement:*

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

- *Prevent illicit discharges into its sanitary sewer system (examples may include I/I, storm water, chemical dumping, unauthorized debris and cut roots, etc.);*
- *Require that sewers and connections be properly designed and constructed;*
- *Ensure access for maintenance, inspection, or repairs for portions of the lateral owned or maintained by the Public Agency;*
- *Limit the discharge of fats, oils, and grease and other debris that may cause blockages, and*
- *Enforce any violation of its sewer ordinances*

The City possesses the necessary legal authority to prevent, require, ensure, limit and enforce specific features and operations required by the Order. A summary of the relevant sections of the City of Madera’s Municipal Code (MMC) and Madera County Health Code (MCC) is shown in Table 3-1. A copy of each document follows the table.

TABLE 3-1

<b>Legal Authority To:</b>	<b>Existing Authority:</b>
a. Prevent illicit discharges into the sanitary sewer system	MMC 5-4.03
b. Require that sewers and connections be properly designed and constructed	MMC 5-4.01 MMC 5-4.02 MMC 5-4.19 MMC 7-2.02
c. Ensure access for maintenance, inspection or repairs for portions of the lateral owned by the City	MMC 7-2.11
d. Limit the discharge of fats, oils and grease and other debris that may cause blockages	MMC 5-4.03 MCC 13.66.050 MCC 13.66.070
e. Enforce any violation of City sewer ordinances	MMC 1-2.01



### **MCC 1-2.01 - VIOLATIONS A MISDEMEANOR**

In accordance with Cal. Government Code § 36900, violations of city ordinances are declared to be infractions, punishable as set forth in Cal. Government Code § 36900, unless specifically designated misdemeanors by any ordinance amending this code adopted after June 1, 1981.

### **MCC 5-4.01 - SEWER CONNECTIONS REQUIRED WITHIN SPECIFIED TIME**

Each residence, building, or place of business within the city shall be connected onto the sanitary sewer system of the city where sewer mains are located within 100 feet of the premises of such residence or building. No sanitary sewer connection shall serve more than one ownership. All connections shall be made within two years from the time that sewer mains are constructed within 100 feet from the premises, and all human waste and waste water from human sanitation shall be discharged into the sanitary sewers of the city within two years from the time that such sewer mains are constructed within 100 feet from the premises. The provisions of this section shall be enforced by the Health Officer.

### **MCC 5-4.02 - SEWER CONNECTIONS REQUIRED IMMEDIATELY**

Whenever sanitary sewer mains are constructed within 100 feet of any premises within the city and the Health Officer determines that such premises shall be connected immediately to the adjacent sewer mains for purposes of health and sanitation, the Health Officer shall be empowered to order the immediate connection by the premises onto the sewer system without waiting for the two-year period of time to lapse. The provisions of this section shall be enforced by the Health Officer.

### **MCC 5-4.03 - WASTEWATER COLLECTION AND TREATMENT; REGULATIONS**

No person shall discharge or cause to be discharged, either directly or indirectly, into the sewer wastewater system of the city, any substance or substances in violation of those standards and uniform requirements for direct and indirect contribution to the wastewater collection and treatment system of the city as established and adopted by resolution of the City Council. This section, and the resolution adopted pursuant hereto, shall apply in the city, and to all persons or entities outside of the city that are or may be, by contract or agreement with the city, users of the city publicly-owned treatment works. All such persons are required to abide by the terms of this chapter and the regulations adopted pursuant hereto, so as not to cause the city to be in violation of applicable state and federal regulations and requirements pertaining to wastewater collection and treatment. In the event of violation of any of the provisions of this code, and, or the regulations adopted hereunder, any person causing such violation is expressly declared to be guilty of a misdemeanor and upon conviction thereof shall be punished by imprisonment in the county jail for a term not to exceed six months, or by a fine not to exceed \$500 or by both such imprisonment and fine. Every day such violation continues shall constitute a separate offense. In addition, any person who intentionally or negligently violates any provisions of this section, the regulations adopted hereunder, any provisions of any permit issued pursuant to the regulations, or who intentionally or negligently discharges waste or wastewater which causes pollution or who violates any cease and desist order, prohibition, effluent limitation, or national pretreatment or toxicity standard, shall be civilly liable to the city in a sum not to exceed \$6,000 for each day in which such violation occurs. ('61 Code, § 5-4.03) (Ord. 17 N.S., passed - - ; Am. Ord. 42 C.S., passed 3-6-63; Am. Ord. 407 C.S., passed 2-21-83)



#### **5-4.19 - SEWER DEPARTMENT TO MAKE ALL SEWER CONNECTIONS**

It shall be unlawful for any person to perform the work or connect onto the city sewer system. The city, by and through its Sewer Department, shall make all connections onto the city sewer system.

#### **7-2.11 - INSPECTIONS**

The person performing work under the provisions of this chapter shall cause all work to be inspected by the Inspector and shall notify the Inspector at least 24 hours before the time set for such inspection. Work completed without giving such notice or request for inspection shall not be acceptable, and work done during the absence of the Inspector shall be subject to rejection. All work performed under this chapter shall be in conformance with applicable plans, details, and specifications of the city and shall be done to the satisfaction and under the supervision of the Director.

#### **13.66.050 – ADDITIONAL REQUIREMENTS TO INSTALL GREASE TRAPS – FOOD ESTABLISHMENTS**

All food establishments as defined in Chapter 7.01 of this code which are or are required or permitted to be connected to a community sewer system shall install grease, oil, sand and grit interceptors for the proper handling of wastes containing grease or oil in excess of three hundred milligrams per liter of animal and vegetable origin and/or one hundred milligrams per liter of mineral or petroleum origin, or any flammable wastes, sand, grit and other harmful ingredients. Interceptors shall be designed to substantially conform to the standards set forth in Section 13.66.060 of this chapter and Exhibit A thereto. Any deviation from the standards of this section must be approved in advance in writing by the county engineer. (Ord. 279-C § 2(part), 1994).

#### **13.66.070 – INSPECTION AND MAINTENANCE REQUIREMENTS FOR GREASE TRAPS**

Grease traps required under this chapter must be inspected on a monthly basis and accumulated wastes must be removed as needed. A record of such inspection and of all removals must be submitted to the county engineer on a quarterly basis on a form prescribed by the county engineer. (Ord. 279-C § 2(part), 1994).

#### **WASTEWATER PRETREATMENT REGULATIONS**

City Wastewater Pretreatment Regulations, (see Attachment, Wastewater Pretreatment Regulations) sets uniform requirements for direct and indirect contributors into the wastewater collection and treatment system for the City of Madera. The objectives of these regulations are:

- To prevent the introduction of pollutants into the municipal wastewater system which will interfere with the operation of the system or contaminate the resulting sludge.
- To prevent the introduction of pollutants into the municipal wastewater system which will pass through the system inadequately treated or otherwise be incompatible with the system.
- To improve the opportunity to recycle and reclaim wastewaters and sludge from the system.
- Provide for the regulation of direct and indirect contributors to the municipal wastewater system through the issuance of permits to certain non-domestic users and through enforcement of general requirements for the other users and authorizes monitoring and enforcement activities.



- These regulations apply to the City of Madera and to persons outside the City who are, by permit from the City, users of the Publicly Owned Treatment Works (POTW). Except as otherwise provided herein, the Director of Public Works of the City of Madera shall administer, implement, and enforce the provisions of these regulations.



## Element 4-Operation and Maintenance Program:

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### *Requirement:*

*The SSMP must include those elements listed below that are appropriate and applicable to the Enrollee's system:*

- a. *Collection System Map: Each wastewater collection system agency shall maintain up-to-date maps of its wastewater collection system facilities, showing all gravity line segments and manholes, pumping facilities, pressure pipes and valves, and applicable storm-water pumping and piping facilities.*
- b. *Preventive Operation and Maintenance: 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 problems areas. The Preventive Maintenance (PM) program should have a system to document scheduled and conducted activities, such as works orders.*
- c. *Rehabilitation and Replacement Plan: 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 inspection of manholes and sewer pipes, and system for ranking the conditions of 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 implement the short- and long-term plans plus a schedule for developing the funds needed for the capital improvement plan.*
- d. *Training: Provide training on a regular basis for staff in sanitary sewer system operations and maintenance, and require contractors to be appropriately trained.*
- e. *Contingency Equipment and Replacement Inventories: Provide equipment and replacement part inventories, including identification of critical replacement parts.*

### **A. Collection System Map**

The Department of Public Works strives to maintain accurate up-to-date maps of its wastewater collection system facilities as well as all work performed on those assets. This section describes the AutoCAD Utility Underground Map Books software program utilized to maintain this information.

1. AutoCAD (CAD) is the graphics program used for mapping and printing City wide underground utility maps. The City sewer map is divided into 60-sections, enlarged to fit 8-1/2" X 14" sheets, printed, bound in binders and placed in each sewer maintenance vehicle. Maps display streets along with sewer assets and are referenced for maintenance activities.
2. AutoCAD Sewer Layer Structure, Sanitary sewer collection system information is maintained in a Master AutoCAD sewer file which contains the following layers:
  - SS-MANHOLES: location of sewer manholes, lamp-holes, and identification numbers for each.



- SS-MAINLINES: location of sewer gravity mainlines, force-mains and identification numbers for each.
  - SS-PUMPSTATIONS: location of sewer pumping station buildings
3. In AutoCAD, information pertaining to sewer features (such as manhole number, rim and invert elevations, mainline size and length) is displayed as text annotation layers. CAD feature layers (non-text layers) are exported into an ArcSDE Geodatabase (geodatabase) as GIS feature classes. In GIS, these features have the CAD text information stored as data in layers attribute tables along with other pertinent data.
  4. GIS Computer Mapping Program, GIS is a computer mapping system that links graphic features on a map to databases of related information. The City is still in the process of converting all of its sanitary sewer assets into a GIS system. While AutoCAD is used primarily for design work, GIS is utilized for storage/retrieval of asset information. Exhibits 4.1.A.ii through 4.1.A.vii were created using GIS ArcView software.

### **Map Update and Maintenance Procedures**

Keeping the sewer collection system maps up to date is an ongoing effort with all modifications coordinated through the Public Works Engineering Technician. The following routine actions are part of the program:

- Field personnel note any discrepancies or errors on field maps. These mark ups are submitted to the Public Works Engineering Technician for verification and map updates.
- The master underground utilities AutoCAD map is modified and updated underground utilities map book pages are distributed.
- In-house AutoCAD (CAD) drawings for all capital improvement and system rehabilitation projects are sent to the Public Works Engineering Technician as part of project close-out. The master underground utilities AutoCAD map is modified and updated.
- Developers submit “as-builts” of final sewer system construction to the City Engineer. These mark ups are submitted to the Public Works Engineering Technician for map updates.

### **B. Preventive Operation and Maintenance**

The Public Works Sewer Division has developed several maintenance approaches for the sewer collection system which include, Routine Preventive Sewer Line Cleaning, Monthly Cleaning of High Maintenance Sewer Lines, Pump Station Maintenance and utilization of VIDEO inspections.

Objectives of Sewer Maintenance Preventative Maintenance Program include:

- Increase Preventative Maintenance and management of all parts of the wastewater collection system to decrease SSOs minimizing the frequency of sanitary sewer overflows (SSOs) and mitigating the impact of SSOs.
- Continue with routine hydro-cleaning of sewer mains and monthly hydro-cleaning of identified sewer mainline target (high-maintenance) areas.
- Conduct VIDEO condition assessment of each sewer mainline, identify and prioritize sewer main repairs or replacement of problem sewer mainlines.



- Document any problem or concerns regarding each pipe segment and/or sewer manholes.
- Develop a Restaurant Owners' Guide for Grease Control.
- Upgrade root removal equipment and improve maintenance program.
- Develop contingency equipment and replacement part inventory.
- Refer sewer main concerns identified by VIDEO or with repeat maintenance to Engineering for evaluation.
- Conduct appropriate analysis/evaluation of SSOs utilizing historical maintenance and activity data and records and provide recommendations to reduce future risk.
- Identify collection system blockages due to fats, oil and grease (FOG) and develop strategies to decrease backups.
- Operate all pump stations at peak efficiency and perform preventative maintenance on equipment at all sanitary sewer pump stations.
- Maintain records of the sanitary sewer system and respond to inquiries.

#### **Routine Preventive Sewer Line Cleaning:**

Sewer Maintenance employees are trained on proper maintenance and operation of Jet Rodder truck for Hydro flushing sewer lines. Routine cleaning of all City sewer lines takes approximately 1-1/2 to 2 years complete. One goal of the Sewer Division is to clean each and every sewer mainline once every 1-1/2 years.

The Sewer Division divided the collection system map into 13 individual section maps for preventive maintenance cleaning purposes. These area maps are utilized to manage crew activities and ensure proper and thorough mainline cleaning.

The Operator completes a daily sewer line cleaning log which notes date sewer line was cleaned, name of the Operator, sewer main location as well as documenting any problem or concerns regarding each pipe segment and/or sewer manholes. This data is entered into a spreadsheet which can be sorted by sewer line number, location, Operator and description of problem. This data is reviewed to determine if repairs, VIDEO inspection, replacement or rehabilitation of sewer line is required and reported to Engineering for consideration for rehabilitation or replacement if necessary.

#### **Monthly Cleaning of High Maintenance Sewer Lines:**

The Sewer Division has an aggressive monthly preventative maintenance (PM) program for identified problem (high maintenance) target areas of the collection system shown in Table 4-1. It currently takes 1 to 1-1/2 weeks per month to clean high maintenance sewer mainlines. A majority of problem with these lines are that they are older sewer mains with little or no grade. If it is determined that rehabilitation or replacement of line may be necessary or an opportunity to increase grades by connecting to new sewer mains, Engineering will be notified. At this point, Engineering will evaluate findings in the pipe and handle the rehabilitation or replacement as necessary.



**Table 4-1**

<b>No.</b>	<b>Description (street name, alley, etc.)</b>	<b>Sewer main Location</b>	<b>FROM/TO (point of beginning and point of ending)</b>	<b>Distance</b>	<b>Size</b>
1	Cross Street	Cross Street	Vineyard Ave., heading east towards Lilly Street	500'	6"
2	Washington Street	Washington Street	Lilly to Malone Street	425'	6"
3	Washington Street	Washington Street	Vineyard Ave. to Lilly Street	500'	6"
4	Vineyard Ave.	Vineyard Ave.	Washington Street to Cross Street	500'	10"
5	Vineyard Ave.	Vineyard Ave.	Clinton Street to Washington Street	350'	10"
6	Siphons	South from MID canal on Clinton	Cross MID canal towards 1st manhole on Adelaide	100'	6"
7	Alley	between Lake and Vineyard	Clinton heading north toward 7th Street	380'	8"
8	Clinton	Clinton	Between Sycamore and Vineyard heading east to Vineyard	150'	10"
9	Siphons	Clinton Street	Lake Street to Sycamore	250'	12"
10	South Lake Street	South Lake Street	Moore Street to Sunrise	475'	6"
11	Alley	between A and B Streets	6th to Yosemite Ave.	250'	6"
12	6th Street	6th Street	Between B and C Streets to between A and B Streets	400'	6"
13	Alley	between B and C Streets	6th Street heading south towards MID canal	Sewer main on east side 400', Sewer main on west side 200'	6"
14	Alley	between A and B Streets	Clinton to MID Canal	500'	6"
15	Alley	between B and C Streets	9th Street to 10th Street	400'	6"
16	Alley	between C and D Streets	10th Street to 11th Street	600'	6"
17	Alley	between C and D Streets	9th to 10th Street	350'	6"
18	Alley	between D and E Streets	10th Street to 11th Street	400'	6"
19	Alley	between C and D St.	12th Street to 11th Street	300'	6"



20	Alley	between C and D Streets	13th Street to 12th Street	550'	6"
21	Alley	between Hull and Stinson	A Street, heading south to 201 Hull Street	600'	6"
22	Alley	Between A and B	13th Street to Roosevelt	400'	6"
23	Alley	between B and C Streets	14th Street to Roosevelt	300'	6"
24	Alley	between B and C Streets	13th Street to 14th Street	450'	6"
25	Alley	between G Street and Gateway Drive	Madera Ave. to 11th Street	500'	6"
26	Madera Avenue	Madera Avenue	between G Street Gateway Drive to Gateway Drive	455'	12"
27	Alley	Between G and Gateway Dr.	7th Street to 6th Street	430'	6"
28	Easement	Between 5th and E. Yosemite	Between Flume and High Street heading east toward High Street	210'	6"
29	Alley	between Flume and High Streets	5th Street heading south to first manhole	310'	6"
30	Alley	between A and B Streets	5th to East 4th Street	425'	6"
31	East Yosemite Ave.	East Yosemite Ave.	Heading East from 218 Yosemite (Ritz Bar)	330'	6"
32	East Yosemite Ave.	East Yosemite Ave.	Heading West from 218 Yosemite (Ritz Bar)	330'	6"
33	Alley	between C and D Streets	5th Street to Yosemite	south 550'	6"
34	Alley	between C and D Streets	5th Street to 4th Street	north 400'	
35	5th Street	5th Street	Between C and D Streets to between B and C Streets	400'	10"
36	North Lake	North Lake	Central Ave. heading north towards 317 North Lake Street	317'	4"



