



Orange County
Sanitation District
70th Anniversary

Asset Management Planning & Reporting At OC San

Presented By: Brian Waite, PE
Engineering Supervisor Asset Management

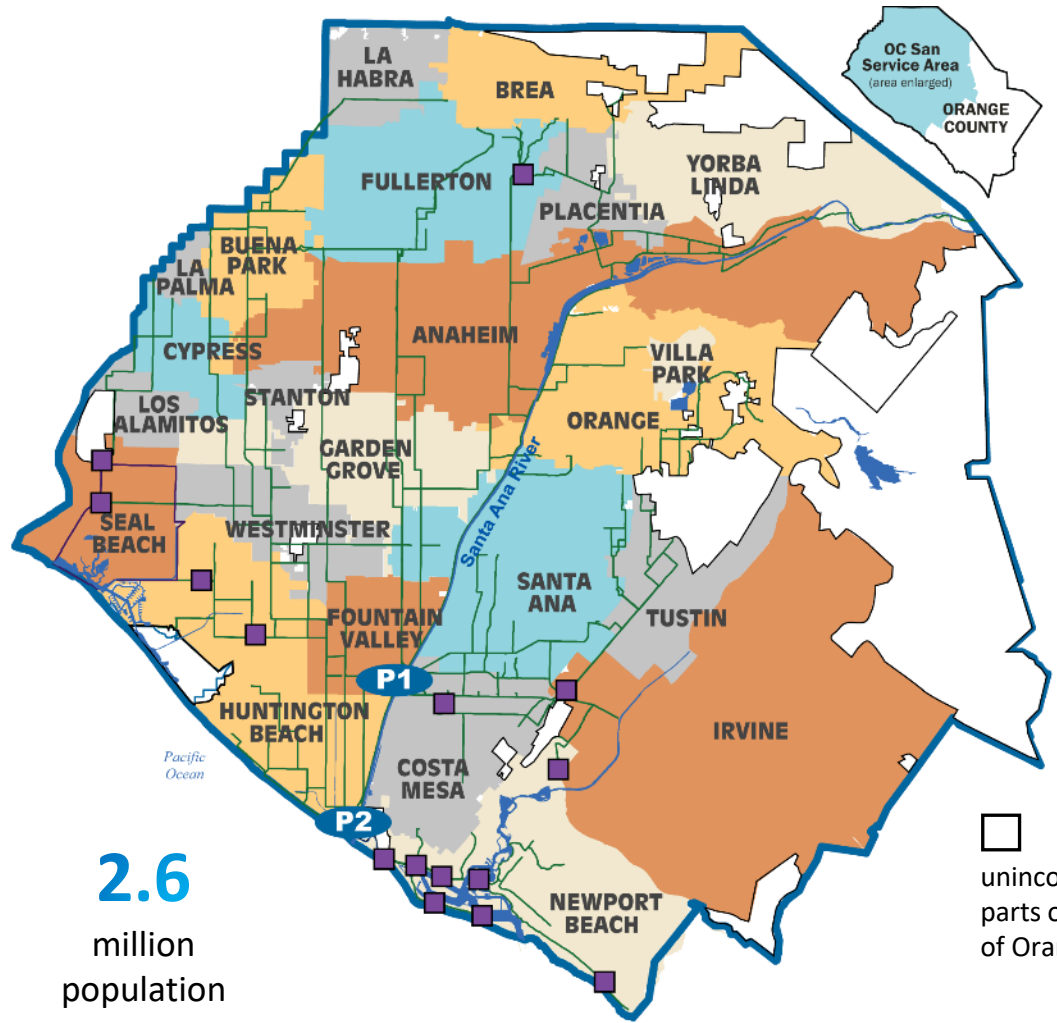
February 15, 2024

Agenda

- Who Is OC San?
- Asset Management (AM) History
- AM Program Overview
- AM Process and Tools
- AM Plan Development
- Program Improvement Opportunities



