

**InfoShare Asset Management—  
Report to BACWA Board**

InfoShare Asset Management Committee meeting on: 02/23/2017  
Executive Board Meeting Date: 03/17/2017  
Committee Chair: Dana Lawson, Central San

**Committee Request for Board Action: None**

**Attendees:** Dana Lawson, Jon Macagba, David Wellner (Central San); Jill Chamberlain (CCWD); Leonard Espinoza, Tanner McGinnis (City of Sunnyvale); Patricia Chapman, Irene O’Sullivan (Delta Diablo); Aaron Johnson (DSRSD); Dillon Cowan (EBMUD); Robin Gamble (Napa Sanitation)

<b>Introductions</b> <ul style="list-style-type: none"><li>• See above</li></ul>
<b>Announcements</b> <ul style="list-style-type: none"><li>• none</li></ul>
<b>Announcements</b> <ul style="list-style-type: none"><li>• Overview of Central San’s recent implementation efforts including GIS, web mapping, CMMS, CCTV, hydraulic model, renovation planning, program management information system (Lawson). See slide handouts attached.</li><li>• Central San field staff are using iPads to access Cityworks and GeoPortal.</li><li>• Aaron said that DSRSD is using Infomaster and is beta-testing a version for vertical assets.</li><li>• Inspections have also been configured. Using condition inspection forms from the recent masterplan endeavor, inspection forms were configured in Cityworks where each observation has a pick-list of answers that tie to a score, which the system uses to calculate an overall condition score for the asset. Not all inspection forms are configured to calculate a score for an asset. Some are used with PMs to record readings, document work that was done, or as a checklist of tasks.</li></ul>
<b>Discussion</b> <ul style="list-style-type: none"><li>• Two meetings ago (August) attendees expressed interest in developing resources for asset cost &amp; lifecycles after Lani (West Yost) presented their work for DSRSD Reviewed set-up of Asset Cost &amp; Lifecycle Tables spreadsheet determined at the last meeting (November), which included asset class, asset type, asset subtype, and what data to track. A draft was sent to November attendees. Aaron will add data and return; then Dana will post in the “cloud” (either Dropbox or Onedrive) and e-mail everyone for contributions. Objective is to finish the tables by the end of the year, then revisit annually to update cost into current year’s dollars and audit selected assets’ costs. Attendees expressed an interest to continue working on this. See draft attached.</li></ul>
<b>Next BACWA Asset Management Infoshare Committee Meeting:</b> Tentatively May 17, 2017 at EBMUD  <i>Please e-mail <a href="mailto:dcowan@ebmud.com">dcowan@ebmud.com</a> if you can provide a presentation or host a future meeting; default is to host at CCCSD or EBMUD if no other agencies are able to volunteer.</i>



# UPDATE ON ASSET MANAGEMENT SOFTWARE IMPLEMENTATIONS

*Dana Lawson*  
*Senior Engineer, Asset Management*  
*February 23, 2017*

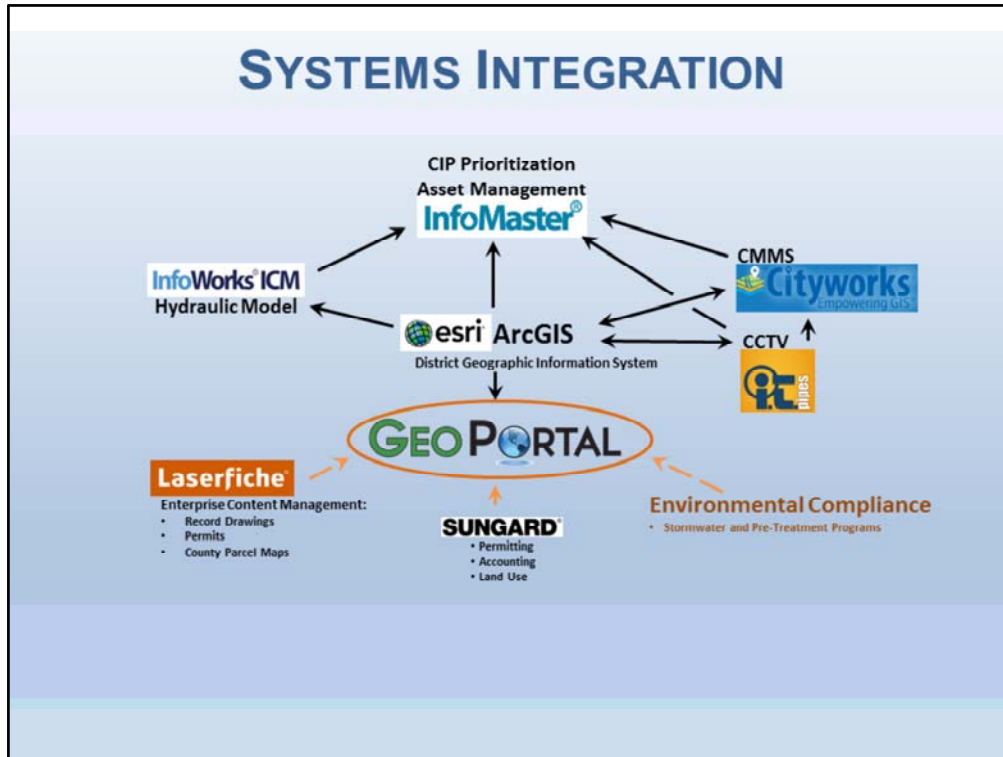


## OVERVIEW

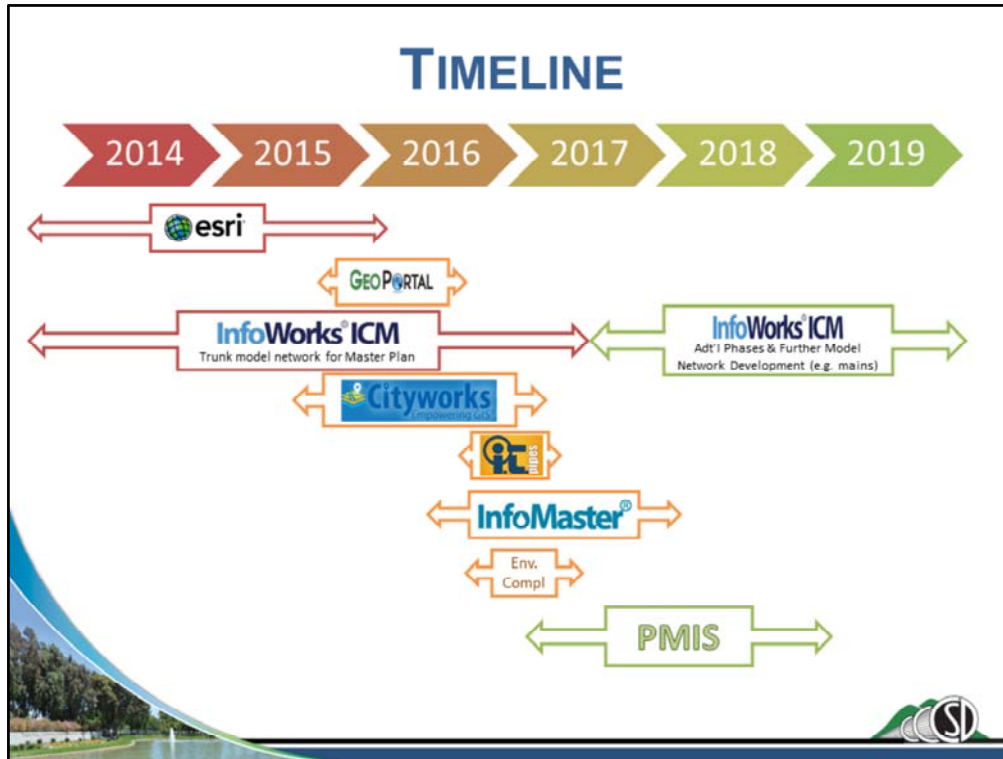
- System Integration
- Timeline
- Status of Implementations