37	Easement	between North A and Lake Streets	Central towards Fresno River	200'	6"
38	3rd Street	3rd Street	From between A and B Streets to Central	125'	6"
39	Alley	between B and C Streets	3rd to Central	450'	6"
40	Alley	between B and C Streets	3rd Street to 4th Street	350'	6"
41	East 3rd Street	East 3rd	Between D and E Streets to between C and D Streets	400'	8"
42	Easement	Between 3rd and 4th	E Street heading east toward alley	100'	4"
43	E Street	E Street	Between 3rd and 4th Streets, heading south towards 4th Street	60'	4"
44	Gateway Drive	Gateway Drive	4th Street to 3rd Street	425'	6"
45	Gateway Drive	Gateway Drive	5th Street to 4th Street	425'	6"
46	Alley	between G Street and Gateway Dr.	5th Street to 4th Street	425'	8"
47	5th Street	5th Street	Between G and Gateway to Gateway Drive	225'	10"
48	Martin Street	Martin Street	Dunham to 123 Martin	200'	6"
49	Dunham Avenue	Dunham Avenue	Monterey Street to Martin Street	390'	6"
50	Santa Bonita Street	Santa Bonita Street	Olive, south to 144 Santa Bonita	600'	6"
51	Alley	between Freeway 99 and I Street	8th to 9th Street	350'	6"
52	Alley	between Freeway 99 and I Street	7th to 8th Street	450'	
53	Alley	Between South I Street and Freeway 99	7th Street, heading north past 6th Street, toward Yosemite	600	6"
54	Alley	between I and J Streets	Yosemite to 5th Street	425'	6"
55	Alley	between I and J Streets	Yosemite to 6th Street	375'	6"



56	Alley	between J and K Streets	Yosemite to 5th Street	450'	6"
57	Alley	between J and K Streets	Yosemite to 6th Street	387'	6"
58	Alley	Between K and L Streets	Yosemite to 5th Street	450'	6"
59	Alley	between K and L Streets	Yosemite to 6th Street	380'	6"
60	Alley	between L and M Streets	Yosemite to 5th Street	425'	6"
61	Alley	between L and M Streets	Yosemite to 6th Street	380'	6"
62	Alley	between M and N Streets	Yosemite to 5th Street	375'	6"
63	Alley	between M and N Streets	Yosemite to 6th Street	390'	6"
64	Alley	between N and O Streets	Yosemite to 6th Street	375'	6"
65	Alley	between N and O Streets	Yosemite to 5th Street	450'	6"
66	Alley	between O and P Streets	Yosemite to 5th Street	425'	6"
67	Alley	between O and P Streets	Yosemite to 6th Street	375'	6"
68	Alley	between P and Q Streets	Yosemite towards 6th Street	365'	6"
69	Alley	between P and Q Streets	Yosemite to 5th Street	365'	6"
70	Alley	between Q and R Streets	Pine to Yosemite	600'	6"
71	O Street	O Street	4th Street heading south to lamp hole	125'	4"
72	Alley	between O and P Streets	Olive to 6th Street	270'	6"
73	Williams	Williams	4th Street to 204 Williams	175'	4"
74	Dwyer Street	Dwyer Street	Howard to Plumas	500'	6"



75	Howard Road	Howard Road	West from Schnoor	600'	12"
76	West Park Drive	West Park Drive	Claremont to Orchard	325'	8"
77	Lateral	2905 West Gate	From City clean out at 2905 West Gate to main on Westgate	50'	4"
78	Pinewood Court	Pinewood Court	North from Pinewood Drive to 915 Pinewood Court	80'	
79	Pinewood Court	Pinewood Court	South from Pinewood Drive to 1112 Pinewood Court	south 80'	6"
80	Riverview Drive	Riverview Drive	From Storm Pump Station #3 on Riverside heading east toward 2300 Riverview	200'	8"
81	Riverview Drive	Riverview Drive	Valley Way heading east towards 1st manhole	350'	8"
82	Riverview Drive	Riverview Drive	From 2512 Riverview Drive heading east to Valley Way	300'	8"
83	Riverview Drive	Riverview Drive	From 2524 Riverview Drive heading east towards 2512 Riverview	150'	8"
84	Riverview Drive	Riverview Drive	From Granada Drive heading east towards 2524 Riverview	100'	8"
85	W. National	W. National	West from 2612 W. National to 2716 W. National	300'	8"
86	W. National	W. National	Granada to 2612 National	350'	8"
87	Freeway Crossing	From Terrace and Central	Cross freeway heading west to Central	325'	8"
88	Harding	Harding	Owens to Sharon Road	125'	4"
89	Alley	between Cleveland and Wilson	Owens to Sharon Road	375'	6"
90	Alley	between Cleveland and Wilson	Owens heading east to first manhole	250'	6"
91	Alley	between Cleveland and Wilson	Davis heading west to 1st manhole	116'	6"
92	Alley	between Cleveland and Wilson	Davis to Torres	220'	6"
93	Torres Way	Torres Way	Rush to Cleveland Ave.	350'	6"
94	Torres Way	Torres Way	Lincoln to Rush	550'	6"
95	Alley	between Columbia and Sierra	Rush to Cleveland Ave.	475'	6"
96	Renee Way	Renee Way	Noreen Way to Lucia	475'	6"
97	Nicola Way	Nicola Way	Sherwood to Pescara	300'	8"



98	Alley	between Daulton and Riverside Drive	Lake Street to Fresno Street	500'	8"
99	Alley	between Garfield and Lincoln	Fresno Street to Merced Street	490'	8"
100	Easement	Between Merced and Tulare Streets	Cleveland Ave. to Wessmith	600'	6"
101	Easement	Between Merced and Tulare Streets	Wessmith to Cleveland	600'	6"
102	Merced Street	Merced Street	Wessmith to 1517 Merced Street	550'	8"
103	Rogers	Rogers	Wessmith to Ashland	350'	6"
104	Fresno	Fresno	Wessmith to Ashland Way	350'	6"
105	Clark	Clark	Lake Street, heading west towards Madera Garden Apartments	250'	6"
106	Alley	between D and Nebraska	South Street to Riverside	550'	6"
107	Siphons	East side of D Street Fresno River bridge	Cross river from Central Avenue to Riverside	425'	8"
108	Siphons	West side of D Street Fresno River bridge	Cross river heading north to Riverside	425'	10"
109	Siphon	Freeway 99 and Road 28, N/O Avenue 13	Cross freeway 99 from W/O freeway towards E/O freeway	315'	15"

**Pump Station Maintenance:**

The Sewer Division is in charge of the operations and maintenance of the five sewage pumping stations (sewer lift stations):

1. Fairground Sewer Lift Station
2. South Street Sewer Lift Station
3. Airport Sewer Lift Station
4. Small Airport Sewer Lift Station
5. Madera Avenue Sewer Lift Station (in the process of being eliminated with new CIP construction. Will be converted to gravity flow.)



These sewer lift stations are automatically controlled so pumps alternate as lead / lag pumps, maintain wet well operations to limit pump starts and stops and in-line storage.

Sewer Pumping Stations are inspected daily during work week as part of the sewer maintenance pump station preventative maintenance program. Work activities are developed and prioritized based on these inspections. Major rehabilitation or major repair concerns are forwarded to Engineering. At this point, Engineering will evaluate findings and handle the rehabilitation, replacement or repair as necessary. South Street Sewer Lift Station is currently being engineered to be upgraded with new electric motors, pumps, valves and grinder

Some items covered during preventative maintenance inspections are as follow:

- Check lubrication
  - Motors, pumps, drive shafts, locks, latches and hinges
- Inspection
  - Sump Pumps, controls, alarms, wet well levels, forced fresh air ventilation system, amperage, ensure all locks and latches are secured
- Leak Checks
  - Fuel/Oil lines, valves, packing, seals, lubricators, bubbler air systems
- Exercise
  - Motors and valves as needed
- Housekeeping
  - Clean interior/exterior, landscape maintenance, purge bubbler air system, wash down channel chamber and dry well, clear debris from bar screen,

Most of the sewer lift stations are connected to a SCADA system which monitors pump run-times, amperage, high and low wet well levels and power failures. If preset perimeters are exceeded, SCADA alarm will notify, by phone, Sewer Division Lead Worker during normal working hours and/or Public Works Stand-by person during off work hours, weekends and holidays. Staff is currently looking at the viability of connecting the sole remaining lift station to the SCADA system.

Fairground Sewer Lift Station and South Street Sewer Lift Station are most critical stations with highest sewer flows. Both of these sewer lift stations are equipped with permanent emergency electrical generators and automatic transfer switches. They are also equipped with exercise clocks that automatically start and stop these systems under a load once per week to ensure they are operational for emergency situations.

Airport Sewer Lift Station, Madera Avenue Sewer Lift Station and Small Airport Sewer Lift Station currently experience minor sewer flows. A six-inch portable pump is available to bypass sewer flows around the Airport or Madera Avenue Sewer Lift Stations in case of a power outage. Sewage from the Airport Sewer Lift Station can be vacuumed by Vactor Jet Rodder truck as needed during a power outage.

**Equipment Dedicated to Maintenance of Sewer Collection System:**

- (1) Permanent emergency electrical generator w/auto transfer switch for Fairground Sewer Lift Station



- (1) Permanent emergency electrical generator w/auto transfer switch for South Street Sewer Lift Station
- (2) Pickup trucks
- (1) One Ton Utility Truck with boom lift
- (1) 350 kW portable electrical generator
- (1) 6" portable pump
- (1) Submersible/portable pump
- (1) Air Compressor
- (1) Backhoe
- (1) Dump Truck
- (1) Vactor Jet Rodder truck (Street Division has (1) Vactor Jet Rodder truck that Sewer crew can be make use of as needed)
- (1) Trailer
- (1) Lateral VIDEO Camera

**Personnel Dedicated to Maintenance of Sewer Collection System:**

- 1-Operations Manager
  - Oversees System Operations
- 1-Wastewater Collection System Supervisor
  - Site Supervisor and assist repair crew
- 2- Sewer Maintenance Worker IV
  - Vactor Operators, routine preventive maintenance and repairs
- 1-Maintenance Technician
  - Pump station maintenance, routine preventive maintenance and repairs
- 2-Maintenance Worker II
  - Routine preventive maintenance and repairs and assist Vactor Operators

**C. Rehabilitation and Replacement Plan**

Public Works, Sewer Division goal is to conduct visual and video inspections to assess each sewer mainline. The video inspection is performed by contracted services. Information from the video inspection is provided to City of Madera in written report and DVD. Written report provides date of inspection, location of main videoed, pipe material, pipe size, length of pipe and location of lateral connections and noted concerns regarding condition of sewer line. This data is reviewed by Public Works and prioritized for repairs, replacement or rehabilitation. In addition, to Routine condition assessment, the following locations are added to the video program:

- Lines with more than three service requests within the past year
- Lines under roadway scheduled for rehabilitation
- Lines identified by field personnel as problem locations
- New sewer line installations

If it is determined that rehabilitation, replacement or repair of line may be necessary, Engineering will be notified. At this point, Engineering will evaluate findings and handle the rehabilitation, replacement or repair as necessary.



**Capital Improvement Program (CIP)**

The current Sanitary Sewer Main CIP is included in Table 4-2. Individual CIP projects run cradle-to-grave and therefore can begin before and continue beyond the budget cycle.

Table 4-2						
Project No.	Project Title	2014/15	2015/16	2016/17	2017/18	Total Cost
S-2	Replace Miscellaneous Sewer Mains, Various locations	\$ 973,000				\$ 973,000
S-3	Replace Main, 9th Street - Alley to Gateway	\$ 25,000				\$ 25,000
S-6	Replace Main, Ongoing, Upgrade South Street Lift Station	\$ 189,000				\$ 189,000
S-7	Replace Main, Manhole Cover Replacement Misc.		\$ 10,000			\$ 10,000
S-9	Construct Interceptor Sewer along Westberry Blvd, Kennedy St, Ellis Overcrossing			\$ 110,000		\$ 110,000
S-11	Expose manhole covers and raise to grade on Madera Ave	\$ 74,800				\$ 74,800
S-12	Schnoor Ave. Trunk Sewer and Pump Station	\$ 649,700	\$2,993,000			\$3,642,700
S-995	Construction of Rd 28 Interceptor DIF Reimbursement	\$ 206,000				\$ 206,000
S-996	Southeast Quadrant Sewer Improvements				\$106,200	\$106,200
S-998	Northwest Quadrant Sewer Improvements				\$125,000	\$125,000
Total Costs		\$2,117,500	\$3,003,000	\$110,000	\$231,200	\$5,461,700

Managing the annual capital investment in sanitary sewer rehabilitation, inflow/infiltration improvements and capacity upgrades requires a long-term conceptual planning document. This Projected CIP projection is used to develop sewer rates and plan for the issuance of bonds necessary to finance the projected Capital Improvement Programs. The funds that support the Capital Improvement Program come from the City's Sewer Fund. The sewer fund is an enterprise fund and sewer fees are established to meet projected needs.



#### **D. Training**

City of Madera Sewer Maintenance Division staffs are required to complete various types of training as listed below. They are also encouraged to study and prepare for CWEA Certification exam. City contracted services are performed by State Certified Contractors and required to abide to State and City standards. Another goal is to train public on importance of FOG control by developing and distributing "Guide for Grease Control".

- Customer Service
- Sexual Harassment
- Class B Drivers License
- CWEA Certifications
- Sewer Mainline Cleaning (Jet Rodder with various nozzles, power snake for laterals)
- Forklift
- Confined Space
- Gas Detection
- Traffic Control
- USA Locating
- SSO Prevention and response
- Sewer Lift Station pump repairs
- Wellness Program
- Worker's Comp

The City also conducts safety training when new equipment is acquired. The City utilizes the equipment supplier to provide training to appropriate crew members. Safety training activities log that is kept at Public Works Admin office.

#### **Public Education to Promote Proper Disposal FOG**

The City recognizes grease from restaurants as the number one cause of sewer line stoppages and spills. Therefore, another goal will be to develop a Restaurant Owners' Guide for Grease Control which will be distributed to every restaurant within the City. The guide will contain information on the importance of fighting grease as well as a list of grease control products available from the local hardware stores.

Large multifamily residential developments are also a significant source of grease. The City will develop a "Home Owners Guide for Grease Control" which will cover various options for homeowners to stop pouring grease down sinks from simply pouring it into a glass jar with a lid, storing it under the sink until trash collection day to using products available at local stores.

#### **E. Contingency Equipment and Replacement Inventories**

Critical replacement parts stocked for emergency sewer lift station pump repairs are spare Variable Frequency Motor Drives, motor controllers, float switches and relays. All City sewer lift stations are designed and equipped with one extra pump in case one pump fails. Pumps are pulled, repaired and replaced one at a



time as needed. City will explore budgeting to keep one spare pump and motor on shelf for Fairground and South Street Sewer Lift Stations.

The Sewer Division has the necessary tools and equipment to work on the sewer lines or pumping stations. In addition to small tools, the City has two sewer cleaning trucks; two six-inch trailer-mounted emergency diesel generators, two by-pass pumps, and a truck with hoist capable of lifting the pumps.

**Table 4-4 Wastewater Collection Equipment**

Unit	Type	Year	Model	Use
144	Trailer	1987	6" Storm Pump & Trailer	Emergency By-Passing
192	A.C.	1971	Forklift	Construction/ Maintenance
229	Caterpillar	1997	Generator	Emergency By-Passing
346	John Deere	2005	Backhoe	Construction/ Maintenance
364	Chevy	2006	½ Ton Pickup	Construction/ Maintenance
376	Honda	2006	Civic	Construction/ Maintenance
399	Freightliner	2008	5-yd Dump Truck	Construction/ Maintenance
1504	Ford	2013	½ Ton Pickup	Construction/ Maintenance
1505	Ford	2014	½ Ton Pickup	Construction/ Maintenance
2004	Ford	2015	1 Ton Utility Truck	Construction/ Maintenance
3001	Vaccon	2014	V350/1000	Vactor/Maintenance
5502	Sullivan	2013	Port Air Compressor	Construction/ Maintenance



## Element 5-Design and Performance Provisions:

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### *Requirement:*

- a. Standards for Installation, Rehabilitation and Repair: *The SSMP must identify 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 sewer systems.*
- b. Standards for Inspection and Testing of New, Rehabilitated, and Repaired Facilities: *The SSMP must identify the procedures and standards for inspecting and testing the installation of new sewers, pumps, and other appurtenances and for rehabilitation and repair projects.*

### **Installation Standards, Specifications and Testing**

The City maintains construction standards and specifications (City of Madera Standards) for sewer manholes, grease interceptor, approved pipe materials, prohibited pipe material, installation of pipe, backfill, compaction of trenches, house branches, manhole construction, minimum pipe sizes, slopes, pipe depths, clearance with other utilities, other appurtenances and testing installation procedures. City of Madera Standards is available on the City's website ([www.cityofmadera.org](http://www.cityofmadera.org)).

### **Sewer Pump Station Specifications**

Sewer pump stations have historically been developed on a case-by-case basis as needed. Public Works has developed the following general requirements as a guide for future sewer pump stations.

