San José-Santa Clara Regional Wastewater Facility
Capital Improvement Program

Semiannual Status Report
January - June 2014

San José-Santa Clara Regional Wastewater Facility

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

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Eastward view of the secondary treatment tanks, which use bacteria to clean wastewater.

San José-Santa Clara Regional Wastewater Facility

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I. Introduction

Report Objective and Contents

This report provides information on the implementation of capital improvement projects at the San José-Santa Clara Regional Wastewater Facility* (RWF). All projects discussed in the report are guided by the Plant Master Plan (PMP) and included in the 2014-2018 Adopted Capital Improvement Program (CIP). South Bay Water Recycling projects, which are not considered RWF projects, are not part of this report.

The projects discussed in the report are tracked in the Capital Project Management System (CPMS) database and fall under one of three classifications:

- **Construction Projects:** Capital improvement projects that are designed by City staff or consultants, then bid to a contractor for construction. Such projects may also be built by City staff, or by a design-build entity through an agreement.
- **Non-Construction Projects:** Non-construction projects that may lead to the construction of capital improvements such as feasibility studies, pilot studies, and master planning efforts.
- **Public Art Projects:** The CIP also funds projects that involve public art installations; these projects may be associated with a specific capital improvement or may be part of a larger public art strategy with funding support from the CIP.

This report also describes the policy context that guides decision making; outlines accomplishments and specific issues; provides detailed summaries of project schedules and budgets; and highlights key projects in the CIP.

Facility Background

The RWF is a regional advanced wastewater treatment plant that serves eight South Bay cities and four special districts, including:

- City of San José
- City of Santa Clara
- City of Milpitas
- Cupertino Sanitary District (Cupertino)
- West Valley Sanitation District (Campbell, Los Gatos, Monte Sereno and Saratoga)
- County Sanitation Districts 2-3 (unincorporated)
- Burbank Sanitary District (unincorporated)

Jointly owned by the cities of San José and Santa Clara, the RWF is managed and operated by the City of San José's Environmental Services Department (ESD).

Facility groundbreaking, 1956

The RWF is the largest tertiary wastewater treatment plant in the western United States. Operating on a 24-hour schedule, 365 days per year, it treats an average of 110 million gallons per day (mgd) of wastewater, has an average dry weather flow design capacity of 167 mgd, and peak hourly flow capacity of 271 mgd. The facility's operational area occupies 180 acres of a 2,600-acre site at the southern edge of the San Francisco Bay.

Constructed in 1956 as a primary treatment plant for agricultural wastewater and a growing population, the RWF subsequently expanded in response to continued population and economic growth and to meet state regulations. Facilities for secondary treatment were constructed in 1964, followed by another expansion to tertiary treatment in 1979 to meet Clean Water Act regulations. Additional expansions included the South Bay Water Recycling facility in 1998, and the Silicon Valley Advanced Purification Center (SVAPC) in 2014, which began operations in July in partnership with the Santa Clara Valley Water District (SCVWD).

**The legal, official name of the facility remains San Jose/Santa Clara Water Pollution Control Plant, but beginning in early 2013, the facility was approved to use a new common name, the San José-Santa Clara Regional Wastewater Facility.*

Importance to the Region and Environment

As the South Bay has grown, so has the critical importance of the RWF to the region. The facility ensures that the wastewater it receives is cleaned to meet strict standards to protect public health and the environment. The RWF serves more than 1.4 million residents and approximately 17,000 businesses in an area greater than 300 square miles. South Bay communities depend on it to reliably protect their quality of life as well as safeguard wildlife habitat and Bay water quality. Businesses such as food service, automotive, metal finishing, photo processing, and manufacturing rely on the facility to ensure that their wastewater is further treated to meet regulations. In protecting residents, businesses, and the environment, the RWF supports the local economy.

The RWF recycles about 10 mgd of its highly treated wastewater annually for use in landscape irrigation, industrial processes, cooling towers, and toilet flushing in certain commercial areas of San José, Santa Clara, and Milpitas. The recycled water program saves an average of 2.2 billion gallons of drinking water each year. This number is likely to grow as advanced treatment for recycled water becomes available through the SVAPC.

Facility Energy Accomplishments

- **2010:** The RWF was honored with a Green California Leadership Award for its energy innovations.
- **2009:** The federal Environmental Protection Agency included the RWF in a nationwide list of the top 10 on-site alternative energy producers and users.

The RWF generates up to 75 percent of its own energy, an important contribution to local air quality and energy reliance efforts. Like other similar plants, the RWF is a large energy user. Its secondary treatment aeration process, followed by pumping and heating, represent two major sources of demand. The facility's daily energy demand can range from 8 to 11 megawatts (MW). By using on-site power generation equipment and a blend of digester, landfill, and natural gases, the RWF can produce as much as 8 MW of power daily. In the future, new biosolids dewatering and thermal drying facilities will create additional power demands; however, these increases can be largely offset by secondary treatment improvements to reduce aeration demands. The RWF has been recognized for its energy accomplishments, and will continue working towards the City's Green Vision goal of 100 percent energy self-sufficiency by 2022, to the extent feasible.

Infrastructure Condition Assessment and PMP

Most of the RWF's infrastructure is now more than 50 years old and has exceeded its useful life, with repairs needed to every process area. Still, the facility must continue to provide uninterrupted service and meet the strict requirements of more than 18 federal, 13 state, and four regional regulations for treated wastewater discharge, use of recycled water, disposal of biosolids, air emissions, safety requirements, and land use controls. It's key role as protector of public and environmental health underscores the critical need for infrastructure rehabilitation and replacement.

In 2007, the RWF completed an Infrastructure Condition Assessment report that identified nearly $1 billion in needed projects to refurbish its aging electrical, mechanical, and structural assets. The report recommended $250 million in immediate critical repairs to the electrical and solids digestion systems and $750 million in other significant but lower-priority capital replacements. The report also identified a funding gap of approximately $40 million annually, based on a recommended capital reinvestment level of $250 million per five-year CIP cycle to address decades of deferred maintenance.

> Rebuilding and improving the RWF is among the largest public works efforts in the South Bay's history.

As the assessment study focused only on existing condition deficiencies, staff recommended the development of a master plan that would address how the different treatment processes interrelate, the impacts of future regulations, changes to flow and loads, risks from rising sea levels, and opportunities for implementing new technology or process optimization.

In late 2007, the San José City Council and the Treatment Plant Advisory Committee (TPAC) approved a consultant agreement to develop a Plant Master Plan (PMP). A Steering Committee comprised of staff from the cities of San José, Santa Clara, and the tributary agencies guided the three-year planning process, with extensive technical oversight and stakeholder input. The project team provided regular updates to TPAC and San José's Transportation and Environment Council Committee. This work resulted in the Draft PMP Preferred Alternative, approved by TPAC and the City Council in April 2011.

A Draft Environmental Impact Report (DEIR) on the Draft PMP was circulated for public review and amended in 2013. In November 2013, San José's Planning Commission certified the EIR, and the San José City Council formally adopted the EIR and the PMP. The Santa Clara City Council adopted the documents in December 2013. The PMP is now being implemented.

II. Capital Program Overview

The PMP envisions approximately $2 billion in capital investments over the next 30 years to rebuild and modernize the RWF, with more than $1 billion occurring in the first 10 years.

Project Criteria. Capital projects recommended by the PMP were evaluated and prioritized based on six criteria:

1. **Infrastructure condition:** Risk of failure requires repairs or rehabilitation
2. **Regulatory requirements:** Future regulations require new or modified infrastructure
3. **Economic benefit:** Opportunities exist to save operations and maintenance costs by modifying or replacing infrastructure
4. **Improved performance benefit:** Modifying or replacing existing infrastructure improves reliability or treatment performance
5. **Increased flows or increased loading:** Increased flows trigger the need for additional infrastructure
6. **Policy decision:** Policy direction triggers improvements

The PMP sets the direction for future CIP projects that will upgrade and rebuild the facility. However, as a high-level planning document the PMP does not provide sufficient detail for project implementation. Over the last six months, CIP and operations and mantenance (O&M) staff invested significant effort laying the groundwork for this transition, working with a program management consultant to develop a validated CIP program with greater detail, consistency, control, and monitoring. Highlights of this work are below.

Project Validation

The objective of project validation, launched in October 2013 and completed in February 2014, was to decide which PMP projects to include in the RWF's five and 10-year CIPs. The effort was driven by several program needs, including:

- Incorporating changed conditions since the completion of the Draft PMP work in 2011;
- Updating project costs, schedules, and scopes;
- Advancing critical energy projects;
- Identifying project interdependencies; and
- Identifying gap projects.

