



OPTIMIZATIONS PROGRAM ANNUAL REPORT

FISCAL YEAR
2018-19



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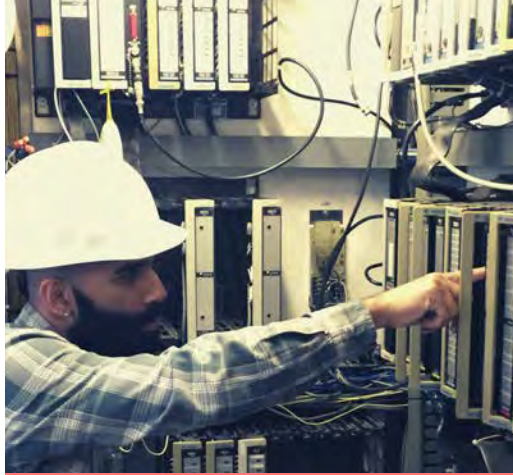
This report includes optimizations completed and in progress between July 1, 2018 and June 30, 2019. The projects have been categorized by their main objective or benefit to Central San.

ACHIEVEMENTS AT A GLANCE

27 COMPLETED OPTIMIZATIONS

25 IN-PROGRESS OR ONGOING OPTIMIZATION EFFORTS

14 POTENTIAL OPTIMIZATIONS IDENTIFIED FOR FY 2019-20



COMMITTING TO OPTIMIZATION

A MESSAGE FROM THE GENERAL MANAGER

Central Contra Costa Sanitary District (Central San) has emphasized optimizations as a means of becoming a highly efficient and effective utility with a focus on continuous improvement. As our agency has been in operation for over 70 years, our current focus is on infrastructure rehabilitation and replacement. We consider each task - no matter how small - an opportunity to identify ways to do our work better, and it is thanks to the ingenuity and initiative of our staff that these achievements are made possible. This fiscal year (FY), we formalized our commitment to optimization with the launch of our Optimizations Program, which utilizes an overarching view toward efficiency and effectiveness.

To inaugurate this program, we identified and executed improvements to critical processes District wide, developed a mechanism to track progress, and established executive oversight, all with the hope of ingraining efficiency into the company culture as an everyday mindset for all staff.

We protect public health and the environment in service to our customers. We aim to deliver the best value for their investment, while maintaining our reputation of being safe and reliable. The optimizations in this report show the significant changes we have made toward self-improvement, strengthening our infrastructure, reducing costs, and keeping our rates as low as possible, without sacrificing our high level of customer service, responsiveness, and reliability to our stakeholders.



GENERAL MANAGER
Roger S. Bailey

ABOUT CENTRAL SAN

Established in 1946, Central San is a special district responsible for the collection and treatment of wastewater for nearly 500,000 residents and more than 3,000 businesses. It is headquartered in Martinez, California, approximately 30 miles east of San Francisco.

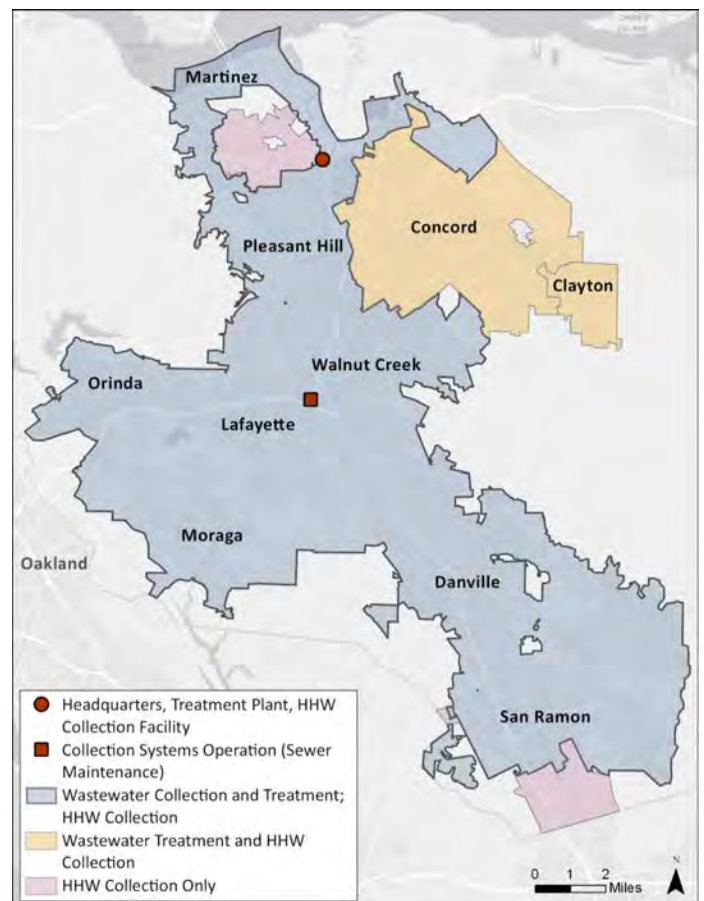
Central San serves the communities pictured in the service area map on the right. Central San maintains 1,540 miles of sewer pipelines and cleans an average of 35 million gallons of wastewater a day.

Central San has 291 budgeted full-time employees led by a General Manager, a Deputy General Manager, two Department Directors, and 13 Division Managers.

ENVIRONMENTAL STEWARDSHIP

Since 1997, Central San has operated a Household Hazardous Waste Collection Facility (HHWCF) that serves approximately 24,000 residential and small business customers, keeping more than two million (M) pounds of hazardous waste per year out of landfills and waterways.

Central San also operates a Residential Recycled Water Fill Station to provide customers with recycled water at no additional charge. Through the fill station and the Recycled Water Program, Central San distributes about 196 million gallons of recycled water each year to help augment the potable water supply in the service area.



GUIDED BY A STRATEGIC PLAN

Every two years, Central San creates a Strategic Plan as a roadmap to accomplish the six goals set by the Board of Directors, reflecting the priorities and practices for the following two years. Goals 3 and 6 of the current FY 2018-20 Strategic Plan (pictured) specifically call for the use of optimization to manage costs and for embracing technology and innovation.