## **CITY OF MADERA DESIGN REQUIREMENTS FOR SEWAGE LIFT STATIONS**

### **A. General Requirements**

1. Lift stations will not be allowed where an acceptable alternative gravity route exists.
2. Design the lift station to serve the entire tributary at build-out densities conforming to the General Plan, and in accordance with City peaking standards and I/I allowances.
3. Lift stations may be package wet well/dry well stations or site designed vertical, dry pit, non-clogging, centrifugal pumping stations, depending on station size, head requirements and motor horsepower. No submersible pumps will be allowed in the system.

Table 5-1, below, outlines the allowable design criteria for each type of pump station, listed in order of preference:



**TABLE 5-1**

**PUMPING STATION DESIGN CRITERIA**

<b>Station Type</b>	<b>Influent Flow Range (gpm)</b>	<b>Maximum TDH *</b>	<b>Maximum Motor Horsepower</b>
Wet well/ Dry well	Up to 3000 gpm	Up to 45 feet	100 HP @ 1450 rpm
Vertical centrifugal	No restrictions	No restrictions	No restrictions

\* TDH = Total Dynamic Head. Submittal of calculations required.

4. Tandem pumping may be allowed where low flow, high TDH conditions exist with expressed written permission from the City Engineer.
5. All pumps, regardless of station type, will be non-clogging, capable of passing a minimum 3" diameter sphere. All pumps, regardless of station type, will be single speed.
6. Lift stations are not allowed within the street right-of-way.
7. Provide a 12-foot paved access road with a 14-foot wide rolling gate to allow service vehicles to be parked off the street and clear of the sidewalks. Turnarounds are required for stations constructed along heavily traveled streets. Provide service vehicle access to wet well.
8. Provide a reinforced concrete base slab sized adequately to counteract buoyancy. Provide supporting design calculations.
9. Provide a single surface pad over site that incorporates lift station access, wet well/dry well access and supporting generator and fuel supply tanks, as necessary.
10. Provide restrained flexible couplings on all outlet piping within 2 feet of the station wall.
11. Provide reinforced concrete supports for pipes between wet well and dry well, where appropriate.
12. Wet well to be minimum 72" in diameter with 4-hour capacity or as necessary to accommodate pumping equipment. For all other station designs wet well size will be based on good sanitary engineering practices. Provide resilient-seat gate valve on-line into wet well.
13. Provide 6" PVC emergency by-pass system consisting of a suction line and a discharge line and a standpipe equipped with a cap and cam-lock connector. Bypass will be located in a vault. Standpipe connects to force main through an AWWA resilient seat gate valve with stainless steel trim and a check valve. The suction and discharge lines will have gate valves for isolation. Adequately support all piping.



14. Provide 1-inch minimum water service with reduced pressure backflow preventor and piping insulation
15. Provide re-key able Best Access System locks for all padlock applications.
16. Lock hardware finish is Satin Chromium Plated unless other finish is specified.
  - a. Certifications – ANSI A156.2 Series 4000 Grade 1 – Heavy Duty Locks – Levers, Knobs, Deadbolts & Padlocks.
  - b. All locks must have interchangeable core.
  - c. Patent Protection for keying system.
  - d. All hardware must be compatible with the City’s existing key, core & lock system as provided by Best Access Systems.
  - e. Exit Doors are opening able at all times from the inside without the use of a key or any special knowledge or effort.
17. Provide fall protection device for ladders that include winch and center post. Winch will be Miller M 52-50SS or approved equal. Center post will be Uni-Hoist Arm # UH 504-24 with top and back rollers or approved equal. Provide non-skid surface on ladder.
18. Provide a spare pump and air release valve prior to acceptance.
19. Provide calculations to determine the need for hydrogen sulfide suppression in force main.
20. Station piping, equipment and appurtenances will be painted in accordance with designated standard colors as set forth in Table 5-2, below:

**TABLE 5-2  
PUMPING STATION COLOR CODES**

<b>TYPES OF EQUIPMENT, PIPING, VALVES</b>	<b>COLOR</b>
1. Pump suction isolation valve	Blue
2. Pump discharge isolation valve	Red
3. Pump discharge check valve	Orange
4. Force main isolation valve	White
5. Emergency pump isolation valve	Yellow
6. Emergency pump check valve	Brown
7. Sump pump isolation valve	Black
8. Sump pump check valve	Orange
9. Mechanical seal pressure valve	Pink
10. Chemical isolation valve / piping	Purple
11. All electric motors	Blue
12. All sewer pumps and pipes	Green
13. All compressed air system	Per City
14. Standby generator	Per City



## **B. Pumping Equipment**

1. Provide a minimum of two pumps and controls to alternate lead and lag pumping. Where required by City Engineer, 3 or more pumps may be required in a lead, lag, standby arrangement.
2. For each type of pump, provide one spare rotating mechanism to replace each pump type.
3. Provide one set of routine service replacement parts such as wear rings, bearings, and seals for the pumps.
4. Provide calculations used to determine the capacity of the wet well and the specifications for the pump.
5. Provide hour meters for each pump that records pump run time, only if the motor is operating.
6. Provide a magnetic flow meter on the discharge of the pump station. Meters may be in an approved vault. Display must be installed above ground inside or near motor control panel.
7. Packaged wet well/dry well stations
  - a. Above ground lift station is preferred.
  - b. Lift station standard is 7'-6" diameter, Fiberglass Reinforced Plastic underground lift station by Gorman-Rupp with above ground controls and underground pump shut -offs.
  - c. All pumps, motors, internal valves and piping, level indicators, control switches, ladder; alarms, blower and dehumidifier will be manufactured and assembled as a package. Supply and warranty will be through one company.
  - d. The pumps will be self-priming, horizontal, centrifugal, sewage pumps. Pumps will pass a maximum solid, 3" diameter sphere.
  - e. All motors will be totally enclosed, fan cooled, premium efficiency.
8. Vertical centrifugal stations
  - a. The lift station will employ vertical, dry pit, single stage non-clogging centrifugal sewage pumps.
  - b. Pumps with mechanical grease seals will be provided with grease reservoir.
  - c. All motors will be totally enclosed, fan cooled, premium efficiency.
  - d. Pumps will include an individual air bleed system from each pump to the wet well.



- e. Seal water piping systems, where necessary, will be schedule 80 PVC or Type "K" copper. Seal water systems will be designed with drains.
- f. Design of lift station enclosure for vertical centrifugal stations will be coordinated with the City Building and Fire Departments with respect to occupancy class and electrical and HVAC system design.

### **C. Lift Station Piping and Valving**

1. When not included with package stations, all internal main lift station piping will be flanged, except as discussed in No. 2.
2. All main lift station pipes will have flexible connections (Victaulic or Dresser) to allow for disassembly.
3. All main piping will have manual vents and drains to allow draining of sewage prior to piping disassembly.
4. Resilient seat gate valves in manholes will be used for station wet-well isolation.
5. Cast iron, non lubricated eccentric plug valves with worm gear operators will be used for pump isolation valves. Valves will have stainless steel bearing, nickel seats, neoprene faced plugs and nitrile-butadiene packing. For package wet well/dry well stations, if space does not permit isolation valves for each pump use 3-way valves.
6. Main Pump Check Valves will be cast iron swing checks with external lever return. Check valve will not be installed in the vertical. Disc will be 316 stainless steel or cast iron with bronze trim. Pivot arm and bearing will be 316 stainless steel or cast iron with bronze trim. Seat will be field replaceable with neoprene facing.

### **D. Electrical Equipment**

1. Free standing electrical service and transfer switch will be heavy duty electrical weatherproof enclosure securely mounted in a manor acceptable to the Public Works Operations Director, a minimum of 24" above the ground. Provide a concrete pad around steel supports. Enclosure and equipment to be provided by Tesco, Cutler-Hammer, or Square D. Provide 110-volt duplex, GFI, receptacle in a weatherproof box. The box will have 316 stainless steel hinges and hardware and will be factory primed and field painted per City requirements. Enclosures to be epoxy-coated.
2. Provide Killark connector for mobile generator with manual transfer switch. Generator plug will be a minimum of 36-inches above ground. See attached single-line diagram for wiring manual transfer switch.
3. If the lift station dry well is a confined space, provide explosion proof dry well lighting adequate to illuminate the ladder and the floor of the dry well.



4. Provide an exterior light in accordance with City STD. Provide 12-inch diameter pole-mounted luminaries at 120V, 250 W HPS.
5. Provide OSHA approved rubber mat in front of all indoor control panels.
6. Provide ability to operate station with one pump removed for maintenance, by utilizing a local-remote switch and no parallel switching in order to allow for proper lockout procedures. Provide local disconnect at motor per NEC.
7. Provide waterproof local control in dry well to operate pumps for testing.
8. Provide 25% additional spare wires and 2" conduits or oversize conduits to meet ultimate station capacity.
9. Soft-start or VF Drives will be Allen-Bradley, Baldor, GE, and ABB or approved equal and provided with solid state smart type motor starters with a pump control option used to provide ramp starting and stopping of motors. The controller will have the following start modes: soft start with selectable kick starts, current limit and full voltage. Product submittals are required prior to product approval in the event the City standardizes to a single brand manufacturer.
10. Each drive will include an across-the –line bypass contactor in the event of a failed drive. A selector switch will be provided to delegate (Drive or Bypass) operation of each.

#### **E. Telemetry (SCADA System)**

##### **1. Control Panels**

All control panels will have the following general features.

- a. Panels and enclosures will have NEMA ratings as shown on the drawings. In general the NEMA ratings will be:
  1. NEMA 3 316 SS for outside installations. Include sun shield.
  2. NEMA 12 for protected installations inside buildings.
- b. Panel design will incorporate the following features:
  1. Provide a lamp with switch.
  2. Provide a 120 VAC duplex convenience outlet.
  3. Provide heating and cooling to maintain internal components within operating tolerances and to avoid condensation.
  4. Provide 120 VAC uninterruptible power supply (UPS) or an Equivalent DC voltage subsystem sized for 150% of peak load. For all internal panel components for a minimum of 30 minutes run time.
  5. Provide radio communications system compatible with CITY'S current SCADA system. See City personnel for specific frequency and any changes.
    - a. System must have SCADA pack RTU's and SATEL Radio.
    - b. Equipment must be able to integrate with the existing "Wonder ware In Touch" Software, currently in use.
  6. Provide a high temperature switch (alarm) for the control panel.
  7. Provide an automatic alarm dialer to annunciate critical alarms.



2. Programmable Logic Controller
  1. Provide a programmable logic controller to perform monitoring and control of the facility. Provide a large or small PLC as shown on the Drawings or specified in the Contract Documents. System will include all software and cables for logging on, editing and programming ladder logic to PLC.
    - a. All PLC applications will be Tesco L 2000 only.
    - b. All PLCs will utilize the following features:
  2. All analog inputs will be isolated with 4-20 mA current signals isolators.
  3. Provide two serial communication interfaces running MODBUS RTU mode.
  4. Provide an operator interface panel.
  5. Provide input and output points as defined in the specifications and drawings.
  6. Provide 20% spare analog and digital I/O's.
  7. PLC's will be capable of monitoring off generator parameters listed in F-5.
3. Panel Mounted Devices
  - a. 24 VDC Power supplies: Power supplies will be linear, open frame supplies with a minimum capacity of 3.0 Amp manufactured by Acopian, Power One, or Solo.
  - b. Relays: Relays will be SPDT with a minimum 10 Amp rating by Idec, Potter & Brumfield, Turck, or Allen-Bradley.
  - c. Signal Isolators: Current isolators and converters will be by M-Systems, Wago, or Wilkerson.
  - d. Terminal Block System: Terminal blocks, fuse blocks, and disconnect blocks will be by M-Systems, Wago, Wilkerson, or Allen-Bradley.
  - e. Temperature Switch: Temperature switch will be used to monitor internal panel temperature for high temperature conditions. Range will be 0 – 250 degrees F. Provide cooling fans.
  - f. Interior Lighting: Provide all control panels with a fluorescent interior light of the same approximate width of the control panel located along the top of the panel. Provide light with a separate light switch.
  - g. UPS: Provide an uninterruptible power supply sized for 150% of calculated load with sufficient battery backup time for 30 minutes of operation. Provide American Power Conversion or Best Power Products.
  - h. Selectors and Pushbuttons: Provide corrosion resistant selectors and pushbuttons by Allen-Bradley or Square-D.
4. Wet Well Level Measurements
  - a. Provide continuous (analog) wet well level measurement by use of a reactive air cell bubbler system. Mount bubbler system components (compressors, pressure transmitter, valves, etc.) in control panel. Mount air cell 6 inches above the wet well floor. Use 304 or 316 SS tubing for all piping.
  - b. Use a differential pressure transmitter for pressure (level) measurement on the bubbler system. Use Rosemont model 1151 smart pressure transmitter or Endress & Hauser model PMD 230. Provide 0.5 inch NPT block and shutoff valves. Provide 0.5 inch NPT three-valve manifold for calibration.



- c. Use duplex air compressors with manual alternation. Use WISA model 110 compressor or equal capable of supplying 5 psi air at 100 cfm.
  - d. Provide a normally open solenoid valve on the air supply line that can be used to build up pressure and supply a burst of air to clear the air cell periodically. Provide protection for controller.
  - e. Provide float for high-high level contact.
5. Record Drawings and Operations & Maintenance Documentation
- a. As-Built Drawings: Provide as-built drawings showing physical location of components. Provide loop drawings (end-to-end wiring diagrams) meeting the ISA S5.4 standards with minimum required items plus optional items. Provide three (3) copies of all drawings and an electronic version in AutoCAD latest version.
  - b. Provide O&M Manuals for hardware.
    1. Cover equipment comprising the system in the hardware instruction manuals for all equipment including third party equipment, provided as part of the SCADA system. Provide instructions for operation and maintenance of the installed system, as well as operation and maintenance instructions for the individual equipment units comprising the system.
    2. Cover equipment comprising the system in the hardware instruction manuals for all equipment including third party equipment, provided as part of the SCADA system. Provide instructions for operation and maintenance of the installed system, as well as operation and maintenance instructions for the individual equipment units comprising the system.
    3. Standard hardware manuals will be acceptable, provided that errata sheets are included to reflect the specific equipment provided.
    4. Electronic CD-ROM hardware manuals are acceptable.
    5. Provide three (3) copies of O&M manuals plus an electronic copy when available.
  - c. Provide O&M Manuals for software.
    1. Provide complete, organized, and standardized documentation for operations centers, RTUs, PLCs, and other software provided as part of the SCADA system. In general, structure the documentation such that each level develops a different degree of detail. Begin with a broad approach (Systems Manual), focus on smaller pieces of the overall system (Subsystem Documentation) and finally pinpoint the finest detail (Program Documentation).
    2. Fully annotate and document every PLC program.
    3. Provide three (3) copies of software O&M manuals plus an electronic copy when available.
6. Testing Requirements
- a. Factory Acceptance Test (FAT): Fully test all SCADA components at the Contractor's facilities prior to shipping, installing, reprogramming, or reconfiguring the City's SCADA equipment. The purpose of the



testing is to verify compliance with the specifications and correct deficiencies at the Contractor's facility and not in the field. Insofar as practical, test the functional, performance, and interface requirements. Test each control loop from terminal strips to the PLC.

- b. Site Acceptance Test (SAT): After installation, fully test all SCADA components to verify compliance with the specifications. Insofar as practical, test the functional, performance, and interface requirements. Test each control loop from the instrument or terminal strip, through the PLC, to the City's central SCADA system. Tune all control loops. Test all control strategies.
- c. Operational Availability Demonstrations (OAD): The OAD is a 90 day period of time during which the SCADA system will be utilized by the CITY in day-to-day operations. Its purpose is to test the SCADA system stability and completeness over time. Start the OAD upon written notice from the CITY and after successful completion of field testing. The OAD is considered successful if the system availability is 99.8 percent or better. The OAD will be restarted or repeated if availability is less than 99.8 percent. Final Completion will not be granted until OAD is passed.

## 7. Programming and Configuration Services

- a. Configure the PLCs based on the configuration drawings, P&IDs, the Process Control Narratives and functionality as specified in other sections. Include all necessary constant and variables required to meet the Specifications whether shown on the drawings or not. Provide a fully functioning control system.
- b. The Contractor will conduct coordination meetings at the City's site during the configuration and programming program on a periodic basis as needed but at least twice during the project. The purpose of the meetings is to solicit input from and coordinate activities with City personnel and the Engineer. The Contractor will provide samples of PLC programs and present an update of current activities, a forecast of future activities, and discuss any problem areas.
- c. Use diagrams in ladder rung format for the PLC program documentation system. Show all input devices near the left "power rail" and all outputs near the right "power rail." The diagrams will show all device codes and functional descriptions shown on the Drawings and will also show PLC reference codes and I/O assembly codes, module numbers, and terminal numbers. Provide source code for all operators interface programming, amply annotated to explain the operation. Include I/O tag numbers in rung or device annotations. Use control strategy numbers to identify PLC program sections. Alternative programming techniques may be used if approved in writing by the City.
- d. Organize and structure all PLC programs to aid in software maintenance and modification. Organize each PLC program into a



three-level “outline” structure consisting of strategies, equipment items (or sub-strategies), and “functions.” Each PLC strategy consists of the logic required by one strategy in the Process Control Narratives. Each PLC equipment item (or sub-strategy) will consist of the logic associated with one piece of mechanical equipment (or associated with a logical subsection of a strategy). “Functions” will be the smallest subdivision of programs and will consist of functions, subroutines, or short algorithms requiring roughly five to ten rungs of ladder logic. Ladder logic will be used for all PLC programming unless otherwise approved in writing by the City.