Additional Information

- **Validated Projects:** http://sjenvironment.org/Archive.aspx?ADID=2323
- **Current CIP:** http://sjenvironment.org/index.aspx?nid=4266

During the validation process, an integrated team of City engineering, O&M, and executive leadership staff worked with the consultant to identify, prioritize, and sequence PMP projects. For more efficient project delivery, the team "packaged" projects into groups based on priority, proximity, timing, process, and interdependency. The team provided updates and gathered input from senior leaders in six workshops, and identified nine programmatic studies for further research. CIP executive leaders presented validation results in budget, financing, and advisory committee meetings prior to completing the process.

The following Table 1 summarizes the validated PMP projects that are scheduled to begin over the next 10 years. The results of validation were used to inform the 2015-2019 Adopted CIP, which reflects an increase in construction spending of $121M as compared to the 2014-2018 Adopted CIP for the RWF as shown on page 26, with highlights of selected capital projects on page 19.

Table 1 — Summary of Validated PMP Projects

Process Area	Validated Cost Estimate
1. Preliminary Treatment Projects	$118.8 M
2. Primary Treatment Projects	$114.1 M
3. Secondary Treatment Projects	$225.1 M
4. Tertiary Treatment Projects	$140.7 M
5. Biosolids	$397.1 M
6. Electrical Systems and Power Generation	$134.4 M
7. Advanced Process Control and Automation Systems	$33.1 M
8. Site Facility Improvements	$258.8 M
Total	$1,422.1 M

Program Startup

The goal for program startup is to create and share tools for a consistent, programmatic project delivery approach that emphasizes collaboration and standardization. A key startup element is the Program Execution Plan (PEP). Developed as a "user's manual" for CIP staff, the PEP provides an overview of the entire program, including CIP management and organization, the CIP project delivery model (PDM), and program-wide strategies. The PEP is being used both as a shared tool and as a training resource for new staff.

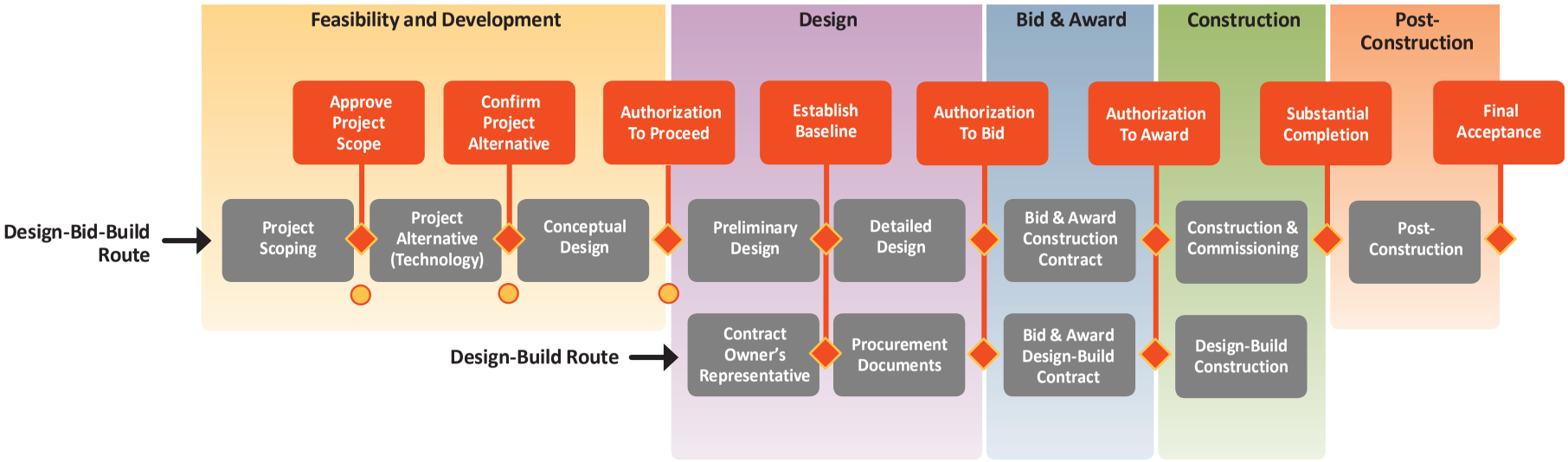
The PEP is housed on the CIP Portal, a web-based internal collaboration site launched in March 2014. The portal, which is also home to the CIP Master Project Schedule and project team sites, creates a collaborative environment in which staff can learn, share and distribute information.

Additional startup deliverables included plans for health and safety, document management, and operations and maintenance staff engagement; and a decision-making process.

Project Delivery Model

The CIP's project delivery model, or PDM, is critical to establishing a consistent, standardized approach to project delivery. Every CIP project must go through the PDM process. As part of the PDM, decision-making meetings, or "stage gates," provide project managers the opportunity to summarize progress to date and make a case for the project to proceed. Senior CIP and O&M staff review projects to determine whether they are ready to proceed to the next phase. This process results in accountable and resilient decision making.

Figure 1 — CIP Project Delivery Model



Key

- Stage Gates
- Stages
- Optional Points to Hire Consultant and/or Redirect Project

Program Tools Testing

Four capital projects were selected to test program tools, such as document management and project scheduling, before they are widely applied to full-scale projects. The projects were selected because they represent a spectrum of those that will be delivered in the CIP, as well as different process areas. For example, the New Cogeneration Facility project is a design/build rather than a more typical design/bid/build project, and addresses energy generation. The Digester and Thickener Facilities Upgrade is a large-scale, $60M biosolids project. The Iron Salts Feed Station is a smaller, more traditional project that focuses on primary treatment; and the Plant Instrument Air System Upgrade is a smaller site facilities project that addresses mechanical equipment.

The testing resulted in process improvements so that the tools can now be successfully used in the wider program, PDM, reporting cycle, and project performance meetings.

Programmatic Studies

During the project validation process, the team identified nine studies to develop specific technical information needed for PMP project implementation. CIP and O&M staff are working together to complete the studies, which will result in technical memoranda, or condition assessments that will be used to inform project development.

- **Design Criteria and Sizing Basis** – This study will evaluate flow and load projections and redundancy and reliability guidelines to be used as the basis of design on all capital projects. It will also develop a model to establish RWF baseline hydraulics and evaluate the potential impacts of proposed modifications.
- **Aeration Demands and Biosolids Production Assessment** – This study will upgrade and expand the existing RWF process simulator to assess the impacts of modifications to equipment and treatment processes throughout the facility. This modeling will allow for simulated testing of new process changes and a more accurate estimate of flows and solids that can be used as the basis of future design projects.
- **Odor and Corrosion Control** – One of the objectives of the CIP is to implement improved odor control for all rehabilitated and new facilities. This study will verify the assumptions of previous planning work related to odor control, better define the extent of control required, and develop a program-wide approach.
- **Automation Master Plan and Process Control Approach** – This master plan will evaluate how to integrate automation improvements into the CIP. To ensure consistency across projects, the study will define a process control approach and establish automation standards to govern the design and implementation of instrumentation and control components.
- **Yard Piping Condition Assessment Plan** – More than 300,000 linear feet (LF) of pipes carry gas, liquids, sludge, air, steam, and other process streams to and from various RWF treatment processes. This study will evaluate, prioritize, and recommend a condition assessment approach for roughly 60,000 LF of process piping.
- **Facility-wide Heating and Cooling Systems Evaluation** – This study will evaluate future heating and cooling demands and supplies from current and proposed sources, and will recommend project sequencing and equipment configurations to ensure reliable service during CIP implementation.
- **Site Improvement Guidelines** – This study will develop architectural guidelines for programming (codes and standards, flood protection, security) and design (building materials and finishes, signage, perimeter barrier landscaping) to be used by all capital projects.

The Yard Piping Condition Assessment Plan will recommend an assessment approach for roughly 60,000 LF of process piping, much of which is underground.

- **Facility-wide Process Risk Assessment Due to Project Implementation** – This study will review project scopes, identify construction activities with the potential to disrupt RWF operations, and recommend mitigation measures to avoid or minimize such disruptions.
- **Asset Management Approach and Strategy** – This study will identify RWF asset management business needs and goals, and recommend initiatives to help staff plan, design, construct, operate, and maintain facility assets.

