San Francisco
Water Power Sewer
Services of the San Francisco Public Utilities Commission

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DATE: September 2, 2021

TO: Commissioner Sophie Maxwell, President
Commissioner Anson Moran, Vice President
Commissioner Tim Paulson
Commissioner Ed Harrington
Commissioner Newsha Ajami

FROM: Michael Carlin, Acting General Manager

RE: Hetch Hetchy Capital Improvement Programs Quarterly Report
4th Quarter / Fiscal Year 2020-2021

Enclosed please find the Hetch Hetchy Capital Improvement Programs Quarterly Report for the 4th Quarter (Q4) of Fiscal Year (FY) 2020-2021. The primary intent of the report is to provide the Commission, stakeholders, and the public with a status summary of the Hetch Hetchy Capital Improvement Programs based on data for the period of April 1, 2021 to June 30, 2021.

This quarterly report incorporates the Hetch Hetchy Capital Improvement Programs 2018 Baseline that was approved by the San Francisco Public Utilities Commission (SFPUC) on December 11, 2018. The scopes, schedules, and budgets are included for individual projects over $5M that are currently active or planned to be active within FY19/20 or FY20/21 and are part of the Hetchy Capital Improvement Projects (HCIP), a sub-set of projects within the adopted SFPUC Ten-Year Capital Plan for FY18/19 through FY27/28 for the Hetch Hetchy Water and Power (HHWP) Division of the Water Enterprise.

This report also includes a status summary of the Hetch Hetchy Renewal and Replacement (R&R) programs, including Water, Power, and Joint assets. The progress of these R&R programs is measured and reported upon based on the status of planned milestones at the end of the reporting quarter and forecast milestones for the subsequent quarter.

As reported last quarter, the Power Enterprise Capital Improvement Program will no longer be reported in these quarterly reports commencing with this quarter.

London N. Breed
Mayor

Sophie Maxwell
President

Anson Moran
Vice President

Tim Paulson
Commissioner

Ed Harrington
Commissioner

Newsha Ajami
Commissioner

Michael Carlin
Acting
General Manager

The highlights for this reporting period are as follows:

For Contract HH-1000R, Mountain Tunnel Improvement project, the contractor has set up all office trailers and most staging areas needed for the project. The large excavation crane was mobilized at Priest Reservoir. Construction of the retaining walls and mass excavation of the hillside to build the access shaft and pad for the Flow Control Facility (FCF) and also for the Priest adit portal were initiated. The large keyway armored spoil areas were constructed to receive excavation material from the FCF shaft and Priest adit portal. Safety improvements for the access roads continued to be constructed. In depth planning and coordination is taking place for construction work that will be performed during the first Mountain Tunnel outage in early 2022. Forecast construction completion is at the end of 2026.

For Moccasin Penstock Rehabilitation project, the draft condition assessment and structural evaluation reports were distributed for review. The reports are anticipated to be finalized in September.

For Design Build Contract DB-121R2 Moccasin Powerhouse Generators Rewind, two qualified contractors actively participated in negotiations with the City over contract terms including modifications to the City's standard indemnification requirements that were proposed by both contractors, which would require Board of Supervisors' (BOS) approval to change. The Acting General Manager recommended that the Commission award the contract to General Electric Renewables US LLC (GE) based on more favorable terms provided, and subject to BOS approval of the modified indemnification language. On May 11, 2021, the contract was awarded to GE by the Commission subject to BOS approval, and on June 8, the BOS approved the non-standard indemnification language based on the City Risk Manager's recommendation. Notice to Proceed No. 1 (for design) was issued on June 21, 2021.

For Contract HH-1003R, Moccasin Powerhouse Generator Step-Transformer Installation, Big Valley Electric was awarded the contract by the Commission on April 27, 2021. Notice to Proceed was issued on June 7, 2021.

For Contract HH-1002R, O'Shaughnessy Dam Access and Drainage Improvements, four bids were received. Mountain Cascade was awarded the contract by the Commission on June 8, 2021. Notice to Proceed is anticipated in Early October.

For Contract HH-1001, Moccasin Reservoir Perimeter Security Fence, the Commission accepted and authorized final payment for the work completed under contract No. HH-1001 by Resolution No. 21-0072 at its May 11, 2021 meeting.

Attachment

San Francisco
Water Power Sewer
Services of the San Francisco Public Utilities Commission

QUARTERLY REPORT

Hetch Hetchy Capital Improvement Programs

April 2021 – June 2021

Published: August 31, 2021

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Quarterly Report

Hetch Hetchy Capital Improvement Programs

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I. HETCH HETCHY WATER AND POWER (HHWP)– WATER DIVISION CAPITAL IMPROVEMENT PROGRAMS

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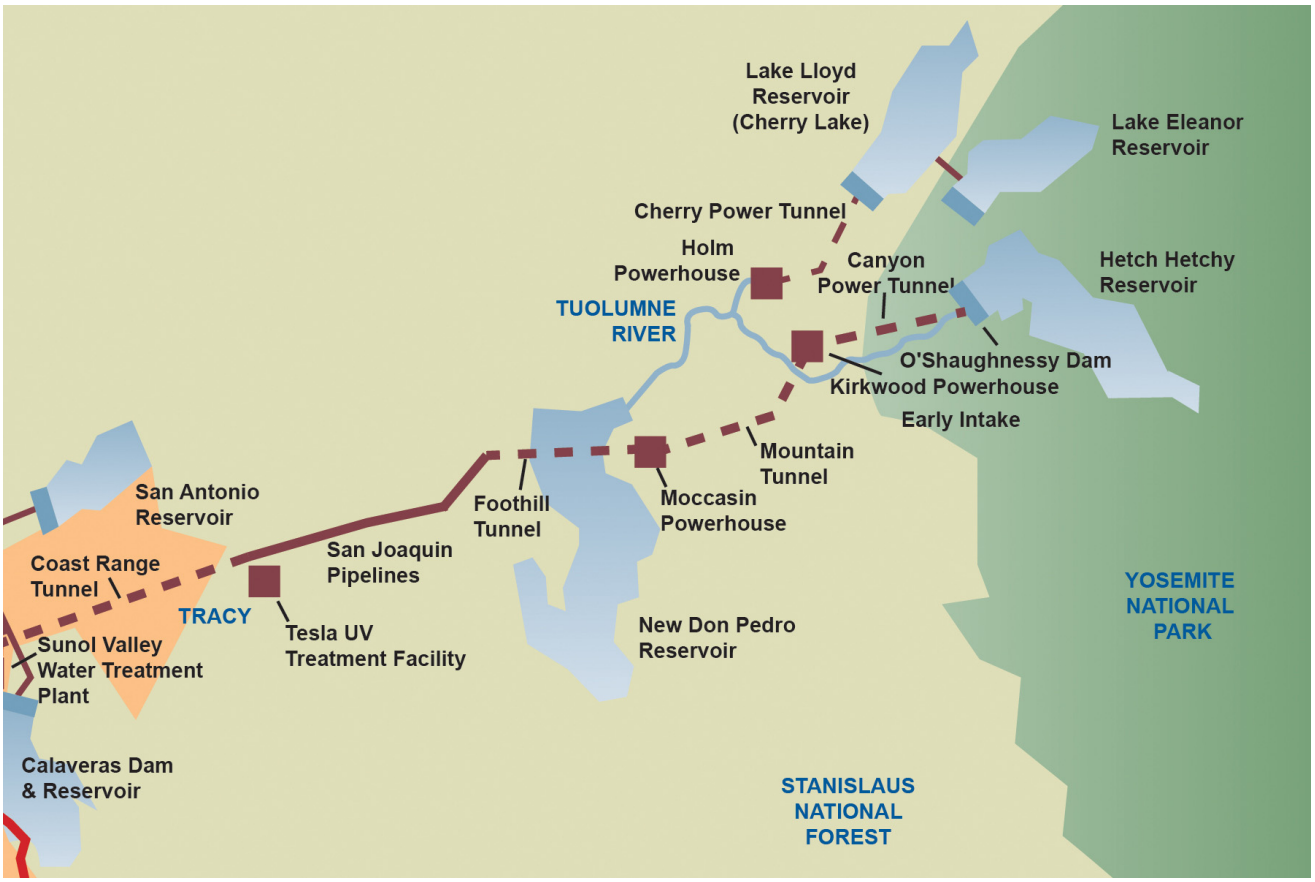
INTRODUCTION

The Hetch Hetchy Water and Power (HHWP) Water Division is the division responsible for operating, managing, and maintaining the HHWP system and facilities. This includes water facilities from Hetch Hetchy Reservoir, located in Yosemite National Park, to Alameda East Portal, located in Sunol Valley and power facilities located from Early Intake to Newark. The HHWP Water Division operates, manages, and maintains three impoundment reservoirs, three regulating reservoirs, four powerhouses, one switchyard, three substations, 170 miles of pipeline and tunnels, almost 50 miles of paved road, over 160 miles of transmission lines, watershed land, and right-of-way property. HHWP Water Division provides 85 percent of the San Francisco Public Utilities Commission (SFPUC) water supply for 2.7 million residential, commercial, and industrial customers in Alameda, Santa Clara, San Mateo, and San Francisco counties. On average, HHWP Water Division generates about 1,650 gigawatt hours (GWH) of clean hydro-generated power annually.