MISSION

To protect public health and the environment

VISION

To be a high-performance organization that provides exceptional customer service and regulatory compliance at responsible rates

VALUES

PEOPLE

- Value customers and employees
- Respect each other
- Work as a team
- Work effectively and efficiently
- Celebrate our successes and learn from our challenges

COMMUNITY

- Value water sector partners
- Foster excellent community relationships
- Be open, transparent, and accessible
- Understand service level expectations
- Build partnerships

LEADERSHIP AND COMMITMENT

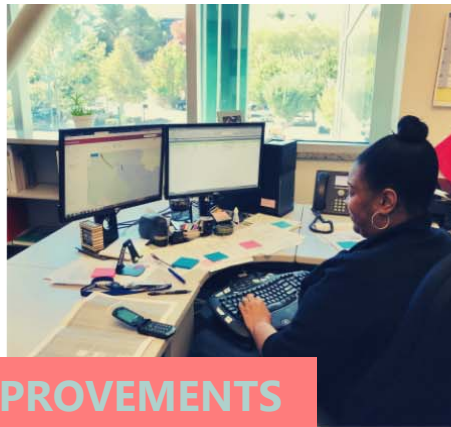
- Promote a passionate and empowered workforce
- Encourage continuous growth and development
- Inspire dedication and top-quality results
- Provide a safe and healthful environment

PRINCIPLES

- Be truthful and honest
- Be fair, kind, and friendly
- Take ownership and responsibility

STRATEGIC GOALS





BUSINESS PROCESS IMPROVEMENTS

While laying the groundwork to begin a major, multi-year effort to replace the enterprise resource planning (ERP) software at the foundation of its operations, Central San has been adjusting its business processes within the spirit of efficiency, leveraging available technology, and improving operational sustainability.

COMPLETED PROJECTS

PROJECT MANAGEMENT INFORMATION SYSTEM (E-BUILDER®)

Following a significant effort to set up the software, migrate data, and train staff, e-Builder® has been fully implemented as the project management information system (PMIS) for engineering projects. It is being used to track schedules and cash flow. This alleviates the repetitive, manual data entry that was inefficient and time consuming and can create reports quickly. Work is continuing to expand the use of e-Builder®, which is detailed below under In-Progress Projects.



TEACHER TRAINING ACADEMY

Central San's collection system and treatment plant processes provide an excellent, real-world model to help students learn about wastewater treatment and their role within it. As state and federal education standards have changed, staff has updated Central San's education programs to meet them. This year marks the first time Central San shared its new educational resources directly with the teachers in the service area through a Teacher Training Academy. Through this program, Central San staff gave local teachers a behind-the-scenes tour of the plant and facilities and shared the first phase of Central San's updated educational resources for them to test in their classrooms.

Teachers spent a total of three days with Central San staff, both at Central San and at Mt. Diablo Unified School District's training center, learning and asking questions. The teachers engaged in classroom-based activities such as a filter design challenge, having fun with turbidity, and trying to solve a mystery wastewater investigation. When asked, 100 percent of the participants said they would recommend future Central San training to their colleagues.

CONVERTING “ROUTINE” PIPELINE CLEANING WORK ORDERS TO “SCHEDULED”

Historically, sewer pipelines were categorized in two different cleaning categories: “routine” and “scheduled.” Routine work was performed on pipe segments that were deficiency free and cleaned every 10 years, and this work was assigned at the beginning of the year for crews to complete when time was available. However, once Cityworks® was in place, routine schedules became unnecessary. Staff completed a massive effort to consolidate all pipelines into one “scheduled” category by converting approximately 23,000 lines’ of routine work orders. Now, each pipe has a scheduled date for cleaning.

GROUPING OF 1-, 2-, AND 3-MONTH PIPELINE CLEANING SCHEDULES BY LOCATION

The work of the Collection System Operations (CSO) crews to clean and maintain sewers is critical to preventing overflows and protecting the health of the community. These activities are carefully coordinated so that “hotspots” are paid extra attention and all sewers are cleaned as needed. To optimize the work orders that dispatch the crews, staff completed the first phase of this effort by reviewing 1-, 2-, and 3- month frequency schedules and grouping them by location for improved efficiency. Combining work orders geographically minimizes visits to the same vicinity, which decreases drive time between job sites, increases productivity, facilitates better management of work schedules, reduces overdue cleaning work orders, and simplifies the performance matrices and reports used to track goals. The next phase of this effort, to review all other frequency schedules, is detailed under In-Progress Projects.



VIEWING PANEL IN ULTRAVIOLET (UV) DISINFECTION FACILITY

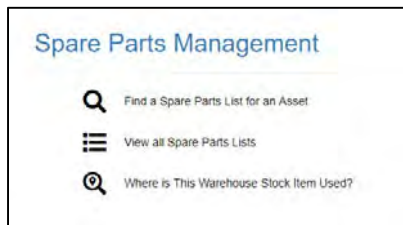
After servicing the UV Disinfection Facility, Maintenance staff must inspect the banks that hold the UV lamps. Part of the inspection includes checking the indicator lights on a testing unit, which required technicians to open a door, exposing them to live electricity and UV rays. One of those technicians, Utility Worker Mark Angel (pictured), suggested creating a window in the door so staff can view the indicator lights with greater safety. This optimization will make this routine maintenance safer for many technicians for years to come and was the winner of the 2019 Central San Safety Suggestion Award.

AUTOMATED SLUDGE RETENTION TIME CONTROL

Consistent sludge retention time (SRT) has the potential to improve settling in the treatment process, which improves effluent quality, plant capacity, filter plant operation, and dissolved air flotation operation. To help maintain consistent SRT, an automated controls system was installed to continuously monitor and adjust the activated sludge process using field instrumentation that calculates sludge age on a real-time basis. Before this change, Operators received the sludge age data once a day and made the necessary adjustments manually.

INTEGRATING 360-DEGREE PHOTOS INTO THE PLANT INFORMATION MANAGEMENT SYSTEM

As part of an effort to increase the number of asset management tools at staff's disposal, 360-degree photos of various Treatment Plant components have been uploaded to the Plant Information Management System (PIMS) site. This creates one comprehensive library for all Treatment Plant equipment. It also allows Plant Operators to train remotely by "walking around the asset" through the computer screen, and it provides accessibility to visitors on facilities tours who are unable to see the equipment in person. Additional photos will continue to be updated as equipment is progressively photographed.



TREATMENT PLANT SPARE PARTS MANAGEMENT

For Central San to reliably provide its critical service, it is important to minimize equipment downtime. The newly created Treatment Plant Spare Parts Data Tool allows Maintenance staff to perform repair work without delays due to lack of supplies. It catalogues spare parts by integrating ERP and geographic information systems (GIS) data so

that, before beginning any repair work, Maintenance staff can ensure the spare parts that are needed are stocked in the Warehouse. This also enables the Warehouse staff to effectively manage their inventory and reduces Maintenance staff inquiries about parts availability.