Our Service Area



479
square miles

~180
million gallons per day

2.6
million population

20
cities

4
special districts

388
miles of sewers

2
treatment plants

15
pump stations

□ unincorporated parts of County of Orange

Our Facilities



OC San Headquarters
Fountain Valley

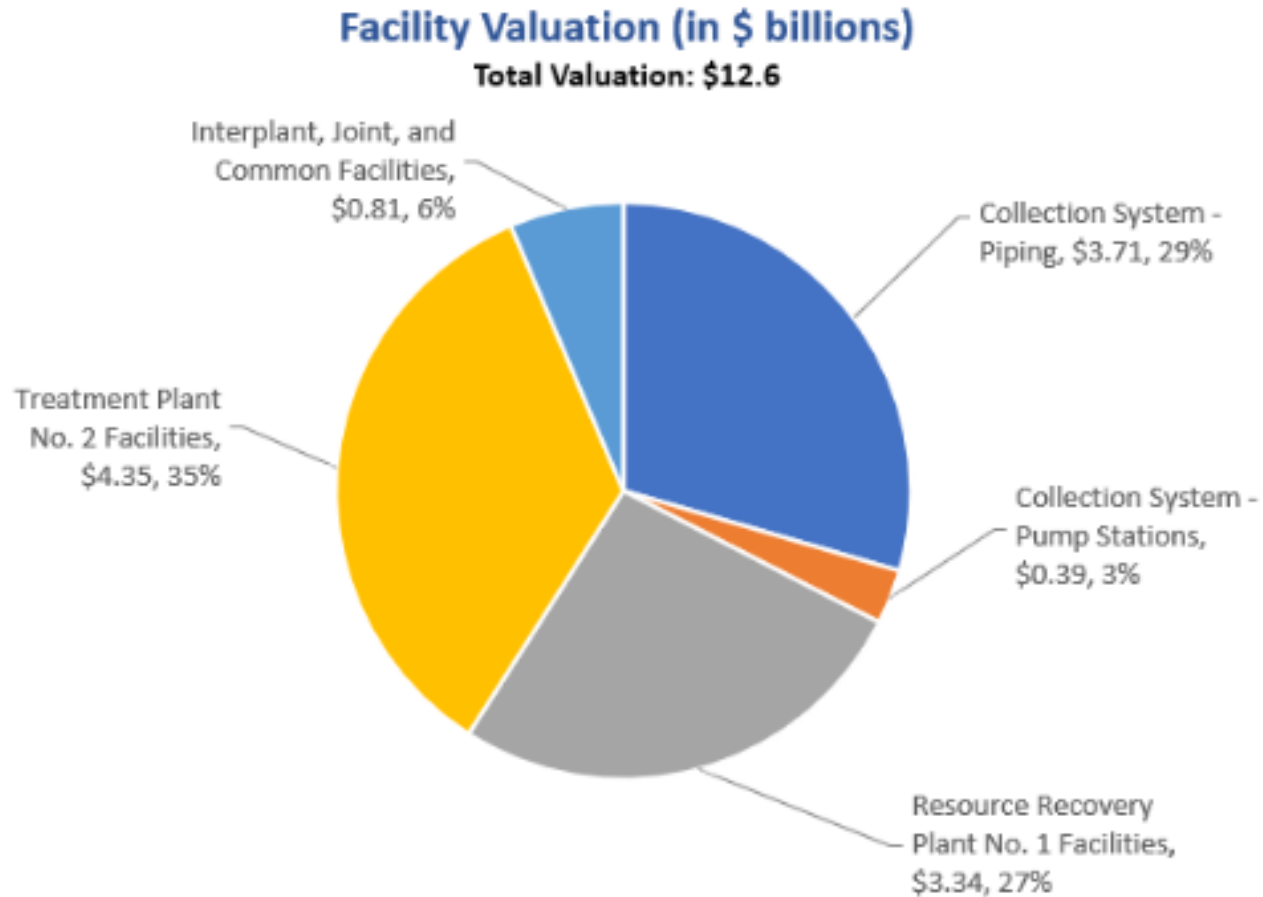


Reclamation Plant No. 1
Fountain Valley



Treatment Plant No. 2
Huntington Beach

The Importance of Asset Management



The Asset Management Beginnings

Late 1990's

- Identified assets
- Tagging system
- P&IDs
- Loop Drawings

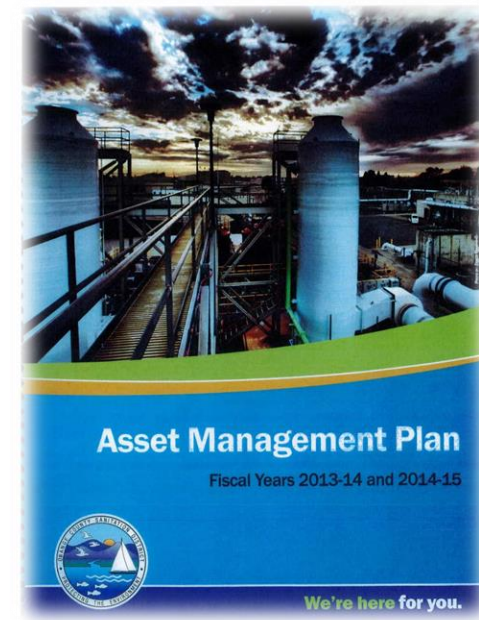
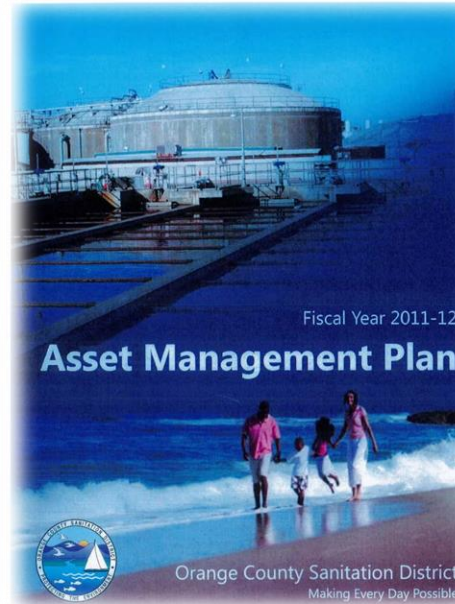
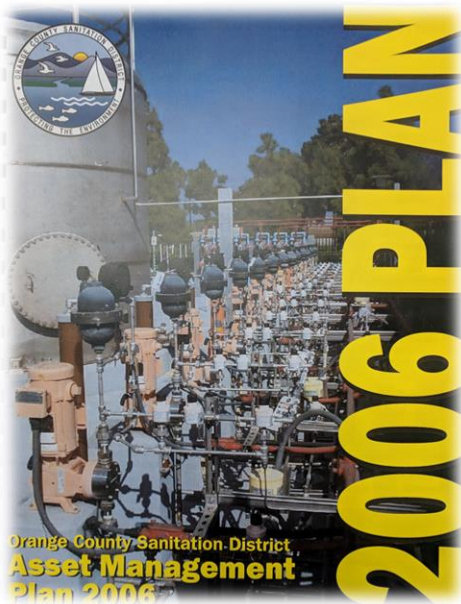
2002