Today I will provide a brief overview of the asset management software implementations that Central San has been undertaking. First, I'll provide an overview of how the systems are integrated and related. Then a snapshot of the timeline for these implementations. And lastly more detail on the status of the implementations with a few highlighted.



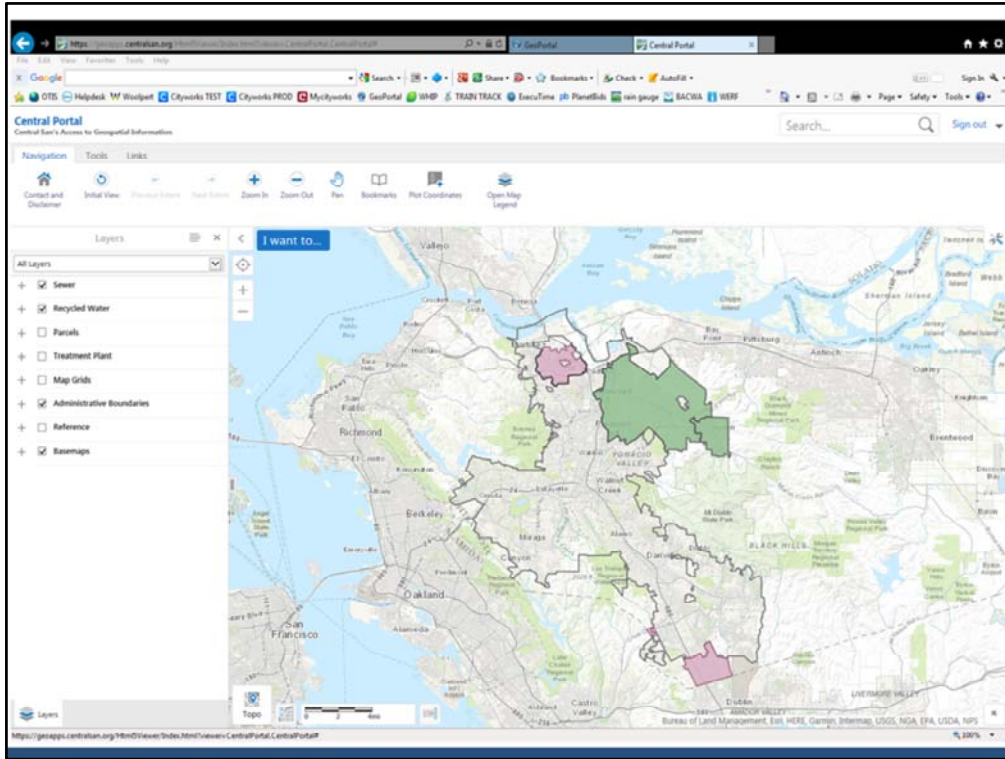
The GIS is the foundation on which we've built the Asset Management Program since it stores the asset inventory for Central San. Leveraging the asset inventory in the GIS is the CMMS, CCTV and Hydraulic Model. In addition, Infomaster also leverages the asset inventory and data from the other three systems. Displaying information from this system, the GIS team have built GeoPortal, which has also been programmed to display data and documents related to assets and parcels from Laserfiche, Sungard, and the Stormwater and Pre-Treatment Program.



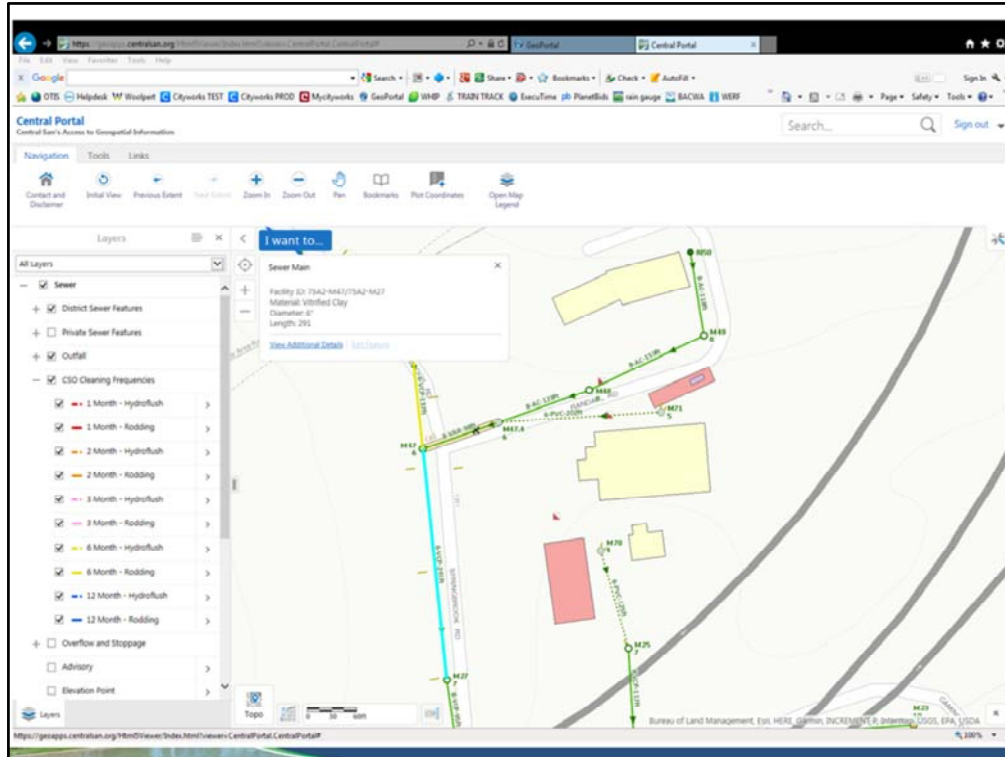
Many of these implementations are multi-year endeavors. The GIS replacement was completed in April 2016, and was followed by development of GeoPortal. Concurrently, the Planning Group has been replacing the hydraulic model with Infoworks. Cityworks implementation began in July 2015 and was recently completed. IT Pipes began late last year and will be completed in the next few months. Infomaster, along with Infoworks, is being completed with the Comprehensive Wastewater Master Plan and will be implemented on Central San's servers this year. Environmental Compliance's program is undergoing a fundamental system upgrade. Lastly, for now, Central San is initiating efforts to implement a Program Management Information System that is expected to take up to 18 months to implement all phases and modules. The Planning group will also be expanding the hydraulic model to the mains by area.



