


<p>CITY OF MODESTO</p>  <p>WASTEWATER COLLECTIONS</p>	<p>V. OPERATIONS AND MAINTENANCE PROGRAM</p>
	<p>DATE ISSUED: 4-6-09</p>
	<p>DATE REVISED: 6-28-10</p>
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The sanitary sewer system collection system consists of approximately 641 miles of sewer pipes, 12,571 manholes, 39 lift stations and other related infrastructure. The City operates and maintains the sanitary sewer system through a balanced sanitary sewer maintenance program that includes the following elements.

A. System Inventory and Mapping

The City’s sanitary sewer collection system assets are fully inventoried in a GIS database system that is able to provide full mapping capabilities and asset attribute descriptions. The City’s Information Technology (IT) department is responsible for creating the geographic information system (GIS) map of the system of infrastructure. Updates to the data are currently made randomly but steps are being taken to regularly update information to accurately reflect conditions changes made in the field.

In addition to the GIS database, the City also maintains an electronic engineering records document management system. These engineering drawings (e.g., subdivision improvement plans) are scanned and indexed within the system and are made available to all staff via web interface or through the GIS system. The creation of the sanitary sewer GIS database began two years ago and continues today.

In the fall of 2008, a \$1.3M project was completed that re-inventoried the entire Storm and Sewer Collections systems. This information now gives us a complete asset inventory and mapping of our systems as required. The IT Dept currently has an Intern who keeps this database updated with information from our Collections Crews. WQC has been approved to hire a full time GIS IT person for Fiscal Year 2011 who will be responsible for ensuring all information is kept accurate and up-to-date. The main line descriptors include pipe sizes, pipe types, direction of flow, and installation year, and directional flow descriptors.

In addition to the GIS database, the City also maintains an electronic engineering records document management system. Engineering drawings (e.g., subdivision improvement plans) are scanned and indexed within this system and are made available to all staff via a web interface or through the GIS system. To ensure our system stays current and up to date, the City is in the process of hiring a GIS Analyst whose responsibility will be to add and update information as field changes occur. Also too, information gather through our CCTV operations will be linked to our GIS inventory and any discrepancies encountered will be passed through the GIS Analyst to incorporate into our system.

The database includes manholes, sewer mains, pump stations, rockwells, catch basins, detention/retention basins, and stormwater outfalls. The attributes captured for each manhole on the sanitary and stormwater systems include:

- Manhole type: manhole, lamphole, cleanout, terminal manhole
- Manhole ID: the unique identification number for each manhole from the CassWorks

Computerized Maintenance Management System (CMMS), populated only for sanitary manholes and not for stormwater manholes:

- Physical location: X and Y, in state plane coordinates
- Rim elevation, Z, at the center of the structure
- Invert elevation: the invert elevation of the pipe leaving the manhole. This data was compiled from previous databases developed by the City; invert elevations were not surveyed as part of the new work
- Vertical datum: elevations in the City are typically in NAVD 88 or in the City's custom vertical datum. This field has not been populated for all manholes.

Manhole material was not captured as part of the inventory. The attributes captured for each pipe segment on the sanitary and stormwater systems include:

- Material of construction
- Year of installation: populated from date on record drawings or plat maps
- Diameter
- Length
- Force main (yes/no)
- Private (yes/no): Pipes that are maintained by homeowner associations or private landowners; the City is not responsible for maintaining these pipes