Treatment Plant Asset Information
Asset Lifecycle

Data Selection

Please set at least one of the following criteria:

Process: Sub Process: System:

Asset Class: Spare Asset Available: Spare Parts Configured:

Show: 10 entries

Legacy ID	COF	POF	BRE	Replacement Cost	Process	Sub Process	System	Asset Class	Spare Asset Available	Spare Parts Configured
Grinder Element #	1	1	1	\$15,000	Primary Treatment	Headworks	Influent Screening	Grinder	✓	✓
Grinder Element #	8	5	49	\$15,000	Primary Treatment	Headworks	Influent Screening	Grinder	✓	✓
1000 HOB	1	3	3	\$3,000,000	Buildings	Headquarters Office Bldg	Structures	Building	✗	✓
10010 Passenger Elevator	1	2	2	\$350,000	Buildings	Headquarters Office Bldg	Elevator	Elevator	✗	✗
10020 Dewatering Elevator	1	2	2	\$10,000	Buildings	Headquarters Office Bldg	Elevator	Elevator	✗	✗
10021 FS-09 9W Fire	4	5	20	\$10,000	Buildings	Headquarters Office Bldg	Fire/Life/Safety	Instrument	✗	✗
10022 HOB Fire System	5	1	5	\$10,000	Buildings	Headquarters Office Bldg	Fire/Life/Safety	Safety Equipment	✗	✗
10025 Gas Detector H2S Engineering	1	10	10	\$5,000	Buildings	Headquarters Office Bldg	Fire/Life/Safety	Instrument	✗	✗

ASSET LIFECYCLE TOOL IN TREATMENT PLANT PORTAL

In the Cityworks® computerized maintenance management system (CMMS) as well as Central San's Treatment Plant Portal, there are over 5,600 assets in the Treatment Plant and Pumping Stations, which are organized into 70+ asset classes. Because there was no way to view all assets within a specific process, staff created an Asset Lifecycle Tool (pictured) in the Treatment Plant Portal, which classifies assets in a process hierarchy to make searching, querying, and analyzing assets faster. This allows staff in Operations

and Engineering to filter and sort by process, asset class, consequence of failure (COF), probability of failure (POF), and business risk exposure (BRE) ratings (the COF, POF, and BRE ratings will be continually updated based on condition assessments). The next phase of this project – the Reliability Engineering Tool – will launch in FY 2019-20 and is detailed under In-Progress Projects.

ELECTRONIC SIGNATURE ROUTING

After the Environmental and Regulatory Compliance workgroup successfully piloted DocuSign® software for electronic signatures last FY, Human Resources (HR) staff began using it to process some documents, and Purchasing now uses it for all professional service agreements. Licenses can be made available for other workgroups as DocuSign® is rolled out organization wide, with the hope that all

divisions can benefit from faster document processing, the ability to track statuses of documents and send reminders, and reduced paperwork.

CONFERENCE ROOM TABLET SCHEDULING

The Teem® app, which Central San already uses for visitor check-in at the front desk, can display a conference room's schedule on a tablet so employees can check room availability and schedule a meeting directly on the device. After piloting the app on a tablet mounted outside one conference room, tablets have now been installed outside each conference room.

TWO-FACTOR AUTHENTICATION FOR NETWORK ACCESS

Following a successful pilot, all District staff is now using Duo® software for dual-factor authentication when accessing the virtual private network (VPN) externally, including Office 365®. This extra layer of security was recommended by an audit to safeguard access to the network when staff works remotely.

NEW ONLINE SAFETY TRAINING SOFTWARE (TARGETSOLUTIONS®)

With Central San's main training room, the MultiPurpose Room (MPR), undergoing seismic retrofitting, staff needed a larger selection of online classes that could be used to perform trainings through the internet. TargetSolutions® not only has 5,000 available courses online on broad topics (compared to 100 mostly safety-related courses with the previous software), but also allows staff to customize the library by uploading its own training videos produced in house. The software tracks training information and will be able to integrate with the forthcoming centralized learning management system, which will be procured in FY 2019-20.

LOGGING RECYCLED WATER METER READINGS IN CITYWORKS®

Traditionally, Central San's CMMS, Cityworks®, has been used primarily by Plant Maintenance and CSO crews to manage work orders. This year, Planning staff found another use for it and has recently begun logging recycled water meter readings in Cityworks®. This creates a centralized place to access the information, which is the same software used for other tasks by the staff performing the readings.

STREAMLINED OCCUPATIONAL HEALTHCARE

Staff switched to Kaiser Permanente® as Central San's occupational healthcare provider, streamlining all occupational treatment through one reliable vendor for establishing protocols for new hires, performing annual medical evaluations, and providing workers' comp medical treatment. To those employees who have Kaiser Permanente® personal health coverage, this provides an added benefit by allowing them to consolidate their personal and occupational healthcare.

IN-PROGRESS PROJECTS

ERP REPLACEMENT

SunGard HTE® has been Central San's ERP software since 1993. This foundational system manages the data for critical business processes, including HR, Procurement, Accounting, Billing, Permitting,

and related subsystems. At first, staff had planned to perform targeted improvements to extend the life of the software, but when those improvements did not resolve the limitations staff was encountering, the decision was made to replace SunGard HTE® completely. After extensive planning to ensure adequate staff resources, change management, and high-level support, and establishing 1,700 requirements needed from the new software, Central San contracted with Emtec® with Board approval in early June 2019. Staff will continue working on the project through FYs 2019-20 and FY 2020-21, including addressing the challenges of working on the ERP in addition to day-to-day duties, management of temporary staff, and changing work processes. This is a District-wide effort requiring individual workgroups to work with Emtec® and Information Technology (IT) to build and train on their new modules and to interface with related systems. The multi-year project will result in major business process improvements across the organization.

CHART OF ACCOUNTS UPDATE

Part of the ERP replacement is the need to update the Chart of Accounts, which is a foundational item for any ERP or new accounting system as it determines how information will be stored in the system. If not carefully considered, information may not be conveniently available in output reports, and costs may not be properly segmented, which may require manual processes later. Movement towards best practices and removing the clutter of previous workarounds were some improvements targeted in this effort. Changes in the chart will result in informational reporting from the ERP that meets the needs of stakeholders (staff, Board, and the public) and an accounting system design that minimizes manual processes needed to obtain information. The recommendations from this effort were delivered in time for the implementation phase of the ongoing ERP project.