As I mentioned, the GIS system is foundational to the asset management program. This was a huge undertaking by the GIS team to move Central San into a state-of-the-art, robust platform. The GIS Team now has the ability to create a gallery of web maps that can be customized to major workgroups. The primary, everything but the kitchen sink, is “Central Portal”.



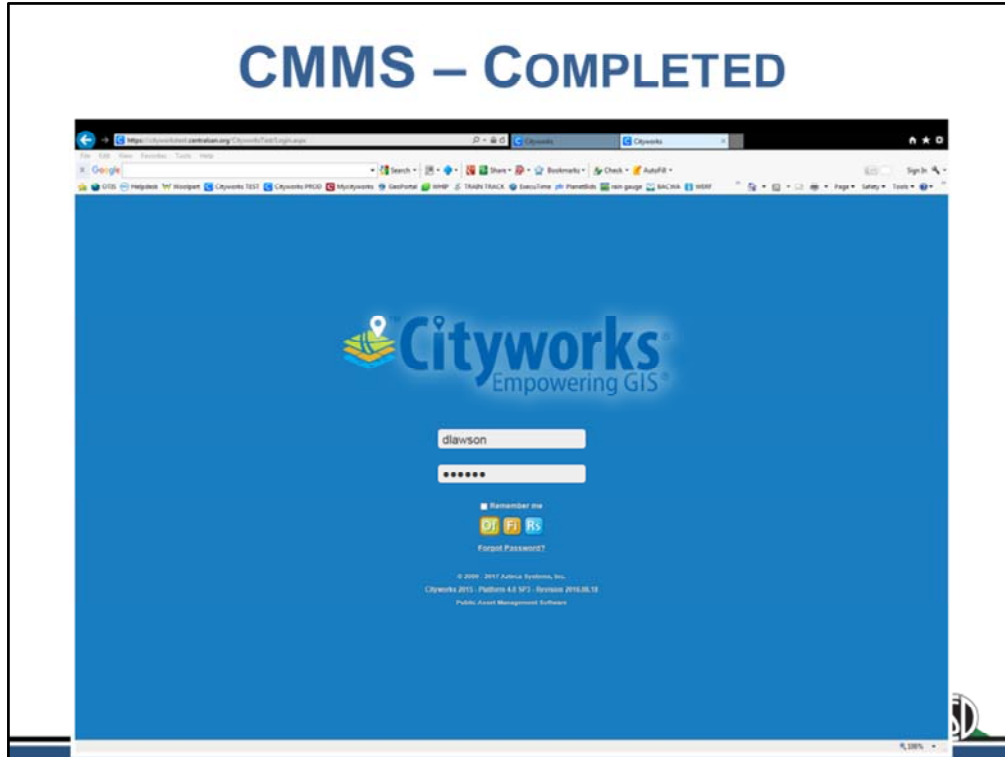
This is a screenshot when staff log-in to our “Central Portal” showing the whole District.



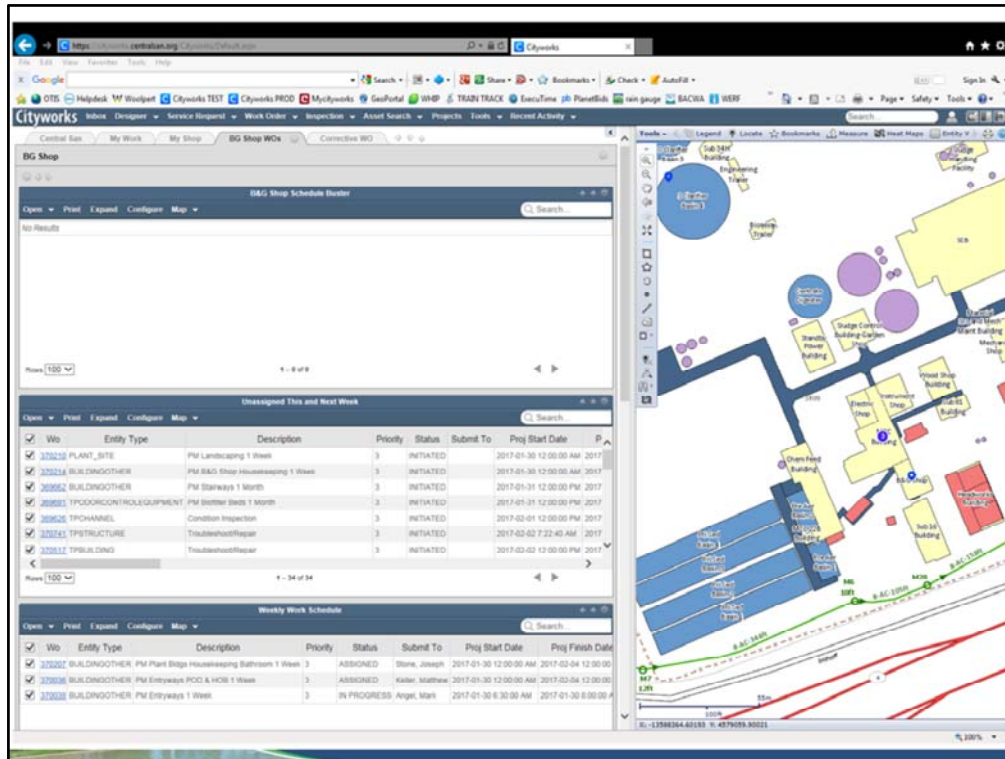
Staff can search or zoom in to specific areas and find information on assets or parcels, turn on or off specific layers depending on their needs. Staff can “View Additional Details” and pull up reports that link to other databases such as CCTV, CMMS, Laserfiche (for record drawings or permit records), or Environmental Compliance database, etc.