- e. PLC programming will be thoroughly documented. Each contact, coil, timer, function block, or other rung item will be annotated in the program listing with: the internal item number (i.e., coil number, contact number, etc.); the external tags (where applicable); and a brief description of the item’s function. External tags will be the input or output tag number from the PLC I/O schedule or, for points created in a PLC and transmitted to (or from) the central computer system, the tag number used in the central computer.

#### **F. Standby Generator**

1. Provide permanently installed, natural gas fueled Kohler, Onan or approved equal generator with automatic transfer switch, manual transfer switch, and load bank connection. Provide Crouse Hinds E0400-1686 Posi-lok load bank receptacles to test generator for output and generator break in. The design Engineer must verify gas pressure with P.G. & E. and fuel demand with generator manufacturer prior to review of submittal. The engine manufacturer must certify that the engine is designed to operate on natural gas and propane. Generator will be shipped from the factory with City approved color. See attached single-line diagram for wiring.
2. Submit generator sizing calculations for City approval. Sizing calculations will assume loading based on lead pump running, lag pump starting and full operation of all electrical equipment at the site. Generator will run at 100% of name plate current for 4 hours on primary fuel supply using City owned load bank.
3. Provide automatic back-up propane fuel capability and 24 hour supply of fuel. Propane tank to be factory-painted with City approved color.
4. Obtain Fire Department approval for site of back-up fuel tank.
5. Provide instrumentation:
  - a. Generator voltage, frequency, and amp meters.
  - b. Oil pressure gauge.
  - c. Battery volt meter.
  - d. Temperature gauge.
  - e. Hour meter.
  - f. External battery with trickle charge.
  - g. Dry contacts for telemetry - showing generator running.
  - h. Automatic clock for exercising system under a load.
6. Provide automatic shut-off and alarms:



- a. Low engine oil pressure.
  - b. High engine temperature.
  - c. Over speed.
  - d. Over crank.
7. Locate exhaust away from dry well ventilation and provide stainless steel rain cap. Insulate exhaust stack from generator enclosure or roofing material.
  8. Provide sound attenuation as necessary to meet or exceed City noise standards for location. Attenuation may include silencers, insulation and/or enclosure. Provide ambient noise measurements and calculations demonstrating compliance.

#### **G. Gas Monitoring System**

1. Provide a permanent gas monitoring system in the dry well.
2. Monitoring system will monitor for lack of oxygen, lower explosives limit, and hydrogen sulfide.
3. The monitoring system will be tied to the telemetry system alarms.
4. Manufacturer will be MSA or an approved equal.

#### **H. Details Required on Improvement Plans**

1. Site Plan: Locations of power pole, transfer switch, emergency generator, emergency fuel supply, control panel, wet well, dry well, ground slab, driveway, fencing, water service, emergency suction/discharge boxes. Provide site grading and drainage details.
2. Wet well: Influent piping (standard inside drop manhole); suction piping (min. 6" off bottom of manhole); emergency suction line; bubbler line including connection hardware; water/alarm levels (pump on, pump off, low level, high level), redundant high water float switch.
3. Dry well: Pumps and piping; safety ladder, ladder light.
4. Emergency Power: Electrical details specified to include size and material of conduit, switch gear, telemetry compatibility. Electrical details will include power source, meter location, cabinetry. Wiring diagrams will depict connection to and between PG&E, transfer switch, emergency generator and dry well as shown in the attached single-line diagram.
5. Force main discharge details.

#### **I. Record Drawings and Manuals**

1. Provide three (3) copies of record drawings and an electronic copy in AutoCAD latest version.
2. Provide three (3) copies of O&M Manuals plus an electronic copy when available.

**-End of Design Requirements for  
Sewage Lift Stations**



### **Rehabilitation and Repair**

The City is monitoring the field of no-dig pipeline rehabilitation as advancements are continually being made. The no-dig technology appears to be the future answer to pipeline rehabilitation as systems reach their life expectancy. The City is planning on no-dig rehabilitation methods to be the standard rehabilitation practice and will be developing construction standards as methods are perfected.

### **Inspection**

City contract provides that the work is not placed into service and accepted by City of Madera until inspection and testing is completed. The City provides inspection during the construction of sewer facilities and believes that proper installation is the key element to insure proper operation and maximum life expectancy.

In addition to City Inspector's experience and training, he has the City Standard Manual for reference if needed during inspection of contractor's work. With regard to testing sewer lines, the City requires deflection test of PVC pipe by use of properly sized ball or mandrel, air-testing and video inspection on all new main lines.



## Element 6-Overflow Emergency Response Plan:

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*Requirement:*

*Each Enrollee shall develop and implement an overflow emergency response plan that identifies measures to protect public health and the environment. At a minimum, this plan must include the following:*

- a. Proper notification procedures so that the primary responders and regulatory agencies are informed of all SSOs in a timely manner;*
- b. A program to ensure an appropriate response to all overflows;*
- c. Procedures to ensure prompt notification to appropriate regulatory agencies and other potentially affected entities (e.g., health agencies, Regional Water Boards, water suppliers, etc.) of all SSOs that potentially affect public health or reach water 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.*

### **Overflow Emergency Response Plan**

#### **Purpose**

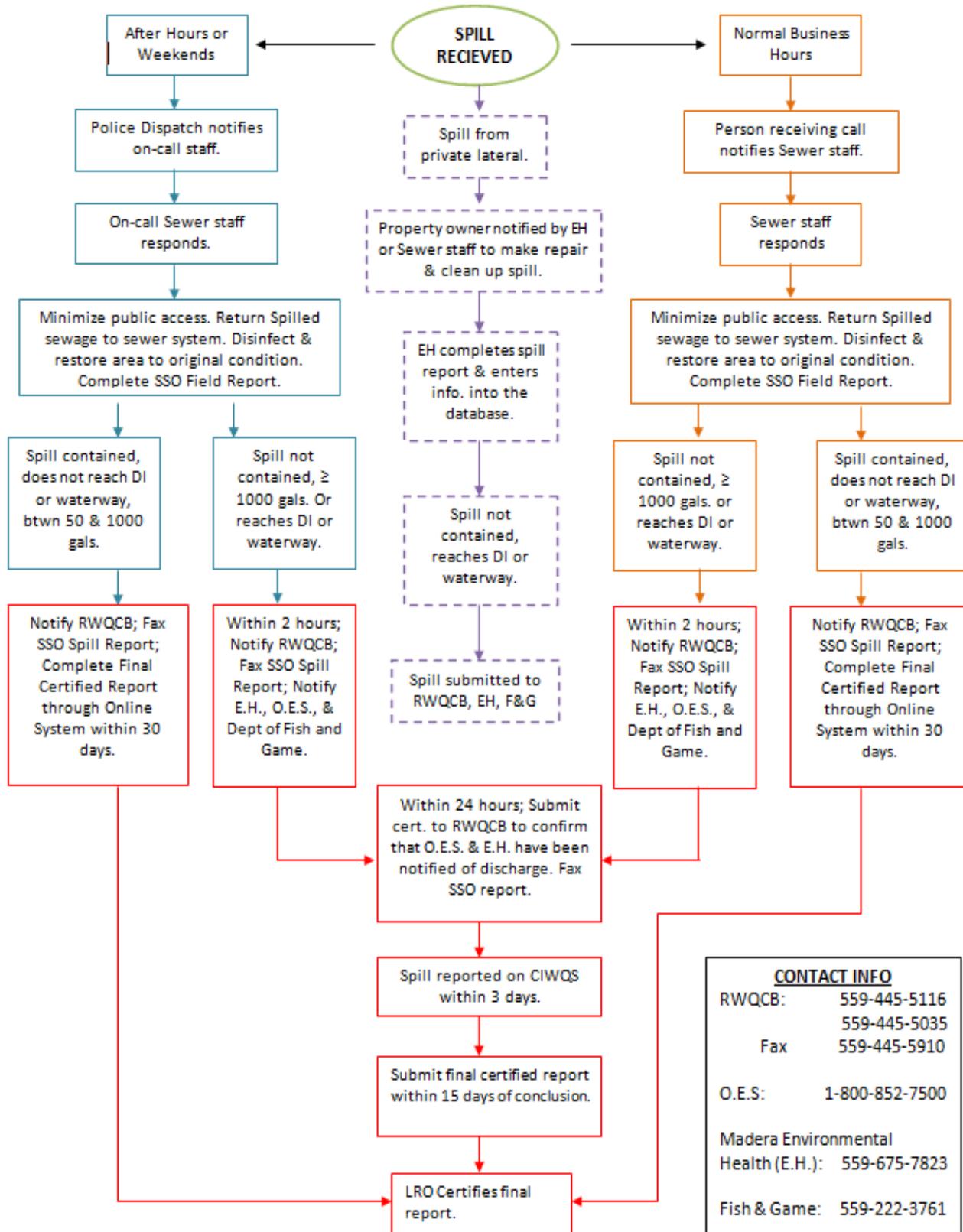
The purpose of the Overflow Emergency Response Plan (OERP) is to support an orderly and effective response to Sanitary Sewer Overflows (SSOs). This plan provides guidelines for City of Madera personnel and other parties working on their behalf to follow in responding SSOs that may occur in the City's wastewater collection system.

The OERP is designed to ensure that every report of a sewage overflow is immediately dispatched to the appropriate crews so that the effects of the overflow can be minimized with respect to impacts to public health, adverse effects on beneficial uses and water quality of surface waters, and customer service.

The OERP further includes provisions to ensure field personnel follow established guidelines to secure the wastewater overflow area, relieve the cause of the overflow, minimize health hazards to the public, ensure that the affected area is cleaned as soon as possible de-contaminate sanitary sewer spills, follow proper reporting and record keeping procedures as seen in the SSO Field Response Chart attachment (6-1). Every effort must be made to protect the environment and prevent sewage from reaching state waters.



**City of Madera Sanitary Sewer Overflow Field Response Chart Table 6-1**





### **During Normal Work Hours/Days**

During normal business hours, Public Works Office Staff are primarily responsible for receiving phone calls from the public and other agencies. This includes complaints of possible sewer overflows from the wastewater collection system, and forwarding those complaints to the FIRST RESPONDER(S) (in most cases, the Sewer Division Maintenance Division).

Public Works Office Staff obtain following relevant information regarding the overflow including:

- Time and date call was received;
- Specific location;
- Description of problem;
- Time possible overflow was noticed by the caller;
- Caller's name and phone number;
- Observations of the caller (e.g., odor, duration, back or front of property); and
- Other relevant information that will enable the responding investigator and crews, if required, to quickly locate, assess and stop the overflow.

Office Staff record the overflow information on SSO Complaint Form (Attachment 6-2) and notify the Sewer Division Lead Worker and Operations manager or other Sewer Division staff.

Also, pump station alarms are monitored at Water and Sewer Division main office during normal working hours. If alarms are not answered, SCADA system, will phone cell phones to the Operations Manager, Sewer Maintenance Leadworker, Public Works Standby person, Madera Radio Dispatch until it is answered and acknowledged.

Sewer overflows detected by maintenance personnel in the course of their normal duties are reported immediately to the Sewer Division Leadworker and Operations Manger. Operations Manager records all relevant overflow information and Sewer Division is dispatched.



**Attachment 6-2**

**City of Madera, Public Works Office  
Sanitary Sewer Overflow (SSO)  
Complaint Form**

Date Call Received: \_\_\_\_\_ Time Call Received: \_\_\_\_\_

Caller's Name: \_\_\_\_\_ Phone Number: \_\_\_\_\_

Specific Location (i.e. street, alley, front or rear of property): \_\_\_\_\_

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Description of Problem (i.e., sewer manhole, sewer service): \_\_\_\_\_

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Time Possible SSO was noticed by Caller: \_\_\_\_\_

Observations by Caller (i.e.: odor, duration,) \_\_\_\_\_

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### **After Normal Working Hours**

During non-business hours, Madera City Police Dispatch receives calls and forwards work orders to the Public Works Standby. Currently, there are seven Public Works Standby crew members that rotate being on Standby on a weekly basis.

The Public Works Standby person can be reached at home phone number, by City cell phone or by portable two-way radio. Public Works Office updates Public Works Standby schedule and provides an updated copy to Police Dispatch. Police Dispatch should obtain all relevant information available regarding the overflow including:

- Time and date call was received;
- Specific location;
- Description of problem;
- Time possible overflow was noticed by the caller;
- Caller's name and phone number;
- Observations of the caller (e.g., odor, duration, back or front of property); and
- Other relevant information that will enable the responding investigator and crews, if required, to quickly locate, assess and stop the overflow.

If scheduled Public Works Standby Person cannot be reached, Madera Police Dispatch will phone next person on Public Works Standby list until contact is made. In addition, after hours, pump station alarms are monitored by SCADA system which phones the Public Works Standby Person if there is an alarm. If a sewer overflow is confirmed, Public Works Standby person will contact appropriate Maintenance Staff for assistance as needed.

### **Spill Response**

The Spill Response Procedure presents a strategy for the City to mobilize labor, materials, tools and equipment to correct or repair any condition which may cause or contribute to an un-permitted discharge. The plan considers a wide range of potential system failures that could create an overflow to surface waters, land or buildings. Failure of any element within the wastewater collection system that threatens to cause or causes an SSO should trigger a timely response to isolate and correct the problem. Crews and equipment shall be available to respond to any SSO locations.

The First Responder for Sewer Division confirms the overflow. Until verified, the report of a possible spill will not be referred to as a "sewer overflow." The Spill Response Procedure presents a strategy for the City to mobilize labor, materials, tools and equipment to correct or repair any condition which may cause or contribute to an un-permitted discharge. The plan considers a wide range of potential system failures that could create an overflow to surface waters, land or buildings. Failure of any element within the wastewater collection system that threatens to cause or causes an SSO should trigger a timely response to isolate and correct the problem. Crews and equipment shall be available to respond to any SSO locations. Additional Maintenance Crews will be dispatched to any site of a reported SSO as soon as notified.

### **Spill Response Priorities**

The FIRST Responder's priorities are:

- To follow safe work practices
- To respond promptly with the appropriate equipment
- To contain the spill wherever feasible



- To restore the flow as soon as practicable
- To minimize public access to and/or contact with the spilled sewage
- To promptly notify City personnel of preliminary spill information, need for additional help, and potential impacts
- To return the spilled sewage to the sewer system
- To disinfect and restore the area to its original condition (or as close as possible)

### **Safety during Spill Response**

The FIRST RESPONDER is responsible for following all City safety procedures while performing the sewer investigation. The FIRST RESPONDER should be aware that sewer spills could involve Hazardous Materials and the following procedures should be followed:

- Upon arrival at the scene of a sewer overflow, should a suspicious substance (e.g., oil sheen, foamy residue) be found on the ground surface, or should a suspicious odor (e.g., gasoline) not common to the sewer system be detected, the FIRST RESPONDER shall first call the fire department's hazardous material response team and then notify the Sewer Division Leadworker of Operations Manager.
- The FIRST RESPONDER or crew shall await the arrival of the fire department to take over the scene. Any vehicle engine, portable pump or open flame (e.g., cigarette lighter) can provide the ignition for an explosion or fire should flammable fluids or vapors are present. Keep a safe distance and observe caution until assistance arrives.
- Upon arrival of the fire department, the FIRST RESPONDER or crew will take direction from the person with the lead authority of that team. Only when that authority determines it is safe and appropriate for the FIRST RESPONDER and crew to proceed can they then proceed under the OERP with the containment, clean-up activities and correction

### **Initial Response Procedure**

It is the responsibility of the first person who arrives at the site of a sewer overflow to protect the health and safety of the public by mitigating the impact of the overflow to the extent possible. Should the overflow not be the responsibility of the City yet present imminent danger to public health, public or private property, or to the quality of waters of the U.S., then prudent emergency action should be taken until the responsible party assumes responsibility and provides actions.

The FIRST RESPONDER should notify the Sewer Division Leadworker and Operations Manager if additional crews, materials, supplies, or equipment are needed. All employees being dispatched to the site of an SSO during regular work hours shall proceed immediately to the site of the overflow. Any delays or conflicts in assignments must be immediately reported to the supervisor for resolution. The City has a 45-minute response time goal from notification to site of a potential sewer overflow during weekday hours and a 90-minute response time goal to site of a potential sewer overflow during after hours. Upon arrival at an SSO, the response crew should do the following with a focus on resolution, protection and reporting:

1. Determine the cause of the overflow, e.g. sewer line or lateral blockage, pump station mechanical or electrical failure, sewer line break, etc.;



2. Identify and request, if necessary, assistance or additional resources to correct the overflow, to assist in the determine of its cause, or if there is doubt on how to proceed;
3. Determine if private property is impacted. If yes, the FIRST RESPONDER should inform Madera County Environmental Health (1-559-675-7823) within 24 hours;
4. Request additional personnel, materials, supplies, or equipment that will expedite and minimize the impact of the overflow.
5. Determine whether to proceed with clearing the blockage to restore the flow or to initiate containment measures. The guidance for this decision is:
  - Small spills – proceed with clearing the blockage.
  - Moderate or large spill where containment is anticipated to be feasible and effective – proceed with the containment measures.
  - Moderate or large spills where containment is anticipated to be unfeasible or ineffective – proceed with clearing the blockage; however, call for additional assistance if the blockage cannot be cleared after 20 minutes, and begin implementing any possible containment measures.
6. Take immediate steps to stop the overflow, e.g. relieve pipeline blockage, manually operate pump station controls, repair pipe, etc. Additional efforts to contain and control flow should be considered where overflows from private property threaten public health and safety (e.g., an overflow running off of private property into the public right-of-way).