PERMITTING SOFTWARE

Another component of the ERP replacement is the need to replace Central San's SunGard® permitting software. Staff is an early adopter of Oracle®'s permitting software and will be heavily involved in this 11-month effort, which will modernize the permitting process and integrate with Central San's new ERP.



GROUPING OF PIPELINE CLEANING SCHEDULES BY LOCATION

The first phase of this effort – grouping 1-, 2-, and 3- month frequency schedules by location – was completed in FY 2018-19.

The next phase of the project will be to review all other cleaning schedules – namely, the 6-month, 1-year, 2-year, 3-year, 5-year, and 7-year schedules – for potential grouping together by location for increased efficiency. This is an ongoing

project and a Strategic Plan initiative that is integral to meeting the target of completing greater than 95% of pipeline cleaning schedules completed on time.

Treatment Plant Asset Information
Reliability Engineering (Treatment Plant Assets Only)

Data Selection

Please set at least one of the following criteria:

Process: All | Sub-Process: All | System: All

Asset Class: All | Spare Asset Available: All | Spare Parts Configured: All

Preventive Maintenance (PM) WOs Configured: All | Predictive Maintenance (PdM) WOs Configured: All | Reliability Analysis (RA) WOs: All

Show 10 entries

Legacy ID	COF	POF	BRS	Replacement Cost	Process	Sub-Process	System	Asset Class	Spare Asset Available	Spare Parts Configured	PM Work Orders Configured	PdM Work Orders Configured	RA Work Orders
Grinder Element E	1	1	1	\$15,000	Primary Treatment	Headworks	Influent Screening	Grinder	✓	✓	0	0	0
Grinder Element F	1	1	1	\$15,000	Primary Treatment	Headworks	Influent Screening	Grinder	✓	✓	0	0	0
10000 HOB	1	1	1	\$3,000,000	Buildings	Headquarters	Structures	Building	✗	✓	15	0	0
10010 Passenger Elevator	1	2	2	\$500,000	Buildings	Headquarters	Office Bldg	Elevator	✗	✗	0	0	0
10015	1	2	2	\$10,000	Buildings	Headquarters	Elevator	Elevator	✗	✗	0	0	0

RELIABILITY ENGINEERING TOOL

This is a planned expansion and renaming of the Asset Lifecycle Tool that was developed and launched in FY 2018-19. This phase of the project will enhance the tool by adding the ability to see which assets do not have preventive maintenance (PM) work order cycles, which was previously identified as a functionality not available in Cityworks®. It will also add the ability to view which assets have predictive maintenance (e.g., vibration analysis and temperature analysis) work order cycles

and which assets have a maintenance program assessment (e.g., root cause analysis and RCM) performed on them. The Reliability Engineering Tool will continue to be enhanced as needs arise.

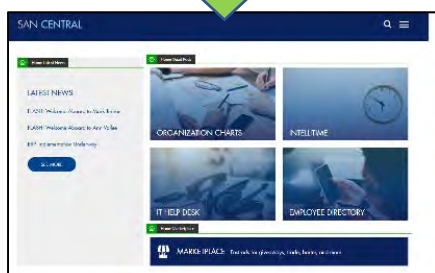
LINKING PHOTOS TO ASSETS IN GIS

Staff often loads photos of District assets into the document repository, Laserfiche®, to record condition and/or location information, but there was no previous link between Laserfiche® and the web mapping tools in GIS. This year, the two repositories were linked so that staff can click on an asset in the Central Portal or Treatment Plant Portal in GIS to pull the photo associated with that asset in Laserfiche®. This action also organizes asset photos for access by all staff, identifies locations of assets in the field, and visually tracks asset conditions for risk assessment needs. Staff will continue to upload additional photos into Laserfiche® using a template to link to the Portals.



INTRANET REPLACEMENT

Central San's intranets, Online Total Information System (OTIS) (pictured) and PIMS, are outdated, have slow response times, do not function properly on mobile devices, and are difficult to keep updated. The new intranets will allow staff to easily access policies, procedures, training manuals and videos, and other data. A selection committee of employees received demonstrations from multiple vendors, and Digital Deployment®, which updated the external customer website, was selected to bring the new intranet, San Central (pictured), to life, along with a new PIMS platform. In addition to the sleeker and more organized feel, San Central includes a new feature called the Marketplace, where employees can post advertisements for giveaways, trades, and sales. The soft launch of San Central began on May 31, 2019 with OTIS still active while staff builds the site, finds and corrects issues, and fills in missing pieces. OTIS will be decommissioned in August 2019.



SLUDGE PROCESS IMPROVEMENT VIA SELECTOR OPTIMIZATION

A good selector improves the performance of the secondary treatment process, theoretically resulting in a more consistent sludge volume index, reduction in bulking, and an increase in treatment and filter capacity. The latter is especially important toward achieving needed wet weather capacity while keeping existing infrastructure. Planning staff is evaluating ways to optimize the selector's performance, in tandem with the Automated Sludge Retention Time Control optimization completed by Plant Operations, aforementioned as a completed project. This work could help avoid over \$10 million of future capital improvements needs for another secondary clarifier for reliable peak wet weather capacity. Testing will need to be conducted on a long-term basis to acquire reliable results for determining next step optimization actions. Field sampling work was performed this year, and the draft report is forthcoming.

HOUSEHOLD HAZARDOUS WASTE STAFFING EFFICIENCY

Since the HHWCF began operating six days a week in 2009, Contract Technicians (CTs) have been used to fill voids when District staff is unavailable or the facility is experiencing high customer volumes. Retaining trained, reliable, and consistent contract staff is a challenge, and each one requires personalized hazardous waste training by District staff. A Contract Specialist (CS), in comparison to a CT, is able to oversee the facility alone for one to two hours and can act as the lead contract person. To increase versatility and improve efficiency at the HHWCF, staff hopes to be able to eventually replace one CT with a CS, and, after time, reduce the number of CTs from three to two. A new contractor started in June 2019, and their staff is undergoing training.