- Asset Management Strategic Plan
- Small team created
- Hired GHD

2005/2006

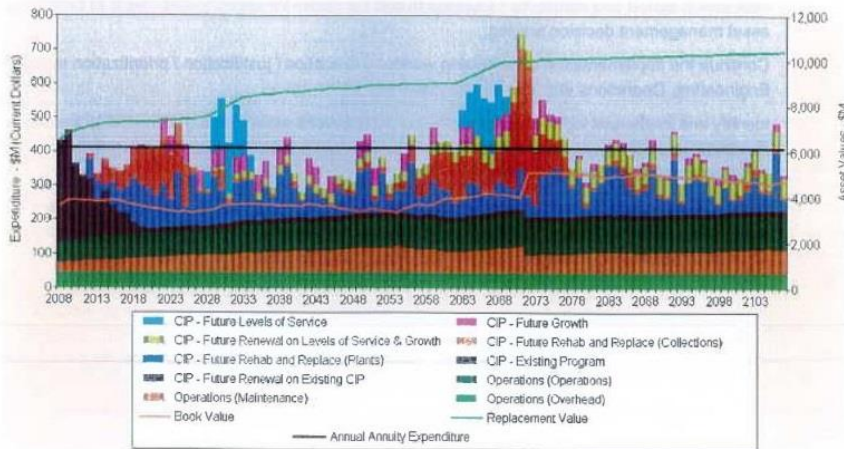
- First Asset Management Plan
- Maximo
- Corrosion Management Plan

History Continued

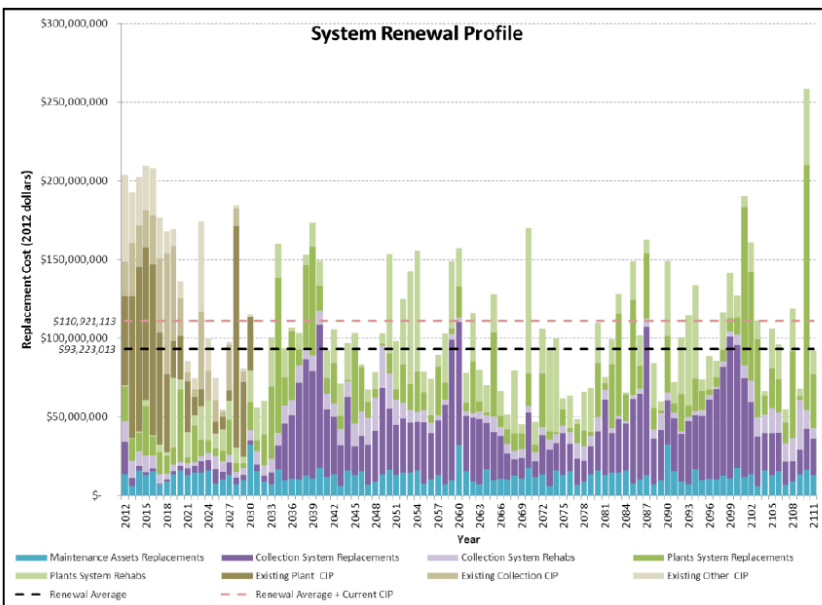


- Plans developed every 1 to 2 years
- Organized into area engineers (2009)
- Facilities Master Plan (2017)
- **Asset Management Team (2019)**

Summary of Early Asset Management



- Theoretical remaining useful life
- Inaccurate risk analysis
- Inaccurate budget projections
- Funding projections based on continuous maintenance projects
- Budget and resources not considered
- Lack of internal resources



Change was required!

Asset Management A Top Priority



Operations, Maintenance, and Engineering Organizational Realignment



Lore, Kelly on behalf of Herberg, Jim
To: All_OCSD

Reply Reply All Forward

Thu 11/8/2018 11:33 AM

Follow up. Completed on Thursday, January 3, 2019.

Good

“OC San’s focus is transitioning from increasing our capacity and levels of treatment to Asset Management and replacement of facilities.”

From the effective replacement effort, we need to align our resources and organizational structure to integrate the knowledge, skills, and insights from all levels of Operations, Maintenance, and Engineering.

challenges more Management and and minimize duplicated

In January, I started Replacement, and management is delivering established well into their efforts from all

“Asset management is not new to OC San, but with many of OC San’s major assets being well into their useful lives, asset management is a priority of the agency.”

ishment, asset uously r assets being as possible, ed.

The managers from Operations, Maintenance and Engineering were tasked to reevaluate our structure, working relationships, and functional This new structure will better This new structure will support This alignment will also support

“To be as efficient and cost effective as possible, efforts from all departments, divisions must be well planned, clearly communicated, and closely coordinated.”

Staff that will be directly impacted were briefed this morning, and all changes will take place between now and January 1. As with any organizational structure changes, there are a lot of behind the scene tasks that need to take place. This time will allow the administrative tasks to occur properly, without error and without being rushed.

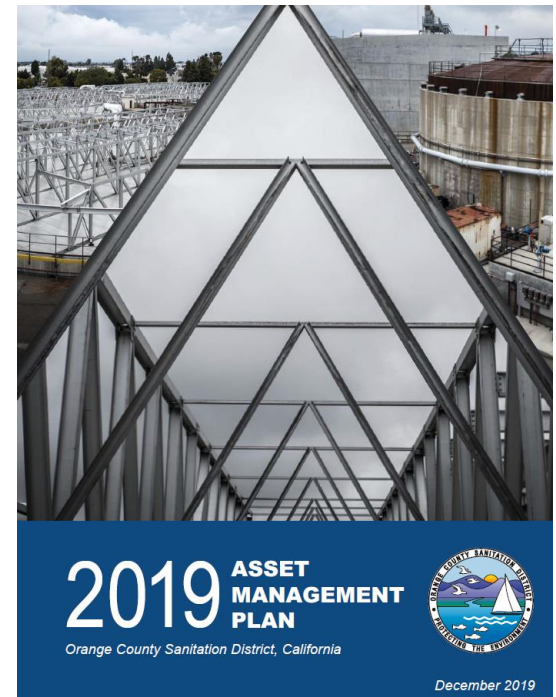
OC San's New AM Philosophy



1. What do we own?
2. What condition is it in?
3. What is our plan to maintain our assets effectively?
 - Minimize life cycle costs
 - Acceptable level of risk
 - Established levels of service