III. Program Accomplishments and Challenges

Several capital program milestones were achieved during the last two quarters of FY 2013-2014, including the award of new construction contracts for eight projects, totaling $31.4 million:

Digester Gas Storage Replacement

Award date: April 2014 **Scheduled completion date:** September 2015
Baseline budget: $3,167,610 **Contract amount:** $1,825,100

This project will demolish and replace the existing wet seal digester gas holder with a new, dry seal digester gas holder. The project will also install a new foundation system, electrical conduits, utility piping, and concrete pavement.

Fire Main Replacement – Phase 3

Award date: April 2014 **Scheduled completion date:** June 2015
Baseline budget: $2,201,560 **Contract amount:** $1,572,870

This final project phase will replace approximately 7,750 LF of piping, and will install or replace 22 new fire hydrants, along with gate valves, air relief valves, and associated appurtenances.

BNR-2 Clarifiers Guardrail Replacement

Award date: April 2014 **Scheduled completion date:** March 2014
Baseline budget: $551,153 **Contract amount:** $320,793

This project will replace approximately 2,700 LF of existing railing, including new top-mounted posts, brackets, anchor bolts, and toe boards.

Digester Gas Compressor Upgrade

Award date: May 2014 **Scheduled completion date:** October 2016
Baseline budget: $14,963,100 **Contract amount:** $11,316,000

This project will design and construct a new 5,000 square foot (SF) building to house two new gas compressors. The new facility will be located immediately north of the existing Sludge Control Building. The project also includes two digester gas pre-coolers, two cooling towers, associated gas piping, and associated building and equipment utility tie-ins.

Training Trailer Replacement

Award date: May 2014 **Scheduled completion date:** August 2015
Baseline budget: $776,274 **Contract amount:** $513,874

This project will replace two 30-year-old trailers with a new 5,000 SF trailer to accommodate the RWF training needs and Operator in Training program.

Street Rehabilitation – Phase 3

Award date: June 2014 **Scheduled completion date:** March 2015
Baseline budget: $656,859 **Contract amount:** $388,859

This project will replace existing asphalt concrete, replace curb and gutters, install valley gutters, replace traffic loops, and construct an overlay of rubberized asphalt along Center Street from Main Street to Zanker Road, and along First Street from Center Street to Building 40.

Filtration Building B2 & B3 Pipe and Valve Replacement

Award date: June 2014 **Scheduled completion date:** July 2015
Baseline budget: $383,680 **Contract amount:** $158,900

The valves and piping inside the RWF Filtration Building are more than 35 years old and require frequent maintenance to repair leaks. This project will demolish and replace two filter backwash valves, valve actuators, and adjoining piping in the building's Battery B gallery.

Emergency Diesel Generators

Award date: June 2014 **Scheduled completion date:** November 2016
Baseline budget: $20,141,000 **Contract amount:** $15,310,000

This project will install four 3 MW generators, two 22,500-gallon on-site fuel storage tanks, and auxiliary systems to sustain critical operations and aeration for secondary treatment in the event of a power outage.

RWF career fair

Additional Accomplishments

- In the first quarter, a $1M service order was executed for development of design criteria and sizing basis for RWF processes; project management for Headworks Improvements and New Headworks; and project management services for four programmatic studies identified during the project validation process.
- Staff initiated Headworks Improvements, New Headworks, and nine programmatic studies needed for future projects; completed an initial staffing and resource gap analysis; and published the first CIP Monthly Status Report. In addition, staff held TPAC study sessions to discuss the future of RWF biosolids treatment and disposition; and proposed operating and capital budgets, guiding principles, policy considerations, and next steps for the 10-year CIP funding strategy.
- During the second quarter, the New Cogeneration Facility project received the California Environmental Quality Act (CEQA) Notice of Determination and state authority to proceed with the design-build process. Staff held workshops to review business case evaluations for biosolids transition, as well as the first of six workshops on asset management implementation. Additionally, Digester and Thickener Facilities project was approved to begin design.
- Over the two-quarter period, five capital program vacancies were filled, including positions for three senior engineers, a senior engineering technician, and an office specialist. Several training sessions on technical and program-related topics were held for both O&M and engineering staff.
- Three service orders totaling $900,000 were executed under existing CIP master agreements to initiate consultant work on the Iron Salt Feed Station; an evaluation of the sludge digestion process; and a preliminary geotechnical report for the New Cogeneration Facility.

Key Projects:

Two key projects, New Cogeneration Facility and Digesters and Thickener Facilities Upgrade, have advanced quickly and are providing an excellent learning opportunity for CIP staff in terms of document control, contracts and other project standards and tools.

Challenges

For successful delivery of the large and complex CIP, staff must meet the following key challenges:

- **Continue to recruit and fill key vacancies** – Experienced project managers, designers, and process engineers; O&M staff; and additional program support staff are critical to program success. The CIP and O&M divisions have been making significant progress in recruiting, but a number of vacancies still need to be filled. In addition, senior CIP personnel will complete a staffing plan that will effectively transfer program management from consultants to City staff over the next three to five years.
- **Develop and strengthen program delivery processes** – Schedule and budget control, document management, and asset management systems are all needed to provide a consistent approach for effective and efficient program and project delivery. Standardized project delivery tools; design standards and specifications; control system and integration strategies; startup; commissioning; and training procedures are well underway and continue to be furthered developed.
- **Develop program funding strategy** – To ensure that the CIP is funded in a sustainable and equitable manner, a long-term funding strategy is needed. A flows and loads study is underway, as is the development of a comprehensive financial model that will inform the strategy and help determine program affordability. Once a strategy is agreed upon, the focus will be on the substantial effort required to obtain external financing and amend master agreements with the City of Santa Clara and the tributary agencies.

IV. Capital Project Performance

Performance Measures

A key goal of this Semiannual Status Report is to provide regular updates on project performance based on schedule and budget commitments. Project schedules and budgets described in this report follow the same definitions and conventions as the Citywide CIP Annual Status Report.

Schedules

Baseline schedules are established as a commitment for delivery and a measurement of on-time project delivery performance. Project schedules are set once project scope and requirements have been established, and fall into one of the following categories:

- **On schedule:** Projects are considered to be on schedule if completed within two months of the committed completion date. Projects are also in this category if no schedule commitment existed prior to this report.
- **Extended schedule:** Projects have extended schedules if they are running more than two months behind the committed delivery date.
- **Schedule reset:** Project schedules are reset when committed schedules are no longer feasible as a result of significant changes in scope, bid protests, or Council-directed reprioritization. This reset process occurs as part of the City Council's consideration of the Citywide Annual CIP Status Report.
- **Schedule pending:** Projects that do not have schedules at the time of this report are noted as pending. The schedules for these projects are uncertain due to incomplete scoping, community concerns, or funding issues.
- **Schedule on hold:** Project schedules that have been deferred are placed on hold.

Phases

CIP projects are described as progressing through the following phases:

- **Planning:** Work may include condition assessments, pilot tests, feasibility studies, scope development, preliminary engineering, and environmental clearance.
- **Design:** Work may include preparation and review of plans and specifications, selection and management of consultants, and project coordination.
- **Bridging Documents:** These documents and drawings describe all components that go into building, and are designed to give each design-build bidder a clear understanding of what the RWF requirements are on a given project.
- **Bid and Award:** Work may include bid advertisement, pre-bid meetings, preparation of addenda, evaluation of bids, and recommendation for award.
- **Construction:** Work may include execution of contract and issuance of the notice to proceed, construction management, and construction inspection.
- **Design-build:** A combination of design and construction phase tasks performed by the design-build contractor, based on plans and specifications developed during the bridging documents phase.
- **Post-construction/startup:** Work may include final inspection, project closeout, warranty tracking and documentation, operations and maintenance training, startup, and commissioning.

Budgets

Baseline budgets are established as a commitment for delivery and a measurement of on-budget project delivery performance. Project budgets are generally established once the project scope is complete and a schedule has been determined. Projects are considered on budget if total project costs are within 1 percent of the established baseline budget. The baseline budget may differ from the CIP budget in that baseline budgets may include funding that has not yet been identified and appropriated by the San José City Council. Any resets of baseline budgets will occur during Council consideration of the Citywide Annual CIP Status Report.

Performance Summary

Table 2 shows active projects by phase. Four projects are in the Conceptual Planning phase, which precedes the Planning phase. These projects do not yet have detailed scopes, schedules, or budgets. In order for a baseline schedule and budget to be established, a project in the Conceptual Planning phase will require further clarification and refinement of project goals; environmental clearance; and engineering analysis, such as feasibility studies and technology evaluations. Projects in the Conceptual Planning phase are included in **Table 3** on page 18.