MULTIPURPOSE ROOM REDESIGN

The seismic retrofit of the MPR has created an opportunity to evaluate the room for possible improvements. Given that the MPR is used by outside agencies and used to host events, it is sometimes the event attendees' only impression of Central San; thus, it is important for the room to project a professional and technologically advanced atmosphere and for the room's features to be easy to use. To that end, staff will install two additional projector screens, more microphones, a tablet audio/visual equipment controller, and a slimmer lectern. Staff will also be relocating the sound system to a less obtrusive area and will install permanent cameras to record training sessions, special presentations, Board workshops, Central San Academy, and other events. This will reduce staff time to record videos, eliminate the potential safety hazards of electrical cords on the ground, and broaden the possibilities for video recording in the room.

ENTERPRISE RISK MANAGEMENT PROGRAM

Managers have completed an operational risk inventory, including estimates of the likelihood and severity of each risk, as well as consideration of existing risk reduction strategies and future risk mitigation opportunities. This inventory will be integrated with the Executive Team's inventory of strategic risks to form the basis of an enterprise-wide, ongoing risk review and monitoring program.

BOARD POLICIES AND ADMINISTRATIVE PROCEDURES MANAGEMENT

The Board has adopted 39 Board Policies (BPs), and 10 related Administrative Procedures (APs) have been approved by the General Manager. Behind-the-scenes issues with maintaining the electronic files for these documents have arisen, with version control and the potential for errors and missed biennial reviews as a concern. To address this, staff has developed a standardized electronic file folder structure for the different stages of the BPs and APs as well as a comprehensive tracking log, tickler system, and the intent to implement a biennial AP review process to coincide with the related BP. Once these improvements are in place, staff will be able to keep on top of multiple moving parts of the process and reduce errors.

OTHER IN-PROGRESS PROJECTS

- Permit Counter staff and Development Services inspectors are partnering with the City of Walnut Creek to pilot **PlanGrid® software** for potential implementation with the permitting module of the new ERP. PlanGrid® allows engineering project plans to be reviewed and inspected digitally.
- Employee **performance evaluation forms** are being enhanced in collaboration with the bargaining units to make the appraisal process less cumbersome and emphasize the delivery of meaningful feedback.
- **Notifications of upcoming expiring contracts** will be sent automatically from Purchasing to project managers to ensure that contract renewals are done in a timely manner and that contracts remain in place or are properly closed. This will allow materials and services to be purchased as need arises with limited delays.
- Staff utilizes **Isle®** to match Central San with promising, new technologies. Isle® tracks and suggests emerging technology to its clients, and it facilitates a peer network of other utilities which meet annually to evaluate available technology.



INFRASTRUCTURE UPGRADES

Central San's robust Asset Management and Plant Maintenance Programs extend the useful life of critical equipment; however, much of Central San's core infrastructure was built in the 1970's and requires replacement to continue reliable service. These projects offer an opportunity to optimize performance and strengthen the integrity of Central San's infrastructure.

COMPLETED PROJECTS



HEADWORKS FACILITY UPGRADES

Construction was completed this FY on an \$8.2 million upgrade to the Treatment Plant's Headworks Facility.

This massive project addressed odor issues by revamping the odor control system to capture more nuisance odors and installing more enclosed bar screens to better trap the odors.

The most significant impact to operational ability was eliminating the process of grinding and returning screenings (items separated by the screens) to the wastewater flow. This practice would increase the plastics and floatable material in the wastewater, which could lead to equipment problems in the plant.

The new bar screens have smaller $\frac{1}{4}$ -inch screens (compared to the $\frac{3}{4}$ -inch width on the old screens),

which remove more solids from the wastewater. Screenings are now mechanically raked into a sealed trough and carried by water to the washers, where organic material is rinsed off and returned to the wastewater flow. The non-organic material is then compacted and stuffed into sleeves before being conveyed up a tipping trough. When the material reaches the end of the trough, it tips and dumps the compacted screenings into a dumpster. Central San is only one of a handful of facilities in the country using a tipping trough, which has the added benefit of keeping operators from having to manually rake screenings.

This project has been very successful and is proving to have great benefits to both plant operations and to the environment. Previously, rags were causing issues with equipment throughout the plant, and smaller, floating solids were making their way through the treatment process. Since the upgrade, staff has seen significant improvement in the cleanliness of the UV Disinfection Facility and a reduction in floating solids in the water. This has resulted in less wear on equipment and an improved ability to treat the water.



IMPROVING RELIABILITY OF UV DISINFECTION BASINS

The UV system, with 24 banks of bulbs, is a critical plant process that neutralizes microorganisms in the effluent and is vital to helping Central San meet its permit requirement for continuous disinfection. Recently, it was found that 75% of the UV Basin control hardware was at its end of life and could no longer be purchased from the manufacturer. Staff had also been observing

failure of similar obsolete hardware on other systems. Additionally, despite the installation of the new bar screens at the Headworks Facility, the wastewater had low transmittance levels, which requires more UV light to disinfect the wastewater. To improve UV transmittance and reliability, new programmable logic controller input and output cards were installed, and the obsolete cards were saved to use as replacement spares should any more failure in the future. The UV system is now controlled by half new input cards and half older cards. In conjunction with the Capital Improvement Plan (CIP), the UV system will eventually be replaced with one with variable power controls, which will increase reliability and capacity.

GRIT WASHER AUGER EXERCISE TIMER

In dry weather months when low influent flows occur, the amount of grit entering the Headworks Facility becomes lower as well. As a result, the grit washer screws operate very infrequently, allowing grit to dry in the auger, causing current overloads on the auger motor. Staff must then manually remove grit from the auger to fix the overload. To avoid having to do this, staff has installed an exercise timer which will operate the auger briefly and on a fixed schedule, preventing the drying of grit in the auger and the subsequent overload.



VALVE EXERCISING PROGRAM

During preparation and construction of capital projects, staff had sometimes found valves that no longer work due to lack of use. By exercising critical valves on a regular basis, staff can prevent them from breaking and eliminate the related project delays. To put this valve exercising rotation program into place, staff identified critical valves that could cause major failures or expenses, determined if those valves are captured in other documented PM tasks, created a list with valves and the frequencies at which they must be exercised, wrote a procedure, and formally documented the PM in CityWorks®.



PORTABLE LOAD BANK

A portable pocket load bank has been set up for use on the Pumping Stations portable generator, and staff has been trained on its use. This is used for testing fixed and portable generators to verify operation under load at the Concord Industrial, Clyde, Acacia, Flush-Kleen, and Orinda Crossroads Pumping Stations. The load banks improve Central San's existing maintenance program for standby power through the use of a portable device for routine maintenance and troubleshooting. The load banks will also be used on the two generators that have particulate filters. Getting the particulate filters hot enough will

theoretically yield a good burn off, which will reduce the number of times they will need to be sent out for cleaning.