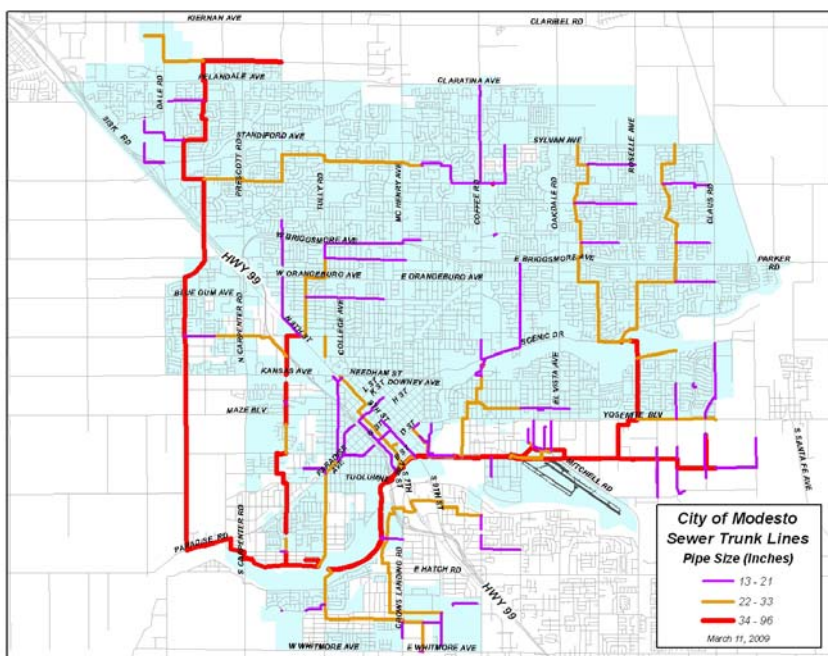
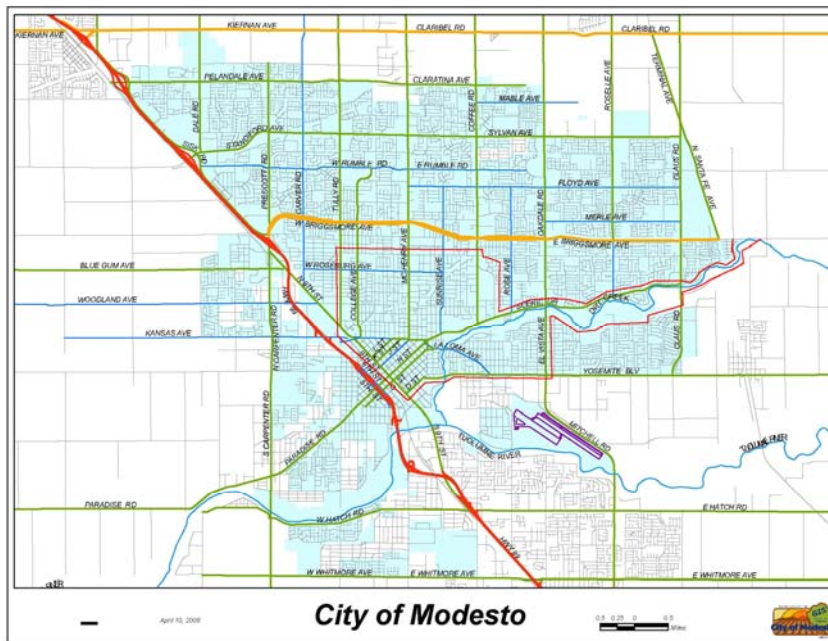
Flow direction: the pipes are digitized in the direction of flow so that the City can develop a geometric network of the system:

- Slope: calculated when invert elevations are present at the upstream and downstream manholes
- Data source: record drawings or other data source

The upstream and downstream manhole IDs are not stored in the attribute table for the pipe segments. However, this information can be obtained from the geometry of the graphical features. Pipe segments do not have an identification number.

The attributes captured for each pump station include:

- Name
- Type: sanitary or stormwater
- Survey location: X and Y in state plane coordinates; Z elevation in feet of structures