FIRST RESPONDERS should in all cases report their findings, including possible damage to private and public property, to the Sewer Division Leadworker and Operations Manager immediately upon making their investigation. If the Sewer Division Leadworker has not received findings from the field crew within 90 minutes, the Sewer Division Leadworker shall contact the response crew to determine the status of the investigation. In all cases, the Sewer Division Leadworker shall respond to all SSOs to ensure that provisions of this OERP are being implemented.

Regarding work on private property, the FIRST RESPONDERS should use discretion in assisting the property owner/occupant as reasonably as they can. Be aware that the City could face increased liability for any further damages inflicted to private property during such assistance. The response crew should only enter private property for purposes of assessing damage after receiving such authorization from the property owner. Appropriate photographs, if possible, should be taken of the outdoor area of the sewer overflow and impacted area in order to thoroughly document the nature and extent of impacts. Available photographs are to be forwarded to the Operations Manager.

#### **Initial Measures for Containment**

Crews should initiate measures to contain the overflowing sewage and recover where possible sewage which has already been discharged, minimizing impact to public health or the environment. It is important that crews use all reasonable measures to contain sewer overflows from discharging to storm drains, creeks, or other surface waters.

- Determine the immediate destination of the overflow, e.g. storm drain, street curb gutter, body of water, MID canal, etc.;
- Identify and request the necessary materials and equipment to contain or isolate the overflow, if not readily available; and
- Take immediate steps to contain the overflow, e.g., block or bag storm drains, recover through vacuum truck, divert into downstream manhole, etc.



### **3.5 Wet Weather Spill Response**

The City recognizes that some sewer overflows are the result of wet weather combined with system capacity issues (not blockages). In the case of wet weather events, the crew members should actively examine the system for surcharged or overflowing manholes. If surcharged or overflowing manholes are discovered and the crew determines the cause is not related to a blockage, crew members should:

- Set up traffic barricades and public notification signs;
- Check that the nearest pump station downstream of the manhole(s) is functioning properly;
- Set up bypass pumping to divert some or all of the flow to a downstream manhole that is not surcharged, if possible;
- Use best efforts to contain and return overflowing sewage back to the collection system. All wet weather SSOs must be documented and reported in the same manner as other SSOs.

### **Pump Station Failures and Force Main Breaks**

Procedures to contain, bypass, resolve, and document overflows should follow the requirements for gravity system overflows. Overflows or issues that could lead to overflows at the City's larger pump stations, such as the Fairground Sewer Lift Station and South Street Sewer Lift Station, must receive the highest priority for response due to the volume of the flow involved. All pump station and force main related SSOs must be documented and reported in the same manner as other SSOs.

### **Emergency Equipment List**

The City has the following equipment available to respond to an SSO event:

- (1) Permanent emergency electrical generator w/auto transfer switch for Fairground Sewer Lift Station
- (1) Permanent emergency electrical generator w/auto transfer switch for South Street Sewer Lift Station
- (2) Pickup trucks
- (1) One Ton Utility Truck with boom lift
- (1) 350 kW portable electrical generator
- (1) 6" portable pump
- (1) Submersible/portable pump
- (1) Air Compressor
- (1) Backhoe
- (1) Dump Truck
- (1) Vactor Jet Rodder truck (Street Division has (1) Vactor Jet Rodder truck that Sewer crew can be make use of as needed)
- (1) Trailer
- (2) Portable power rodders
- (1) Lateral VIDEO Camera
- Containment Tools and Materials
- Traffic control devices
- Trash pump with hose (for emergency bypass)
- Repair bands in all sizes
- Control parts (for pump stations)
- Pipe in 6 and 8 inch sizes (for gravity lines)
- Tools



### **The Spill Mitigation and Cleanup**

Mitigation and Cleanup section specifies mitigation actions to minimize the effects of an SSO and measures that should be taken to clean up after both an external and internal SSO events.

#### **Mitigation**

The objectives of the mitigation actions taken during an SSO are:

- To protect public health, environment and property from sewage overflows and restore surrounding area back to normal as soon as possible;
- To establish perimeters and control zones with appropriate traffic cones and barricades, vehicles or use of natural topography (e.g., hills, berms, etc.);
- To promptly notify the regulatory agency's communication center of preliminary overflow information and potential impacts;
- To contain the sewer overflow to the maximum extent possible including preventing the discharge of sewage into storm drains, creeks and other surface waters; and
- To minimize the City's exposure to any regulatory agency penalties and fines.

Under most circumstances, the City will handle all response actions with its own maintenance forces. These trained personnel have the skills and experience to respond rapidly and in the most appropriate manner. An important issue with respect to an emergency response is to ensure that the temporary actions necessary to divert flows and repair the problem do not produce a problem elsewhere in the system. For example, repair of a force main could require the temporary shutdown of the pump station and diversion of the flow at an upstream location. If the closure is not handled properly, sewage system back-ups may create other overflows. Circumstances may arise when the City could benefit from the support of outside construction assistance. This may be true in the case of complex collection sewer pipe repairs, or issues with the City's larger diameter pipes. The City may also choose to use private contractors for open excavation operations that might exceed one day to complete, or where the number of concurrent issues requires immediate response that exceeds the capabilities of City crews.

#### **Additional Measures under Potentially Prolonged Overflow Conditions**

In the event of a prolonged sewer line blockage or a sewer line collapse, which is defined as a sewer line blockage or collapse that cannot be remedied within a reasonable time determined by the FIRST RESPONDER after onsite activities to remedy the overflow have been underway, a determination should be made to set up a portable by-pass pumping operation around the obstruction.

- Appropriate measures shall be taken to determine the proper size and number of pumps required to effectively handle the sewage flow.
- Contact local rental companies such as Rain for Rent (1-559-485-5610) to rent emergency bypass pumping equipment as needed.
- Continuous or periodic monitoring of the by-pass pumping operation shall be implemented as required. Bypass operations should occur concurrently with continued efforts to remove the blockage, or repair the collapse.



## Cleanup

Sewer overflow sites are to be thoroughly cleaned after an overflow. No readily identified residue (e.g., sewage solids, papers, rags, plastics, rubber products) is to remain.

## External SSO Cleanup

- Where practical, the area is to be thoroughly flushed and cleaned of any sewage or wash-down water. Solids and debris are to be flushed, swept, raked, picked-up, and transported for proper disposal. Water used for flushing should be collected with a vacuum truck.
- The overflow site is to be secured to prevent contact by members of the public until the site has been thoroughly cleaned. Post warning signs as required.
- Where appropriate for hard surface areas, the overflow site should be disinfected and deodorized. Apply minimal amounts of disinfectant (e.g., a solution of laundry bleach diluted 10:1 with water, or a suitable commercial disinfectant/deodorant) with a hand sprayer, and take care to prevent any disinfectant from reaching a receiving water. The amount applied should be just enough to wet the surface but not cause runoff. Do not use disinfectant during wet weather conditions.
- Where sewage has resulted in ponding, the ponded area should be pumped dry.
- If a ponded area contains sewage which cannot be pumped dry, it may be treated with bleach. If sewage has discharged into a body of water that may contain fish or other aquatic life, bleach or other appropriate disinfectant should not be applied and the California Department of Fish and Game (CDFG) should be contacted for specific instructions.
- If any sewage has reached a waterway, CDFG should be consulted regarding recommended cleanup and protection measures, and the FIRST RESPONDER should obtain water samples. Safety should be considered while collecting samples, especially during wet weather events. Typically, samples should be collected upstream (about 500 feet), downstream (about 500 and 1,000 feet) and at the point of sewage entrance, and sent to the approved laboratory for analysis. Samples should be analyzed for ammonia, dissolved oxygen, fecal coliform, and biological oxygen demand (BOD).

## Documentation

An Operator Sewage Spill Report (Attachment 6-3) shall be completed by the FIRST RESPONDER. The FIRST RESPONDER shall promptly notify the Operations Manager when the overflow is resolved. SSO Field report should include the following:

- Indication if the sewage overflow had reached surface waters, i.e., all overflows where sewage was observed running to surface waters, or there was obvious indication (e.g. sewage residue) that sewage flowed to surface waters; and
- Indication if the sewage overflow had not reached surface waters. Guidance in characterizing these overflows to include:
  - Sewage overflows to covered storm drains (with no public access) where personnel verify, by inspection, that the entire volume is contained in a sump or impoundment and where complete clean-up occurs leaving no residue.
  - Preplanned or emergency maintenance jobs involving bypass pumping if access by the public to a bypass channel is restricted and subsequent complete clean-up occurs leaving no residue (Any preplanned bypass under these circumstances will not be considered an overflow.); and



- Overflows where observation or on-site evidence clearly indicates all sewage was retained on land and did not reach surface water and where complete cleanup occurs leaving no residue.
- Determination of the start time of the sewer overflow by one of the following methods:
  - Date and time information received and/or reported to have begun and later substantiated by a sewer investigator or response crew;
  - Visual observation; or
  - Pump station and lift station flow charts and other recorded data.
- Determination of the stop time of the sewer overflow by one of the following methods:
  - When the blockage is cleared or flow is controlled or contained; or
  - The arrival time of the sewer investigator or response crew, if the overflow stopped between the time it was reported and the time of arrival.
  - Visual observations
- An estimation of the rate of sewer overflow in gallons per minute (gpm) by one of the following criteria:
  - Direct observations of the overflow; or
  - Measurement of actual overflow from the sewer main.
  - Attachment 6-4 contains several tools to aid sewer investigators in estimating the rate of sewer overflow.
- Determination of the volume of the sewer overflow:
  - When the rate of overflow is known, multiply the duration of the overflow by the overflow rate; or
  - When the rate of overflow is not known, investigate the surrounding area for evidence of ponding or other indications of overflow volume.
- Photographs of the event, when possible.



**Attachment 6-3 Operator Sewage Spill Report**

<p style="text-align: center;"><b><u>Caller Summary</u></b></p> <p><b>SSO Address:</b> _____</p> <p><b>Cross Street:</b> _____</p> <p>Caller Name: _____</p> <p>Caller Contact #: _____</p> <p>Date of Initial Call: _____</p> <p>Time of Initial Call: _____ am pm</p> <p>Desc. Of Complaint _____</p> <p>Est. Time SSO Began: _____ am pm</p> <p style="text-align: center;"><b><u>Work Summary</u></b></p> <p>Rec'vd by Crew (DATE/TIME): _____ am pm</p> <p>Arrival Time: _____ am pm</p> <p>Time SSO Ended: _____ am pm</p> <p>Time Clean-up Finished: _____ am pm</p> <p>Employees: _____</p> <p>Vehicles: _____</p> <p>Materials _____</p>	<p><b>Condition Encountered (Describe...):</b></p> <p>• <b>Actions Taken:</b></p> <hr/> <ul style="list-style-type: none"> <li>• Contained All of Spill? <span style="float: right;">Y N</span></li> <li>• Contained Portion of Spill? <span style="float: right;">Y N</span></li> <li>• Restored Flow? <span style="float: right;">Y N</span></li> <li>• Returned All or Portion to Sewer System? <span style="float: right;">Y N</span></li> <li>• Site Cleaned-Up? <span style="float: right;">Y N</span></li> <li>• Site Disinfected? <span style="float: right;">Y N</span></li> <li>• Health Warnings Posted? <span style="float: right;">Y N</span></li> <li>• Barricades Placed? <span style="float: right;">Y N</span></li> <li>• Photos Taken? <span style="float: right;">Y N</span></li> </ul> <p>(REQUIRED)</p>														
<p style="text-align: center;"><b><u>SSO Details</u></b></p> <ul style="list-style-type: none"> <li>• SSO Duration (hrs/min): _____</li> <li>• Est. SSO Volume (gal): _____</li> <li>• Est. Vol. Recovered (gal): _____</li> <li>• Est. Vol. Not Recovered(gal): _____</li> <li>• Est. Rate (gal/min) _____</li> <li>• Feet Cleaned: _____ main _____ lateral</li> <li>• Rain: Y N If yes, Size of Rain Event _____</li> <li>• Property Type? Public Private</li> <li>• Property Damage? Yes No</li> <li>• <b>Spill Appearance Point:</b></li> </ul> <p><input type="checkbox"/> Inside Bldg/Struc (location) _____</p> <p><input type="checkbox"/> Cleanout on lateral</p> <p>Lat type: <input type="checkbox"/> Proper c-o <input type="checkbox"/> Imp c-o <input type="checkbox"/> No c-o</p> <p>Lat loc: <input type="checkbox"/> Front <input type="checkbox"/> Back <input type="checkbox"/> Side</p> <p><input type="checkbox"/> Manhole MH# _____</p> <p><input type="checkbox"/> Lampost Cleanout LP# _____</p> <p><input type="checkbox"/> Other: _____</p> <p>Problem found in: <input type="checkbox"/> Lateral <input type="checkbox"/> Mainline</p> <p>UPSMH# _____ DWNMH# _____</p> <p>DIA of Pipe _____" Pipe Material: _____</p>	<ul style="list-style-type: none"> <li>• <b>Problem (circle):</b> Blockage, Bypass, Capacity-Deficiency, Inflow &amp;/or Infiltration, Natural Disaster, Power Failure, Unknown Cause, Other _____</li> <li>• <b>(If Blockage) Blockage From(Circle):</b> Animal Carcass, Construction Debris, Debris, Detergent, Grease, Roots, Solids, Other _____</li> <li>• <b>Final Destination (circle):</b> Bubble-up Storm Drain, Storm Drain System, Inside Bldg/Structure, Unpaved Surface, Street/Curb/Gutter, Surface Water Impact, Other _____</li> </ul> <p><i>If Storm Drain System – Was stormpipe plugged downstream and vacuumed? Y N N/A</i></p> <ul style="list-style-type: none"> <li>• <b>Reach State Water?</b> Y N Unknown</li> <li>• Est. Vol. Reached State Water: _____ gal</li> <li>• Name of Impacted Water: _____</li> <li>• <b>Samples Collected:</b> Y N</li> </ul>														
<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:14%; text-align: center;"><b>Agencies Notified</b> <i>(please Circle)</i></td> <td style="width:14%; text-align: center;"><b>County Health</b> 675-7823</td> <td style="width:14%; text-align: center;"><b>Office of Emer. Srvcs.</b> (800)852-7500</td> <td style="width:14%; text-align: center;"><b>Fish &amp; Game</b> 232-3761</td> <td style="width:14%; text-align: center;"><b>Regional WQCB</b> 445-5116</td> <td style="width:14%; text-align: center;"><b>Sewer Leadworker</b> 232-8767</td> <td style="width:14%; text-align: center;"><b>Manager</b> 232-3127</td> </tr> <tr> <td style="text-align: center;"><b>Date/Time Called</b></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	<b>Agencies Notified</b> <i>(please Circle)</i>	<b>County Health</b> 675-7823	<b>Office of Emer. Srvcs.</b> (800)852-7500	<b>Fish &amp; Game</b> 232-3761	<b>Regional WQCB</b> 445-5116	<b>Sewer Leadworker</b> 232-8767	<b>Manager</b> 232-3127	<b>Date/Time Called</b>							
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<b>Date/Time Called</b>															



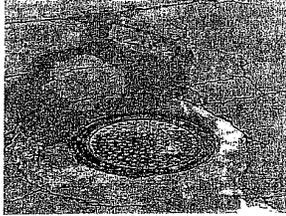
**Attachment 6-4**



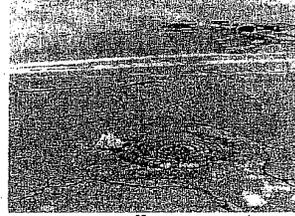
City of San Diego  
Metropolitan Wastewater Department

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

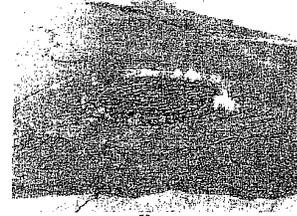
Wastewater Collection Division  
(619) 654-4160



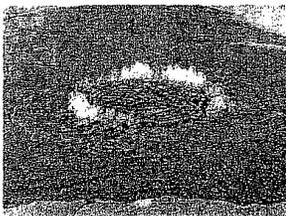
5 gpm



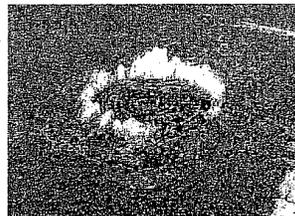
25 gpm



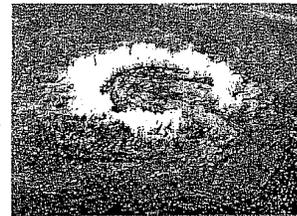
50 gpm



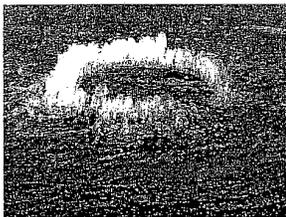
100 gpm



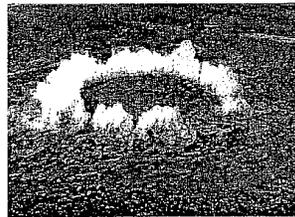
150 gpm



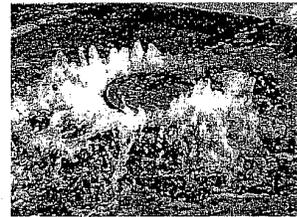
200 gpm



225 gpm



250 gpm



275 gpm

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

rev. 4/99

Flow Estimation Pictures

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

**Failure Analysis Investigation**

The objective of the failure analysis investigation is to determine the “root cause” of the SSO and to identify corrective action(s) needed that will reduce or eliminate future potential for the SSO to recur. The investigation should include reviewing all relevant data to determine appropriate corrective action(s) for the pump station or line segment or other collection system facilities. The investigation should include:

- Reviewing past maintenance records;
- Reviewing operations and monitoring activities before, during and after the spill event;
- Reviewing available photographs;
- Conducting a closed circuit television (CCTV) inspection to determine the condition of the line segment immediately following the SSO and reviewing the video and logs (does not apply to pump station spills); and
- Interviewing staff who responded to the spill.