The AM Program Overview

- Tactical
- Dedicated in-house team
- Continuously updated plan
 - Specific
 - Well coordinated
 - Timing and packaging
- Accurate budget projections
- Project prioritization



Collaboration w/ Maintenance

Before 2019

Planning Div

AM Modeling
CIP Planning /
Budgeting
CIP Execution



Maintenance

Trouble shooting
Maintenance
project execution
PMs and CMs
Reliability Analysis

After 2019

Condition assessment
Asset planning
Trouble shooting
Project Development
Maintenance project
execution
Project Prioritization

Nine Asset Areas, Nine Area Teams

ASSET AREAS

Plant No. 1 Preliminary and Primary Processes

Plant No. 1 Secondary and Solids Handling Processes

Plant No. 2 Preliminary and Primary Processes, and Outfall System

Plant No. 2 Secondary and Solids Handling Processes

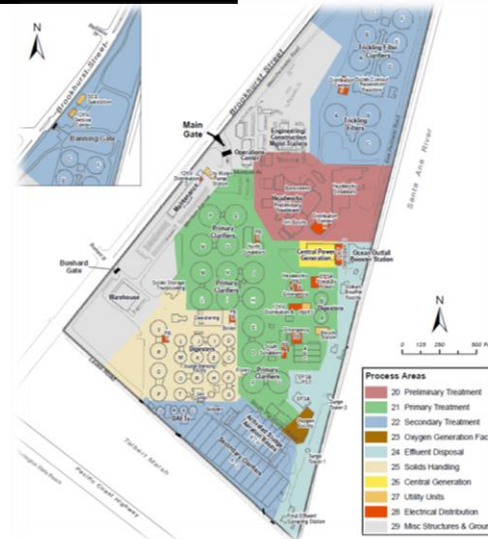
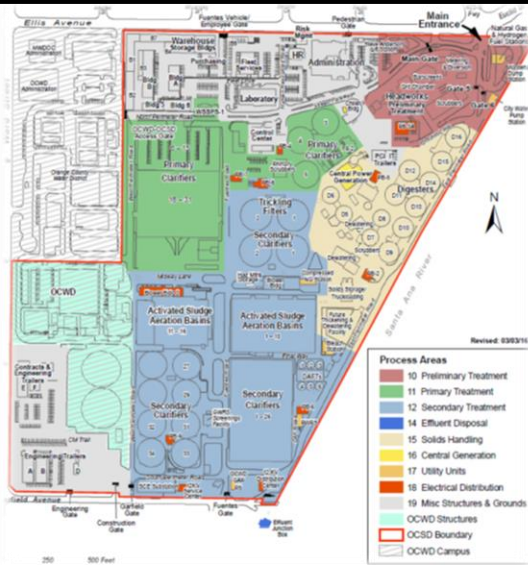
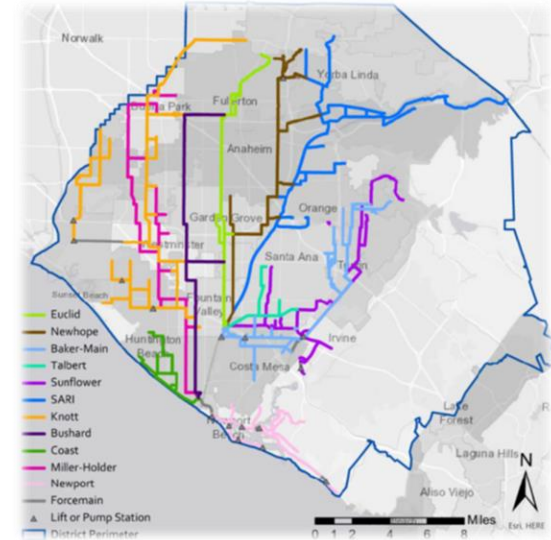
Plant Nos. 1 & 2 Central Generation Facility

Plant Nos. 1 & 2 Electrical Equipment and Distribution System

Plant Nos. 1 & 2 Utilities, Buildings, Miscellaneous

Collection System Gravity Sewer, Interplant Facilities

Collection System Pump Stations and Force Mains



OC San's AM Process



Definition of Remaining Useful Life

Basic Definition: An asset's remaining useful life (RUL) is the estimated time remaining until the asset cannot be reliably maintained and fails to provide the required level of service.

RUL Score	5	4	3	2	1
RUL	< 5 years	5 – 10 years	11 – 15 years	16 – 20 years	> 20 years

How Do We Determine RUL?

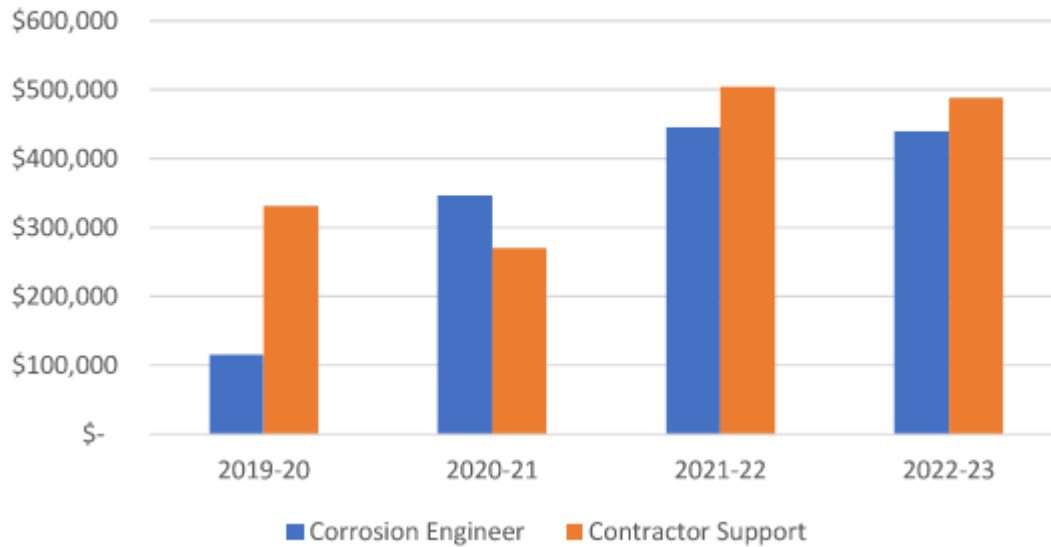
- Original installation, repair, or rehabilitation date(s)
- Equipment availability
- **Condition assessments**
- **Field observations and recommendations**
- Performance and maintenance history
- Condition Monitoring Reports
- Condition Scoring Guidelines