The HHWP Water Division's capital improvement programs are divided into two programs: Hetchy Capital Improvement Projects (HCIP) and Renewal and Replacement (R&R).

A majority of HHWP staff is based in Moccasin, CA, which is 140 miles east of San Francisco. The map below shows the location of the assets and facilities associated with HHWP.



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I.A. HETCHY CAPITAL IMPROVEMENT PROJECTS (HCIP)

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1. PROGRAM DESCRIPTION

The Hetchy Capital Improvement Projects (HCIP) are a multi-year group of capital projects to upgrade existing, aging infrastructure so that it will meet the challenges of today and the future. These projects will deliver improvements that enhance the SFPUC's ability to provide reliable, affordable, high quality water to its 2.7 million customers in an environmentally sustainable manner. The goals are to provide capital improvements needed to cost-effectively ensure that water quality, seismic reliability, delivery reliability, and water supply objectives that have been established for the regional water system facilities managed by HHWP are met, while optimizing the benefits of HHWP power facilities operations. Ongoing development of the HCIP will sustain the regional water system's status as an unfiltered water source and a gravity-driven system.

The scope of HCIP is divided into three major project types: Water, Power, and Joint. The Water sub-program includes only asset improvements benefiting the SFPUC's water customers. The Power sub-program includes only asset improvements used to generate environmentally friendly hydroelectric energy. The Joint sub-program includes projects for assets that are used for both water delivery and power generation. In addition, projects in each sub-program of the HCIP have been further organized by asset type to align with the Hetch Hetchy 10-Year Capital Improvement Program (CIP) Plan for Fiscal Years (FY) 2019-2028. These asset groupings consist of the following:

- Buildings – projects to provide safe and code compliant work spaces.
- Dams & Reservoirs – projects to improve assets used for storage and delivery of water to SFPUC customers, as well as water storage for power generation.
- Mountain Tunnel – projects to address deficiencies with the Mountain Tunnel, a critical, non-redundant link in the Hetch Hetchy water system that conveys water from Kirkwood Powerhouse to Priest Reservoir.
- Powerhouses – projects to improve facilities at the Holm, Kirkwood, and Moccasin powerhouses.
- Roads & Bridges – projects intended to replace bridges that are utilized to access HHWP assets.
- Switchyard & Substations – projects to meet operational objectives for power, including reliability, regulatory compliance, and sustainability.
- Tunnels – projects to repair tunnels along the HHWP system (other than Mountain Tunnel).
- Water Conveyance – projects to enhance the reliability of water delivery through pipelines and penstocks, allowing for both delivery of water to SFPUC customers and delivery of water to powerhouses for power generation.

2. PROGRAM STATUS

This fourth (4th) quarter report for FY2020-2021 presents the progress made on the HCIP between April 1, 2021 and June 30, 2021. The data reported herein as the "approved" project budget and schedule conforms to the annual update of the Hetch Hetchy 10-Year CIP for FY2019-2028, approved by the Water and Power Enterprise Managers and adopted by the Public Utilities Commission on February 13, 2018.

On December 11, 2018, SFPUC approved the Hetch Hetchy Capital Improvement Programs 2018 Proposed Baseline of $682.93M, a subset of the Hetch Hetchy 10-Year CIP for FY2019-2028. The Approved Baseline included projects over $5M that were then active or were intended to be active by FY2020. The status of these projects included in the 2018 Approved Baseline are discussed in this quarterly report and can be found in sections I.A.6 and I.A.10.

The CUH10215 – Canyon Tunnel Rehabilitation project remains in "On-Hold" status.

Project Development (PD) accounts for program-level expenditures for each of the Water, Power, and Joint Programs were created in the 2018 Approved Baseline to capture overall programmatic costs. The accrued PD expenditures are included in Program Delivery Costs in Table 3.1 in order to give an accurate report of the overall HCIP cost performance.

In addition to the nineteen (19) projects presented in the 2018 Approved Baseline, this quarterly report includes the status of the 2018 March Storm Event Emergency Repairs and Interim Improvements (Water-Only Assets) project, which is in the closeout phase and is reported on in Section 8 of the report.

On March 22, 2018, HHWP experienced excessive rainfall and subsequent flash flooding with a large volume of debris, consisting of silt, downed trees, and logs. This affected various assets associated with Priest Reservoir, Moccasin Reservoir, and adjacent areas. The project (with funding budgeted at $17.92M) includes debris removal and emergency repairs at the water-related assets.

The budget baseline for the project was based on initial cost estimates and contract pricing, but was not formally approved by the Commission. This project was funded by deferring money from Water projects included in the Hetch Hetchy 10-Year CIP for FY2019-2028. This project is now in closeout, with each of the three emergency contracts having received Commission acceptance of work performed.

Figure 2.1 shows the total Approved Budget for all twenty (20) projects in each phase of the program as of June 30, 2021 (excluding PD accounts). The number of projects currently in each phase is shown in parentheses.

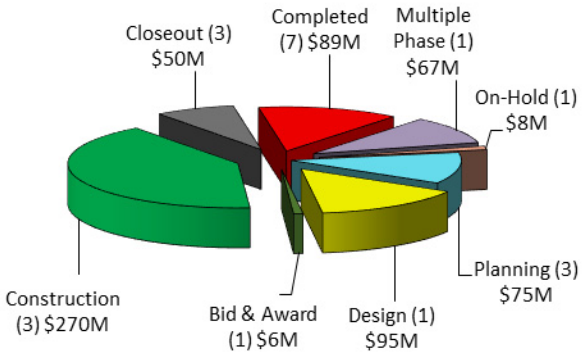

Figure 2.1 Approved Budget for Projects in Each Phase

Figure 2.2 shows the total number of projects in the following stages as of June 30, 2021: Pre-construction, Construction, and Post-construction.

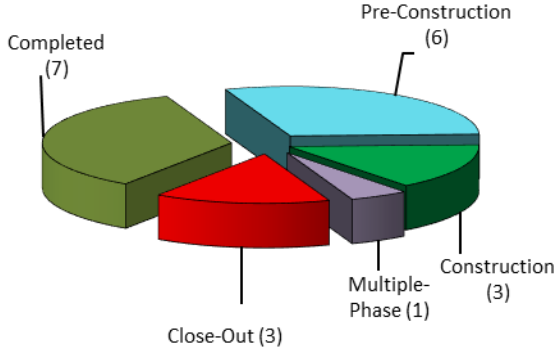

Figure 2.2 Number of Projects in Pre-construction, Construction, and Post-Construction

Figure 2.3 summarizes the environmental review status of the HCIP projects as of June 30, 2021. Environmental review is performed for projects under California Environmental Quality Act (CEQA).

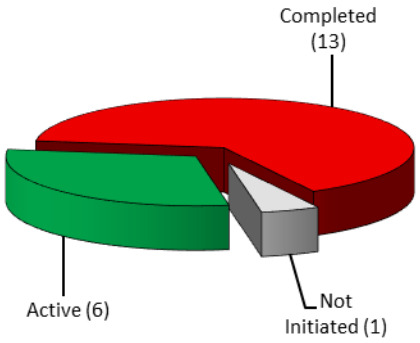

Figure 2.3 Program Environmental Review

3. PROGRAM COST SUMMARY

Table 3.1 provides an overall cost summary of the 20 approved HCIP projects included in this report, as well as PD costs. It shows the Expenditures to Date, Current Approved Budget, Current Forecast Cost, and the Cost Variance between the Approved and Forecast Costs. The Current Approved Budget was increased by $17.92M over the 2018 Approved Baseline with the addition of the 2018 March Storm Event Emergency Repairs and Interim Improvements (Water-Only Assets) project.