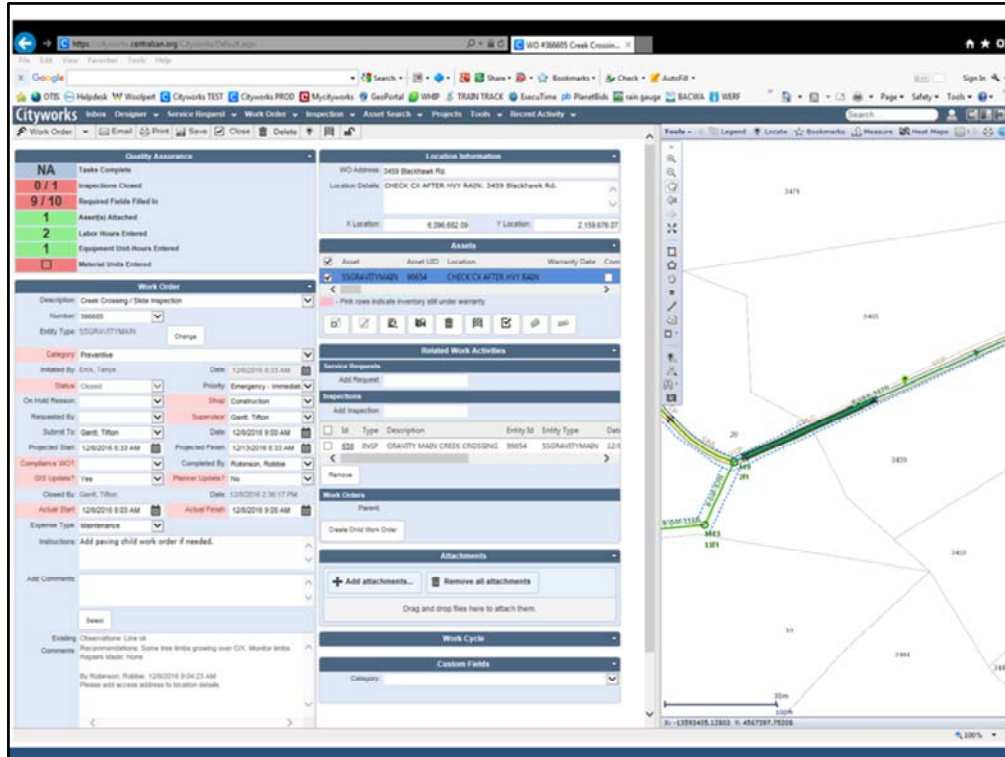
## CMMS – COMPLETED



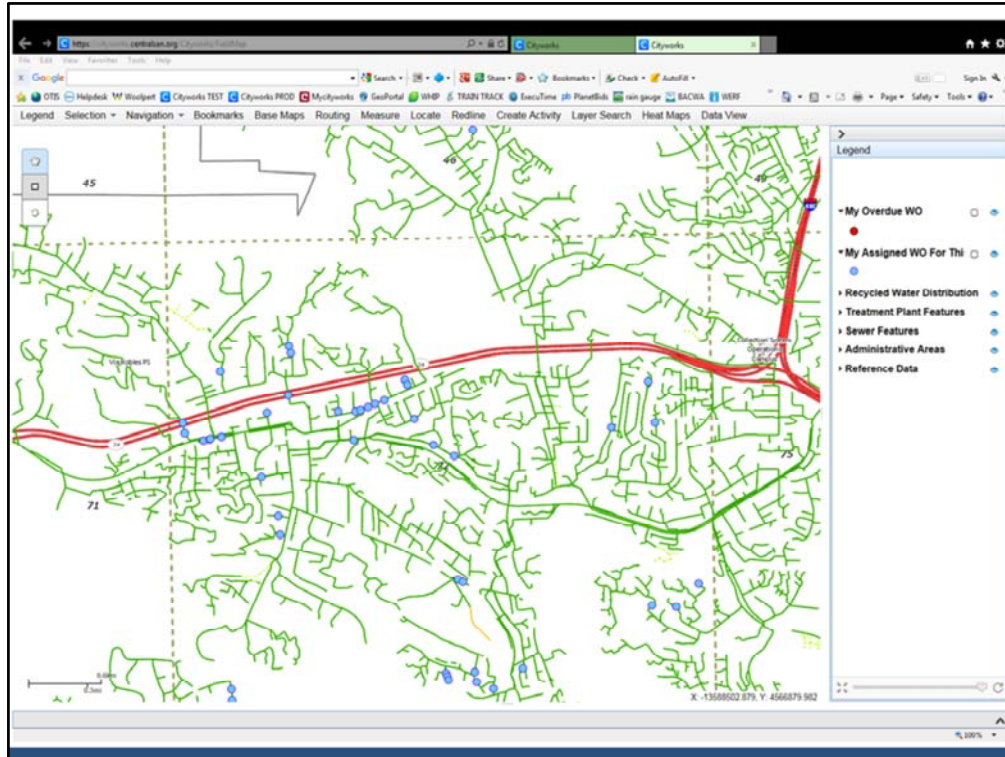
Another huge endeavor by our Asset Management and GIS Group, has been the replacement of three separate CMMS systems, consolidating all assets and workgroups into one system that has an easier GUI look. Previously, Fleet used an old version of Accela, Collection system also used an old version of Accela but it was a separate database from Fleet, and Treatment Plant used Mainsaver. A lot of meetings were held to get all three groups on the same page regarding codes and terminology to apply best practices to configure the new system.



Staff have easy access to a map, quickly showing them where the asset is located that requires maintenance. Additionally, inboxes are set-up and customized by work group or staff depending on what they need to see on a regular basis. The system has hyperlinks that make navigation much easier than the previous systems to access related work orders, assets, inspections, service requests, or work history.



The work order template has been configured with a required fields highlighted, drop-down lists, attachments, and asset details. Again, the asset is readily viewable on a map. This was not possible in the previous system and Collection System Operations Division staff would spend several hours at the beginning of each month highlighting maps that corresponded to the work orders they were assigned so that they could route their work for the month.



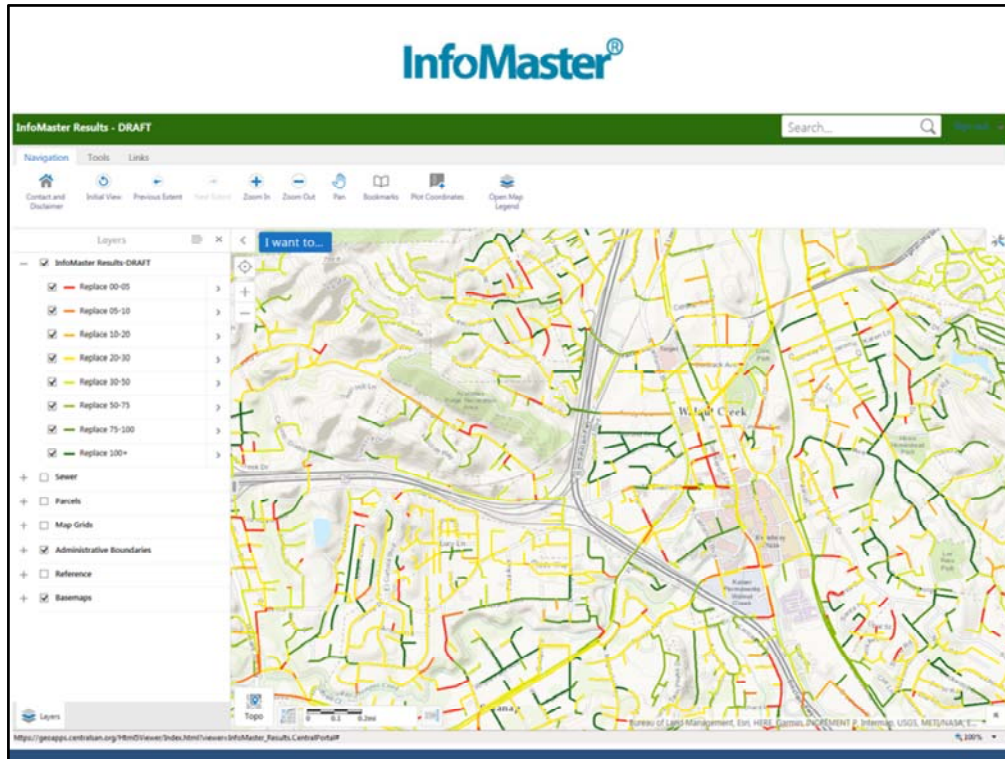
Now, field staff have tablets to easily view their work on a map and complete work orders in the field. This screenshot shows a Crew Leader where his assigned work is so that he can plan an efficient route for the day. Staff can create new saved searches and apply to the map, however they would like.