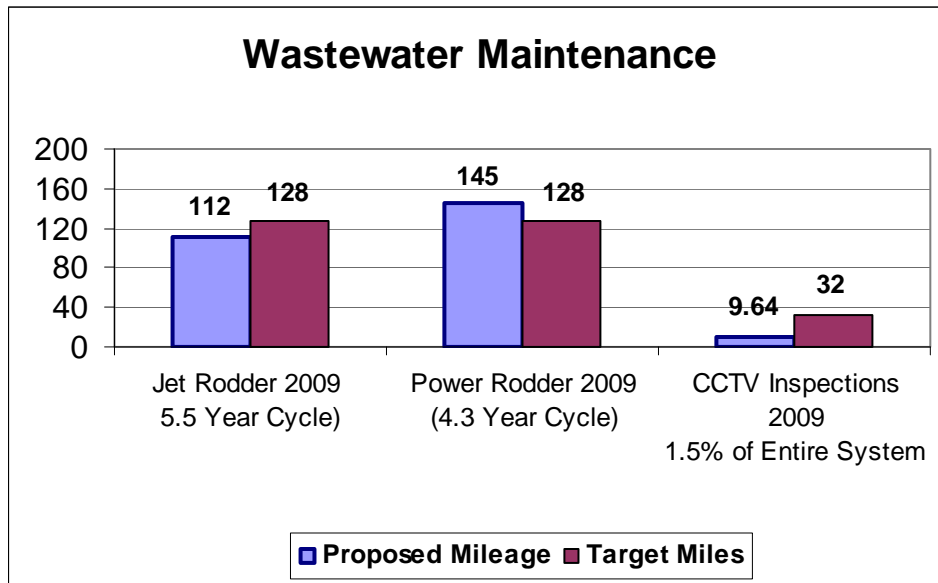


B. O&M Activities

The City consistently monitors sanitary sewer blockages and other conditions that indicate the need for regular cleaning and maintenance. Routine cleaning cycles are established and performed on based on a rotational basis or more frequently if assessments warrant. Routine cleaning cycles range from 3 to 5 years and accelerated cleaning cycles range from monthly to bi-annually. Regular scheduled maintenance is also performed on all lift stations. The City's maintenance program includes periodic cleaning and maintenance of the sanitary sewer system, and more frequent and accelerated cleaning and maintenance of known problem areas.

1. **Maintenance** crews handle the routine maintenance of our sewer lines utilizing 2 power rodding machines and 3 jet/vacuum trucks. Our entire system is mapped and divided into approximately 40 East & West maintenance sections. One power rodder and one jet/vac are assigned to each half of town and focus on cleaning of 6"-10" mainlines. Crews systematically work through each area removing accumulated grease and other debris from the lines before moving into the next section, unless emergencies dictate otherwise. For each half of town, it takes approximately 3.5 years to complete an entire cleaning cycle. The third jet/vac truck focuses on the cleaning of lines 12"-36" sewer trunk/sub-trunk lines.

As illustrated, currently the City jet rodding (flushes the system) crews are cleaning 18% of the entire system annually. This equates to a 5.5 cleaning cycle rotation. City Power rodding (removes roots and heavy materials) crews are cleaning 23% of the system annually which puts them on a 4.3 year cleaning cycle. The figure also shows the approximately 11.77 miles of CCTV are performed annually, which equates to approximately 1.5% of entire system.



2. **Construction:** Our construction crew is comprised of 3 Wastewater Collections Operators who are responsible for performing replacement and emergency repairs to our sewer infrastructure. At times construction projects require working in harmony with our Maintenance and CCTV teams in order to successfully complete tasks. The Construction crew also works closely with outside contractors in providing direction and assistance when working in close proximity to our sewer utilities.

Our in house construction activities are limited to those maintenance and repair projects that we can complete which are under our \$50,000 public works threshold limit.

3. Closed Circuit Television: Our closed circuit television (CCTV) crew consists of four members who perform routine, warranty and emergency video inspections of our sewer and storm lines. Our current CCTV equipment consists of one TV van and one combination Jet-rodger. Currently, we have purchased additional equipment which allows us to establish a second CCTV crew. Utilizing state of the art video inspection equipment, we are able to observe our infrastructure from the inside. This enables us to identify problematic areas or deficiencies and plan for their correction, or if necessary, make the immediate repairs. In addition, this crew performs inspections and mandrel testing to lines installed by contractors prior to the end of one year warranty periods and before final acceptance by the City of Modesto.