The overall program negative Cost Variance of $34.12M in Table 3.1 can be attributed to the following factors:

- Water Infrastructure – the overall positive Cost Variance of $5.99M is due to the following project reevaluations:
  - The CUH10001 SJPL Rehabilitation project has been completed at $0.75M under budget.
  - The CUH10003 Lower Cherry Aqueduct has been completed at $6.03M under budget.
  - The 10035574 SJPL Tesla Valves Replacement Forecasted Costs were decreased by $3.64M due to a transfer of scope to 10035575.
  - The 10035575 SJPL Valve and Safe Entry Improvements Forecasted Costs were increased by $3.64M due to a transfer of scope from 10035574.
  - The CUH100PD WATER ONLY/PROJ DEV Forecasted Costs increased by $0.79M to match the 10-Year CIP Plan.
- Power Infrastructure – the overall negative Cost Variance of $36.17M is due to the following project reevaluations:
  - The CUH10102 Holm and Other Powerhouse Projects' Forecasted Costs were reduced by $3.67M.
  - The CUH10113 Kirkwood Penstock has been completed at $1.82M under budget.
  - The CUH10115 Warnerville Substation Rehabilitation Forecasted Costs were increased by $9.94M for additional design and construction to complete project work; this work has been funded as part of the approved 10-Year CIP for FY2021-30.
  - The CUH10116 Moccasin Penstock Rehabilitation Forecasted Costs were increased by $34.09M, to match the approved 10-Year CIP for FY2021-30.
  - The CUH10119 Early Intake Switchyard Slope Hazard Mitigation completed at $3.36M under budget.
  - The CUH101PD POWER ONLY/PROJ DEV Forecasted Costs were increased by $0.99M to match the 10-Year CIP Plan.
- Joint Infrastructure – the overall positive Cost Variance of $1.45M is due to the following project reevaluations:

- The CUH10214 Moccasin Facilities New Construction was completed at $1.33M under budget.
- The CUH10216 Cherry Dam Outlet Works Rehabilitation has been completed at $1.47M under budget.
- The CUH10220 Mountain Tunnel Inspection & Repairs project was completed at $1.99M under budget.
- The CUH10223 OSH Dam Access and Drainage Improvements is forecasted at $1.88M under budget.
- The 10032903 OSD Outlet Works Phase I Forecasted Costs were increased by $4.00M to account for initial design and construction estimates being higher than expected.
- The CUH102PD JOINT/PROJ DEV Forecasted Costs were increased by $1.23M to match the 10-Year CIP Plan.

- 2018 March Storm Event – the negative Cost Variance of $4.04M was due to increased construction cost for the flood control berm and associated construction management costs.

Table 3.1 Program Cost Summary

Cost Categories	Expenditures To Date ($ Million) (A)	2018 Approved Budget ($ Million) (B)	Current Approved Budget ($ Million) (C)	Q4/FY20-21 Forecasted Costs ($ Million) (D)	Cost Variance ($ Million) (E = C - D)
Water Infrastructure	**$27.44**	**$137.94**	**$137.94**	**$131.95**	**$5.99**
Construction Costs (1)	$10.44	$74.87	$74.87	$68.19	$6.68
Program Delivery Costs (2)	$16.77	$52.40	$47.75	$50.01	($2.26)
Other Costs (3)	$0.23	$10.67	$15.32	$13.75	$1.57
Power Infrastructure	**$57.59**	**$151.19**	**$151.19**	**$187.36**	**($36.17)**
Construction Costs (1)	$26.97	$80.79	$80.79	$117.82	($37.04)
Program Delivery Costs (2)	$30.45	$57.73	$57.79	$66.92	($9.13)
Other Costs (3)	$0.17	$12.68	$12.62	$2.62	$9.99
Joint Infrastructure	**$89.70**	**$393.81**	**$393.81**	**$392.36**	**$1.45**
Construction Costs (1)	$34.87	$215.69	$235.69	$237.69	($2.00)
Program Delivery Costs (2)	$54.70	$156.05	$156.05	$148.70	$7.35
Other Costs (3)	$0.13	$22.07	$2.07	$5.97	($3.90)
2018 March Storm Event Emergency Repair and Interim Improvements (Water-Only Assets)	**$21.67**	**-**	**$17.92**	**$21.97**	**($4.04)**
Overall Program Total	**$196.41**	**$682.93**	**$700.86**	**$733.64**	**($32.78)**

Notes:

1. Construction Costs include the Construction Base Bid and owner-provided equipment/material for all projects. Those costs include any construction contingency.

2. Delivery Costs include program management (i.e. Project Development), project management, planning, environmental (CEQA, permitting, construction compliance), design, construction management, and engineering support during construction.

3. Other Costs include environmental mitigation, art enrichment, security improvements, real estate expenses, and director's reserve.

4. PROGRAM SCHEDULE SUMMARY

Figure 4.1 and Table 4.1 compare the 2018 Approved Schedule and the Current Forecast Schedule for the HCIP. As shown in Table 4.1, the overall HCIP is currently forecast to be completed in May 2037.

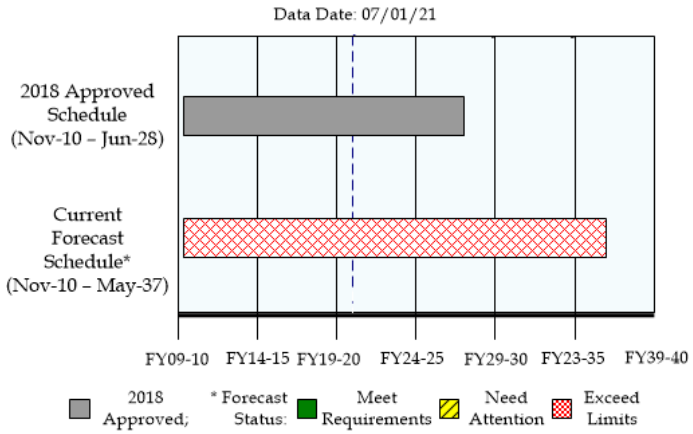

Figure 4.1 Program Schedule Summary

Table 4.1 2018 Approved vs. Current Forecast Schedule Dates

Sub-Program	2018 Approved Project Start	Actual Start	2018 Approved Completion	Current Forecast Completion	Schedule Variance (Months)
Water Infrastructure	11/08/10	11/08/10✓	06/30/28	06/30/31	36
Power Infrastructure	05/29/12	05/29/12✓	06/30/28	06/30/31	36
Joint Infrastructure	10/03/11	10/03/11✓	06/30/28	05/25/37	106.9
Overall HCIP Projects	**11/08/10**	**11/08/10✓**	**06/30/28**	**05/25/37**	**106.9**

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5. PROJECT PERFORMANCE SUMMARY*

All costs are shown in $1,000s as of 07/01/21

Project Name	Active Phase (**)	Approved Budget (a)	Current Forecast Cost (b)	Expenditures To Date (c)	Cost Variance (d= a - b)	Cost Status (+)	Approved Completion (e)	Current Forecast Completion (f)	Schedule Variance (g = e - f)	Schedule Status (+)	Project Data Sheet
Water Conveyance (Water)											
Water Conveyance (Water)											
10035574 - SJPL Tesla Valves Replacement	CN	$ 7,380	$ 3,740	$ 973	$ 3,640	★	06/28/24	12/30/22	18.0 mo. Early	★	See Section 10
10035575 - SJPL Valve and Safe Entry Improvement	DS	$ 95,284	$ 98,924	$ 2,279	($3,640)	⚠	07/01/25	03/13/28	32.4 mo. Late	●	See Section 6
Power Infrastructure											
Powerhouse (cont'd)											
CUH10114 - Moccasin Powerhouse and GSU Rehabilitation	MP	$ 66,714	$ 66,714	$ 3,598	-	★	06/28/24	04/13/27	33.5 mo. Late	●	See Section 6
Switchyard & Substations (Power)											
CUH10115 - Warnerville Substation Rehabilitation	CN	$ 24,305	$ 34,248	$ 21,532	($9,943)	●	03/04/20	11/25/26	80.8 mo. Late	●	See Section 6
Joint Infrastructure											
Water Conveyance (Power)											
CUH10116 - Moccasin Penstock	PL	$ 13,158	$ 47,251	$ 5,080	($34,093)	●	12/31/24	02/25/28	37.8 mo. Late	●	See Section 6

* Exclude projects in closeout, completed, not initiated, on hold, deleted projects, and projects combined with other projects.