## IN PROGRESS

WITH THE COMPREHENSIVE WASTEWATER MASTER PLAN



- **Hydraulic Model** **InfoWorks® ICM**
  - Replace static model for the CS with a commercially available, supported, dynamic model that leverages with GIS.
  - Additional phases may expand from trunks to mains for priority development areas.
- **CIP Prioritization** **InfoMaster®**
  - Implement a capital improvement prioritization system for CS renovation planning that integrates with GIS, CMMS, CCTV, and the Hydraulic Model.

Other implementations that are in progress with the Master Plan are the Hydraulic Model and CIP Prioritization. The first replaces an obsolete static model, with a commercially available, and supported dynamic model that leverages with the GIS. The second helps to plan our collection system renovations needs to enable Management and the Board to make informed funding decisions. It also integrates and uses information from the GIS, CMMS, CCTV, and the Hydraulic Model.



As an example, this screenshot shows draft results for when pipes may need to be replaced.

## IN PROGRESS

- CCTV Inspections 
  - Replace unsupported CCTV software that integrates with GIS and CMMS.
- Environmental Compliance 
  - Migrate to SQL to provide robust, multi-user, stable database which also supports mobile access and more easily integrates with GIS.

Additional efforts in progress include replacement of the CCTV inspection software with a supported platform that integrates with GIS and CMMS, keeping our data connected and consistent, and migration of Environmental Compliance's Stormwater and Pre-Treatment program onto a SQL server to provide a robust, multi-user stable environment that supports mobile access and more easily integrates with GIS.



## INITIATED

- Program Management Information System
  - Monitor capital improvement program to track status and performance of projects and overall program on a continual basis so it is delivered on-time and on-budget.
  - Spring/Summer 2017: select software/consultant, develop interim program schedule
  - Fall 2017 through 2018: implement full system in phases:
    1. program management
    2. project management
    3. construction administration

And lastly, we recently initiated efforts to select and implement a Program Management Information System to monitor the CIP, track status and performance of projects and the overall program, which will become extremely useful as tackle the future needs of the District to continue to meet our customers expectations and regulatory requirements. I e-mailed the BACWA Asset Management group attendees the other week and received helpful responses. In particular, City of Sunnyvale is using a system that was recommended for us and they provided a live web demo which was very helpful.



Asset Class	Asset type	Asset Sub type	Size UOM	Asset Cost (\$/UOM)	Useful Life (yr)	Min	Max	# Rehabs	Rehab Cycle (yr)	Ext Useful Life per Rehab (yr)	Rehab Cost (% of Asset Cost)
Civil Sitework	Cathodic Protection										
Civil Sitework	Fence	chainlink	FT	\$ 2.00	75						
Civil Sitework	Fence	wood	FT	\$ 9.00	75						
Civil Sitework	Fence	wrought iron	FT	\$ 10.00	75						
Civil Sitework	Gate	slide	FT		75	30	30	2	10		20%
Civil Sitework	Gate	swing	FT		75	30	30	2	10		20%
Civil Sitework	Gate	turnstile	FT		75	30	30	2	10		20%
Civil Sitework	Irrigation		FT								
Civil Sitework	Lighting										
Civil Sitework	Paving		SY						5		
Civil Sitework	Piping System		FT								
Civil Sitework	Safety Equipment	eyewash	EA	\$ 10.00	10		20	-	N/A		N/A
Civil Sitework	Safety Equipment	Fire alarm panel			12		15				
Civil Sitework	Safety Equipment	fire extinguisher			5			-	N/A		N/A
Civil Sitework	Safety Equipment	fire suppression system			50	20			N/A		
Civil Sitework	Safety Equipment	fume hood			35						
Civil Sitework	Security Equipment	alarm system									
Civil Sitework	Security Equipment	card reader	EA								
Civil Sitework	Security Equipment	card reader panel	EA								
Civil Sitework	Security Equipment	video camera	EA								
Civil Sitework	Utilities										
Electrical	Battery		V		15			1	10		20%
Electrical	Battery Charger		V		15			1	10		20%
Electrical	Circuit Breaker		A	\$ 4.00	35	20	20	1	10		20%
Electrical	Control Panel				15		30				
Electrical	Electrical Feeder		FT					1	10		20%
Electrical	Electrical Panel				20	15	30	1	10		20%
Electrical	Motor Control Center				30	15	40	2	10		20%
Electrical	Soft Starter										
Electrical	Starter	combination			40						
Electrical	Starter	electric reduced voltage			40						
Electrical	Substation										
Electrical	Switch				25	15	20	1	10		20%
Electrical	Switchgear				30	20	35	1	10		20%
Electrical	Transformer	dry			40	15	40	-	N/A		N/A
Electrical	Transformer	oil-filled			40	15	40	-	N/A		N/A
Electrical	Uninterruptible Power Supply (UPS)				12	10	20	1	10		20%
Electrical	UV Equipment	Drop			35						
Electrical	UV Equipment	Lampbank									
Electrical	UV Equipment	Power Distribution Center (C)			30						
Electrical	Variable Frequency Drive				12	10	25	1	10		20%
Instrumentation (& Process Control)	Analyzer	CL2	EA	\$ 4,000.00	20			-	N/A		N/A
Instrumentation (& Process Control)	Analyzer	Compustion	EA	\$ 2,500.00	20			-	N/A		N/A
Instrumentation (& Process Control)	Analyzer	Flow point	EA	\$ 3,000.00	20			-	N/A		N/A
Instrumentation (& Process Control)	Analyzer		EA	\$ 500.00	20			-	N/A		N/A
Instrumentation (& Process Control)	Analyzer		EA	\$ 8,000.00	20			-	N/A		N/A
Instrumentation (& Process Control)	Analyzer		EA		20			-	N/A		N/A
Instrumentation (& Process Control)	Analyzer	mon	EA	\$ 3,000.00	20			-	N/A		N/A
Instrumentation (& Process Control)	Analyzer	NOx	EA	\$ 2,500.00	20			-	N/A		N/A
Instrumentation (& Process Control)	Analyzer	O2	EA	\$ 600.00	20			-	N/A		N/A
Instrumentation (& Process Control)	Analyzer	Opacity	EA	\$ 2,000.00	20			-	N/A		N/A
Instrumentation (& Process Control)	Analyzer	ORP	EA	\$ 1,000.00	20			-	N/A		N/A
Instrumentation (& Process Control)	Analyzer	Other	EA		20			-	N/A		N/A
Instrumentation (& Process Control)	Analyzer	pH	EA	\$ 500.00	20			-	N/A		N/A
Instrumentation (& Process Control)	Analyzer	Turbidity	EA	\$ 5,000.00	15	5	20	-	n/a		n/a
Instrumentation (& Process Control)	Analyzer	UV	EA		20	5	20	-	N/A		N/A