**Engineering
Judgement!**



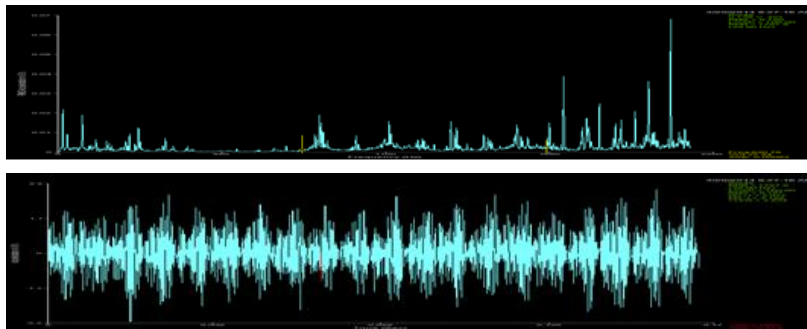
Condition Assessment Program

Conditional Assessment Contract Annual Expenditures



Condition Monitoring

- Vibration Analysis
- Oil Analysis
- Infrared Thermography
- Ultrasound
- IRIS motion camera
- Circuit breaker testing
- Motor circuit analysis
- Medium voltage feeder cable testing



Area: 26 - 26 P2 CO-GENERATION FACILITIES
Equipment: 26BTUR100 - Turbocharger #1
Point: IR3 - Turbocharger
Survey Date: 4/11/2017 3:17:04 PM

Thermal Image

Fault Information
Thermographer:
Part:
Observation:
Fault:
Severity: Equipment in good condition
Recommended Actions:
Notes:
Environment Parameters
Ambient Temperature: 25.1
Wind Speed: 0
Wind Direction:
Solar Load: None
Emissivity
Fault: 0.9
Reference: 0.9
Electrical Parameters
Phase/Circuit:
Voltage: 0
Actual Load: 0
Rated Load: 0
Percent Full Load:

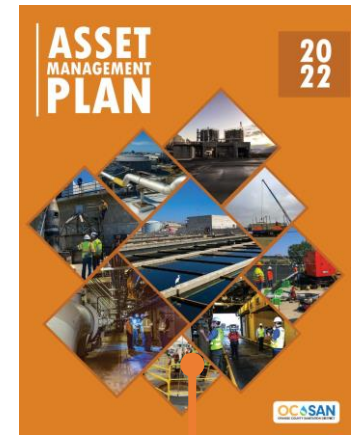
Condition Scoring Guidelines

Condition Score	Performance	Non-Destructive Condition Assessment			Destructive Condition Assessment (Core Samples)		Presence of Rebar Corrosion Activity	
		Visual Assessment and/or O&M description	Sounding	Surface Penetrating Radar	pH	Depth of Carbonation	Half-cell Potential Survey	Galvanostatic Pulse Testing
1	Sufficient capacity to meet average and peak flow requirements; appropriate utilization and function	New Concrete/No damage	Sharp Ping	Greater than 1.0 inches over required design cover	Greater than 11	Within 2.0 inches of the rebar zone	Corrosion is not occurring at the time of measurement	Negligible
2	Under-utilized or oversized; may be causing O&M issues	Minimal Damage to Concrete	--	0.5 – 1.0 inches	9 - 11	Within 1.0 inch of the rebar zone	--	Negligible
3	Sufficient capacity but unable to meet functional requirements	Damage to Concrete Mortar	Hollow Sound	Meets rebar cover requirements	7 - 9	Adjacent to the rebar zone	Uncertain if corrosion is occurring at the time of measurement	Low Activity
4	Able to meet average capacity needs but not peak capacity needs	Loss of Concrete Mortar/Damage to Rebar	--	Less than 0.5 – 1.0 inches in rebar cover	< 7	Compromised the rebar zone	--	Moderate Activity
5	Unable to meet average capacity Needs	Significant Damage to Structure/Rebar Severely Corroded	Soft Thud	More than 1.0 inches deficient in rebar cover	< 7	Encompassed the rebar zone	Corrosion is occurring at the time of measurement	High Activity