**** Phase Status Legend**

PL Planning DS Design

BA Bid & Award CN Construction MP Multiple-Phase

+ Cost and Schedule Status

★ Meet Requirements: Forecast Cost/Schedule is within Approved Budget/Schedule.

⚠ Need Attention: Forecast Cost is over Current Approved Budget by greater than 1% and less than 10%. Or Forecast Schedule is over Current Approved Schedule by greater than 2 months and less than 6 months and less than 10%.

● Exceed Limits: Forecast Cost is over Current Approved Budget by 10% or more. Or Forecast Schedule is over Current Approved Schedule by greater than 6 month or 10% or more.

Project Name	Active Phase (**)	Approved Budget (a)	Current Forecast Cost (b)	Expenditures To Date (c)	Cost Variance (d= a - b)	Cost Status (+)	Approved Completion (e)	Current Forecast Completion (f)	Schedule Variance (g = e - f)	Schedule Status (+)	Project Data Sheet
Joint Infrastructure											
Dams & Reservoirs (Joint)											
10032903 - O'Shaughnessy Dam Outlet Works Phase I	PL	$ 17,206	$ 21,206	$ 720	($4,000)	●	08/25/22	09/16/25	36.8 mo. Late	●	See Section 6
CUH10223 - OSH Dam Access and Drainage Improvements	BA	$ 5,830	$ 3,952	$ 988	$ 1,878	★	02/26/21	02/28/23	24.1 mo. Late	●	See Section 6
Mountain Tunnel											
CUH10221 - Mountain Tunnel Improvement Project	CN	$ 238,219	$ 238,219	$ 32,057	-	★	12/31/26	06/03/27	5.1 mo. Late	⚠	See Section 6
Roads & Bridges (Joint)											
10035086 - Bridge Replacement (4 - Bridges)	PL	$ 44,287	$ 44,287	$ 710	-	★	12/30/25	05/25/37	136.9 mo. Late	●	See Section 6

* Exclude projects in closeout, completed, not initiated, on hold, deleted projects, and projects combined with other projects.

**** Phase Status Legend**

PL Planning DS Design

BA Bid & Award CN Construction MP Multiple-Phase

+ Cost and Schedule Status

★ Meet Requirements: Forecast Cost/Schedule is within Approved Budget/Schedule.

⚠ Need Attention: Forecast Cost is over Current Approved Budget by greater than 1% and less than 10%. Or Forecast Schedule is over Current Approved Schedule by greater than 2 months and less than 6 months and less than 10%.

● Exceed Limits: Forecast Cost is over Current Approved Budget by 10% or more. Or Forecast Schedule is over Current Approved Schedule by greater than 6 month or 10% or more.

6. PROJECTS NOT WITHIN BUDGET AND/OR SCHEDULE

10035575 - SJPL Valve and Safe Entry Improvement

Project Description: The San Joaquin Pipeline (SJPL) Entry Assessment and Valve Improvement Project involves the three parallel transmission pipelines that stretch approximately 48-miles across the San Joaquin Valley from Oakdale Portal to Tesla Portal, with a partial fourth pipeline consisting of a 6.4-mile Eastern Segment and an 11-mile Western Segment. The four pipelines were built between 1932 and 2012, respectively, and range from 56- to 79.5-inches in diameter. As part of the Water System Improvement Program (WSIP), valve vaults were constructed along the SJPL System at various locations to increase operational flexibility and the overall reliability of the SJPL System. Since the commissioning of the valve vaults, Hetch Hetchy Water & Power (HHWP) has expressed concern that 1) valves may not be sufficiently rated and may fail due to a pressure transient surge event using certain operational assumptions 2) there is an inability to establish double isolation and bleed configurations along the SJPL System, resulting in insufficient protection for maintenance personnel, and 3) multiple isolation valves are not adequately rated for hydrostatic head. In order to achieve the safety and access goals, the scope is to: install a surge shaft upstream of Tesla Treatment Facility (TTF) to reduce maximum pressure from unplanned reactor valve closure and upgrade line valves to resist transient pressure from unplanned line valve closure; install new double isolation and bleed valves at all locations where major upgrades and construction are required; and retain single isolation where no upgrades are needed. There are four primary locations where major upgrades and construction are required: Emery, Roselle, Pelican, and Tesla.

Program: Water Infrastructure	**Project Status:** Multiple Phase	**Environmental Status:** Active

Project Cost:

Approved		$95.28 M
Forecast		$98.92 M
Actual		$2.28 M

Project Schedule:

Approved	Jul-19	Jul-25
Forecast	Jul-19	Mar-28

Project Percent Complete: 2.3%

Approved; Actual Cost; * Forecast Status: Meet Requirements; Need Attention; Exceed Limits

Key Milestones:	Environmental* Approval	Bid* Advertisement	Construction* NTP	Construction* Final Completion
Current Forecast	(A) 10/14/21 (B) 10/14/21 (C) 12/06/22 (D) 05/06/22	(A) 09/16/21 (B) 12/03/21 (C) 12/21/22 (D) 05/20/22	(A) 02/21/22 (B) 05/23/22 (C) 06/19/23 (D) 11/21/22	(A) 06/12/23 (B) 06/07/24 (C) 05/24/27 (D) 06/07/24

**(A) Phase 1A – Pipeline 2 Tesla & Oakdale Entry Improvements – HH-1005; (B) Phase 1B – Pipelines 3&4 Tesla & Oakdale Entry Improvements HH-1006; (C) Phase 2 -Pelican, Roselle, Emery and P4J Entry Improvements; and (D) Phase 3 - Tesla Surge Stack.*

Progress and Status:

This project is divided into four (4) sub-projects, as outlined in the above footnote:

For Phase 1A, 65% design was completed in May. The project team continued to work towards the 95% design. For Phase 1B, the design started this quarter. The design of the other two phases has not started yet.

Issues and Challenges:

The forecasted cost and schedule are greater than the approved budget and schedule due to scope refinements to improve safe entry and resequencing of construction contract schedules and scopes to better coordinate with system shutdowns in Fall/Winter to minimize the impact on water delivery.

Construction Photo of a Victaulic Cap and Coupling SJPL 1 @ Oakdale

CUH10114 - Moccasin Powerhouse and GSU Rehabilitation

Project Description: The two Moccasin Powerhouse generators were completed in 1969 and generate a combined maximum output of 110 megawatts. Both generator units have exceeded their life expectancy and are in need of repair in order to continue operating reliably. The objective of this project is to replace stator cores and coils. The scope of work also includes rehabilitation of the rotor field poles with new pole cores and re-insulated field coils, replacement of the rotor pole/rim tail connection system with a new T-tail connection system, and supply of a new rotor rim for each generator following inspection and testing. This is a design-build project and was advertised twice in 2011 and 2013. Bids were unresponsive. The project will also involve replacement of two generator step-up transformers (GSUs) with new oil containment barriers, and remaining plant work including: replacing 480V switchgear, 13.8kV switchgear, motor control centers, main control boards, protective relays, and cooling water piping.

Program: Power Infrastructure	**Project Status:** Multiple Phase	**Environmental Status:** Active

Project Cost:

Approved		$66.71 M
Forecast		$66.71 M
Actual		$3.60 M

Project Schedule:

Approved	Jan-16	Jun-24
Forecast	Jan-16	Apr-27

Project Percent Complete: 5.4%

Approved; Actual Cost; * Forecast Status: Meet Requirements; Need Attention; Exceed Limits

Key Milestones:	Environmental* Approval	Bid* Advertisement	Construction* NTP	Construction* Final Completion
Current Forecast	(A) 09/28/20✓ (B) 09/28/20✓ (C) 12/30/22	(A) 11/20/20✓ (B) 10/30/20✓ (C) 09/06/23	(A) 06/07/21✓ (B) 06/21/21✓ (C) 03/05/24	(A) 05/23/23 (B) 06/17/24 (C) 10/13/26

** (A) Moccasin Powerhouse Generator Step-Up (GSU's) Transformers HH-1003R was re-advertised on 1/14/21; (B) Moccasin Powerhouse Generators Rewind – DB-121R2; and (C) Moccasin Powerhouse Systems Upgrade.*

Progress and Status:

This project is divided into 3 sub-projects, as outlined in the above footnote.

Sub-project A: HH-1003R Moccasin Powerhouse GSU Transformer Installation was awarded to Big Valley Electric by the Commission in April. Notice to Proceed was on June 7. The submittal for the GSU design was approved in June, and fabrication will commence in July. Delivery of the first GSU is anticipated in September/October 2021 .