Asset Class	Asset type	Asset Sub type	Size UOM	Asset Cost (\$/UOM)	Useful Life (yr)	Min	Max	# Rehabs	Rehab Cycle (yr)	Ext Useful Life per Rehab (yr)	Rehab Cost (% of Asset Cost)
Instrumentation (& Process Control)	Computers	Clients									
Instrumentation (& Process Control)	Computers	HMI									
Instrumentation (& Process Control)	Computers	Servers									
Instrumentation (& Process Control)	Electrical Meter	amp	EA		20	5	20	-	N/A		N/A
Instrumentation (& Process Control)	Electrical Meter	frequency	EA		20	5	20	-	N/A		N/A
Instrumentation (& Process Control)	Electrical Meter	other	EA		20	5	20	-	N/A		N/A
Instrumentation (& Process Control)	Electrical Meter	power	EA		20	5	20	-	N/A		N/A
Instrumentation (& Process Control)	Flow	compound	EA	\$ 2,000.00	20	5	20	-	N/A		N/A
Instrumentation (& Process Control)	Flow	magnetic	EA	\$ 2,000.00	20	5	20	-	N/A		N/A
Instrumentation (& Process Control)	Flow	mass flow	EA	\$ 2,000.00	20	5	20	-	N/A		N/A
Instrumentation (& Process Control)	Flow	orifice	EA	\$ 2,000.00	20	5	20	-	N/A		N/A
Instrumentation (& Process Control)	Flow	parshall	EA	\$ 2,000.00	20	5	20	-	N/A		N/A
Instrumentation (& Process Control)	Flow	pitot tube	EA		20	5	20	-	N/A		N/A
Instrumentation (& Process Control)	Flow	positibe displacement	EA	\$ 2,000.00	20	5	20	-	N/A		N/A
Instrumentation (& Process Control)	Flow	rotameter	EA		20	5	20	-	N/A		N/A
Instrumentation (& Process Control)	Flow	thermal dispersion	EA		20	5	20	-	N/A		N/A
Instrumentation (& Process Control)	Flow	turbine/propeller	EA	\$ 3,000.00	20	5	20	-	N/A		N/A
Instrumentation (& Process Control)	Flow	ultrasonic doppler	EA		20	5	20	-	N/A		N/A
Instrumentation (& Process Control)	Flow	Vcone	EA		20	5	20	-	N/A		N/A
Instrumentation (& Process Control)	Flow	venturi	EA		20	5	20	-	N/A		N/A
Instrumentation (& Process Control)	Flow	vortex	EA	\$ 2,000.00	20	5	20	-	N/A		N/A
Instrumentation (& Process Control)	Flow Meter	flow tube	EA	\$ 2,000.00	12			-	n/a		n/a
Instrumentation (& Process Control)	Flow Meter	magnetic flow element	EA	\$ 2,000.00	12			-	n/a		n/a
Instrumentation (& Process Control)	Flow Meter	rotameter	EA		20			-	N/A		N/A
Instrumentation (& Process Control)	Level	bubbler	EA			5	20	-	N/A		N/A
Instrumentation (& Process Control)	Level	capacitance/admittance	EA			5	20	-	N/A		N/A
Instrumentation (& Process Control)	Level	DP cell	EA		20	5	20	-	N/A		N/A
Instrumentation (& Process Control)	Level	float	EA		20	5	20	-	N/A		N/A
Instrumentation (& Process Control)	Level	radar	EA	\$ 2,000.00	20	5	20	-	N/A		N/A
Instrumentation (& Process Control)	Networking	Copper/CAT6									
Instrumentation (& Process Control)	Networking	Fiberoptic cable									
Instrumentation (& Process Control)	Networking										
Instrumentation (& Process Control)	Networking										
Instrumentation (& Process Control)	Position				20	5	20	-	N/A		N/A
Instrumentation (& Process Control)	Pressure/DP	positive displ			20	5	20	-	N/A		N/A
Instrumentation (& Process Control)	Pressure/DP	pressure	EA		20	5	20	-	N/A		N/A
Instrumentation (& Process Control)	Pressure/DP	vacuum	EA		20	5	20	-	N/A		N/A
Instrumentation (& Process Control)	Programmable Control/ Central Processing Unit (PLC/CPU)										
Instrumentation (& Process Control)	Sampler		EA	\$ 3,000.00	10	5	15	-	N/A		N/A
Instrumentation (& Process Control)	Sampling Station		EA								
Instrumentation (& Process Control)	SCADA Equipment	Alarm Printer	EA	\$ 100.00	30			5	5		20%
Instrumentation (& Process Control)	SCADA Equipment	Alarm Siren	EA	\$ 850.00	20			-	n/a		n/a
Instrumentation (& Process Control)	SCADA Equipment	Audio Modem Trans	EA		30			5	5		20%
Instrumentation (& Process Control)	SCADA Equipment	Chart Recorder	EA	\$ 1,500.00	30			5	5		20%
Instrumentation (& Process Control)	SCADA Equipment	Current to Air	EA		30			5	5		20%
Instrumentation (& Process Control)	SCADA Equipment	Recorder	EA		10	10	25				
Instrumentation (& Process Control)	SCADA Equipment		EA		30			5	5		20%
Instrumentation (& Process Control)	SCADA Equipment	Modems Network Cable	EA	\$ 1.20	30	20	30	5	5		20%
Instrumentation (& Process Control)	SCADA Equipment	Panel Annunciator	EA		15	15	30				
Instrumentation (& Process Control)	SCADA Equipment	Phase Failure Relay	EA	\$ 200.00	30			5	5		20%
Instrumentation (& Process Control)	SCADA Equipment	Power Factor Corr. Capacitor	EA	\$ 1,000.00	30	20	30	5	5		20%
Instrumentation (& Process Control)	SCADA Equipment	Radio Modem Transmitter	EA		30			5	5		20%
Instrumentation (& Process Control)	SCADA Equipment	Radio Voice Transmitter	EA		30			5	5		20%
Instrumentation (& Process Control)	SCADA Equipment	Relay - Phase Failure	EA		20						
Instrumentation (& Process Control)	SCADA Equipment	RTU	EA	\$ 1,500.00	10	7	12	5	5		20%
Instrumentation (& Process Control)	SCADA Equipment	SCADA	EA		12	7	15				