Annual Asset Management Plan

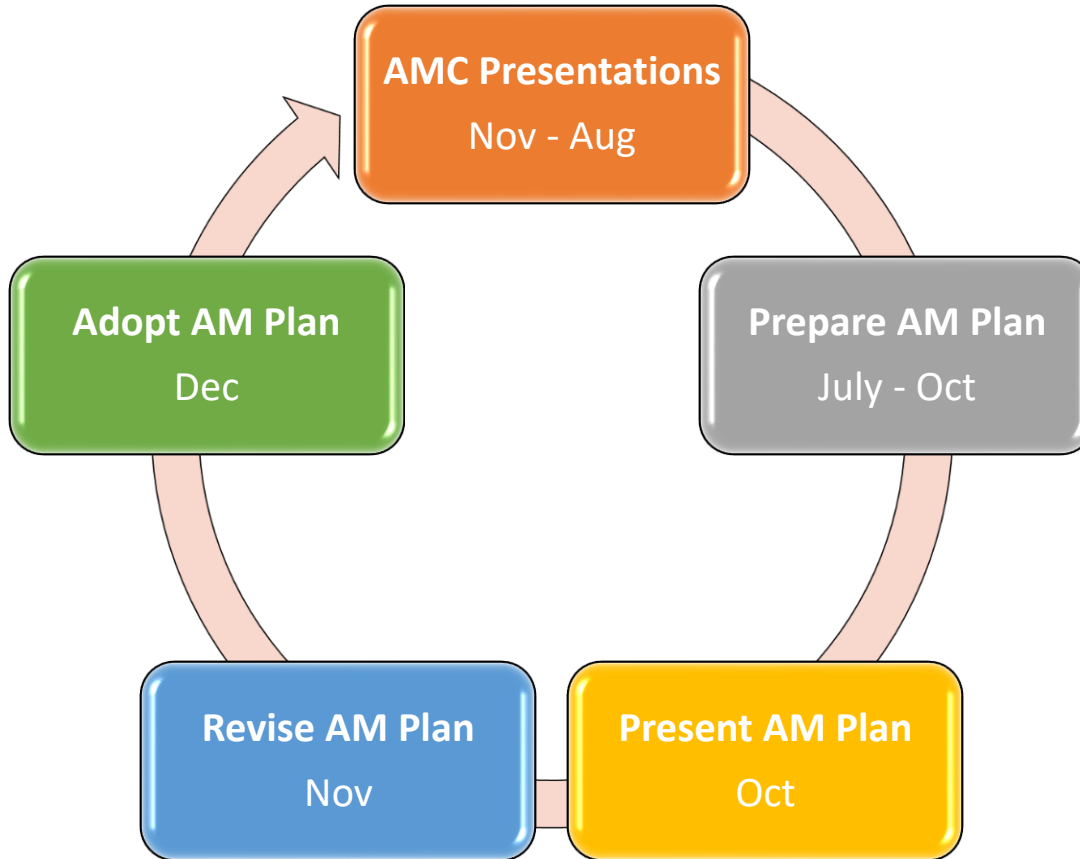


2017

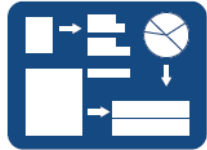


2022

Asset Management Plan Development



What is in the Plan?



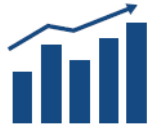
Process Schematic

Provides high-level process schematic to communicate area function and interrelation of key assets within the area



Count of Major Assets

Provides a count of major assets within the area



Major Assets Remaining Useful Life

Provides high-level summary of the condition of area systems and asset types



Key Issues, Actions and Recommendations

Identifies key issues and planned or recommended actions to remedy the issue



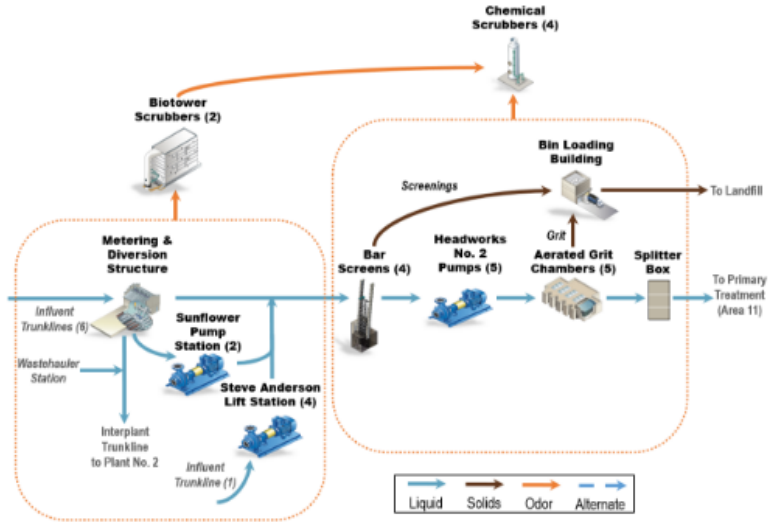
Current & Future Projects Over the Next Ten Years

Identifies the timing of current and planned projects impacting major assets within the area

Example:

ASSET MANAGEMENT SYSTEM SUMMARY – AREA 10 – PLANT NO. 1 PRELIMINARY TREATMENT

Process Schematic



Major Assets	Quantities
Metering & Diversion	
Flowmeters	7
Gates	29
Sunflower Pump Station	
Screw Pumps	2
Motors	2
Gearboxes	2
Lube Oil Systems	2
Gates	3
Steve Anderson Lift Station	
Main Pump/Motor/VFD	4
Drain Pumps	2
Sump Pumps	4
Flowmeter	1

Major Assets	Quantities
Barscreens	
5/8" Barscreens	2
1" Barscreens	2
Gates	21
Fans	4
Main Sewage Pumps	
Pump/Motor/VFD	5
Gates	15
Splitter Box	
Slide Gates	5
Weir Gates	15
Flowmeters	3

Major Assets Remaining Useful Life

Asset Type	Metering & Diversion	Sunflower Pump Station	Steve Anderson Lift Station	Barscreens	Main Sewage Pumps	Grit Chamber	Splitter Box	Bin Loading	Odor Control	Wastehauler Station
Civil										
Effluent Piping	-	-	-	-	-	-	2*	-	-	-
Structural										
General	2	3	1	2	2	2	3	3	3	3
Mechanical										
Piping	5	-	1	-	2*	-	-	-	-	3
Gates/Valves	5	5	2	5	5	5	5	-	5	2
Gearboxes	-	5	-	3	-	-	-	5	-	-
Screens	-	-	4	-	-	-	-	-	-	-
Pumps	-	4	2	-	4	-	-	-	5	-
Conveyors	-	-	-	5	-	-	-	4	-	-
Fans/Blowers	4	4	2	4	5	5	-*	5	5	2
Electrical										
Operators	5	-	-	-	-	-	5	-	-	-
Motors	-	4	1	3	5	-	-	5	-	-
VFDs	-	-	3*	-	5	-	-	-	4	-
MCCs	5	5	2	5	5	5	-	5	5	4
Instrumentation										
General	5	5	3	5	4	-	5	-	5	4

Note: (*) RUL scores that may not reflect most recent development. RUL scores will be updated in the next revision.