In addition, a summary chart of current active projects with budgets and schedules is provided on the next page in **Figure 2**.

The RWF CIP projects are numbered according to the CPMS. This system links interested viewers to a web-based database that provides greater detail on projects. The CPMS can be accessed at:
http://sanjoseca.gov/index.aspx?NID=295

Table 2 — Active Projects by Phase

Project Phase	Number of Projects
Conceptual Planning	4
Planning	5
Design/Bridging Documents	1
Bid and Award	0
Construction	10
Design-Build	2
Post-Construction/Startup	4
Total	**26**

Clarifier tanks help settle solids during the secondary treatment process.

Figure 2 — 2014-2018 Project Schedule and Budget Chart

CPMS No.	Projects by Category	Estimated Total Project Budget	Expenditures to Date
Preliminary Treatment			
7477	Headworks Improvements	$9,050,000	$197,312
7701	New Headworks	$79,400,000	$367,951
Primary Treatment			
6717	Iron Salt Feed Station	$1,993,000	$811,700
Tertiary Treatment			
6833	Filtration Building B2 & B3 Valve & Pipe Replacement	$384,000	$335,700
Biosolids			
7382	Digester and Thickener Facilities Upgrade	$62,429,000	$13,539,000
6631	Dissolved Air Flotation Dissolution Improvements	$1,082,000	$948,100
Electrical Systems and Power Generation			
7100	Digester Gas Compressor Upgrade	$14,963,000	$13,284,100

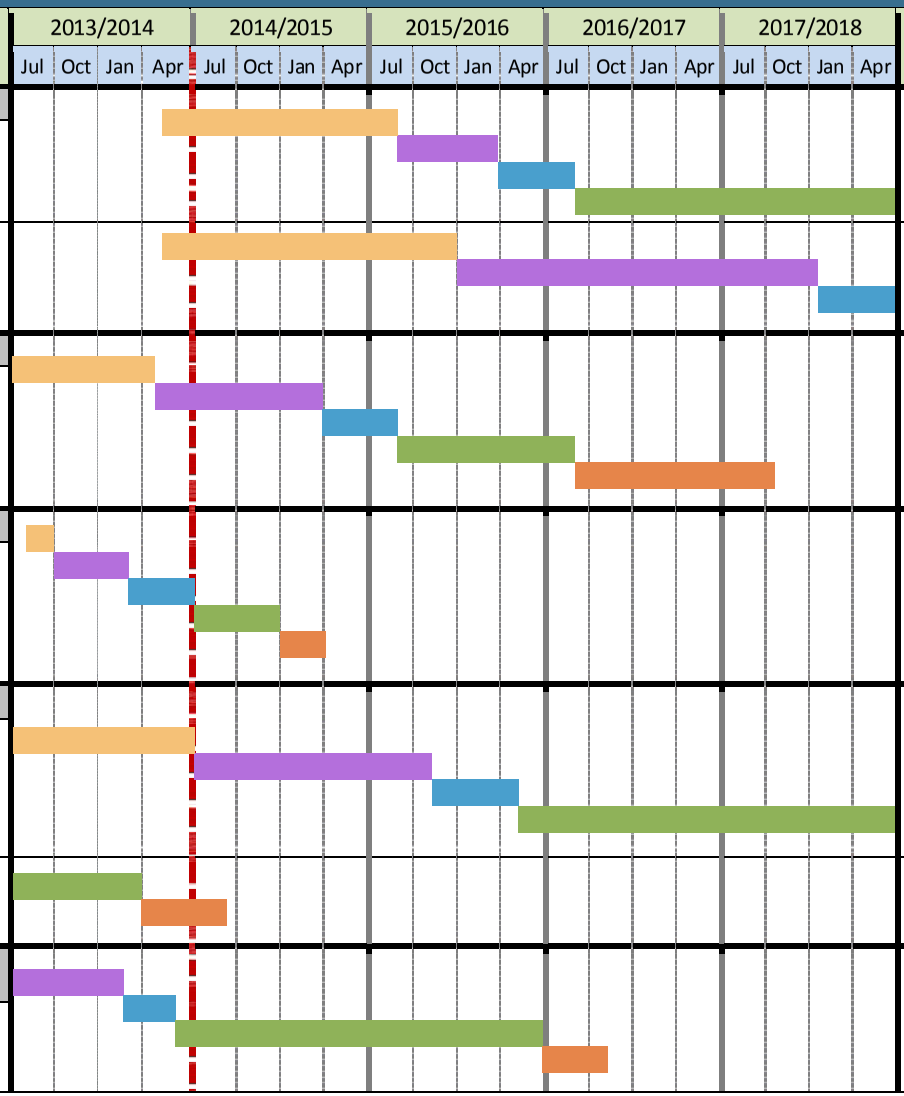


Figure 2 continued from page 15

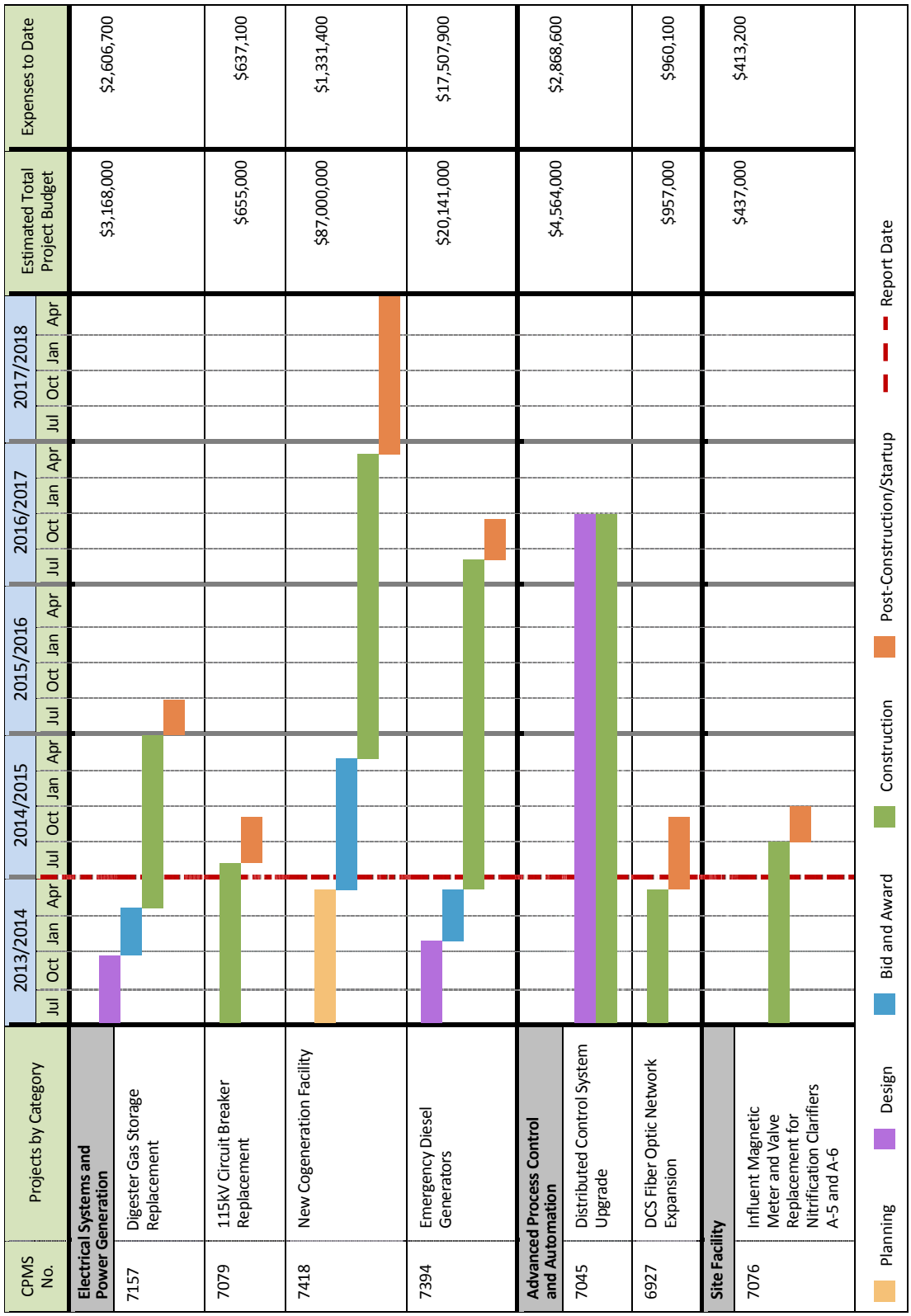


Figure 2 continued from page 16

CPMS No.	Projects by Category	Estimated Total Project Budget	Expenditures to Date
Site Facility			
6835	Handrail Replacement – Phase 5	$1,855,000	$1,644,500
7407	BNR 2 Clarifier Guardrail Replacement	$551,000	$407,200
7249	Training Trailer Replacement	$776,000	$94,200
6998	Fire Main Replacement – Phase 3	$2,202,000	$1,958,600
7474	Street Rehabilitation – Phase 3	$657,000	$559,900