Asset Class	Asset type	Asset Sub type	Size UOM	Asset Cost (\$/UOM)	Useful Life (yr)	Min	Max	# Rehabs	Rehab Cycle (yr)	Ext Useful Life per Rehab (yr)	Rehab Cost (% of Asset Cost)
Instrumentation (& Process Control)	SCADA Equipment	SCADA/FICS	EA		30			5	5		5%
Instrumentation (& Process Control)	SCADA Equipment	Switch - Float/Flood	EA		20						
Instrumentation (& Process Control)	SCADA Equipment	Switch - Thermal Dispersion	EA		20						
Instrumentation (& Process Control)	SCADA Equipment	TELEMETRY	EA		20			1	10		20%
Instrumentation (& Process Control)	SCADA Equipment	Transmitter - Audio Modem	EA		10	7	12				
Instrumentation (& Process Control)	SCADA Equipment	Transmitter - Radio Modem	EA		10	7	12				
Instrumentation (& Process Control)	SCADA Equipment	Transmitter - Radio Voice	EA		10	7	12				
Instrumentation (& Process Control)	SCADA Software		EA		10						
Instrumentation (& Process Control)	Temperature	IR	EA		5		20	-	N/A		N/A
Instrumentation (& Process Control)	Temperature	RTD	EA		5		20	-	N/A		N/A
Instrumentation (& Process Control)	Temperature	thermister	EA		5		20	-	N/A		N/A
Instrumentation (& Process Control)	Temperature	thermocouple	EA	\$ 10.00	20		20	-	N/A		N/A
Instrumentation (& Process Control)	Vibration/Mechanical Analysis	RPM	EA	\$ 10.00	20		20	-	N/A		N/A
Instrumentation (& Process Control)	Vibration/Mechanical Analysis	vibration	EA	\$ 2,000.00	20		20	-	N/A		N/A
Instrumentation (& Process Control)	Weight/Force	scale	EA		20	5					N/A
Instrumentation (& Process Control)	Weight/Force	torque	EA		20	5					N/A
Mechanical	Actuator	electric		\$ 1.00	5	20	20	0	N/A		N/A
Mechanical	Actuator	hydraulic				20	20	0	N/A		N/A
Mechanical	Actuator	pneumatic				20	20	0	N/A		N/A
Mechanical	Aerator	Aerator			15			2	5		20%
Mechanical	Air Dryer		cfm	\$ 10.00	25		25				
Mechanical	Backflow										
Mechanical	Blower		cfm	\$ 10.00	25	30	30	2	10		20%
Mechanical	Boiler		lbs steam/hr	\$ 10.00	27	20	30	2	10		20%
Mechanical	Chemical Equip	Chlorinator			15		30				
Mechanical	Chemical Equip	Feeder - Dry Chemical				10	30				
Mechanical	Chemical Equip	Ozone Contactors			40			3	10		15%
Mechanical	Clutch		HP	8,666.67	27	20	30				
Mechanical	Compressor, Air	piston									
Mechanical	Compressor, Air	rotary									
Mechanical	Compressor, Air	scroll									
Mechanical	Compressor, Gas	Reciprocating, Large Capacity			25	15	30				
Mechanical	Compressor, Gas	Reciprocating, all others			25	15	30				
Mechanical	Compressor, Gas	Reciprocating, propane gas			25	15	20				
Mechanical	Condenser				35			3	5		20%
Mechanical	Conveyor	belt	FT	\$ 584.50	20	20	40	3	5		20%
Mechanical	Conveyor	screw	FT	\$ 584.50	20	20	40	3	5		20%
Mechanical	Deaerater				35			2	5		20%
Mechanical	Dewatering Equip	Centrifuge	GPM		13	10	15	2	5		20%
Mechanical	Dewatering Equip	Classifier/Washer	GPM		20	15	25	2	10		15%
Mechanical	Dewatering Equip	Filterpress			22	20	25				
Mechanical	Dewatering Equip	Gravity Belt Thickener			20	20	22				
Mechanical	Drive/Gearbox										
Mechanical	Elevator	hydraulic	ton		35						
Mechanical	Elevator	traction	ton		35						
Mechanical	Engine	Internal Combustion	HP		30			5	5		20%
Mechanical	Fan		SCFM		20			-	N/A		N/A
Mechanical	Filter	activated carbon	CF		15	30	30	2	10		20%
Mechanical	Filter	particulate	CF		15	15	30	2	10		20%
Mechanical	Filter	sand-anthracite	CF		30	15	30	2	10		20%
Mechanical	Flare, Waste gas										
Mechanical	Generator	emergency			30	10	30	5	5		20%
Mechanical	Generator	portable			20	10	30	5	5		20%
Mechanical	Grinder	Digested Sludge			17	10	25				
Mechanical	Grinder	FOG			25	20	20	3	5		20%
Mechanical	Grinder	influent screenings			25	20	20	3	5		20%

Asset Class	Asset type	Asset Sub type	Size UOM	Asset Cost (\$/UOM)	Useful Life (yr)			# Rehabs	Rehab Cycle (yr)	Ext Useful Life per Rehab (yr)	Rehab Cost (% of Asset Cost)
					Min	Max					
Mechanical	Grinder	primary sludge			25	20	20	3	5		20%
Mechanical	Heat Exchanger	Cooling Tower			30			2	10		20%
Mechanical	Heat Exchanger	Evaporator			20	15	30				
Mechanical	Heat Exchanger	heat exchanger			20	30	30	2	10		20%
Mechanical	Heat Exchanger	heat recovery system			20	15	30	-	N/A		N/A
Mechanical	Heat Exchanger	steam condenser			35						
Mechanical	Hoist	gantry			30	20	40	5	5		20%
Mechanical	Hoist	overhead bridge			30	20	40	5	5		20%
Mechanical	HVAC - AC	Chiller						2	10		20%
Mechanical	HVAC - AC	Cooler						-	N/A		N/A
Mechanical	HVAC - AC	Swamp Cooler						-	N/A		N/A
Mechanical	HVAC - AHU	Air Handling Unit - Large (Supply, exhaust)			25		32				
Mechanical	HVAC - AHU	Air Handling Unit - Small wall mounted			25		30				
Mechanical	HVAC - Coil				30			-	n/a		n/a
Mechanical	HVAC - Heater	furnace			15			2	5		20%
Mechanical	HVAC - Heater	gas unit heater			20				N/A		N/A
Mechanical	HVAC - Heater	hot water unit heater			30			-	N/A		N/A
Mechanical	HVAC - Heater	Warm-air furnace, heat pump household						-	n/a		n/a
Mechanical	HVAC - Heater							-	n/a		n/a
Mechanical	HVAC Equipment	Dehumidifier			20			3	5		20%
Mechanical	HVAC Equipment	louver			30			-	N/A		N/A
Mechanical	Mixer	mechanical			25		40	2	10		20%
Mechanical	Mixer	pneumatic			25	30	30	2	10		20%
Mechanical	Motor	electric motor	HP		30	15	30	3	5		20%
Mechanical	Odor Control Equipment	biofilter									
Mechanical	Odor Control Equipment	fogger/ misting system	FT		25						
Mechanical	Odor Control Equipment	fu-fu			25						
Mechanical	Odor Control Equipment	scrubber	SCFM		25	5	40				
Mechanical	Pump	All others, centr.			27	6	30				
Mechanical	Pump	centr. - 60 MGD and below (Sewage)			40	20	40				
Mechanical	Pump	centr. - Recessed Impeller (WEMCO)			30	20	30				
Mechanical	Pump	circulating clean water units			15	10	20				
Mechanical	Pump				10	10	40				
Mechanical	Pump	grit/sludge			15			2	5		20%
Mechanical	Pump	hydraulic			20	10	40				
Mechanical	Pump	lobe/gear			15	5	20				
Mechanical	Pump	metering			12	5	12				
Mechanical	Pump	Vertical Turbine			25	10	30				
Mechanical	Pump	centrifugal			40						
Mechanical	Pump	diaphragm			10	10	20	-	n/a		n/a
Mechanical	Pump	peristaltic			10			-	n/a		n/a
Mechanical	Pump	progressive cavity			20	10	20	-	n/a		n/a
Mechanical	Pump	submersible			25	10	30				
Mechanical	Pump	vertical			40	20	40				
Mechanical	Screen/Bar Screen	course			25	20	25				
Mechanical	Screen/Bar Screen	Screen/Bar Screen			25	20	25				
Mechanical	Screen/Bar Screen				20	10	15				
Mechanical	Screen/Bar Screen	Gritting and dewatering unit			20	10	15				
Mechanical	Scrubber	dry			20	7	25				
Mechanical	Scrubber	wet			20	7	25				
Mechanical	Scum/Sludge Collector	scum			40	15	40				
Mechanical	Scum/Sludge Collector	sludge			40	15	40				
Mechanical	Steam Trap	mechanical	IN		50			-	n/a		n/a
Mechanical	Steam Trap	thermodynamic	IN		50			-	n/a		n/a
Mechanical	Steam Trap	thermostatic	IN		50			-	n/a		n/a
Mechanical	Steam Turbine				30						