Sub-project B: Contract DB-121R2 Moccasin Powerhouse Generators Rewind - Negotiations for a Design Build Agreement was opened to any qualified contractor due to the inability to secure a responsive bid through advertisement. Two qualified contractors actively participated in the negotiations. General Electric Renewable LLC (GE) provided a proposal that was deemed responsive and most favorable. In May, the Commission awarded the contract to GE subject to the Board of Supervisors' (BOS) approval of negotiated non-standard indemnification terms. In June, the BOS approved the non-standard indemnification terms that had been negotiated with GE based on the City Risk Manager's recommendation. Notice to Proceed 1 (for design) was issued on June 21.

Sub-project C: Moccasin Powerhouse Systems Upgrade - Planning workshops with the project team were conducted to assess the current condition of the powerhouse systems, ongoing maintenance issues, and upgrades needed to meet regulatory and design standards. A Needs Assessment Report will be issued next quarter.

Issues and Challenges:

Sub-project A: Delay to the GSU delivery may affect the installation schedule. If the GSU cannot be delivered for installation within the scheduled first shutdown for the Mountain Tunnel Improvements Project, the project may be delayed for one year. The shop drawing and design for the GSU is anticipated to be available for review in early July.

Sub-project C: The variance between the forecasted completion date and the approved completion date is due to the extended time that was required to procure a professional services contract for planning and design.

CUH10115 - Warnerville Substation Rehabilitation

Project Description: This project is based on the need to extend the useful life of the Warnerville Substation and meet reliability requirements of NERC/WECC and PG&E Intertie Agreements. The upgrades include replacing three existing 3 phase transformer with two larger rated transformers. Other upgrades include new 115kV and 230kV disconnect switches and breakers; new Control Room, perimeter fence, relays and controls; improvement to the grading and grounding system.

Program: Power Infrastructure	**Project Status:** Construction	**Environmental Status:** Active

Project Cost:		**Project Schedule:**		
Approved	$24.31 M	Approved Sep-15		Mar-20
Forecast	$34.25 M	Forecast Sep-15		Nov-26
Actual	$21.53 M	Project Percent Complete: 84.9%		

Approved; Actual Cost; Forecast Status: Meet Requirements Need Attention Exceed Limits

Key Milestones:	**Environmental* Approval**	**Bid* Advertisement**	**Construction* NTP**	**Construction* Final Completion**
Current Forecast	(A) 03/31/16✓	(A) 01/24/17✓ (B) 06/12/24	(A) 10/05/17✓ (B) 01/31/25	(A) 12/31/21 (B) 05/25/26

** (A) Warnerville Substation Phase 1 – DB-127R; (B) Warnerville Substation Phase 2.*

Progress and Status:

Breaker Failure Contingency Plan: The project team completed the 65% design for the breaker failure contingency plan. 100% design is expected next quarter.

Warnerville Substation Rehabilitation - Phase II: The project team continued to evaluate system outages and power delivery schedules.

DB-127R Warnerville Substation Rehabilitation: The project team continued to evaluate the contractual implications due to the incompleted work.

Oil Circuit Breakers

Issues and Challenges:

The forecasted cost and schedule are higher than the approved budget and schedule due to the need to procure a design contract in order to complete plans and specifications for a construction contract to install the four remaining breakers and associated equipment that were not installed under the original design-build construction contract DB-127R.

CUH10116 - Moccasin Penstock

Project Description: The Moccasin Penstock conveys San Francisco Public Utilities Commission (SFPUC) water nearly one mile from Moccasin Tunnel to the Moccasin Powerhouse. The lower 1,084 foot section of welded steel pipe replaced the original penstocks when the new Moccasin Powerhouse was completed in the 1960s. The upper 4,000 feet of penstock dates back to 1924 and has been in service for more than 90 years. Condition assessments based on external inspection and imaging have identified a number of deficiencies along the original pipe. The 104-inch diameter (narrowing to 98-inch) riveted steel penstocks extend 1,554 feet from the downstream Moccasin Tunnel portal then bifurcate to four 66-inch diameter hammer-forged welded steel conduits extending about 2,384 feet to the lower welded steel pipe. Additionally, in September of 2018 the penstock experienced significant leakage in two separate areas, necessitating emergency repairs. This rehabilitation project is intended to enhance the reliability of the penstock system and will include: repair or replacement of some sections of corroded pipe; repair or replacement of four badly cracked concrete anchors and damaged penstock saddles; installation of new manways and a rollout pipe section to provide better access for inspection and maintenance; and recoating the outside pipe, where needed, to reduce future corrosion. The project scope was expanded to include: 1) The installation of additional penstock pipe between the valve house and the first downstream anchor; 2) The replacement of the butterfly valve pneumatic actuator with an electronic actuator, which will include new controls with SCADA connectivity; and 3) A new backup generator.

Program: Joint Infrastructure	**Project Status:** Planning	**Environmental Status:** Active

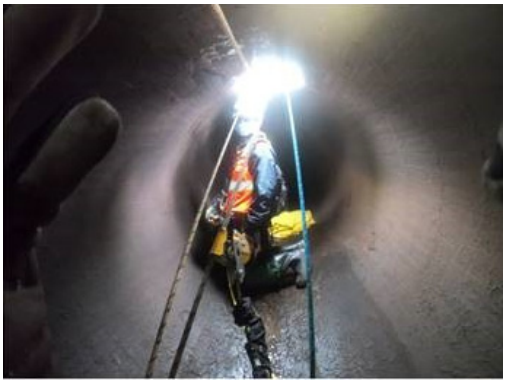
Project Cost:		**Project Schedule:**		
Approved	$13.16 M	Approved Feb-16		Dec-24
Forecast	$47.25 M	Forecast Feb-16		Feb-28
Actual	$5.08 M	Project Percent Complete: 10.8%		

Approved; Actual Cost; Forecast Status: Meet Requirements Need Attention Exceed Limits

Key Milestones:	**Environmental Approval**	**Bid Advertisement**	**Construction NTP**	**Construction Final Completion**
Current Forecast	10/07/24	10/07/24	04/15/25	08/23/27

Progress and Status:

The draft condition assessment and structural evaluation reports were completed by the project team and are under review. Comments are being addressed and the reports are anticipated to be finalized during the next reporting period.



Interior inspection rope access

Issues and Challenges:

Due to the age and vulnerability of the asset, Water Enterprise staff decided to increase the scope of work from rehabilitating one penstock to rehabilitating two penstocks. Also, the scope is expanded to include the improvement at West Portal Valve House and the isolation point at the surge tower which are upstream of the penstocks. The increase in scope resulted in an increase of the forecasted budget and later forecasted completion date.

10032903 - O'Shaughnessy Dam Outlet Works Phase I

Project Description: O'Shaughnessy Dam (OSD) was completed in 1923 and raised in 1938. Condition assessment of the dam outlet works revealed deficiencies. This rehabilitation project addresses deficiencies of the existing outlet works system at OSD, including the drum gates and release system through OSD to Canyon Tunnel and the Tuolumne River. Seven projects were identified and have been prioritized. Phase 1 will include three of these projects: drum gate rehabilitation (upgrading the hinges and rivets, recoating the gate and existing seals, and repairing the spillway concrete), installation of a new bulkhead system, and rehabilitation of slide gates & installation of a diversion pipe butterfly valve.

Program: Joint Infrastructure	**Project Status:** Planning	**Environmental Status:** Active

Project Cost:

Approved		$17.21 M
Forecast		$21.21 M
Actual		$0.72 M

Project Schedule:

Approved	Feb-18	Aug-22
Forecast	Feb-18	Sep-25

Project Percent Complete: 3.6%

Approved; Actual Cost; Forecast Status: Meet Requirements Need Attention Exceed Limits

Key Milestones:	Environmental* Approval	Bid* Advertisement	Construction* NTP	Construction* Final Completion
Current Forecast	(A) 08/25/23	(A) 05/31/22 (B) 04/14/23	(A) 12/30/22 (B) 09/15/23	(A) 03/14/25 (B) 11/29/24

** (A) Bulkheads; (B) Instream Flow Release*

Progress and Status:

Based on priorities and available funding, the scopes of work for multiple projects at the O'Shaughnessy Dam were re-evaluated and scope changes are forecasted for this project. Replacement of the damaged existing instream flow release (IFR) valves was deemed critical and moved from the later Phase 2 project to this Phase 1 scope. Also, some of the improvements for safe access by personnel and for drainage reduction in the dam gallery were removed from the O'Shaughnessy Dam Access and Drainage scope and will be added to this Phase 1 scope. The current approved Phase 1 scope for refurbishment of the existing slide gates, rehabilitation of the drum gates, and installation of a new diversion pipe isolation valve are being considered for deferment to Phase 2 due to limitation in available funding for Phase 1. The current project forecasted budget and schedule include scope for installation of new bulkheads (original scope), replacement of the IFR valves, installation of safe access and drainage improvements, and funding for the planning phase for the drum gates and slide gates refurbishment.