FIRE SYSTEM UPDATE, PHASES 1 AND 2

Phases 1 and 2 of the improvements to the fire system have been completed. Smoke detectors were installed in the MPR and Board Room for increased safety and to protect infrastructure. Fire alarm systems in the Emergency Standby Power Facility were updated from halon to FM200 for cost savings, since halon can at times be mistakenly deployed. Gas monitoring was installed in the Solids Conditioning Building, Headworks Facility, and Pumping Stations, and a foam fire suppression system was installed on bulk diesel tanks. Phase 3 of the project will begin in FY 2019-20 and is detailed under In-Progress Projects.

IN-PROGRESS PROJECTS

STEAM AND AERATION BLOWER REPLACEMENT

The current steam system requires significant maintenance, is aging, and has the potential to perform more energy recovery than it does. One of the issues is that the blowers do not operate reliably in parallel with the electric blower. Secondly, while they are sized for peak air demands, the blowers do not have adequate turndown for low-air-demand conditions, which triggers use of the air waste valve. Thirdly, the electric blower is a backup for emergencies but is undersized for the full range of air demands, so there is no redundant second electric blower.



The replacement that is in the works as part of the planned CIP aims to assess the condition and remaining useful life of the existing boiler feedwater, steam, and aeration systems as well as associated structural, electrical, and instrumentation and control systems. It will also confirm the best energy recovery and aeration system replacement alternative that addresses both current and future needs. The new equipment will be flexible and optimal for addressing potential future permit requirements for nutrient removal and supporting collaborative efforts to expand the use of recycled water such as the Recycled Water Exchange. Currently, staff is in the midst of a two-year condition assessment effort in furtherance of this project.

FIRE SYSTEM UPDATE, PHASE 3

Phases 1 and 2 of the improvements to the fire system have been completed. Phase 3 of the project is being developed, to possibly include new fire alarm panels in the Laboratory and Headquarters Office Building and an emergency evacuation stairwell from the Solids Conditioning Building Control Room. The fire system updates campus wide will likely take about six phases to complete in total.

SOLIDS HANDLING FACILITY IMPROVEMENTS

As part of the planned CIP, the project to improve the Solids Handling Facility addresses regulatory drivers with new air emission control equipment, improves employee safety with seismic improvements, increases resiliency, and replaces aging equipment. Some of the components will optimize operations and lower operations and maintenance costs by reducing chemical, electrical, maintenance repair, and/or fuel expenses, including the following:



- New sludge blending tanks for better mixing of primary sludge and thickened waste activated sludge, improving sludge dewaterability.
- New polymer system, high-efficiency centrifuges, and cake pumps for increased reliability and more cake solids using less polymer, requiring less fuel for the furnace.
- New burners, controls, and combustion air blower system for the furnace, improving air emission (lower nitric oxides) with less fuel.
- New wet scrubbers, multiple hearth furnace emergency bypass, and ash slurry drain system with potential future treatment to reduce metals to ensure compliance with both existing and expected regulatory requirements.
- New wet ash loadout system, wet ash collection system, and ash slurry pump system to create less dust for increased employee safety.

The project is currently in the 50% design stage. The centrifuge, wet scrubber, and cake pumps have been purchased.



DON'T JUST FIX IT; IMPROVE IT

Our Plant Maintenance staff is constantly rehabilitating our assets to extend their useful life and optimize their performance. They make it a regular practice not to just perform the preventive maintenance (PM) or repair, but also to ask what more can be done.

Work orders that are categorized as **"Don't Just Fix It; Improve It" (or DJFI)** typically meet one or more of the following criteria:

- Proposal of an optimization idea
- Failure before an asset's useful life
- Repeat failures showing on the Bad Actors list
- Multiple reactive or corrective work orders on a high-criticality asset
- More than 1 reactive work order with a priority of 1 or 2 on specific asset between PM tasks.

In total, **28 DJFIs were completed in FY 2018-19** (twice the number completed in FY 2017-18), including the following actions:

- Installed furnace burner signal splitters to allow Plant Operators better range of burner temperature control for efficiency and less natural gas usage
- Installed a new probe controller in the Aeration and Nitrification Tank for increased reliability, improved accuracy of dissolved oxygen measurement, and lower energy use through improved control of blower operation
- Installed a new wire harness in power distribution cabinet from circuit board to lamp rack connector
- Added a two-branched strainer system, which was designed and created in house, to the inlet flow pipe of the water softener
- Upgraded the lube delivery piping to the centrifuge element bearings
- Designed and fabricated swivel brackets for water level sensing transducers for the Primary Sedimentation Tanks and the Forebay
- Designed, fabricated, and installed rain shields to protect the switchgear at the Filter Plant from weather conditions
- Designed and fabricated a vacuum collection system to collect debris from the filter housing on the standby generators
- Fabricated spare blowout panels to save time during clarifier PMs.

QA/QC PROCESS IMPROVEMENTS

As Plant Maintenance staff members are fulfilling a work order, they sometimes identify a need to update the work order to reflect a better way of performing the task than prescribed. Within Cityworks®, Maintenance staff can check a box that sends an email to a Maintenance Planner to request a quality assurance/quality check (QA/QC) or improvement to the work order, standard operating procedure (SOP), or asset. The Planners then review and update the work orders accordingly. This practice ensures that the work orders which form the basis of all maintenance tasks are kept updated both by staff doing the work and staff scheduling the tasks. This leads to increased PM program effectiveness and efficiency. Staff is constantly QA/QCing and improving the work orders in Cityworks®, which dictate current and future maintenance tasks and how they are done.

Staff completed **39 QA/QC updates** in FY 2018-19.

TESTING PROGRAMS

The Plant Maintenance group have implemented the following testing programs to supplement asset condition management efforts, avoid equipment downtime, increase reliability, increase the effectiveness of the PM program, enhance the acceptance testing program, and allow advanced diagnostics and trending on key assets and safety and protective devices.

BREAKER / OVERLOAD TESTING will protect circuits from damage. A device can test molded case circuit breakers over current relays and current transformers. These protective devices will open shutoff power if excessive current flows are in the circuit, thus protecting the equipment from damage. Staff will test this as time allows.

ULTRASOUND TESTING aimed at energy savings, potentially in air and steam. Staff is currently awaiting delivery of equipment.