Asset Class	Asset type	Asset Sub type	Size UOM	Asset Cost (\$/UOM)	Useful Life (yr)			# Rehabs	Rehab Cycle (yr)	Ext Useful Life per Rehab (yr)	Rehab Cost (% of Asset Cost)
					Min	Max					
Mechanical	Storage Tank	chemical	GAL		25	10	30	-	N/A		N/A
Mechanical	Storage Tank	fuel	GAL		30	30	50	3 to 4	12 to 25		10 to 15%
Mechanical	Storage Tank	pressure vessel	GAL		25	25	30	-	n/a		n/a
Mechanical	Storage Tank	solids	GAL		50	30	30	-	N/A		N/A
Mechanical	Storage Tank	water	GAL		75	30	30	3 to 4	12 to 25		10 to 15%
Mechanical	Strainer				25	20	30	-	n/a		n/a
Mechanical	Valve	Air Relief	IN		25	15	30	-	N/A		N/A
Mechanical	Valve	Backflow Preventer - Air Gap	IN	\$ 10.00	40						
Mechanical	Valve	Backflow Preventer - Atmospheric V	IN	\$							
Mechanical	Valve	Backflow Preventer - Double Check V	IN	\$ 10.00							
Mechanical	Valve	Backflow Preventer - Double Check V	IN	\$ 10.00							
Mechanical	Valve	Backflow Preventer - Pressure Vacuu	IN	\$ 10.00	40						
Mechanical	Valve	Backflow Preventer - Reduced Pressu	IN	\$ 10.00	40						
Mechanical	Valve	Backflow Preventer - Reduced Pressu	IN	\$ 10.00	40						
Mechanical	Valve	Backflow Preventer - Spill Resistant V	IN	\$ 40.00	40						
Mechanical	Valve	Ball	IN		25	15			N/A		N/A
Mechanical	Valve	Butterfly	IN		25	15			N/A		N/A
Mechanical	Valve	Cone	IN			15	30	-	N/A		N/A
Mechanical	Valve	Cone Check	IN			15	30	-	N/A		N/A
Mechanical	Valve	Control Valve - Air Release	IN		25	15	30				
Mechanical	Valve	Control Valve - Backflow Control	IN		25		30				
Mechanical	Valve	Control Valve - Double Check	IN		25		30				
Mechanical	Valve	Control Valve - Drain	IN		25	15	30				
Mechanical	Valve	Control Valve - Other	IN		25	15	30				
Mechanical	Valve	Control Valve - Pressure Reducer	IN		25	15	30				
Mechanical	Valve	Control Valve - Simple Check	IN		25	15	30				
Mechanical	Valve	Curb Stop	IN		25	15	30	-	N/A		N/A
Mechanical	Valve	Diverter	IN		25	15	30				
Mechanical	Valve	Draw Off	IN		25	15	30	-	N/A		N/A
Mechanical	Valve	Eccentric Plug	IN		25	15	30	-	N/A		N/A
Mechanical	Valve	Flange	IN		25	15	30	-	N/A		N/A
Mechanical	Valve	Flange	IN		25	15	30	-	N/A		N/A
Mechanical	Valve	Globe	IN		25	20	40	2	10		20%
Mechanical	Valve	Globe	IN		25	15	30	-	N/A		N/A
Mechanical	Valve	Knife Gate	IN		25	15	30	-	N/A		N/A
Mechanical	Valve	Mud	IN		25	15	30	-	N/A		N/A
Mechanical	Valve	Oriseal	IN		25	15	30	-	N/A		N/A
Mechanical	Valve	Pinch	IN		25	15	30	-	N/A		N/A
Mechanical	Valve	Plug	IN		25	15	30	-	N/A		N/A
Mechanical	Valve	Pressure Regulator	IN		25	15	30	-	N/A		N/A
Mechanical	Valve	Rotary Air Lock	IN		30	15	30	-	n/a		n/a
Mechanical	Valve	Valves - 4" and larger	IN		20	25	25				
Mechanical	Valve	Valves - 4" and smaller	IN		25	20	25				
Mechanical	Water Heater	Electric water heater household	GAL		14						
Mechanical	Water Heater	Electric water heater household	GAL		12	11	13				
Mechanical	Water Heater	Electric water heater household	GAL		25	20	30				
Mechanical	Water Softener		GAL		35						
Structural	Basin	Backflow Utilization	MG		40			3	10		10%
Structural	Basin	concrete	MG		100			3	25		15%
Structural	Basin	earthen	MG		300						
Structural	Basin	Filtration Facility	MG		60			11	5		5%
Structural	Basin	Gravity Thickeners	MG		50			6	8		10%
Structural	Building	CMU	SF		75	60	75	2	20		20%
Structural	Building	concrete	SF		75	60	75	2	20		20%
Structural	Building	steel frame	SF		75	60	75	2	20		20%
Structural	Building	trailer	SF	\$ 50.00	40			-	n/a		n/a

Asset Class	Asset type	Asset Sub type	Size UOM	Asset Cost (\$/UOM)	Useful Life (yr)	Min	Max	# Rehabs	Rehab Cycle (yr)	Ext Useful Life per Rehab (yr)	Rehab Cost (% of Asset Cost)
Structural	Channel	final effluent	MG		100						
Structural	Channel	partial treated effluent	MG		100						
Structural	Channel	raw influent	MG		100						
Structural	Structure	Lift Station			100						
Structural	Structure	Pump Station			100						
Structural	Structure	Air Vac Pit			100						
Structural	Structure	dry well			100						
Structural	Structure	Floc - Sed Facility			100						
Structural	Structure	Grit Removal - RW - Presedimentation PS						2	10		15%
Structural	Structure	junction structure									
Structural	Structure	Ozone Facility									
Structural	Structure	Rapid Mix Facility			100						
Structural	Structure	Solids Drying Beds			60			1	30		20%
Structural	Structure	sump			100						
Structural	Structure	vault			100						
Structural	Structure	wet well			100						
Structural	Tunnel				100						

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