Major Assets	Quantities
Grit Chambers	
Grit Chambers	5
Bulk Gates	18
Slide Gates	15
Flap Gates	5
Blowers	3
Bin Loading	
Paddle Conveyors	2
Belt Conveyor	1
Fans	3

Major Assets	Quantities
Odor Control	
Bioscrubbers	2
Chemical Scrubbers	4
Fans	6
Recirculation Pumps	12
Chemical Tanks	4
Wastehauler Station	
Flushing System/Tank	1
Barrier Arm	1
Fan	1

Asset RUL Legend:

- RUL < 5 years
- RUL 5–10 years
- RUL 11–15 years
- RUL 16–20 years
- RUL > 20 years

Acronym Key:

- MCC = Motor Control Center
- RUL = Remaining Useful Life
- VFD = Variable Frequency Drive

Example Cont.

ASSET MANAGEMENT SYSTEM SUMMARY – AREA 10 – PLANT NO. 1 PRELIMINARY TREATMENT

Key Issues

Key Issues	Actions and Recommendations
<ul style="list-style-type: none"> Headworks Maintainability – The P1-105 Project will rehabilitate most assets throughout the preliminary treatment area; however, the construction completion date is February 2028. Some assets have very little remaining life or have failed already and will need interim solutions before they are addressed by the project, such as exhaust fans, the hydrogen sulfide (H₂S) monitoring system, and grit paddles. 	<ul style="list-style-type: none"> Continue to actively monitor the condition of aging assets scheduled for repairs/replacement under P1-105 and develop temporary/minimal solutions as applicable until a permanent solution is provided by P1-105.
<ul style="list-style-type: none"> Sunflower Pump Station – This pump station is equipped with two screw pumps, which are experiencing issues with bearings and gear boxes. These assets in the pump station are approaching the end of their useful lives. 	<ul style="list-style-type: none"> FE19-04 is planned to replace Pump No. 1 with associated gear box, bearings, and couplings and rehabilitate the concrete trough. The project will also upgrade electrical and instrumentations required for successful operation of Pump No. 1. Pump No. 2 will be replaced by a separate project (FE19-04 Phase 2) after P1-105 construction completion in 2028.
<ul style="list-style-type: none"> Wastehauler Station – The station currently lacks an appropriate office building for the staff and that has raised some safety and security concerns. 	<ul style="list-style-type: none"> FE20-01 will improve the safety and security of the Wastehauler Station by installing entrance and exit gates with a radio frequency identification (RFID) system, providing an office facility for the staff, and installation of two automated sampling systems to collect samples from wastehauler trucks.
<ul style="list-style-type: none"> Steve Anderson Lift Station HVAC – Both HVAC and condensing units have passed their useful lives with excessive corrosion and reliability issues. Critical electrical and controls at the station are in danger of failure due to heat and humidity levels if these units are not replaced in a timely manner. 	<ul style="list-style-type: none"> PRN-00953 will replace the existing HVAC and condensing units with new units of the same/similar design to ensure that the systems will continue to maintain adequate temperature and humidity for critical electrical equipment in the building that serves the Ellis Avenue Trunk.

Current and Future Projects

Project No.	Project Title	Impacted Facilities	Description of Work	FY 23/24	FY 24/25	FY 25/26	FY 26/27	FY 27/28	FY 28/29	FY 29/30	FY 30/31	FY 31/32	FY 32/33	FY 33/34	FY 34/35	FY 35/36	FY 36/37	FY 37/38
P1-105	Headworks Rehabilitation at Plant No. 1	Headworks	<ul style="list-style-type: none"> Rehabilitate structures of impacted facilities, replace mechanical/electrical/instrumentation as needed throughout impacted facilities, improve grit handling. 															
FE19-04	Sunflower Pump Replacement at Plant No. 1	Sunflower Pump Station	<ul style="list-style-type: none"> Rehabilitate Sunflower Pump Station and replace pump #1 															
PRN-00443	Sunflower Pump Replacement at Plant No. 1 – Pump #2	Sunflower Pump Station	<ul style="list-style-type: none"> Replace pump #2 at the Sunflower Pump Station 															
PRN-00953	SALS HVAC Replacement at Plant 1	Steve Anderson Lift Station	<ul style="list-style-type: none"> Replace existing HVAC split system units (#1 and #2) with like units. 															
FE20-01	Wastehauler Station Safety and Security Improvements	Wastehauler Station	<ul style="list-style-type: none"> Install automatic samplers, RFID entrance system, and office trailer. 															
X-102	Wastehauler Facility Improvements	Wastehauler Station	<ul style="list-style-type: none"> Demolish abandoned wastehauler pump station and provide permanent building for staff. 															
X-044	Steve Anderson Lift Station Rehabilitation	Steve Anderson Lift Station	<ul style="list-style-type: none"> Rehabilitate or replace mechanical, electrical, and instrumentation. 															
N/A	Replacement of Bioscrubber Media at Plant 1	TL & M&D Odor Control	<ul style="list-style-type: none"> Replace scrubber media for odor control bioscrubbers. 															