During this quarter, the Conceptual Engineering Report was revised to address this modified scope. Additionally, during the quarter, work began on Planning for the IFR Valve Replacement Project.

Discharge from the Instream Flow Release Valve

Issues and Challenges:

The current planning-level design and construction cost estimates are higher than the approved budget due to the additional forecasted scope from the IFR Valves Replacement and the dam gallery access and drainage improvements, and the higher level of detail included in the most recent construction cost estimate for installation of the new bulkhead system. The schedule forecast for installation of the new bulkhead system has been likewise extended to allow time for additional inspections, underwater modification of the existing slots and corroded inlet surfaces, and installation of the bulkheads using divers. Based on the changes to Phase 1 scope discussed above, the project team has forecast that the Phase 1 construction will now be completed under multiple contracts, and the final subproject of Phase 1 will be completed in late 2025.

CUH10223 - OSH Dam Access and Drainage Improvements

Project Description: The key objective of this project is to provide safe access for Hetch Hetchy Water and Power operators inside the O'Shaughnessy Dam by improving fall protection, access, and drainage. The key elements include:

• Replace Access Structures in Ladder Wells. The existing access structures in the four (4) vertical ladder wells (shafts) include vertical ladders and horizontal grating platforms that are spaced throughout the ladder wells.

• Install Fall Protection Systems. Install new Occupational Safety and Health Administration (OSHA)"compliant ladders and landings with safety cage and/or install fall restraint systems.

• Seal or Mitigate Existing Leakage. Address flowing water by sealing leaks or otherwise diverting, collecting and disposing of flows.

• Drainage Improvements. Clear the drains in the dam so that water can drain as designed and/or install sump pumps, if appropriate.

• Replace Watertight Door between Ladder Wells 3 & 4. This scope item includes replacing the existing watertight door between Ladder Wells 3 & 4.

Program: Joint Infrastructure	**Project Status:** Bid and Award	**Environmental Status:** Completed (CatEx)

Project Cost:

Approved	$5.83 M
Forecast	$3.95 M
Actual	$0.99 M

Project Schedule:

Approved	Mar-17	Feb-21
Forecast	Mar-17	Feb-23

Project Percent Complete: 25.0%

Approved; Actual Cost; Forecast Status: Meet Requirements Need Attention Exceed Limits

Key Milestones:	Environmental Approval	Bid Advertisement	Construction NTP	Construction Final Completion
Current Forecast	07/16/20✓	03/18/21✓	10/01/21	08/29/22

Progress and Status:

Three bids were received in April for the construction contract that had been reduced in scope and rebid. On May 11, by Resolution No. 21-0087, the Commission awarded the construction contract to Mountain Cascade. Notice to Proceed is expected in early October 2021.

Issues and Challenges:

The forecast cost is less than the approved budget due to a reduction in the scope of work; scope was transferred to the O'Shaughnessy Dam Outlet Works Phase 1 project. The forecast schedule is longer than the approved schedule due to contracting delays, added complexity of the remaining scope, and the need to revise the construction contract documents with the reduced scope and to rebid.

Inclined Stairway OSH Dam

CUH10221 - Mountain Tunnel Improvement Project

Project Description: Mountain Tunnel conveys the SFPUC water supply from Kirkwood Powerhouse to Priest Reservoir. Mountain Tunnel has been in service since 1925. Due to its age, deferred maintenance, and construction deficiencies in the early 1900s, sections of the tunnel lining have deteriorated, some extensively. This project provides for design and construction of an engineering alternative that will keep this vital component of the Hetch Hetchy Water and Power System in reliable service for years to come.
Up until 2016, the scope consisted of just the Planning Phase for the project. The primary focus was on the development of viable alternatives for the project including rehabilitation or relining the existing tunnel or construction of a new tunnel.
In 2017, the City adopted the rehabilitation alternative as the preferred project for design and construction. The rehabilitation option met almost all of the project performance standards with the least cost. The project consists of tunnel lining repairs, contact grouting, downstream flow control valving, a new tunnel adit at Priest Reservoir, a South Fork Siphon extension tunnel, access road widening and tunnel access improvements, and environmental mitigations, and site restoration.

Program: Joint Infrastructure	**Project Status:** Construction	**Environmental Status:** Completed

Project Cost:

Approved	$238.22 M
Forecast	$238.22 M
Actual	$32.06 M

Project Schedule:

Approved	Oct-11	Dec-26
Forecast	Oct-11	Jun-27

Project Percent Complete: 13.5%

Approved; Actual Cost; Forecast Status: Meet Requirements Need Attention Exceed Limits

Key Milestones:	Environmental Approval	Bid Advertisement	Construction NTP	Construction Final Completion
Current Forecast	01/14/20✓	11/13/19✓	01/29/21✓	12/03/26

Progress and Status:

Mountain Tunnel Improvement Project HH-1000R: 4th quarter progress to date included obtaining approvals for submittals for the ongoing and future work, setting up multiple site specific offices and staging areas, mobilization of equipment, including the crane that will be used for excavating and constructing the Flow Control Facility (FCF) shaft, creating large scale excavation disposal areas at Priest Reservoir, and beginning the mass excavation and retaining wall construction around the Priest Reservoir FCF shaft site. Excavation work has also begun for the retaining walls that will support the excavation pit for the Priest Reservoir tunnel adit. It is expected that large scale FCF shaft excavation and Priest Reservoir tunnel adit excavation will be in full construction at the beginning of FY2021-2022. Safety improvement work continued during the quarter for site access roads. Planning and coordination is taking place for the project's first planned tunnel outage in January 2022.

Priest Spoils Disposal Site Development underway

Issues and Challenges:

The Schedule Variance between the current forecast and the approved schedule is due to having had to re-bid the project and also due to COVID 19 challenges.

The project team is working with the contractor to close this schedule variance gap by having the contractor perform a time impact analysis. This analysis will be used by the project team to manage and prevent delays that might impact critical work. Some management options being evaluated include the use of twelve hour work shifts, the use of two ten hour shifts for critical work, and the addition of an eight hour Saturday maintenance shift.

10035086 - Bridge Replacement (4 - Bridges)

Project Description: HHWP is responsible for maintaining 14 bridges located in the Cherry, Eleanor, and Hetch Hetchy region. Condition assessment has identified the need for rehabilitation and/or replacement (both due to age and to meet current seismic design criteria). Four of the fourteen bridges require substantial modification or replacement and have been combined into this project. This project includes rehabilitation and/or replacement of Cherry Lake Road Bridge (public access), Early Intake Bridge (public access), O'Shaughnessy Adit Access Bridge, and Lake Eleanor Dam Bridge.

Program: Joint Infrastructure	**Project Status:** Planning	**Environmental Status:** Not Initiated

Project Cost:

Approved		$44.29 M
Forecast		$44.29 M
Actual		$0.71 M

Project Schedule:

Approved Jul-19		Dec-25
Forecast Feb-20		May-37

Project Percent Complete: 1.6%

Approved; Actual Cost; Forecast Status: Meet Requirements Need Attention Exceed Limits

Key Milestones:	Environmental* Approval	Bid* Advertisement	Construction* NTP	Construction* Final Completion
Current Forecast	(A) 02/27/23 (B) 06/28/24	(A) 08/01/23 (B) 07/31/24	(A) 01/31/24 (B) 02/03/25	(A) 03/09/26 (B) 03/09/27

** (A) Lake Eleanor Dam Bridge; and (B) O'Shaughnessy Adit Access Bridge.*

*** The forecasted May-2037 project completion is for the two remaining bridges and assumes that additional funding is available in 2031.*

Progress and Status:

For the O'Shaughnessy Adit Access Bridge, the topographic survey and seismic refraction study were completed during the quarter. For Lake Eleanor Dam Bridge, the planning phase and alternative analysis for rehabilitation of the existing bridge began in this quarter. The project team completed the document review, site visit, and evaluation of criteria.

Lake Eleanor Dam Bridge

Issues and Challenges:

The variance between the approved schedule and forecasted completion date is based on the deferment of funding for two of the four bridges until 2031 (with planned completion in 2037).