- The product of the failure analysis investigation should be the determination of the root cause.

### **Post Spill Event Debriefing**

Every SSO event is an opportunity to thoroughly evaluate the response and reporting procedures. Each overflow event is unique with its own elements and challenges including volume, cause, location, terrain, and other parameters. As soon as possible after major SSO events, all of the participants, from the person who received the call to the last person to leave the site, should meet to review the procedures used and to discuss what worked and where improvements could be made in responding to and mitigating future SSO events. The results of the debriefing should be recorded and tracked to ensure the action items are completed.

### **SSO Response Training**

All City personnel who may have a role in responding to, reporting, and/or mitigating a sanitary sewer overflow will receive training on the contents of the City's Overflow Emergency Response Plan. New employees will receive training before they are placed in a position where they may have to respond. Current employees will receive annual refresher training on this plan and the overflow emergency response procedures.

Records will be kept of all training that is provided in support of the City's Overflow Emergency Response Plan. The records for all scheduled training courses and for each overflow emergency response training event will include date, time, place, content, name of trainer, and names of attendees.

### **Customer Satisfaction**

The Operations Manager should follow-up in person or by telephone with the citizen(s) reporting the overflow to express appreciation for the notification and confirm that the issue has been resolved, all cleaning completed, and all activities documented and reported to required authorities

### **SSO Reporting Procedures/ Regulatory Notification**

Timely reporting of spills to appropriate regulatory agencies is a crucial aspect of the sewer overflow response procedure. Reporting procedures are dependent upon the spill quantity, the destination of the spilled sewage, and source of the problem as described.

### **Category 1 SSO**

#### **Definition**

Category 1 SSO is defined as all discharges of sewage resulting from a failure in the Enrollees (City of Madera) 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 drain pipe that was not fully captured and returned to the sanitary sewer system.

#### **Notification Requirement:**

For Category 1 SSO which resulted in a discharge to a drainage channel for a surface water or discharged to a storm drain pipe that was not fully captured and returned to the sanitary sewer system



### **Within 2-Hours**

For any discharge of sewage that results in a discharge to a drainage channel or a surface water, the discharger shall, as soon as possible, but no later than two (2)-hours after becoming aware of the discharge, notify the:

- a. State Office of Emergency Services (O.E.S.) (1-800-852-7550) and
- b. Local Health Officer (Madera County Environmental Health) (1-559-675-7823) and
- c. Regional Water Quality Control Board,(RWQCB) (1-559-445-5116) or (445-5035)
- d. California Department of Fish & Game (river/canals) (1-559-222-3761)

### **Within 24-Hours**

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 (Madera County Environmental Health) have been notified of the discharge.

### **Notification Requirement:**

For Category 1 SSO which did not Result in a Discharge to a Drainage Channel or a Surface Water and/or discharge to a storm drain pipe (fully captured and returned to the sanitary sewer system).

### **Must be reported as soon as:**

- a. Enrollee has knowledge of discharge
- b. Reporting is possible and
- c. Reporting can be provided without substantially impeding clean-up or other emergency measures.

### **Online Reporting:**

#### **Within 3-Days**

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 following information:

#### **Within 15-Days**

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.



## **Category 2 SSO**

### **Definition**

Category 2 SSO is defined as all other discharges of sewage resulting from a failure in the Enrollees (City of Madera) sanitary sewer system.

### **Notification Requirement**

Within 30-Days after end of the calendar month

### **Online Reporting:**

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 1<sup>st</sup>). In such event, the Enrollee must also enter all required (Mandatory Information) information into the Online SSO Database as soon as practical.

## **Private Lateral Sewage Discharges**

### **Definition**

Sewage discharges that are caused by blockages or other problems within a privately owned lateral.

### **Notification Requirement**

Based upon the Enrollee's Discretion

### **Online Reporting:**

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 Enrollee) should be identified, if known. In such event, the Enrollee must also enter all required (Mandatory) Information into the Online SSO Database as soon as practical.

## **No SSOs**

### **Definition**

There are no SSOs during calendar month.

### **Notification Requirement**

Within 30-Days

### **Online Reporting:**

If there are no SSOs during 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. In event that the SSO Database is not available, the Enrollee must fax all required information to the appropriate Regional Water Board office in accordance with



the time schedule identified above. In such event, the Enrollee must also enter all required (Mandatory) Information into the Online SSO Database as soon as practical.

### **Mandatory Information for SSO Online Reporting**

At a minimum, the following mandatory information must be included prior to finalizing and certifying an SSO report for each category of SSO.

#### **Category 2 SSOs:**

- a. Location of SSO by entering GPS coordinates
- b. Applicable Regional Water Board (Region 5)
- 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 of discovery
- j. Estimated operator arrival time
- k. SSO destination
- l. Estimated SSO end time
- m. SSO Certification. Upon SSO Certification, the SSO Database will issue a Final SSO Identification (ID) Number

#### **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)

#### **Category 1 SSO's**

- 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).



## Element 7 - Fats, Oil and Grease (FOG) Control Program:

### *Requirement:*

*Each Enrollee shall evaluate its service area to determine whether a FOG control program is needed. If an Enrollee determines that a FOG program is not needed the Enrollee must provide justification as to 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. The 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, 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.*

### **A. Public Outreach**

The City of Madera produced a brochure entitled "Preventing Sewer Backups." In addition to other means of reducing backups or blockages, this brochure discusses grease and the role of fats, oils, and grease in causing blockages. This brochure is available at the Public Works Department and from the City's website (<http://www.cityofmadera.org/>). Additionally, sewer maintenance staff will provide this brochure to residents who are affected by a blockage or backup.

The Public Works Department also conducts seasonal outreach to the public prior to and during the November and December holiday season. Informational flyers are included with the November and December utility bills. There is anecdotal evidence of increased use of cooking oil during these holidays, particularly through the use of turkey fryers.

### **B. Disposal of FOG**

FOG discharge to the sewer is prohibited. Users are required to properly dispose of pretreatment wastes (brown grease) and cooking grease (yellow grease). Neither City nor County has a registration system for FOG waste haulers. FOG haulers are requested to submit evidence of disposal facility in use. The City of Madera WWTP does not accept trucked or hauled waste at this time.



While the User generally is capable of maintaining an under counter grease trap in-house, a pumping service must be hired to pump and properly dispose of grease interceptor contents. The User that conducts in-house maintenance of under-counter traps has a dilemma of what to do with the collected brown grease. There are few options available. Disposal of liquid wastes in the trash is unlawful. The source control inspector may suggest that the User hire a rendering service to supply a separate container for the brown grease. A facility may also be able to develop a procedure to dewater small quantities (e.g. daily cleanings) by absorbing liquid with absorbent or towels and dispose with solid waste.

The following policy will be established to deal with verifying disposition of grease wastes.

- Facility with grease interceptor shall keep receipts of pumping company names and service dates.
- Facility with grease trap(s) that utilize service company shall keep records of company and service dates
- Facility with grease trap(s) that services in-house must keep record of service dates only, and describe and demonstrate PT waste handling procedure
  - Facility with fryer(s) shall keep yellow grease storage container on-site and receipts of rendering company service dates. (There may be other venues for handling the grease, such as transferring it to another restaurant or release to private party for personal use, such as making bio-diesel fuel. Facility must, at minimum, be able to show storage containers and explain yellow grease handling procedure. The inspector may require a facility without a fryer to off haul used cooking grease if poor work practices are identified (e.g. FOG liquid in trash or accumulated in sewer)

### **C. Legal Authority**

Through City Municipal Code 5-4.03, the City of Madera has legal authority to:

- i. Limit types of wastes discharged to public sewers
- ii. Require that no person shall discharge or cause to be discharged any of the following described waters or wastes to the public sewer...Any water or waste which contains more than 100 parts per million, by weight, of fat, oil or grease.

As well, the Madera County Health Department has adopted codes 13.66.050 and 13.66.060 which require the following:

- i. Installation of grease interceptors. All food establishments are required to install grease, oil, and sand and grit interceptors for the proper handling of wastes containing grease or oil.
- ii. All interceptors shall be constructed in accordance with the provisions of this section.
- iii. Shall be located as to be readily and easily accessible for cleaning and inspection.
- iv. Maintenance of grease interceptors. All grease, oil and sand interceptors shall be maintained by the Owner, at his expense, in continuously efficient operation at all times.

### **D. Grease Removal Devices**

- a. **Requirements** - Grease Removal Interceptor for grease, oil, and sand -Interceptors for grease, oil, and sand shall be required for all food establishments for the protection of the sewage system from liquid wastes containing grease in excessive



amounts, any flammable wastes, sand, and other harmful ingredients. Such interceptors shall be required on discharge from all existing and new service stations, restaurants, automotive repair garages, and dry cleaning establishments. All interceptors shall be of a type and capacity approved by the Madera County Ordinance 13.66.060 and shall be so located as to be readily and easily accessible for cleaning and inspection. Interceptors described herein shall not be required for buildings used solely for residential purposes.

- b. Construction & Maintenance of Interceptors** - Grease and oil interceptors shall be constructed and sized per Madera County Standards and the latest edition of the California Plumbing code adopted by the city.
- i. Grease interceptors shall be constructed in accordance with a design approved by MCC 13.66.060 and shall have a minimum of two (2) compartments with fittings designed for the retention of grease.
  - ii. The owner or operator of the facility shall install grease interceptors at a location easily accessible for inspection, cleaning and removal of grease and shall not install or allow them to be installed in any part of a building where food is handled. Owners or operators shall obtain the prior written approval for the location of grease interceptors from the City's Building Department and Environmental Health Services.
  - iii. The owner or operator of a facility shall ensure regular maintenance and removal of accumulated grease and other contents as necessary to maintain the minimum capacity or volume of the grease interceptor.
  - iv. The owner or operator of a facility shall inspect the grease interceptor at least once each month or more frequently if ordered to do so by enforcement official when maintenance and repair of the grease interceptor is unsatisfactory.
  - v. The owner or operator of a facility shall ensure that the grease interceptor provides a minimum hydraulic retention time in accordance with the latest edition of the California Plumbing Code adopted by the City, and shall remove all accumulated grease cap and sludge pockets as necessary to allow the grease interceptor to perform at maximum efficiency.
  - vi. The owner or operator of a facility shall keep the grease interceptor free from inorganic -solid materials including, but not limited to, grit, rocks, gravel, sand, eating utensils, cigarettes, shells, rags and similar things that could settle into the sludge pocket and reduce the effective volume of the grease interceptor.
  - vii. The owner or operator of a facility shall not allow the discharge of sanitary waste through a grease interceptor.
  - viii. The owner or operator of a facility shall provide a manhole having a minimum diameter of twenty four inches (24") to allow access over each chamber and sanitary tee of a grease interceptor. The manholes shall extend at least to finished grade and shall be designed and maintained to prevent water inflow or infiltration. The manholes shall have covers that can be removed readily for inspection, removal of grease and sampling of wastewater.
- c. Maintenance of interceptors**
- i. When installed, all grease, oil and sand interceptors shall be maintained by the owner, at his expense, in continually efficient operation at all times.
  - ii. The owner or operator of a facility shall keep a written record of the maintenance, repair and cleaning of grease traps and grease interceptors for a period of one year, beginning on the date a new business is open to the public or, in the case of a modification to the facility which requires a building permit, on the date of final inspection as shown on the building permit. This



record shall contain documentation (including, but not limited to, receipts) showing the times, dates, nature of the maintenance, repair and cleaning, quantities of fats, oils and grease removed, and the name, address and phone number of the person or entity cleaning the grease interceptor, grease trap or alternative pretreatment technology devices.

**E. Authority to Inspect**

The officers, employees and inspectors of the City of Madera shall have the right to enter upon the premises of any person connected to a public sewer operated by the City, at reasonable hours to inspect and to determine whether this chapter is being violated. The owner, operator and employees of a facility shall allow enforcement officials access to the facility during the normal business hours of the facility or outside of normal business hours, if acceptable to the facility, for the purpose of sampling wastewater, inspecting the grease interceptors and grease traps, and reviewing the records and documentation.

**F. Identification of FOG Blockages**

The City is required to identify locations of FOG blockages and establishing a routine maintenance schedule to avoid sanitary sewer overflows (SSOs). The City has identified the locations that routinely contain heavy concentrations of FOG, which require routine cleaning of the sewer lines. The City has identified 109 high maintenance spots that are cleaned on a monthly schedule; 103 of these high maintenance areas are related to FOG. The City intends to maintain its regular maintenance/cleaning schedule since it has been successful at reducing SSOs due to FOG.

**G. Control Measures**

As of 2008, the City of Madera has a FOG Control Program in place for use throughout its service area. The City's FOG source control program consists of public outreach and education and the requirement to install grease removal devices for new businesses that produce grease.

Public Education will consist of including informational flyers with customer billing during the months of November and December due to the potential of high FOG generated by holiday cooking. Additionally, the City will run advertisements during these months for additional outreach.

The City will also inspect and permit food service establishments and require the installation of grease removal devices for all food service establishments.



## Element 8-System Evaluation and Capacity Assurance Plan:

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### *Requirement:*

*The Enrollee shall prepare and implement a capital improvement plan 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 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, increases and redundancy in pumping capacity, and storage facilities. The CIP shall include and 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.*

### **A. Evaluation**

In June 2013, a Citywide *Sanitary Sewer System Master Plan* was completed by Akel Engineering. The purpose of the master plan study was to provide the City with a hydraulic evaluation of the collection system and pumping stations. Additionally, the plan includes flow projections, hydraulic modeling, recommendations, and use of the model to identify potential capacity deficiencies in the system. This report is incorporated into this SSMP by reference.

The capacity analysis was based on use of winter water use data to estimate dry weather base wastewater flows for existing development and I/I rates determined based on the flow monitoring. The flow data covered a period from 2006 to 2011. From this data, monthly, daily, peak daily flows, and peak hourly flows (if available), were determined as summarized in Table 8-1.