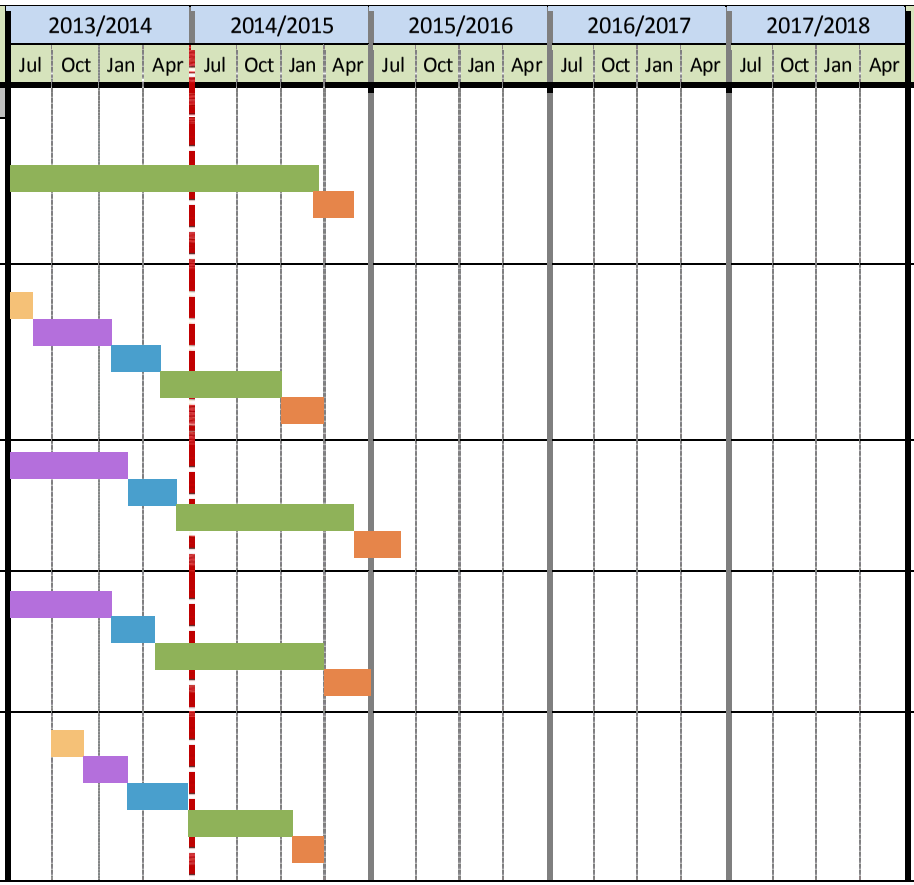


Table 3 – 2014-2018 Project Schedule and Budget – Conceptual Planning	
Project by Category	**Adopted Project Budget**
Primary Treatment	
East Primary Rehabilitation	$82,025,000
Secondary Treatment	
Secondary and Nitrification Clarifier Rehabilitation	$39,724,000
Biosolids	
New Biosolids Facility	$326,000,000
Electrical Systems and Power Generation	
Switchgears S40, G3 & G3A, and M4 Controls Upgrade	$2,500,000

V. Capital Project Highlights

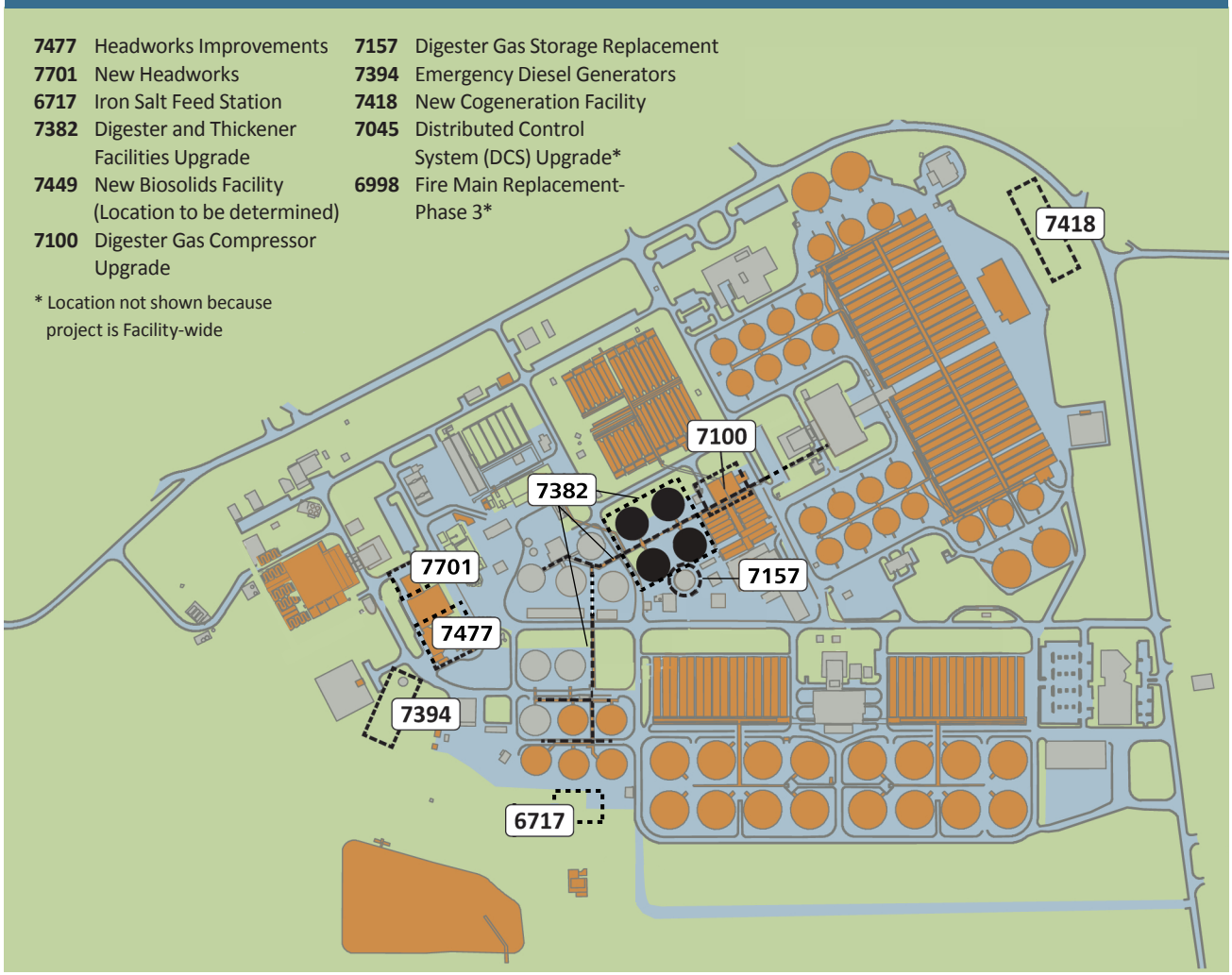
This section provides a detailed look at selected CIP projects and key RWF improvements. These projects showcase work that is critical to ongoing operations. Some, like the New Cogeneration Facility project, also pave the way for continued innovation and efficiency in how the RWF produces and uses energy.

Figure 3 below shows the location of each project at the RWF site.

In addition to information on project description, benefits, status, schedule, and budget, each page in the highlights section shows a budget estimate level. Capital project budget estimate levels are defined as:

- **Program level:** Created for long-term planning and initial feasibility studies; level of certainty plus or minus 35 percent.
- **Preliminary level:** Based on planned sizes of buildings and functional areas, not formal engineering work; level of certainty plus or minus 20 percent.
- **Budget level:** Based on current scope and schematic design work derived from previous similar projects; level of certainty plus or minus 10 percent.
- **Engineer's level:** Based on final construction plans and specifications; level of certainty plus or minus 5 percent.