ELECTRIC MOTOR TESTING THROUGH MOTOR CIRCUIT ANALYSIS will test motors before the winding goes out. Staff has chosen 21 motors for the pilot phase, and baseline readings have been completed for assets identified as good candidates. Staff is continuing to train on use of motor circuit analysis and electric motor testing.





EFFICIENCIES



Central San strives to be a cost-effective operation. One of the tools at its disposal is its ingenious staff, who constantly look to their business processes to identify ways to manage costs through optimizations.

COMPLETED PROJECTS

CALPERS HEALTHCARE

Central San switched to CalPERS healthcare for more cost-effective employee and retiree healthcare plans, which will provide the same coverage at a reduced cost to Central San through membership in a larger risk pool. It is estimated that this action will save Central San \$5.8 million annually.

HEALTH REIMBURSEMENT ACCOUNT FOR TIER III EMPLOYEES

Central San implemented a new Health Reimbursement Arrangement (HRA) for Tier III employees to provide additional benefits to employees and offset some of their future healthcare costs without incurring additional Other Post-Employment Benefits (OPEB) liability for Central San.

REMOTE METER READING PILOT

Physically reading the 47 recycled water meters in the Zone 1 distribution system can take staff up to eight hours, costing approximately \$1,056 per month (or \$12,672 per year) in staff time. This FY, staff successfully tested new technology from Water Pigeon® to remotely read the Zone 1 recycled water meters. Through the web portal, staff could easily obtain water consumption data for each of the 10 piloted sites, and data is provided in six-hour totalized increments, four times per day. The program eliminates the need for physical staff readings, and the analytics can be used to assist in identifying usage trends and potential customer leaks. Following the success of the pilot, staff anticipates purchasing the remaining meters in FY 2019-20. The technology is expected to pay for itself in under two years.

ADOPTION OF UNIFORM PUBLIC CONSTRUCTION COST ACCOUNTING ACT

Under Uniform Public Construction Cost Accounting Act (UPCCAA) policies and procedures, Central San can use informal bidding procedures for construction contracts up to \$200,000. For simpler, lower-cost projects, this can significantly reduce the administrative costs of bidding and expedite project completion, while retaining a competitive process and containing project costs. The UPCCAA became effective for Central San on September 1, 2018 and was used for three contracts in FY 2018-19.

REPLACEMENT OF FURNACE OXYGEN ANALYZERS

Central San's Title V permit requires measurement of oxygen during furnace combustion, as oxygen is an indicator of combustion efficiency, and Central San must report when oxygen exceeds a certain level. The oxygen analyzers were designed such that particulate and ash would build up inside the furnace, which would plug the sampling line. This would require changing the filter and manually clearing the blockage. Staff identified a more robust zirconium oxide analyzer which uses a convective sampling design for unobstructed flow and greater reliability. After a successful pilot involving internal side-by-side oxygen testing and a Relative Accuracy Test to officially certify the new oxygen analyzer as a compliance monitoring instrument, staff has replaced the analyzers in the Multiple Hearth Furnaces Nos. 1 and 2, saving about \$4,500 to \$7,500 in material and labor costs annually. The payback period for the two analyzers will be four to six years, but beyond cost savings, this will also help to ensure regulatory compliance by minimizing Reportable Compliance Activities (RCAs) for inoperative monitor events. The Relative Accuracy Test also found the analyzer to measure more consistently with the Environmental Protection Agency (EPA) reference method than the previous analyzer.



STREAMLINED MEDICAL TESTING

Staff has consolidated respiratory fit testing and hearing tests for employees with annual medical and pulmonary functions evaluations by the same vendor. Now, one van comes on site to perform all these tests.

IN-PROGRESS PROJECTS

UNIFIED COMMUNICATION TOOLS ACROSS PHONE SYSTEMS

Adopting unified communication tools across mobile and desktop phone systems could potentially reduce the number of telephone licenses and hardware for cost savings, and it will have the added benefit of streamlining Emergency Operations Center (EOC) activities by simplifying the establishment of a live phone line. The current desk phones are not intuitive to use and have limited and outdated features, so they are often used in ways that either waste time or prevent the delivery of information in a timely fashion. Staff researched technology that would improve staff efficiency by increasing their accessibility via new collaboration tools. Options for new phone systems were demonstrated to the IT Leadership Committee, and staff is currently conducting an analysis of five-year costs for on-premises vs. cloud-based telephone system options.

SODIUM HYPOCHLORITE USAGE FOR #3 WATER

Before the UV system was constructed and placed into service around 1998, the tertiary-treated (#3) water was the same as secondary-treated water without any disinfection. It was not until after the UV system was implemented that Central San started adding sodium hypochlorite (bleach) to the high and low #3 water. To reduce or eliminate the use of bleach in this instance could result in cost savings, so, to research this, staff sought input from multiple divisions, tested samples, and gathered

data. Staff confirmed that there is no chlorine residual requirement for in-plant water use within the National Pollutant Discharge Elimination System (NPDES) Permit, and the #3 water for on-site use is a Title 22 exemption Central San provides for itself. Thus, Central San could either eliminate the feed of bleach to the high and low pressure #3 water or significantly reduce the current amount used by as much as 50%. While there is not a capital cost associated with elimination, there is a capital cost with reduction that has a payback of approximately eight months. Plant Operations and Maintenance staff are working with Capital Projects to potentially carry out this optimization in the future.

LIME REDUCTION TESTING

Lime is added to the sludge in the Sludge Blending Tank before incineration to help condition the sludge for optimal dewatering. Reducing the amount of lime used would have the potential to save hundreds of thousands of dollars per year in chemical costs and relieve capacity in the furnace. Thus, a project was initiated to test the effects of reducing lime, including whether it will cause ash melting in the furnaces. The first phase, bench-scale testing, was completed in FY 2016-17. The second phase, full-scale testing, has been postponed until after the furnace burner and burner control are upgraded as part of the Solids Handling Facility Improvements Project.

OTHER IN-PROGRESS PROJECTS

- A vendor has been identified for the rollout of a **learning management system** in FY 2019-20, which will respond to Central San's need for a centralized, consistent tracker for District-wide training. This will record spending, hours, course topics, and other relevant data, and it will facilitate easier reporting for budgeting, strategic planning, and benchmarking.
- Development Services inspectors are piloting **mobile devices**. Instead of carrying paper to job sites, accessing plans digitally will save time and money in running hard copies.
- A significant, District-wide effort continues to **upgrade high-intensity and other energy-inefficient lights to light-emitting diode (LED)** fixtures to save on energy and maintenance costs. This has been going on for a few years, and, this year, the lights in the Pump Room, streetlights, clarifiers, and Bay 8 were replaced.