7. On-Going Construction*

The following table reflects active construction contract(s) with an original contract amount greater than $1M.

Construction Contract	Schedule			Budget		Variance (Original - Forecast)		Actual % Complete
	NTP Date	Approved Construction Final Completion	Current Forecast Construction Final Completion*	Approved Contract Cost	Current Forecast Cost*	Schedule (Cal. Days)	Current Forecast Cost	
Power Infrastructure								
CUH101-14.001 Moccasin Powerhouse Generator Rehab - DB-121R2	06/21/21	06/17/24	06/17/24	$ 28,898,986	$ 28,898,986	-	-	0.0%
CUH101-14.001 Moccasin Powerhouse Transformers Installation - H-1003R	06/07/21	05/23/23	05/23/23	$ 3,653,575	$ 3,653,575	-	-	0.0%
CUH101-15.001 Warnerville Switchyard - DB-127R **	10/05/17	07/09/19	12/31/21	$ 14,591,450	$ 14,591,450	(906)	-	90.0%
Joint Infrastructure								
CUH102-21.001 Mountain Tunnel Improvement - H-1000R	01/29/21	12/03/26	12/03/26	$ 152,870,508	$ 152,870,508	-	-	2.4%

Program Total for On-Going Construction	Approved Contract Cost	Current Forecast Cost*	Variance	
			Cost	Percent
	$ 200,014,519	**$ 200,014,519**	**$-**	**- %**

Note:

* The Current Forecast Cost and Current Forecast Construction Final Completion include all approved, pending, and potential change orders.

** The contract is funded with both CIP and non-CIP funds, but only the CIP funded amount is reflected.

8. PROJECTS IN CLOSE-OUT

Project Title	Current Approved Construction Phase Completion	Actual Construction Phase Completion	Current Approved Construction Phase Budget	Construction Phase Expenditures To Date*
Water Infrastructure				
Dams & Reservoirs				
10033156 - Moccasin Reservoir Perimeter Security Fence	10/30/20	03/17/21	$ 3,135,031	$ 1,626,886
Power Infrastructure				
Powerhouse				
CUH10102 - Holm and Other Powerhouse Projects	09/03/19	05/14/21	$ 21,042,058	$ 12,872,280
2018 Moccasin Storm Event				
2018 Moccasin Storm Event				
10033233 - 2018 March Storm Event Emergency Repairs and Interim Improvements (Water-Only Assets)	11/27/19	04/20/20	$ 11,454,122	$ 13,712,568
TOTAL			$ 35,631,211	$ 28,211,734

** It should be noted that this report does not include all phase-level expenditures that have been accrued for work completed due to challenges associated with the migration of the City financial system from FAMIS to PeopleSoft.*

9. COMPLETED PROJECTS

Project Title	Approved Project Completion	Actual Project Completion	Approved Project Budget	Project Expenditures To Date
Water Infrastructure				
Water Conveyance (Water)				
CUH10001-HCIP - SJPL Rehabilitation	12/31/18	02/28/19	$ 5,370,000	$ 4,622,228
CUH10003 - Lower Cherry Aqueduct	01/31/20	04/30/21	$ 18,515,315	$ 12,486,246
Power Infrastructure				
Switchyard & Substations (Power)				
CUH10119 - Early Intake Switchyard Slope Hazard Mitigation	09/30/20	09/30/20	$ 5,533,855	$ 2,175,083
Water Conveyance (Power)				
CUH10113 - Kirkwood Penstock	06/28/19	04/30/21	$ 4,647,523	$ 2,826,822
Joint Infrastructure				
Buildings (Joint)				
CUH10214 - Moccasin Facilities New Construction	06/28/19	04/30/21	$ 20,839,420	$ 19,504,642
Dams & Reservoirs (Joint)				
CUH10216 - Cherry Dam Outlet Works Rehabilitation	06/28/19	06/30/20	$ 10,382,439	$ 8,907,636
Mountain Tunnel				
CUH10220 - Mountain Tunnel Inspection & Repairs (completed)	12/31/19	12/02/19	$ 23,500,000	$ 21,508,468
TOTAL			$ 88,788,552	$ 72,031,125

10. PROJECTS WITHIN BUDGET AND SCHEDULE

10035574 - SJPL Tesla Valves Replacement

Project Description: This project intends to replace all the inline valves that are under-rated for pressure, Tesla Ultra Violet (TUV) 101 to 401, with properly rated valves to improve safety and entry into all four (4) San Joaquin Pipelines (SJPL). In addition, all cross- over valves and bypass valves may need to be replaced or made safe. Modification to the pipes, flanges, spool pieces, actuators, and valve controls are needed. The valve vault will need modification to accommodate the new valves. New facilities may need to be constructed if additional new valves are not designed for direct burial.

Program: Water Conveyance (Water)	**Project Status:** Construction	**Environmental Status:** Completed

Project Cost:

Approved	$7.38 M
Forecast	$3.74 M
Actual	$0.97 M

Project Schedule:

Approved	Jan-20	Jun-24
Forecast	May-19	Dec-22

Project Percent Complete: 26.0%

Approved; Actual Cost; Forecast Status: Meet Requirements Need Attention Exceed Limits

Key Milestones:	Environmental Approval	Bid Advertisement	Construction NTP	Construction Final Completion
Current Forecast	08/26/20✓	N/A	04/06/21✓	05/31/22

Progress and Status:

This project is divided into 2 sub-projects: A) the pre-purchase and installation of Tesla Valve TUV-101; B) the procurement and installation Tesla Valves TUV-201, TUV-301 & TUV-401.

Subproject A: For the purchase order, the submittals for a 66-inch butterfly valve and actuator were reviewed and approved. The vendor started production of the valve and the actuator in June. For valve and actuator installation, the Job Order Contract (JOC) task order cost proposal was finalized and the Notice to Proceed (NTP) was issued in April. The JOC contractor has been working on the submittals during the quarter.

Subproject B: The procurement and installation of the remaining valves TUV 201, 301, and 401 will follow the traditional design-bid-build project delivery method. To optimize the construction and reduce impact on water delivery, the scope and budget for the improvements to TUV201, 301 and 401 will transfer out of this project and become a part of the SJPL Valve and Safe Entry Improvement project. This change will be included in the next 10-year capital plan.

Picture of TUV101 66" BFV @Tesla Valve House TUV101 Valve Replacement

Issues and Challenges:

The variances between the approved schedule and budget and the forecasted schedule and cost are in anticipation of scope and budget to be transferred to the SJPL Valve and Safe Entry Improvement project.

I.B. HETCHY RENEWAL AND REPLACEMENT PROGRAM (R&R)

1. PROGRAM DESCRIPTION

The Hetchy Renewal and Replacement (R&R) Program is an ongoing annual program that addresses deficiencies in three areas: Water Infrastructure, Power Infrastructure, and Joint Infrastructure. The Water program includes only asset improvements benefiting the SFPUC's water customers. The Power program includes only asset improvements used to generate environmentally friendly hydroelectric energy. The Joint program includes projects for assets that are used for both water and power delivery. The objective of the R&R Program is to meet level of service goals and objectives, to ensure regulatory permit compliance, to obtain system reliability and functionality, and to continue sustainable operation of the system.

The R&R Program consists of a series of projects specifically developed to address the needs of an aging infrastructure associated with the Hetch Hetchy Water and Power System. The projects are designed to better the system through inspections, assessments, protective and corrective measures, and routine equipment replacement. Due to the nature of these ongoing projects that are funded on an annual basis, progress is measured by achievement of short-term goals. These goals are discussed in further detail in Section I.B.10, and are referred to as Planned Milestones for the Reporting Quarter (goals that are expected to be achieved during the quarter), Status of Planned Milestones for the Reporting Quarter (progress made in achieving these goals), and Planned Milestones for the Subsequent Quarter (goals for the upcoming quarter).

2. PROGRAM STATUS

This Quarterly Report presents the progress made on the R&R projects between April 1, 2021 and June 30, 2021. The data reported herein as the "approved" project budget and schedule conforms to the most recent annual update of the Hetch Hetchy 10-Year CIP for FY2019-2028, which was approved by the Water and Power Enterprise Managers and adopted by the Public Utilities Commission on February 13, 2018. The 10-Year CIP for FY2019-2028 re-prioritizes the R&R program by defunding several projects that were determined to be lower priority, and re-allocating a portion of the funding to projects determined to be higher priority. Overall, this constituted an increase of $85.75M in the program budget, from $227.05M in FY2017-2026 to $312.08M. The project budget and schedule were developed and approved based on the project team's best assessment HHWP's infrastructure needs at the time. It should be noted that the project team continues the process of re-validating these earlier assessments.