**Table 8-1**

**Historical Flows at The Madera Wastewater Treatment Plant**  
Sanitary Sewer System Master Plan  
City of Madera

Year	Average Annual Flow		Seasonal Average		Maximum Month		Maximum Day		Peak Hour	
	AAF	Percent Change	ADWF	AWWF	MMDWF	MMWWF	MDDWF	MDWWF	PDWF	PWWF
<b>Historical Flows</b>										
	(MGD)		(MGD)	(MGD)	(MGD)	(MGD)	(MGD)	(MGD)	(MGD)	(MGD)
2006	5.05		5.10	5.03	5.12	5.09	6.18	8.23		
2007	5.51	8.3%	5.58	5.48	5.93	6.05	6.40	6.80		
2008	5.82	5.3%	5.87	5.75	6.02	5.80	6.32	6.51		
2009	5.72	-1.7%	5.82	5.68	5.86	5.79	6.19	6.62		
2010	5.68	-0.7%	5.70	5.67	5.79	5.74	6.42	6.57	9.61	11.36
2011	5.58	-1.8%						6.99		10.50
<b>Historical Peaking Factors (applied to AAF)</b>										
2006	1.00		1.01	1.00	1.01	1.01	1.22	1.63		
2007	1.00		1.01	0.99	1.08	1.10	1.16	1.23		
2008	1.00		1.01	0.99	1.03	1.00	1.09	1.12		
2009	1.00		1.02	0.99	1.02	1.01	1.08	1.16		
2010	1.00		1.00	1.00	1.02	1.01	1.13	1.16	1.69	2.00
2011	1.00							1.25		1.88

Notes:

6/5/2013

1. Peaking Factors are multipliers applied to the Average Annual Flow (AAF)
2. Flow Components Definitions
  - AADF = Average Annual Daily Flow (annual flow, expressed in daily or other time units)
  - ADWF = Average Dry Weather Flow (average flow that occurs on a daily basis during the dry weather season, with no evident reaction to rainfall)
  - AWWF = Average Wet Weather Flow (average flow that occurs on a daily basis during the wet weather season)
  - BWF = Base Wastewater Flow (average flow that is generated by residential, commercial, and industrial users)
  - MMDWF = Maximum Month Dry Weather Flow (maximum month flow during the dry weather season)
  - MMWWF = Maximum Month Wet Weather Flow (maximum month flow during the wet weather season)
  - MDDWF = Maximum Day Dry Weather Flow (highest measured daily flow that occurs during a dry weather season)
  - MDWWF = Maximum Day Wet Weather Flow (highest measured daily flow that occurs during a wet weather season)
  - PDWF = Peak Hour Dry Weather Flow (highest measured hourly flow that occurs during a dry weather day)
  - PWWF = Peak Hour Wet Weather Flow (highest measured hourly flow that occurs during a wet weather day)

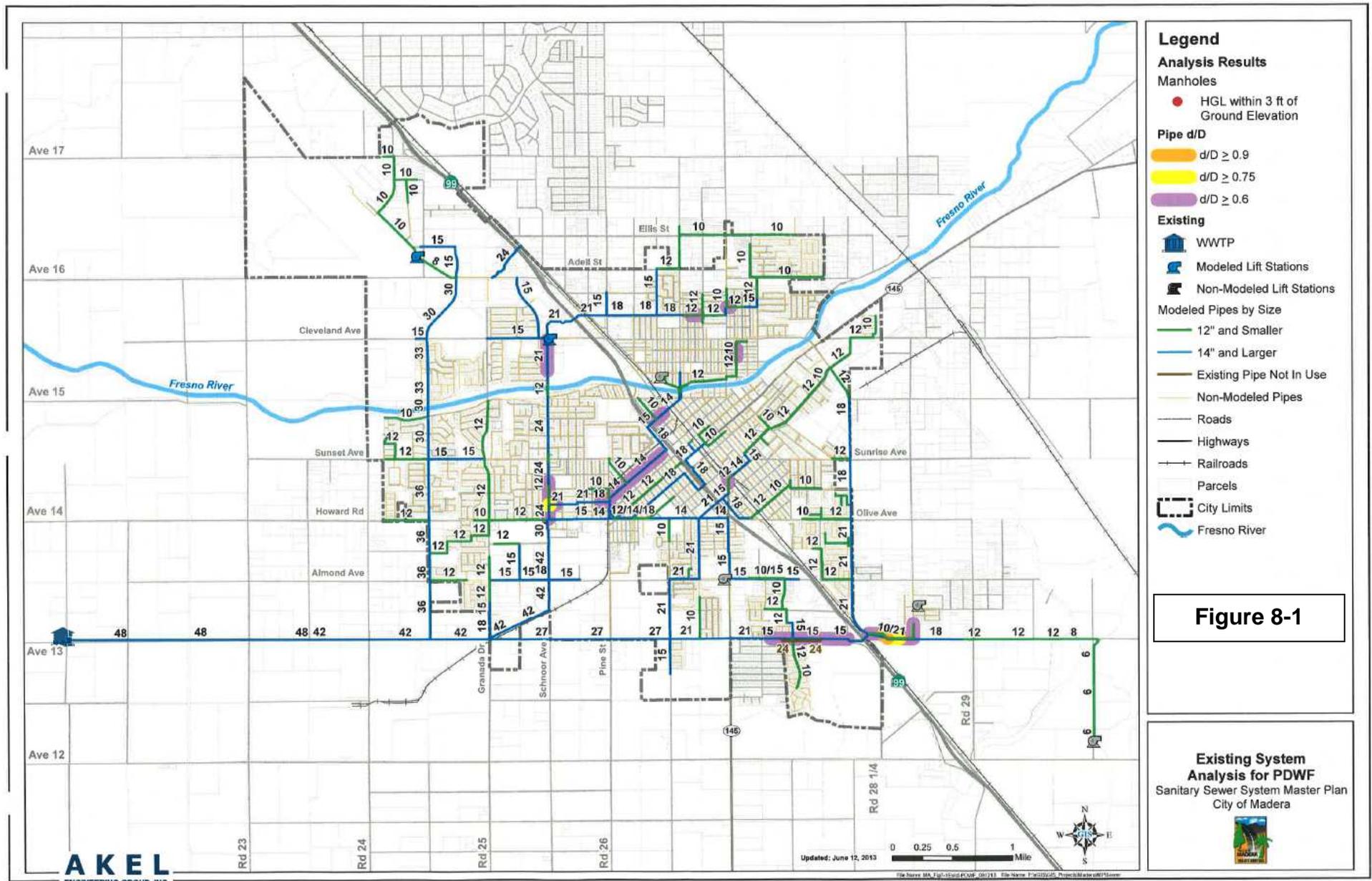


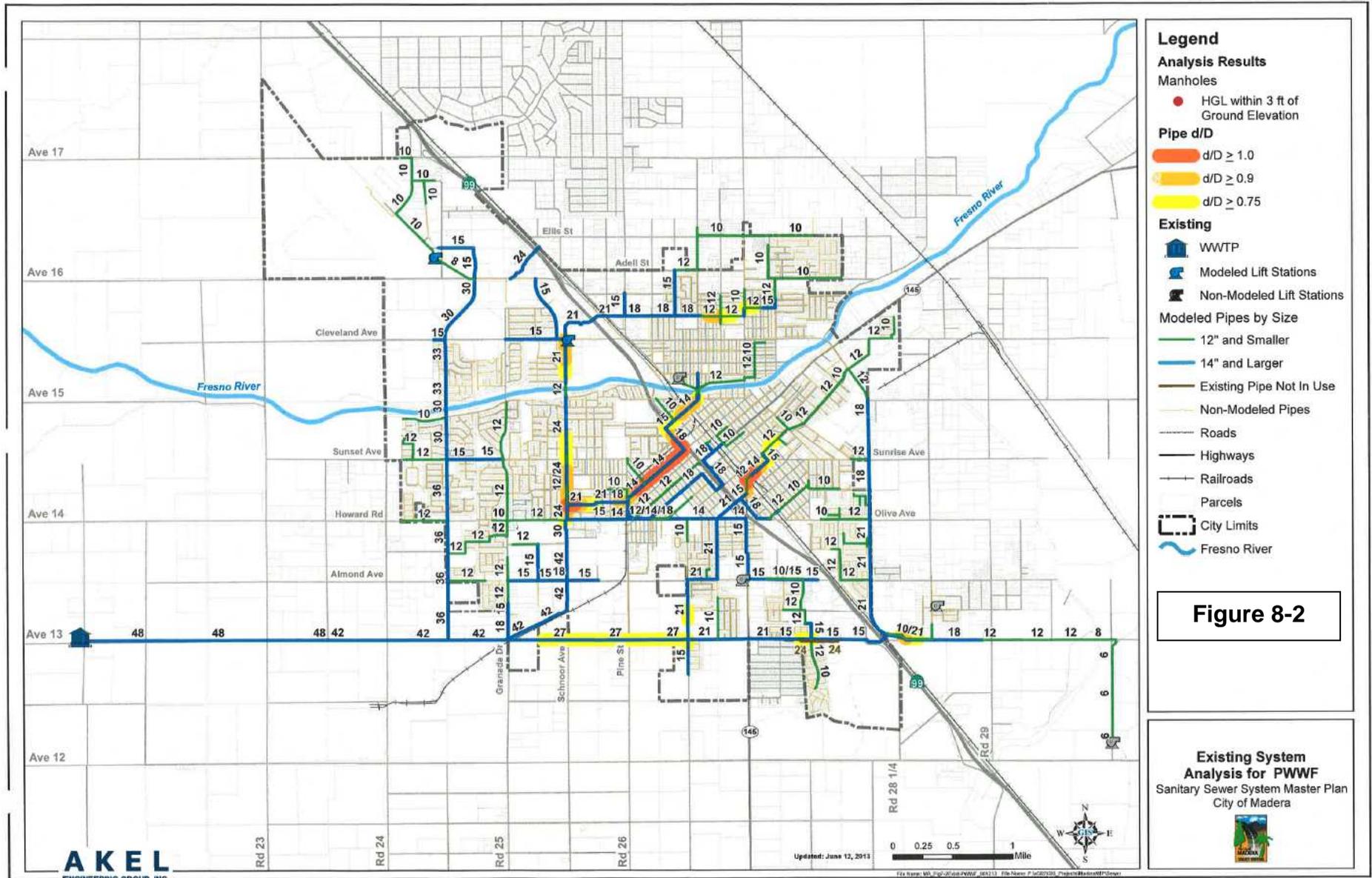
In general, the hydraulic model indicated that the sanitary sewer system exhibited acceptable performance, to service the existing customers during peak dry weather flows and during peak wet weather flows. However, several trunk reaches approach the maximum allowable criteria of a dD Ratio of 0.92 during peak dry weather flows (Figure 8-1) and of 3 feet below the manhole rim during peak wet weather flows (Figure 8-2).

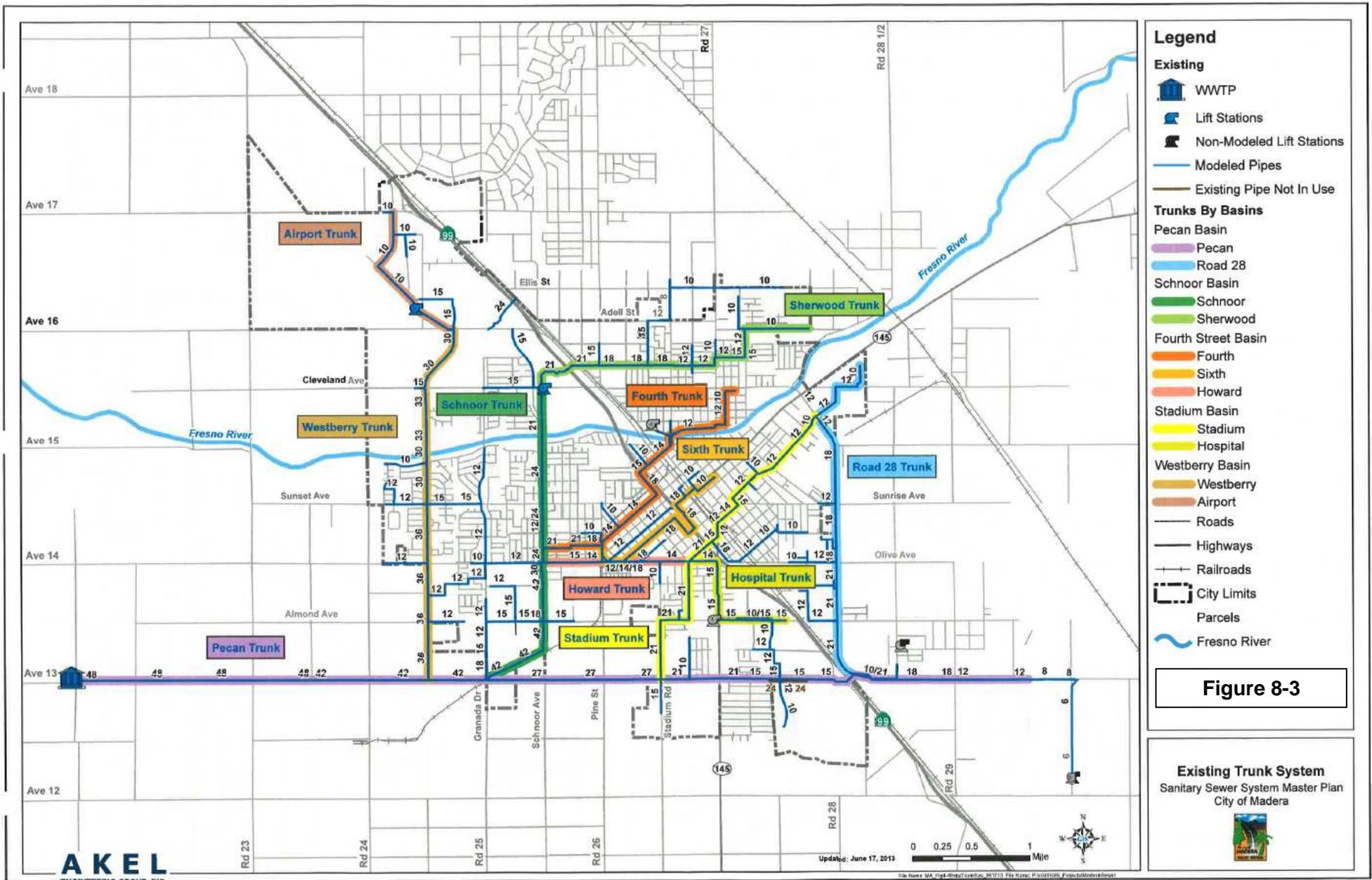
In addition to the sewer pipelines, the City's sewer system also includes several lift stations, whose function is to pump, or "lift", the flow from low-lying areas of the system. Field evaluations of the two major lift stations, Fairgrounds and South Street, were also conducted for this study in order to identify any needed improvements to these facilities. The overall sewer system evaluation also included discussions with City sewer division operations staff to identify any areas of the sewer system with operational or maintenance problems.

The existing and future design flows were input to the hydraulic model to determine the capacity requirements of the sewer system and identify any deficiencies in the existing system. The results of the modeling indicate the following:

- The existing Avenue 13 trunk sewer between Road 25 and Highway 99 will not have sufficient capacity to convey future flows from the eastern and southern portions of the planning area, including the MSCCC Specific Plan area. In the future, a new trunk sewer will be required in order to allow development to continue in those areas.
- The existing trunk sewers in Schnoor Avenue and Sherwood Way (including the Fairgrounds Lift Station) that serve the northern portion of the City have only limited capacity to serve additional development to the north. In the future, a new trunk sewer will be required to serve development north of Adell Street.
- Extensions of the Road 28 and Road 24-1/2 interceptors, and new trunk sewers to the east and the west, will be required to serve future growth in these areas. By full buildout, capacity relief for the Avenue 13 interceptor to the WWTP may also be required.
- A few sewers in the older, central portion of the system may have insufficient capacity to convey extreme peak flows, particularly during wet weather periods. These include sewers in West Fourth Street, and Ninth Street.









**B. Design Criteria**

Criteria for design of sewer facilities are required to ensure that the system has adequate capacity to handle projected flows and will operate without problems under all anticipated flow conditions. The design criteria presented below have been adopted for the SSMP. The criteria apply to all sewer facilities, including small diameter collection mains as well as the trunk sewers addressed in this Master Plan report. These criteria were proposed during the initial phases of the study, and reflect input received from Madera developers and local engineers.

a. **Gravity Sewers** - Gravity sewer design is typically based on the Continuity equation and the Manning equation for steady-state flow:

- Continuity Equation:  $Q = VA$

Where: Q = peak flow, in cubic feet per second (cfs)  
V = velocity, in feet per second (fps)  
A = cross sectional area of pipe, in square feet (sq. ft)

- Manning Equation:  $V = (1.486 R^{\frac{2}{3}} S^{\frac{1}{2}}) / n$

Where: V = velocity, fps  
n = Manning's roughness coefficient  
R = hydraulic radius (area divided by wetted perimeter), ft  
S = slope of pipe, in feet per foot

b. **Pipe Capacity** – Pipe capacity design is typically based on the St. Venant equation, which is a set of two equations, a continuity equation and a dynamic equation, that are used to analyze dynamic flows within a system.

- Continuity Equation:  $\frac{\partial A}{\partial t} + \frac{\partial Q}{\partial x} = 0$

Where: t = time  
x = distance along the longitudinal direction of the channel  
Q = discharge flow  
A = flow cross-sectional area perpendicular to the x directional axis

- Dynamic Equation:  $\frac{\partial Q}{\partial t} + \frac{\partial}{\partial t} \left( \beta \frac{Q^2}{A} \right) + gA \frac{\partial y}{\partial x} + gAS_f - gAS_o = 0$

Where: t = time  
x = distance along the longitudinal direction of the channel  
Q = discharge flow  
A = flow cross-sectional area perpendicular to the x directional axis  
y = flow depth measured from the channel bottom and normal to the x directional axis  
S<sub>f</sub> = friction slope  
S<sub>o</sub> = channel slope  
β = momentum  
g = gravitational acceleration



**Manning Coefficient (n)** - The Manning coefficient 'n' is a friction coefficient that varies with respect to pipe material, size of pipe, depth of flow, smoothness of joints, root intrusion, and other factors. For sewer pipes, 'n' normally ranges between 0.011 and 0.017, with 0.013 being a representative value used by most cities and sewerage agencies for sewer system planning and design. Although lower 'n' values may be applicable to some commonly used sewer pipe materials, such as PVC pipe, an 'n' value of 0.013 is recommended for master planning of trunk and interceptor sewers to reflect the higher friction factors that may be expected as the service age of the pipes increase in the future.

**Flow Depth Criteria (d/D)** - When designing sewer pipelines, it is common practice to adopt variable flow depth criteria based on pipe size. These criteria are expressed as maximum depth-of-flow-to-pipe-diameter (d/D) ratios. Design d/D ratios typically range from 0.5 to 1.0, with the lower values normally used for smaller pipes which may experience flow peaks greater than planned or may experience blockages from grease, roots, or debris.