Figure 3 – Locations of Highlighted Projects



PRELIMINARY TREATMENT

Headworks bar screens

Headworks Improvements

Estimate Type: Program Level

Current Project Budget: $9,050,000

CPMS No. 7477

Description

This project will modify Headworks No. 2 to accommodate all dry weather flow so that Headworks No. 1 can be taken out of service for repair. Once repaired, Headworks No.1 will remain in service while a new primary headworks is constructed.

Current Status

In March 2014, a consultant project manager was brought on to complete scoping for this project and the New Headworks project. The project was initiated in May 2014 and scoping is underway.

Next Milestone

Approve project scope stage gate: *Fall 2014*

PRIMARY TREATMENT

New headworks

New Headworks

Estimate Type: Program Level

Current Project Budget: $79,400,000

CPMS No. 7701

Description

This project will construct a new headworks to serve as the RWF primary headworks. It will increase the equalization basin volume and install new covers over select areas, such as junction boxes and grit collection, for odor control.

Current Status

In March 2014, a consultant project manager was brought on to complete scoping for this project and the Headworks Improvement project. The project was initiated in May 2014 and scoping is underway.

Next Milestone

Approve project scope stage gate: *Fall 2014*

For more information on CIP projects, visit **http://ca-sanjose.civicplus.com/index.aspx?NID=295**

TERTIARY TREATMENT

Dosing station

Iron Salt Feed Station

Estimate Type: Program Level

Current Project Budget: $1,993,000

CPMS No. 6717

Description

This project will design and construct a chemical dosing station to add iron salt and polymer to incoming wastewater. Iron salt helps control the formation of hydrogen sulfide gas, reduce corrosion and odor, and enhance the settling of sludge. Hydrogen sulfide gas is sometimes present at high levels in the RWF digesters, and is a potential air quality problem. Work will include construction of a chemical feed station and a concrete containment structure, as well as installation of pumps, piping, and instrumentation to dose and deliver the iron salt solution.

Current Status

A service order for design services was executed in May 2014. The consultant has begun work on the conceptual design.

Next Milestone

Design completion: *Spring 2015*

BIOSOLIDS

Digesters

Digester and Thickener Facilities Upgrade

Estimate Type: Budget Level

Current Project Budget: $62,429,000

CPMS No. 7382

Description

The RWF has 16 anaerobic digesters constructed between 1956 and 1983. Six of these digesters are out of service due to age and condition; all are more than 30 years old. The first phase of this project will rehabilitate four digesters (Nos. 5, 6, 7, and 8), including installing new covers and mixing systems; heating system and gas collection system upgrades; structural and seismic retrofits; electrical, instrumentation, and control system upgrades; and dissolved air flotation thickeners modifications to allow for sludge co-thickening, including new odor control.

Current Status

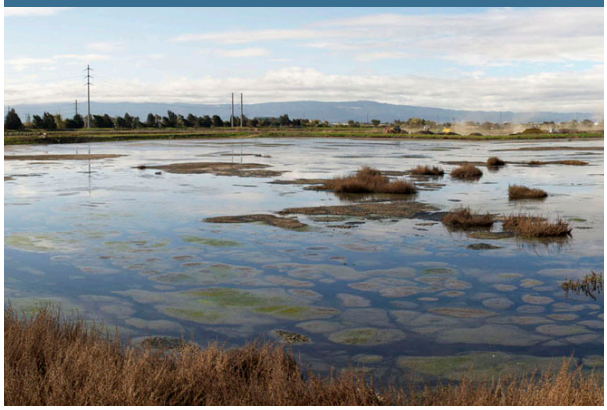
Conceptual design was completed in June 2014. Staff presented the conceptual design report to RWF and CIP leadership, as well as key O&M staff. The project team is preparing for the authorization to proceed stage gate, which will allow the project to proceed to preliminary design.

Next Milestone

Authorization to proceed stage gate: *Summer 2014*

For more information on CIP projects, visit **http://ca-sanjose.civicplus.com/index.aspx?NID=295**

BIOSOLIDS



Lagoon for drying sludge

New Biosolids Facility

Estimate Type: Program Level

Current Project Budget: $326,000,000

CPMS No. 7449

Description

The RWF currently manages its post-digestion biosolids through stabilization lagoons and open-air drying beds prior to shipping the sludge to a nearby landfill for use as an alternative daily cover. With the imminent closure of the landfill, the City is studying its disposal options. Covered mechanical dewatering and drying of sludge, coupled with new odor treatment technologies, would increase these options and reduce odor impacts to surrounding communities.

Current Status

The consultant has completed an investigation to determine whether there is a market for off-hauling post-digester sludge; conducted site visits to comparable facilities; performed heat recovery analysis and site evaluation for new facilities; and prepared technical memoranda summarizing site visits, biosolids hauling and disposition cost projects, and biosolids processing alternatives analysis.

Next Milestone

Business case evaluation results and recommended project delivery method: *Fall 2014*

ELECTRICAL SYSTEMS AND POWER GENERATION

Existing digester gas compressor

Digester Gas Compressor Upgrade

Estimate Type: Engineer's Level

Current Project Budget: $14,963,000

CPMS No. 7100

Description

The RWF operates three digester gas compressors located in the Sludge Control Building: two smaller gas compressors installed in 1964, and one installed in 1984. The two older compressors are increasingly unreliable and difficult to maintain. The newer compressor is also nearing the end of its useful life due to continuous use. This project will construct an approximately 4,400 SF structure to house two new gas compressors.

Current Status

Bids were opened in April 2014 and the project was awarded to the design-builder in May 2014. The notice to proceed was issued in June 2014.

Next Milestone

Design completion of foundation and building: *Fall 2014*

Construction start: *Fall 2014*

For more information on CIP projects, visit **http://ca-sanjose.civicplus.com/index.aspx?NID=295**

ELECTRICAL SYSTEMS AND POWER GENERATION

Gas holder

Digester Gas Storage Replacement

Estimate Type: Engineer's Level

Current Project Budget: $3,168,000

CPMS No. 7157

Description

The RWF has a digester gas holding tank originally built in 1984. The tank's gas holder experienced two failures, one in 2002, and one in 2012. A structural evaluation during the 2012 failure revealed that the gas holder cover skirt was damaged beyond repair. This project will demolish and replace the existing wet seal gas holder with a new, dry seal gas holder.

Current Status

Bids were opened in January 2014 and the project was awarded in April 2014. The project team held a pre-construction meeting in May 2014.

Next Milestone

Issue notice to proceed: *Summer 2014*

ELECTRICAL SYSTEMS AND POWER GENERATION

1.5 MW standby generator

Emergency Diesel Generators

Estimate Type: Engineer's Level

Current Project Budget: $20,141,000

CPMS No. 7394

Description

This project was recommended in the 2012 Energy Management Strategic Plan for energy reliability in the event of power loss. The project will install four emergency diesel generators with capacity of 3 MW each. The generators will automatically start and energize the RWF ring bus electrical distribution system within five minutes after a power outage. The generators will be located south of Substation 1, and will connect to the M3 switchgear.

Current Status

Bids were opened in March 2014 and the project was awarded in June 2014.

Next Milestone

Issue notice to proceed: *Summer 2014*

For more information on CIP projects, visit **http://ca-sanjose.civicplus.com/index.aspx?NID=295**

ELECTRICAL SYSTEMS AND POWER GENERATION

4 MW advanced internal combustion engines

New Cogeneration Facility

Estimate Type: Program Level

Current Program Budget: $87,000,000

CPMS No. 7418

Description

This project is scheduled to bring three 4 MW internal combustion engines online, with a fourth for backup power, by summer 2017. Powered by RWF digester gas blended with natural gas, the engines will be the largest at any California wastewater treatment plant. Cogeneration—a sustainable form of energy—is a critical first step before the RWF can move forward with mechanical dewatering and thermal drying of biosolids.