ON THE HORIZON



Central San is actively looking for ways to innovate. Whether staff is conceiving and carrying out their own ideas or spending time evaluating proposals and technologies, staff is encouraged to take intelligent risks and think outside the box to affect positive change for the future.

In FY 2019-20, staff will continue to work on the in-progress optimizations projects from FY 2018-19, including significant District-wide efforts such as the replacement of the ERP software. Additionally, as part of the Optimizations Program, at the end of FY 2018-19, each division committed to evaluating at least one process for potential optimization in FY 2019-20. Below are the projects that were identified.

PROJECTS CONSIDERED TO BEGIN FY 2019-20

- **A CSO Innovation Workgroup** will be formed, consisting of members from different CSO sections discussing and proposing innovation opportunities. The idea for this task force came from a regular staff meeting, when several crew members volunteered optimization ideas. The goal of the workgroup will be to innovate, optimize, or create an efficiency for at least one process in FY 2019-20.
- **Investigating the use of renewable diesel** instead of regular diesel to fuel the fleet at CSO, if successful, could result in a lower carbon footprint and cleaner emissions, extension of filter regeneration intervals, reduction of filter changes needed, and greater reliability for the trucks with less downtime due to maintenance to clean out the diesel particulate filters. Trucks are refueled often, so optimizing this process will have a significant impact.
- **An employee engagement survey** will gather data on how well employees feel satisfied, valued, and involved in their work at Central San. This will be an analytical way to measure the health of Central San's workforce and identify areas for improvement to boost engagement levels, morale, and productivity.
- **On-site remote deposit machines** will allow for deposits to be made daily without the need to travel to the bank. Staff currently deposits receipts manually without taking advantage of technology currently available and used by the County. Additionally, an internal audit recently recommended greater segregation of duties pertaining to the processing of permit counter receipts, which remote deposit capabilities will help address. Technological efficiency from this process will allow staff to focus on more critical analytical procedures as well as improved customer service with faster deposit turnaround times. Finally, exposure resulting from staff driving deposits to bank will be lessened.
- **Modernizing the general ledger and sub-ledger systems** (cash management, fixed assets, payables, projects, receivables, inventory, purchasing) will be performed via data migration from the legacy SunGard HTE® system to the new Oracle® cloud-based system. The SunGard

HTE® general ledger and various sub-ledgers are dated and inefficient, so implementing the new Oracle® system will significantly enhance the value of financial and non-financial operational information tracked. It will save staff time, improve customer service, and enhance the quality and reliability of financial information for stakeholders.

- **Automated hazardous materials tracking** will move the listing of hazardous materials and their locations throughout District facilities from a Microsoft Access® database that is not easily searchable or accessible from multiple locations to a database linked on the San Central intranet. This will reduce staff time required to obtain the data and increase the accuracy of the data itself.
- **Prefabricating earthquake blowout panels for the secondary clarifiers** will optimize the PMs by facilitating faster completion of the annual PMs and reducing the downtime of the clarifier tank. Specifically, Maintenance staff can complete their annual PM's in a five-day work week, giving Plant Operations greater flexibility and quicker return to service of the tanks.
- **Outsourcing maintenance of insurance documentation** to a third party will save staff time in pursuing insurance documents for vendors in compliance with contractual requirements, decrease exposure for liability, and ensure that the task will be performed on schedule.
- **Accessibility devices** will be provided on District tours to participants with hearing aids or those that are hard of hearing, facilitating visitors with disabilities to take part in the tours. Having these devices will also assist others in being able to hear during the treatment plant tour, which takes place in several areas with loud conditions.
- **Fastrak Flex** devices will be acquired for pool vehicles so that two or more people in a District car can travel in the Highway 580/680 high-occupancy vehicle (HOV) lanes for free to save travel and staff time. This further encourages ridesharing to and from meetings. At a cost of \$20 per Fastrak Flex, the savings of staff time would recover any device cost if the program is effectively encouraged, understood, and managed.
- **A Records Program handbook** will transform administrative procedures into a user-friendly document to be used for staff training and as a reference tool. The handbook will cover all Records Program services – not just destruction procedures and records retention schedules.
- **Assessing the Environmental Compliance workflow** will identify opportunities for optimizing business operations within the group.
- **A valve exercising program** for recycled water distribution system control valves will help guard against breakage of the valves due to lack of use.
- **Reducing signature needs on Personnel Action Forms (PAFs)** will retain internal controls but reduce the significant amount of staff time currently spent scanning and distributing PAFs to department directors and administrative assistants. PAFs are an internal tool for HR staff to make changes to the employee database related to pay and statuses which are often not subject to the approval of the department director. There is no real need for directors or administrative assistants to view the PAFs themselves, since HR provides an action log summarizing all changes made via PAFs. Additionally, PAFs contain personal employee data that is not relevant but needed for HR to process the PAF. Streamlining the PAF signatures to the minimum amount needed for internal controls and retaining the practice of distributing the action log will allow HR staff to spend more time on other tasks, better protect employee data, and preserve department director oversight on all PAF-resultant actions.

Acronym	Definition
AP	Administrative Procedure
BP	Board Policy
BRE	Business Risk Exposure
CIP	Capital Improvement Program
CMMS	Computerized Maintenance Management System
COF	Consequence of Failure
CS	Contract Specialist
CSO	Collection System Operations
CT	Contract Technician
DJFI	Don't Just Fix It; Improve It
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
ERP	Enterprise Resource Planning
FY	Fiscal Year
GIS	Geographic Information System
HHW	Household Hazardous Waste
HHWCF	Household Hazardous Waste Collection Facility
HOV	High-Occupancy Vehicle
HR	Human Resources
HRA	Health Reimbursement Arrangement
IT	Information Technology
LED	Light-Emitting Diode
M	Million
MPR	Multi-Purpose Room
NPDES	National Pollutant Discharge Elimination System
OPEB	Other Post-Employment Benefits
OTIS	Online Total Information System
PAF	Personnel Action Form
PIMS	Plant Information Management System
PM	Preventative Maintenance
PMIS	Project Management Information System
POF	Probability of Failure
QA/QC	Quality Assurance/Quality Control
RCA	Reportable Compliance Activity
SRT	Sludge Retention Time
UPCCAA	Uniform Public Construction Cost Accounting Act
UV	Ultraviolet
VPN	Virtual Private Network