CCTV inspections are performed both routinely and as needed. Typically, following a sewer stoppage, the affected line segment is visually inspected with our CCTV camera. This measure helps determine cause and eliminate speculation.

C. Pump Stations

The City of Modesto’s sanitary sewer collection system is primarily a gravity flow. As the sewage water makes its way through the system, the lines become deeper and deeper. At about 25 feet, the depths of the lines reach a point where maintenance becomes problematic. Because of the flat topography that exists within the City of Modesto; this requires our systems flows to be periodically lifted to higher elevations so it can then gravity flow to the next lift station at which point, the sewage water is once again lifted to a higher elevation where the gravity cycle starts all over again. The structures used to lift those flows are called lift stations. The City of Modesto has a total of 62 (39 sewer and 23 storm) lift stations. The lift stations are comprised of three primary types: Wet/Dry Well, Submersible and Turbine. To maintain these structures we utilize 2 three man Maintenance Mechanic crews. The lift stations are all operated through local pump controls located at each site. In addition, they are also monitored by our staff by week site visits and through a (SCADA) Supervisory Control and Data Acquisition System. The SCADA system allows us to respond to critical alarms when pumps, controls and other related equipment failures occur. A current list of List Stations follows.

1. Rehabilitation and Replacement – The City has a 10 year Sanitary Sewer Capital Improvement program designed to adequately manage system capacity and rehabilitation and replace infrastructure as identified in the 2007 Wastewater Master Plan. The City’s current 2009-2018 sewer CIP is approximately \$129M. A complete asset inventory for the collection system is captured in a database format where each Line segment, pipe type are identified and ages are approximated, if unknown, for each segment. Below is a sample of the information included in the 251 pages of data.

Decade	USMH	DSMH	Const Year	Size	Length	Mat	Address 4204	Location1 Mid-block	Location2 Center Terminal
1990	53091401	53091402	1995	6	117	VCP	Semallon Dr		

2. **Training** – City staff responsible for maintaining the sewer system are thoroughly trained and experienced in performing the duties required to safely and effectively operate and maintain the sewer system. Employees are trained to follow standard operating procedures for all sewer cleaning, repairs, emergency response and other maintenance functions. Employees are trained to be competent in the safe operations of vehicles and equipment necessary to clean and maintain our sanitary sewer system. Employees are also rotated among different crews and sections to learn new skills and maintaining existing skills. Standard Operating Procedures (SOP’s) for our combination vacuum/jet rodders and power rodders have been developed and operational training is given based on those documents. In addition, as further training events are identified, employees are selected and sent as funding allows. Each employee’s training and associated contact hours are tracked and monitored for use by those employees who possess professional organization certifications and which require contact for the renewal of said certifications. We have included a copy of our Power Rodder and Combination Jet Rodder SOP’s, see Appendix B.

3. **Contingency Equipment & Replacement Inventories** – The Fleet Services Division works closely with the Operations and Maintenance staffs to ensure vehicles are functioning properly and safely. Replacement equipment needs are evaluated annually and considered during the budget process. Below shows a list of all vehicles assigned to the Wastewater Treatment Plant.

Wastewater Treatment Plant Vehicles

Description	# of Vehicles		Description	# of Vehicles
Arrow Board	2		Grader	1
Back Hoe	2		Jeep	1
CCTV Van	2		Loader	1
Compressor	1		Message Board	1
Crane	1		Power Rodder	2
Crane Truck	1		Sedan	6
Dump Truck	4		Tractor	1
Electric Car	2		Trailer	3
Equipment`	1		Truck	54
Fork Lift	2		VacCon	4
Generator	9		Van	1
Golf Cart	3		Water Truck	1
Total Vehicles = 106				

4. **Condition Assessment** – The City is currently performing physical condition assessments on a daily basis during routine and accelerated maintenance efforts. The assessment is critical in identifying future system rehabilitation and replacement priorities and funding needs.