Types of Project Legend:

■ CIP - Planning
 ■ CIP - Design
 ■ CIP - Construction
 ■ Maintenance Project

Acronym Key:

CIP = Capital Improvement Program; FY = Fiscal Year; N/A = not applicable; HVAC = heating, ventilation, and air conditioning; LEL = Lower Explosive Limit; M&D = Metering and Diversion; RFID = Radio Frequency Identification; SALS = Steve Anderson Lift Station; TL = trunkline

Asset Management Forms the CIP

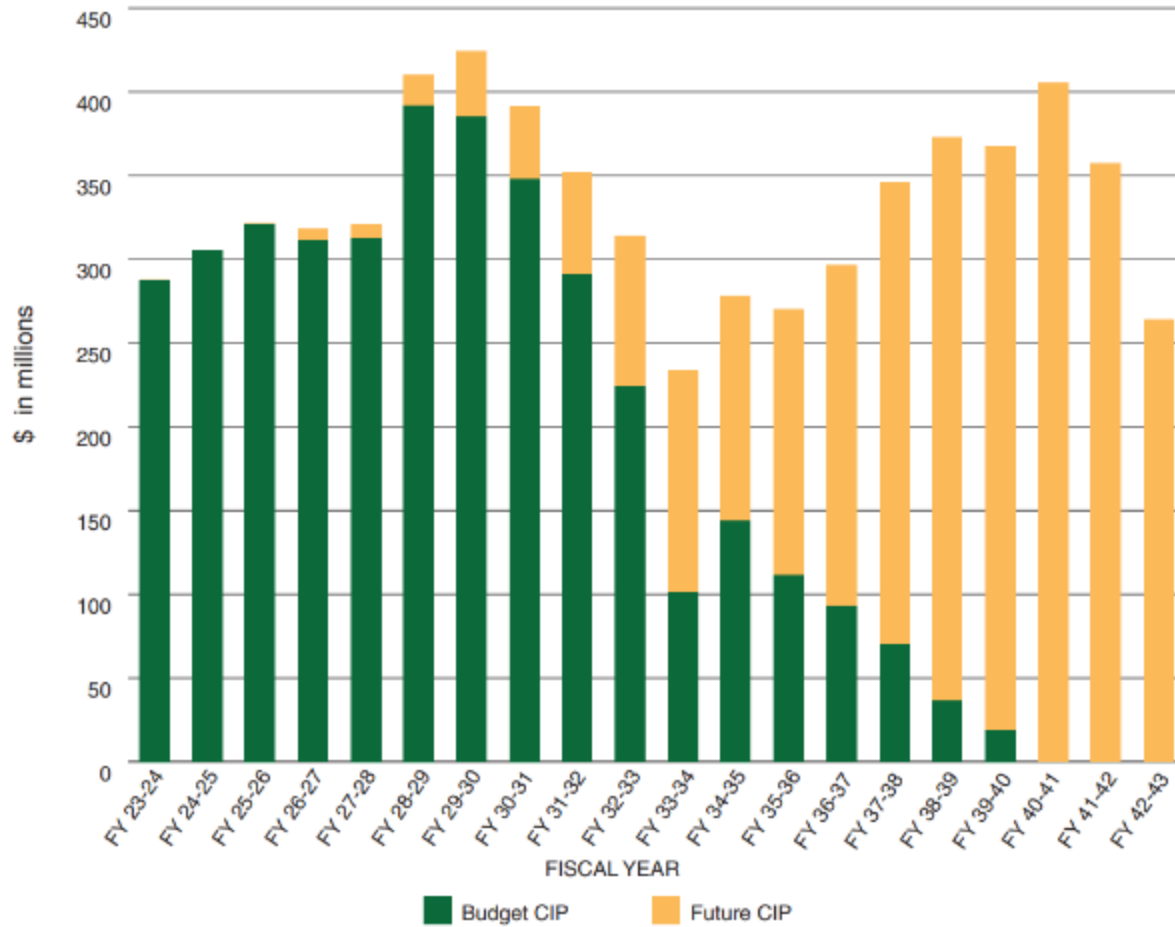


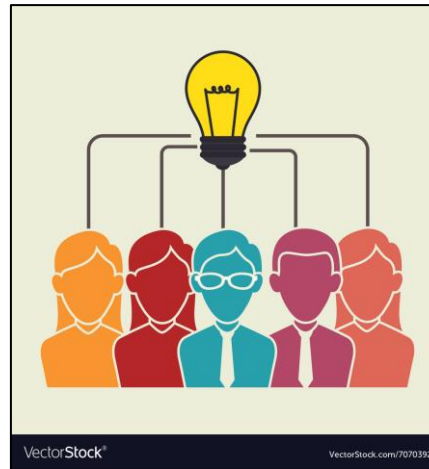
Figure 4-1. 20-Year CIP Outlay

Today's Asset Management Program

Aligned Operations, Maintenance and Engineering Agency



Designated Asset Management Team



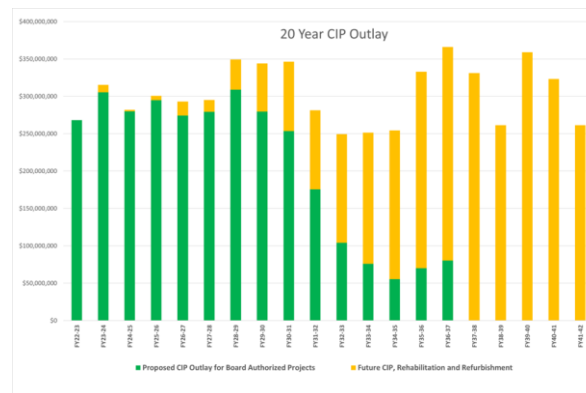
Comprehensive condition assessment program



Proactive Maintenance



Comprehensive 20-year CIP



Rate structure supporting the 20-year CIP



Tomorrow's Asset Management Program

Goals

- Data Driven Asset Management
- BI Dashboards
- Risk Framework

Benefits

- Increased knowledge / planning of our assets
- Defensive, risk-based decision making
- Increased asset reliability and performance
- Optimize O&M Costs

For More Information

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Also on...



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