**Sizing** - For sizing of future sewers under peak dry weather flow (PDWF) conditions, a design d/D ratio of 0.5 is recommended for pipe sizes less than 12 inches in diameter, 0.75 for 12-inch through 18-inch diameter pipes, and 0.9 for pipe sizes 21 inches and larger. A design d/D ratio of 0.9 for all diameters is recommended for peak wet weather flow (PWWF) conditions for existing sewers.

**Minimum Slopes and Velocities** - In order to minimize the settlement of sewage solids, it is standard practice in the design of gravity sewers to specify that a minimum velocity of 2 feet per second (fps) be maintained when the pipeline is flowing half-full. (Due to hydraulics of a circular conduit, velocity of half-full flow approaches the velocity of nearly full flow in pipes.) At this velocity, the sewer flow will typically provide self-cleaning for the pipe. For large diameter pipes (greater than about 24 inches), flow velocities of up to 3 fps or higher may be required to ensure self-cleaning.

Table 8-2 lists the recommended minimum slopes for maintaining self-cleaning full flow velocities based on a Manning 'n' of 0.013. Also shown are the calculated minimum slopes based on a Manning 'n' of 0.011, which may be used for PVC pipe. It should be noted that slopes greater than minimum are desirable if they are compatible with existing topography, and that flatter slopes may be acceptable based on review of specific site conditions and approval by the City Engineer. However, flatter slopes may result in increased cleaning requirements, particularly in the early service years of a sewer when actual flows may be substantially lower than design flows.

**Minimum Pipe Diameter** - The minimum pipe size recommended for gravity sewer mains is 8 inches. However, 6-inch diameter sewers may be acceptable on a site-specific basis for terminal sewers serving no more than 20 dwelling units.

**Allowable Pipe Materials** - Acceptable pipe materials for gravity sewers include vitrified clay pipe (VCP) and polyvinyl chloride pipe (PVC) for sewers 27 inches in diameter and smaller, and VCP, PVC, or reinforced concrete pipe (RCP) for larger diameter sewers. RCP sewers should be designed in accordance with industry standards to provide adequate protection against hydrogen sulfide corrosion over the useful life of the pipe. PVC sewers greater than 15 inches in diameter should conform to ASTM Standard F679.



**Table 8-3**

**Sewer System Performance and Design Criteria**  
Sanitary Sewer System Master Plan  
City of Madera

Pipeline Criteria			
Peak Dry Weather Flow Criteria			
Diameter (in)	Maximum Allowable d/D		
	Existing Trunks	Proposed Trunks	
8 to 12	0.90	0.50	
> 12	0.90	0.75	
Peak Wet Weather Flow Criteria			
Hydraulic Grade Line (HGL) should be at least 3 feet below the manhole rim			
Pipe Size (in)	Minimum Grade (ft/ft)	Capacity <sup>1</sup> (mgd)	Velocity <sup>1</sup> (fps)
8	0.0034	0.49	2.28
10	0.0025	0.76	2.26
12	0.0022	1.15	2.40
15	0.0015	1.73	2.30
18	0.0012	2.81	2.60
21	0.0010	3.46	2.35
24	0.00080	4.42	2.30
27	0.00080	6.05	2.48
30	0.00080	8.01	2.66
33	0.00080	10.33	2.84
36	0.00080	13.02	3.01
42	0.00080	19.65	3.33
48	0.00070	26.24	3.41
Unit Flow Factor Criteria			
Land Use Classification	Unit	Recommended Factor	
		Existing (gpd/unit)	Future (gpd/unit)
<b>Residential</b>			
Single Family	Gross Acre	1,250	1,200
Multiple Family	Gross Acre	1,500	1,500
<b>Non-Residential</b>			
Commercial	Gross Acre	750	950
Industrial, Light	Gross Acre	750	950
Institutional	Gross Acre	750	950
Mixed Use / Village Reserve <sup>2</sup>	Gross Acre	n/a	950

Notes:

3/20/2013

1. Pipe friction factor assumed at 0.013.
2. The Village Reserve category is intended to incorporate neighborhood planning and village building, and as such has been conservatively estimated as equivalent to commercial use.



**Sewer Depth** - Recommended minimum cover for sewer pipelines is 4 feet. This depth provides for adequate slope on building laterals, and allows sufficient clearance for water services to cross over sewer mains and for sewer laterals to cross under water mains. Sewer depths of less than 4 feet to the crown of the pipe may be acceptable in some cases if approved by the City Engineer. For pipes with less than 4 feet of cover, or for very deep sewers, higher strength pipe materials such as ductile iron and/or a concrete encasement or cap should be used. Note also that upstream sewers should not necessarily be installed at minimum cover if sufficient downstream slope is available to allow a greater upstream depth, as this may prevent connection of further upstream areas in the future.

**Manholes** - Manholes allow access to sewers for cleaning and inspection. As such, they should be located at close enough intervals to allow for the effective use of sewer cleaning and TV inspection equipment. Maximum spacing of 400 feet for straight sewer reaches for 8- through 27-inch sewers is recommended. Manholes should also be placed at all sewer pipe junctions and at changes in vertical or horizontal alignment. Manhole spacing of up to 600 feet may be acceptable for 30- inch and larger sewers if approved by the City Engineer. Recommended manhole sizes are 48-inch diameter for sewers up to 30 inches in diameter, and 60-inch diameter for sewers larger than 30 inches.

**Changes in Pipe Size** - When a smaller sewer joins a large one, the invert of the larger sewer should be lowered sufficiently to maintain the same energy gradient. An approximate method for securing these results is to place the 0.8 depth point of both sewers at the same elevation. For master planning purposes, it can generally be assumed that sewer crowns must be matched at the manholes.

**Lift Stations and Force Mains** - Lift stations should be sized to provide pumping capacity to convey the design peak flow with one standby pump having a capacity equal to the largest operating unit. Pumping capacity with the largest unit out of service is termed “firm” or “reliable” pumping capacity. The Hazen-Williams formula is commonly used for the design of force mains. The velocity form of the equation is:

$$V = 1.32 C R^{0.63} S^{0.54}$$

Where:            V = mean velocity, fps  
                      C = roughness coefficient  
                      R = hydraulic radius  
                      S = slope of the energy grade line, ft/ft

The value of the Hazen-Williams ‘C’ factor varies with the type of pipe material and is influenced by the type of construction and age of the pipe. A ‘C’ value of 120 is recommended for master planning.

For the design of force mains, the minimum and maximum recommended velocities are 2 and 6.5 fps, respectively. For evaluating the adequacy of existing force mains, however, a maximum velocity of 8 fps is considered acceptable.



### **C. Capacity Enhancement Measures & Schedule**

The City of Madera's Sanitary Sewer Master Plan contains each project identified as necessary to increase the capacity of portions of the system. The proposed sewer system improvement projects define the recommended Sewer System Master Plan capital improvement program. The CIP is grouped into a suggested expenditure budget, documented on Figure 8-4 and summarized in Table 8-4. The table shows the estimated capital costs for various pipelines and pump stations phased by 5-year fiscal periods through the year 2050. The estimated costs are considered to be "order of magnitude" estimates with an expected accuracy range of +50 to -30 percent. Final project costs will be based on the actual project scope, market conditions at the time of project construction, and the need for and results of additional pipeline alignment studies, including detailed topographic, utility, and geotechnical investigations.

Project priorities and proposed construction stages have been developed for the recommended CIP based on the relative severity of existing and projected system deficiencies and the anticipated timing of future development in various parts of the planning area. City staff provided input into the prioritization and staging of the projects. It must be emphasized that the schedule for project construction is approximate and will ultimately be dictated by the actual location and rate of new development as it occurs.

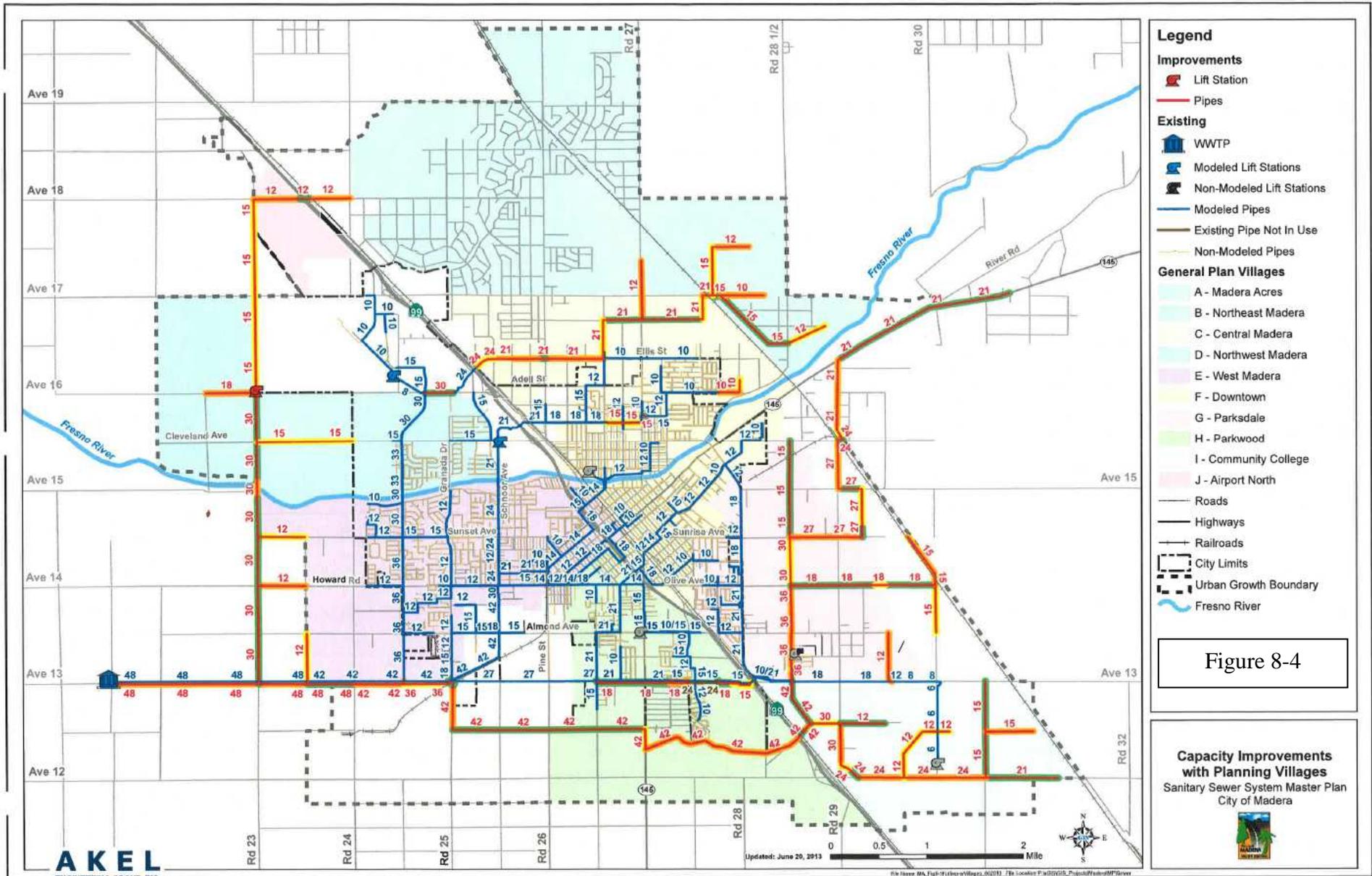


**Table 8-4**

Project Type	Suggested Expenditure Budget <sup>1</sup>							
	General Plan Horizon				Beyond General Plan Horizon <sup>2,3</sup>			
	Near-Term	Intermediate Turn	Long Term		Extended Range			
	FY 2013-2015	FY 2016-2020	FY 2021-2025	FY 2026-2030	FY 2031-2035	FY 2036-2040	FY 2041-2045	FY 2046-2050
Pipelines	\$2,504,688	\$18,235,285	\$8,089,383	\$13,768,976	\$10,080,183	\$11,083,763	\$8,431,569	\$10,927,574
Lift Stations	\$450,000	\$0	\$0	\$0	\$0	\$0	\$0	\$1,712,500
Total	\$2,954,688	\$18,235,285	\$8,089,383	\$13,768,976	\$10,080,183	\$11,083,763	\$8,431,569	\$12,640,074
Cumulative Total	\$2,954,688	\$21,189,973	\$29,279,356	\$43,048,332	\$53,128,515	\$64,212,278	\$72,643,847	\$85,283,921

Notes:

1. This expenditure budget is suggested, and is dependent on the City's rate of growth. The City is not bound by this budget and may implement projects as funding is available.
2. Phasing on this table is based on the extended horizon of available land use within the Planning Area.
3. The extended horizon is based on expected population growth and available residential land uses within the Planning area.





## Element 9-Monitoring, Measurement, and Program Modifications:

*Requirement: 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 preventive 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.*

### **A. Maintaining of Information**

The City of Madera maintains complaint and blockage records in a hardcopy and spreadsheet format, maintains hard copy logs of cleaning and other preventive maintenance activities, and records problems (e.g., excessive debris, observed manhole defects) identified through regular sewer maintenance activities.

### **B. Monitoring and Implementation**

The City is currently developing the sewer inventory, mapping and maintenance database to more efficiently track and utilize records related to any segment of pipe in their system.

All complaints and service calls will be logged, all preventive and corrective maintenance activities will be recorded, and the sewer inspection history of any segment of pipe will be retrievable electronically and the data used to develop condition ratings that will aid in prioritizing future sewer rehabilitation projects, maintenance activities, and updating other SSMP program elements, as applicable.

### **C. Assessment of Success**

With the information available in the SSO reporting system, the Public Works Division will be able to measure the effectiveness of the SSMP by tracking various parameters related to service calls, maintenance and inspection activities, as well as by comparing SSO trends from previous years and identifying system components that continually contribute to system failures. Specifically, the City plans to track the following parameters with which to measure the effectiveness of the SSMP and its effectiveness in reducing SSOs:

- Number of SSOs per year
- Volume of SSOs per year
- Number of dry weather SSOs per year
- Number of SSOs per year by cause (e.g., roots, grease, pipe failure, I/I, pump failure or other deficiency, etc.)
- Response time to SSOs and other service calls (time from call received to first responder arriving on site)
- Length of gravity sewers cleaned annually
- Actual versus scheduled cleaning dates for gravity sewers
- Length of gravity sewers CCTV inspected annually
- Record of pump station maintenance work orders completed annually



**D. Updating and Evaluation**

The information made available from this section will be used for evaluation of the programs success. Updates on performance indicators will be made to the SSMP on a yearly basis.

**E. Performance Indicators**

The purpose of this section is to report the SSOs that occurred in the City of Madera sanitary sewer system during the period January 1, 2013 through December 31, 2013. The total number of SSOs for the City of Madera for the reporting period was zero. The size of SSOs are summarized as shown on Table 9-1

Table 9-1		
Size of SSO (gallons)	Number	Percent of Total by Number
< 100 gal	0	0%
100 - 999	0	0%
1,000 – 9,999	0	0%
> 10,000	0	0%
<b>Total</b>	<b>0</b>	<b>100%</b>

The volume of spills contained and returned to the sewer system is shown in Table 9-2.

Table 9-2			
Date of SSO	Size of SSO (gallons)	Amount Returned	Percentage of Amount Returned
March	0	0	0%
June	0	0	0%
September	0	0	0%
<b>Total</b>	<b>0</b>	<b>0</b>	<b>100%</b>

The cause(s) of SSOs during the period is shown on Table 9-3.

Table 9-3		
Roots	0	0%
F.O.G.	0	0%
Debris	0	0%
Debris from Laterals	0	0%
Animal Carcass	0	0%
Construction Damage	0	0%
Construction Debris	0	0%
Multiple causes	0	0%
Infrastructure failure	0	0%
Pump Failure	0	0%
Inflow & Infiltration	0	0%
Electrical Power Failure	0	0%
Flow Capacity Deficiency	0	0%
Natural Disaster	0	0%
Bypass	0	0%
Cause Unknown	0	0%
<b>Total</b>	<b>0</b>	<b>100%</b>



## Element 10-SSMP Program Audits:

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*Requirement:*

*As part of the SSMP, the Enrollee shall conduct periodic internal audits, appropriate to the size of the system and the number of SSOs. At a minimum, these audits must occur every two years and a report must be prepared and kept on file. This audit shall focus on evaluating the effectiveness of the SSMP and the Enrollee's compliance with the SSMP requirements identified in this subsection (D. 13), including identification of any deficiencies in the SSMP and steps to correct them.*

The City of Madera will perform an internal audit evaluating its SSMP and its compliance with the WDR every two years and will report the results of the audits along with recommendations and suggested improvements to the Water Quality Control Board.

The audit will include:

- Review of progress made on development of SSMP elements
- Identification of successes of implementing SSMP elements and needed improvements
- Description of system improvements since the last audit
- Description of system improvements planned



## Element 11-Communication Program:

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*Requirement:*

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

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

The Public Works Director will provide interested parties with status updates on the implementation of the components of the SSMP and will also consider comments made by interested parties. Additionally, the City of Madera will post the SSMP and all audits to the City's website for view by interested parties.



## Element 12-SSMP Completion and Certification:

*Requirement:*

*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 fourth 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 the State Water Board.*