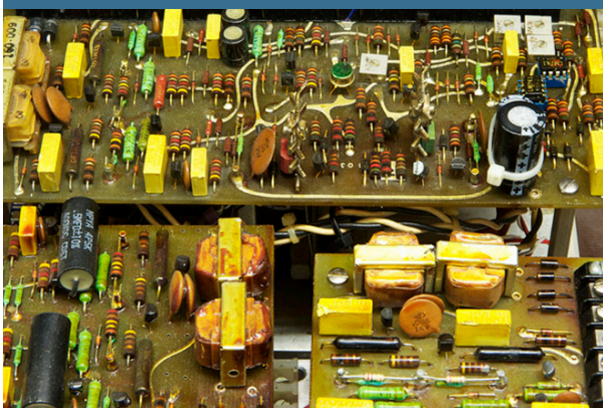
Current Status

The project received a CEQA Notice of Determination in May 2014 and state authority to use design-build in June 2014. The project team is preparing a Request for Pre-Qualification for issuance in late September 2014. The long-range goal is to select a design-build entity in Spring 2015 and start design and construction in Summer 2015.

Next Milestone

Issue prequalification for design-builder: *Fall 2014*

ADVANCED PROCESS CONTROL AND AUTOMATION



Distributed control system

Distributed Control System (DCS) Upgrade

Estimate Type: Engineer's Level

Current Project Budget: $4,564,000

CPMS No. 7045

Description

This project upgrades the RWFs DCS, which monitors and controls many operational areas. The DCS is comprised of software and hardware components that have been in place since the early 1990s. The existing operating system platform is nearing obsolescence and will be phased out by the manufacturer in 2015. This upgrade includes the system software and hardware, user interface, technical training, and system testing.

Current Status

The contractor has completed the conversion of graphics and staff has reviewed the work. Staff performed a factory acceptance test on the system, which is expected to be shipped by the end of August.

Next Milestone

Start of commissioning: *Fall 2014*

For more information on CIP projects, visit **http://ca-sanjose.civicplus.com/index.aspx?NID=295**

Fire main trench

Fire Main Replacement-Phase 3

Estimate Type: Engineer's Level

Current Project Budget: $2,202,000

CPMS No. 6998

Description

This project will replace approximately 7,800 LF of pipe along with associated valves, fire hydrants, and appurtenances. The RWF fire protection system has more than 15,000 LF of fire mains consisting of cast iron and ductile iron pipes installed in stages over the past 50 years. A 2007 condition assessment revealed corrosion and potential piping failure throughout the system. As a result, a phased approach for replacement of the existing fire main system with corrosion-resistant plastic piping was initiated in FY 2007-2008.

Current Status

Bids were opened in February 2014 and the project was awarded in April 2014. The notice to proceed was issued in June 2014.

Next Milestone

Project completion: *Summer 2015*

For more information on CIP projects, visit **http://ca-sanjose.civicplus.com/index.aspx?NID=295**

The following Financial Summaries Chart reflects project costs as adopted in the 2013-2014 CIP Budget. The chart also includes reserves, transfers, and non-construction elements that are not discussed in this status report.

2014-2018 Adopted Capital Improvement Program – Use of Funds (Combined)

	Estimated 2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	5-Year Total
Construction Projects							
Public Art							
Public Art	171,000	457,000	30,000	3,000			490,000
Total	**171,000**	**457,000**	**30,000**	**3,000**			**490,000**
Preliminary Wastewater Treatment							
1. Headworks No. 1 Repair and Rehabilitation	150,000	1,450,000	200,000				1,650,000
2. Headworks No. 2 Enhancement	337,000	7,874,000	3,000,000	300,000			11,174,000
3. Headworks No. 2 Expansion	300,000	200,000					200,000
Total	**787,000**	**9,524,000**	**3,200,000**	**300,000**			**13,024,000**
Primary Wastewater Treatment							
4. East Primary Rehabilitation, Seismic Retrofit, and Odor Control	1,000,000	715,000			2,000,000	5,000,000	7,715,000
5. Iron Salt Feed Station	18,000	1,900,000					1,900,000
Total	**1,018,000**	**2,615,000**			**2,000,000**	**5,000,000**	**9,615,000**
Secondary Wastewater Treatment							
6. Biological Nutrients Removal 1 and Biological Nutrients Removal 2 Connection		876,000					876,000
7. Secondary and Nitrification Clarifier Rehabilitation	8,000	3,162,000			1,400,000	4,000,000	8,562,000
Total	**8,000**	**4,038,000**			**1,400,000**	**4,000,000**	**9,438,000**

Financial Summaries continued from page 26

	Estimated 2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	5-Year Total
Construction Projects							
Tertiary Wastewater Treatment							
8. Alternative Disinfection	20,000	980,000					980,000
9. Filter Improvements	22,000	800,000					800,000
10. New Filter Complex	146,000	854,000					854,000
Total	**188,000**	**2,634,000**					**2,634,000**
Biosolids							
Inactive Lagoons Bio-Solids Removal	624,000						
11. Digester Rehabilitation	398,000	12,445,000	47,000,000	700,000	9,750,000	1,000,000	70,895,000
12. Dissolved Air Flotation Rehabilitation and Odor Control	736,000	264,000					264,000
13. New Biosolids Facility	1,000,000	3,000,000	70,000,000	115,000,000	97,000,000	40,000,000	325,000,000
Total	**2,758,000**	**15,709,000**	**117,000,000**	**115,700,000**	**106,750,000**	**41,000,000**	**396,159,000**
Electrical Systems and Power Generation							
Fuel Cell	20,000						
14. Combined Heat and Power Equipment Repair and Rehabilitation	1,166,000	9,934,000	250,000				10,184,000
15. Energy Generation Improvements	1,300,000	40,000,000	60,000,000				100,000,000
16. Plant Electrical Reliability	1,430,000	2,672,000					2,672,000
Total	**5,041,000**	**52,626,000**	**60,250,000**				**112,876,000**
Advanced Process Control & Automation							
17. Advanced Process Control and Automation	652,000	2,736,000					2,672,000
18. Plant-wide Flowmeter Replacement Program		1,000,000	5,000,000	250,000			6,250,000
19. Treatment Plant Distributed Control System	2,500,000	500,000	500,000	500,000	500,000		2,000,000
Total	**3,152,000**	**4,236,000**	**5,500,000**	**750,000**	**500,000**		**10,986,000**

Financial Summaries continued from page 27

	Estimated 2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	5-Year Total
Construction Projects							
Site Facility Maintenance and Improvements							
Plantwide Facilities	645,000						
Unanticipated/Critical Repairs	250,000						
20. Equipment Replacement	2,133,000	2,522,000	1,663,000	1,663,000	1,663,000	1,663,000	9,174,000
21. Plant Infrastructure Improvements	4,433,000	2,410,000	1,000,000	1,000,000	1,000,000	1,000,000	6,410,000
22. Treatment Plant Engine Rebuild	1,868,000	1,000,000					1,000,000
23. Treatment Plant Fire Main Rehabilitation	1,301,000	1,533,000					1,533,000
24. Treatment Plant Street Resurfacing	524,000	810,000	500,000	500,000	500,000	500,000	2,810,000
25. Urgent and Unscheduled Treatment Plant Rehabilitation	2,237,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	7,500,000
Total	**13,391,000**	**9,775,000**	**4,663,000**	**4,663,000**	**4,663,000**	**4,663,000**	**28,427,000**
South Bay Water Recycling							
Recovery Act - South Bay Water Recycling Phase 1C	68,000						
SBWR Reservoir Facility	464,000	10,000					10,000
27. Plant Backup Water Supply	1,656,000	1,200,000					1,200,000
28. SBWR Extension	4,905,000	3,787,000					3,787,000
29. SBWR System Reliability and Infrastructure Replacement		2,300,000	1,500,000	1,500,000			5,300,000
Total	**7,093,000**	**7,297,000**	**1,500,000**	**1,500,000**			**10,297,000**
TOTAL CONSTRUCTION PROJECTS	**33,607,000**	**108,911,000**	**192,143,000**	**122,916,000**	**115,313,000**	**54,663,000**	**593,946,000**

