APPENDIX I1

Preventive Maintenance Program

Procedure Revision History			
Revision	**Date**	**Approval**	**Reason**
0	09/30/05		Original
1	12/19/11		•
2	01/06/17	Jms Cabral	• Changed mileage of pipe and force mains
3	11/20/18	Jms Cabral	• Minor language changes (in Overview, Gravity Sewers Program, Pressure Sewers and Pumping Facilities Program)
	09/26/19	Jms Cabral	• Reviewed – no changes
4	12/03/19	D. Stokes	• Updated preventive maintenance frequencies
	09/26/22	Jms Cabral	• Reviewed – no changes
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Orange County Sanitation District
Preventive Maintenance Program

Background:

This PMP is prepared and implemented as required by the WDR Section 13.iv.(b).

The PMP covers the assets managed in OCSD's sanitary sewer system and is one component of the overall. The PMP is based on an approach that combines preventive, predictive and corrective maintenance strategies and established best management practices.

Overview:

OCSD manages 389 miles of gravity sewers comprising of manhole structures and their connecting pipeline segments. Currently, OCSD operates and maintains 15 pumping facilities and 32 miles of force mains. The Engineering Department is continuously updating maps and asset register, and the exact mileage numbers may change as data is refined.

OCSD does not own or maintain any portion of the sewer laterals that drain each privately owned parcel or property up to the point of connection to the local sewer; thus, they are not a part of this plan nor are they catalogued.

OCSD staff and/or contractors are used to perform the planned maintenance tasks at scheduled frequencies as part of the asset level of care program. Frequencies are established based on experience and attribute information to minimize risk of blockages or equipment failures that could possibly lead to a SSO. Data from the work is recorded and tracked through CMMS.

Hardcopy data files and paper records not recorded in our CMMS are available for review and audit. SOPs and SMPs ensure consistency. These are available for some maintenance tasks and are continuing to be developed for others. Mobile assets such as service trucks, generators, and other equipment are not covered by this PMP but are covered by plans developed by the Fleet Services unit of our Operations and Maintenance Division.

Asset Inventory and Attribute Data:

Capital assets, minor components and their parts are catalogued in our paper records or CMMS. Source or attribute data for each of these items is obtained from record drawings, sewer maps, plans and specifications and/or supplier data. Levels of care for each item are described in the tasks and frequencies information as catalogued in the CMMS or in the interim, on lists or spreadsheets until the full CMMS implementation is completed.

Asset Level of Care Information

Preventive Maintenance Tasks:

OCSD developed and continues improving asset-specific maintenance tasks for the care of each asset throughout its life cycle. Major PM task groupings are:

- Sewer inspection
- Condition assessment
- Sewer cleaning
- Pump station maintenance
- Chemical dosing for odor and corrosion control and wetwell grease mitigation

PM Frequencies:

As described above, the frequencies for preventive maintenance tasks are assigned to each asset or groups of assets.

Gravity Sewers Program:

Experience has shown that smaller diameter gravity sewers (from 6-inches to 12-inches) are more prone to blockages than larger diameter interceptor and trunk sewers. OCSD established regularly scheduled frequencies for these assets. These schedules are shown in the CMMS. Once work is completed, a record is input and documented in CMMS.. Higher-risk areas are cleaned more frequently, while lower risk areas are cleaned less frequently.

OCSD uses combination cleaning trucks capable of hydraulically washing the pipe wall followed by vacuum removal of the sewer debris at the next downstream manhole. Higher frequency PM areas are on the Trouble Spot list. These line segments have a history of blockages or SSOs mostly due to grease and roots. Trouble Spot areas are cleaned weekly, monthly, quarterly, or in six or nine-month periods as necessary, to prevent blockages. Inverted siphons of all diameters are typically treated as trouble spots and receive higher frequency care due to grease build up and/or debris settling.

Our medium and large diameter sewers are less prone to blockages thus receive a lower level of inspection and cleaning. Our CCTV and manhole inspection programs are on seven-year and five-year schedules, respectively. Each is also inspected before and after any repairs done. Our cleaning schedule is as follows: Lines 42-inches diameter or less are cleaned at least once every five years. Lines larger than 42-inches are cleaned as required based on inspection or need (e.g. CIP projection, inspection).

Pressure Sewers and Pumping Facilities Program:

Isolation valves in the pressure sewers are exercised every three months to make sure they are in good working order. A program is being developed that includes force-main air/vacuum release valves checked at optimal intervals noted in the CMMS. The mechanical, electrical, and instrumentation equipment, and structural, landscape and hardscape systems at the pumping facilities need various levels of care at regularly scheduled frequencies. These schedules are shown in CMMS. Once work is completed, a record is input and documented in CMMS.

Predictive Maintenance

Pd Tasks: (a subset of PM) are inspection and condition- assessment type tasks. These are performed and could determine if the planned preventive maintenance task should be done as scheduled, or rescheduled to a forward date if preventive maintenance, rehab or replacement is not needed. PM tasks are therefore performed based on asset condition and need rather than a strict time interval when maintenance may not be required. Pd tasks include but are not limited to the following:

- CCTV video inspection of piping (NASSCO standards)
- Visual inspection of the manhole structures and their flow channels
- Trending of flow monitoring data
- Pump visual and dimensional inspection (impeller gap clearance for wear)
- Exercising of pump station equipment to verify correct function
- Thermal imaging of electrical systems
- Pump station pressure readings
- Vibration measurement of rotating equipment
- Ground surface inspection of rights of way and easements over the gravity sewers.
- Odor and corrosion assessment and monitoring programs.

The Pd program will continue to develop as technology expands.

Corrective Maintenance Tasks:

CM tasks are performed in response to a failure of an asset, component or part, or a critical utility outage. Low-risk items, such as light bulbs, pressure gauges, sensors and small non-critical valves are planned for run-to-failure, and as such are not part of the PM Program. These items are replaced when they fail. When managed assets critical to the process fail, they are scheduled for CM on an urgent or routine basis on a priority schedule. Some of these repairs may be capitalized as a follow-up activity depending on asset cost and life expectancy. These types of CM repairs include but are not limited to:

- Emergency cleaning to eliminate a pipe blockage
- Spot repair or replacement of a failed pipe
- Replacing a rattling or failed manhole cover
- Repairing or replacing a pump that has become clogged or damaged by debris
- Respond to, investigate and mitigate customer complaints and sewer overflows
- Repair of earthquake damage and
- Vandalism

All CMare documented in the CMMS database.

CCTV or other failure analysis may also be done by staff as a CM task after a problem occurs to diagnose the cause of the problem and recommend changes if indicated. Findings may lead to a spot repair of the pipe, root cutting, root foaming with an herbicide, re-cleaning for grease or debris removal on a periodic preventive basis, or scheduling a manhole-to-manhole pipe replacement or rehab in an urgent or lower priority planned manner. Major replacement or rehab may be capitalized outside of the annual operating budget.

Monitoring, Measurement and Program Modifications:

Findings related to scheduled or non-scheduled tasks and work order tracking will be continually evaluated by staff to improve reliability and system performance. In assessing the success of the PMP, changes in frequency or task activities, spare parts or recommended stock levels will be reviewed by the Supervisor. Database changes and/or new instructions to contractors will follow.

Items recommended for rehab or replacement through our CIP will be sent by the Supervisor to the Staff Engineer for funding and planning by the Division or forwarded to our Engineering Department for action in the agency wide CIP.

This program is subject to revision at any time with the goal of doing a better job more efficiently. The process starts with suggestions from staff on possible ways to improve tracking and managing of work.