Financial Summaries continued from page 28

	Estimated 2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	5-Year Total
Non-Construction Projects							
General Non-Construction							
2014 Bond Cost of Issuance			1,700,000				1,700,000
2014 Transfer to Clean Water Financing Authority Debt Service			6,000,000	6,000,000	6,000,000	6,000,000	24,000,000
Capital Program and Public Works Department Support Service Costs	574,000	653,000	660,000	667,000	674,000	681,000	3,335,000
Transfer to Clean Water Financing Authority Debt Service Payment Fund	6,947,000	6,953,000	6,915,000	6,943,000	6,788,000	5,881,000	33,480,000
29. Payment for Clean Water Financing Authority Trustee	5,000	5,000	5,000	5,000	5,000	5,000	25,000
30. Plant Master Plan	1,565,000	276,000					276,000
31. Preliminary Engineering	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	5,000,000
32. Program Management	1,077,000	4,498,000	3,590,000	3,605,000	3,275,000	2,800,000	17,768,000
33. SBWR Master Plan	2,027,000	419,000					419,000
34. State Revolving Fund Loan Repayment	4,464,000	4,464,000	4,464,000	4,464,000	4,464,000	4,464,000	22,320,000
Total	**17,659,000**	**18,268,000**	**24,334,000**	**22,684,000**	**22,206,000**	**20,831,000**	**108,323,000**
Contributions, Loans and Transfers to General Fund							
Transfer to the City Hall Debt Service Fund	77,000	76,000	82,000	85,000	91,000	97,000	431,000
Total	**77,000**	**76,000**	**82,000**	**85,000**	**91,000**	**97,000**	**431,000**
Reserves							
Reserve for Equipment Replacement		5,000,000					5,000,000
Total		**5,000,000**					**5,000,000**
TOTAL NON-CONSTRUCTION	**17,736,000**	**23,344,000**	**24,416,000**	**22,769,000**	**22,297,000**	**20,928,000**	**113,754,000**
Ending Fund Balance	**118,373,157**	**51,245,157**	**139,503,157**	**79,008,157**	**26,834,157**	**17,447,157**	**17,447,157***
TOTAL USE OF FUNDS	**170,791,157**	**183,480,157**	**356,062,157**	**224,693,157**	**164,444,157**	**93,038,157**	**725,127,157***

**The 2013-2014 through 2016-2017 Ending Balances are excluded from the FIVE-YEAR TOTAL USE OF FUNDS to avoid multiple counting of the same funds.*

VII. Looking Ahead

Aerial view of RWF site looking eastward.

Over the next six months, CIP staff will coordinate with O&M staff to scope several projects for design, with procurement closely following. Staff will continue to launch and refine systems and tools designed to achieve cost savings and improved decision making for future CIPs. Key upcoming activities include:

- Completion of a biosolids treatment and disposal options analysis;
- Completion of three projects under construction;
- Initiation of seven projects, including Digested Sludge Dewatering Facility; Facility-wide Water Systems Improvements; Outfall Bridge and Levee Improvements; and Secondary and Nitrification Clarifier Rehabilitation;
- Completion of the 10-year CIP funding analysis and TPAC and Council approval of the funding strategy by December 2014;
- Recruitment to fill several capital program vacancies;
- November presentation to TPAC on technical and business case evaluations, and recommended approach for biosolids transition;
- Development of a five-year staffing and transition plan to inform the 2016-2020 CIP; and
- Production of monthly CIP status reports and semiannual CIP presentations to replace the semiannual status reports.

Glossary

Biogas A renewable energy source produced by the breakdown of organic matter, such as sewage or green waste, in the absence of oxygen. Biogas is comprised of methane, carbon dioxide, and small amounts of hydrogen sulfide and other components.

Biosolids Treated sewage sludge.

Bufferlands Open acreage used by wastewater treatment plants as a buffer between facility operations and nearby communities. Bufferlands minimize odor and operational impacts on neighboring communities, and often serve as wildlife habitat.

Cogeneration The process of recovering and reusing industrial waste heat to produce electricity.

CPMS The Capital Project Management System, a web-based database updated regularly to provide San José Councilmembers, administrators and the public access to current information on CIP projects.

DCS A Distributed Control System, or DCS, is a computerized system that allows treatment facility staff to remotely monitor and control treatment processes.

Effluent Treated wastewater that is discharged from a treatment facility.

EIR An Environmental Impact Report (EIR) is a public document required under the California Environmental Quality Act to describe potential environmental impacts associated with a project. An EIR also describes measures to mitigate the impacts.

Headworks Facilities that first receive incoming wastewater at a treatment plant. The headworks screen and remove sticks, grit, and other solid material from influent to protect downstream equipment in the treatment process.

Influent Untreated wastewater that flows into a treatment facility.

mgd Million gallons per day.

Preliminary treatment The preparatory wastewater treatment stage, in which influent passes through headworks, which screen and remove sticks, rocks and debris; and grit chambers, which remove sand and gravel.

Primary treatment The initial treatment for incoming wastewater, in which gravity settles solid material and rotating bars skim floating fats, oil, and grease from influent.

Ring bus system An electrical substation switching arrangement of breakers connected in a closed loop.

Secondary treatment The second stage of wastewater treatment, in which aeration tanks pump air into wastewater to promote the growth of naturally-occurring bacteria that remove organic pollutants.

Tertiary treatment The final stage in advanced wastewater treatment, in which wastewater flows through filter beds, then through sodium bisulfite tanks to become 99 percent clean.

Wastewater Water that enters the sanitary sewer system for processing at a treatment plant.

Appendix – PMP Project Validation: Cost Estimates

Validation ID #	Project	Validation Cost Estimate* *(in millions)*
Preliminary Treatment		
PLH01	Headworks Improvements	$28.1 ±
PLH02	New Headworks	$90.7 ±
	Program Subtotal	**$118.8 ±**
Primary Treatment		
PLP01	Iron Salt Feed Station	$ 5.3 ±
PLP02	East Primary Rehabilitation, Seismic Retrofit, and Odor Control	$108.8 ±
	Program Subtotal	**$114.1 ±**
Secondary Treatment		
PLS01	Aeration Tanks and Blower Rehabilitation	$114.9 ±
PLS02	Secondary and Nitrification Clarifier Rehabilitation	$ 58.8 ±
PLS03	Aeration Basin Future Modifications	$ 49.3 ±
PLS04	Secondary Clarifier Rehabilitation Demonstration	$ 2.1 ±
	Program Subtotal	**$225.1 ±**
Tertiary Treatment		
PLD01	New Disinfection Facilities	$ 55.6 ±
PLD02	Outfall Bridge and Levee Improvements	$ 8.2 ±
PLD03	Final Effluent Pump Station and Stormwater Channel Improvements	$ 46.5 ±
PLF01	Filter Rehabilitation	$ 27.2 ±
PLF02	Alternative Filter Technology Field Verification	$ 3.2 ±
		$140.7 ±
Biosolids		
PS01	Digester & Thickener Facilities Upgrade	$ 78.7 ±
PS02	Additional Digester Facility Upgrades	$ 63.4 ±
PS03	Digested Sludge Dewatering Facility	$ 68.2 ±
PS04	FOG Receiving	$ 11.9 ±
PS05	Thermal Drying Facility	$132.0 ±
PS06	Greenhouse Demonstration	$ 11.3 ±
PS07	Lagoons and Drying Beds Retirement	$ 31.7 ±
		$397.1 ±

Electrical Systems and Power Generation		
Validation ID #	**Project**	**Validation Cost Estimate*** *(in millions)*
PE01	Emergency Diesel Generators	$ 20.9 ±
PE02	Cogeneration Facility	$ 91.0 ±
PE03	Digester Gas Compressor Upgrade	$ 10.4 ±
PE04	Digester Gas Storage Replacement	$ 3.3 ±
PE05	Switchgear S40/G3 Relay Upgrade	$ 8.8 ±
	Program Subtotal	**$134.4 ±**
Advanced Process Control and Automation		
PA01	Advanced Facility Control and Meter Replacement	$33.1 ±
	Program Subtotal	**$33.1 ±**
Site Facility Maintenance and Improvements		
PF01	Tunnel Rehabilitation	$ 25.6 ±
PF02	Support Building Improvements	$ 55.6 ±
PF03	Plant Infrastructure Improvements	$ 12.4 ±
PF04	Yard Piping and Road Improvements	$126.3 ±
PF06	Facility-wide Water Systems Improvements	$ 14.1 ±
PF07	Plant Instrument Air System Upgrade	$ 11.2 ±
	Program Subtotal	**$245.2 ±**
Non-Construction		
PF05	Record Drawings	$13.6 ±
	Program Subtotal	**$13.6 ±**

Program Total	**$1,422.1 ±**

** Cost estimates follow the American Association of Cost Engineering International (AACE International) Recommended Practice No. 18R-97 estimate classes 5 and 4. Typical accuracy range for Class 5 estimates are -20 percent to -50 percent on the low side, and +30 percent to +100 percent on the high side. Class 4 estimates are -15 percent to -30 percent on the low side, and +20 percent to +50 percent on the high side. Cost estimates for engineering, construction, and contingencies are escalated using a 3 percent per year escalation factor.*