Figures 2.1 to 2.3 show the total number of subprojects remaining in each phase of the R&R Water, Power, and Joint Infrastructure programs as of June 30, 2021. As reported in previous quarters, the following CUH10001 – SJPL Rehabilitation subprojects were removed from the R&R program and included in the Hetch Hetchy Capital Improvement Programs 2018 Proposed Baseline with a budget of $5.37M (it should be noted that these subprojects have been subsequently completed under the HCIP Program:

CUH10001 – SJPL Rehabilitation
- CUH10001.011 – SJPL No. 1 Replacement at Cashman Creek
- CUH10001.018 – SJPL No. 1 Replacement at SJVH
- CUH10001.022 – Tesla Valves Replacement

The remaining subprojects under project CUH10001 will continue to be reported under the R&R Program. The CUH10001 approved budget, expenditures to date, and current forecast cost have been reduced to reflect the transfer of the three subprojects to the HCIP program.

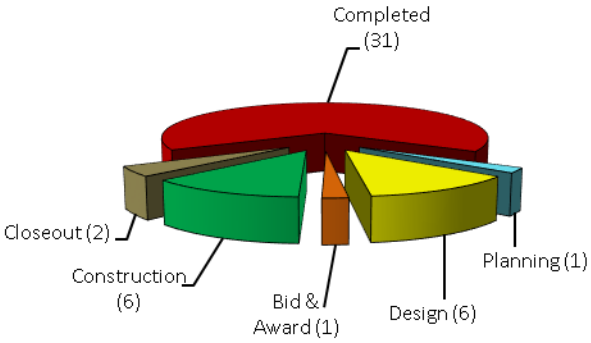


Figure 2.1 Total Number of Water Infrastructure Sub-Projects in R&R Program

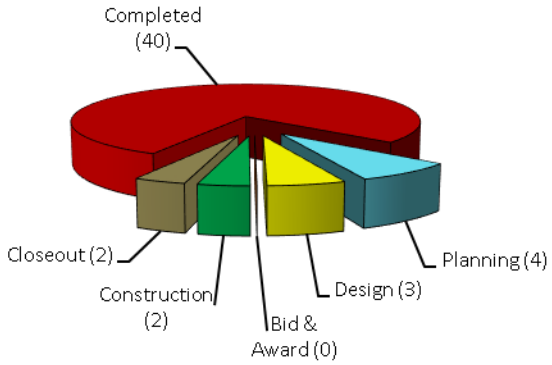


Figure 2.2 Total Number of Power Infrastructure Sub-Projects in R&R Program

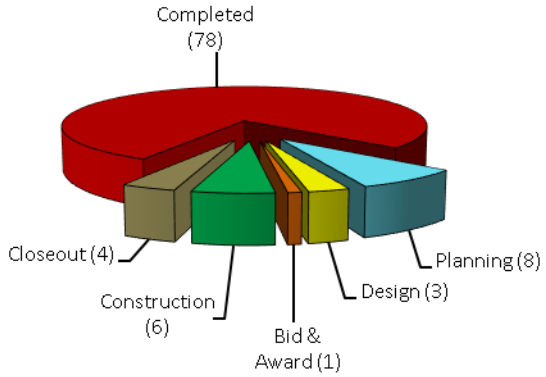


Figure 2.3 Total Number of Joint Infrastructure Sub-Projects in R&R Program

3. PROGRAM COST SUMMARY

Table 3.1 provides an overall current program level cost summary of the R&R Program included in this report. It shows the Expenditures to Date, Approved Budget, Current Forecast Cost, and Cost Variance between Approved Budget and Current Forecast Cost. There were no adjustments to the Approved Budget or Current Forecast Cost during the quarter.

Table 3.1 Program Cost Summary

	Expenditures to Date ($ Million) (A)	**Approved Budget** ($ Million)** (B)	**Current Forecast Cost ($ Million)** (C)	**Cost Variance ($ Million)** (D = B - C)
Water Infrastructure	$19.38	$115.70	$115.70	-
Power Infrastructure	$39.59	$89.51	$89.51	-
Joint Infrastructure	$45.04	$106.88	$106.88	-
Hetchy R&R Program Total*	**$104.00**	**$312.08**	**$312.08**	**-**

**The program total values include completed, not-initiated, and on-hold projects.*
***The approved budget includes the 10-Year CIP Plan, as well as the previous fiscal year's appropriated budget*

4. PROGRAM SCHEDULE SUMMARY

Figure 4.1 compares the 2018 Approved Schedule and Current Forecast Schedule for the R&R program. Refer to the "Cost and Schedule Status" notes in Section 5 for the criteria associated with the three color-coded Forecast Status levels in Figure 4.1 – Meet Requirements, Need Attention, and Exceed Limits.

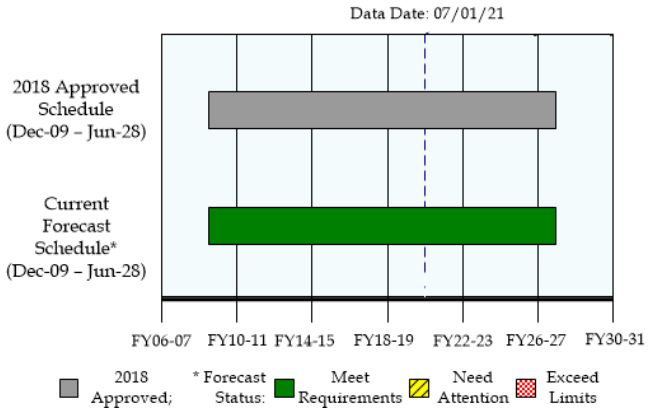


Figure 4.1 R&R Program Schedule Summary

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5. PROJECT PERFORMANCE SUMMARY*

All costs are shown in $1,000s as of 07/01/21

Project Name	Active Phase (**)	Approved Budget (a)	Current Forecast Cost (b)	Expenditures To Date (c)	Cost Variance (d= a - b)	Cost Status (+)	Approved Completion (e)	Current Forecast Completion (f)	Schedule Variance (g = e - f)	Schedule Status (+)	Project Data Sheet
Water Infrastructure											
CUH100 - Water Infrastructure	MP	$ 115,698	$ 115,698	$ 19,380	-	★	06/30/28	06/30/28	-	★	See Section 10
Power Infrastructure											
CUH101 - Power Infrastructure	MP	$ 89,509	$ 89,509	$ 39,585	-	★	06/30/28	06/30/28	-	★	See Section 10
Joint Infrastructure											
CUH102 - Joint Infrastructure	MP	$ 106,875	$ 106,875	$ 45,039	-	★	06/30/28	06/30/28	-	★	See Section 10

* Exclude projects in closeout, completed, not initiated, on hold, deleted projects, and projects combined with other projects.

**** Phase Status Legend**

PL Planning DS Design

BA Bid & Award CN Construction MP Multiple-Phase

+ Cost and Schedule Status

★ Meet Requirements: Forecast Cost/Schedule is within Approved Budget/Schedule.

⚠ Need Attention: Forecast Cost is over Current Approved Budget by greater than 1% and less than 10%. Or Forecast Schedule is over Current Approved Schedule by greater than 2 months and less than 6 months and less than 10%.

● Exceed Limits: Forecast Cost is over Current Approved Budget by 10% or more. Or Forecast Schedule is over Current Approved Schedule by greater than 6 month or 10% or more.

6. PROGRAMS NOT WITHIN BUDGET AND/OR SCHEDULE

All programs are within the current approved budget and schedule.

7. ON-GOING CONSTRUCTION

There are no active construction projects with a construction contract amount greater than $1 million.

8. PROGRAMS IN CLOSE-OUT

No program is currently in close-out.

9. COMPLETED PROJECTS

Project Title	Approved Project Completion	Actual Project Completion	Approved Project Budget	Project Expenditures To Date
Water Infrastructure				
CUH10005 - Priest Pipe Recoating	06/30/18	06/30/18	$ 39,407	$ 38,368
CUH10006 - Moccasin Gate No. 3 Shaft Replacement and Automation	12/31/18	12/31/18	$ 1,049,557	$ 133,278
Power Infrastructure				
CUH10103 - Powerhouse Control Upgrade	07/31/15	07/31/15	$ 1,724,231	$ 1,724,231
CUH10108 - Step-Up Transformers	04/04/17	04/04/17	$ 221,995	$ 182,525
CUH10109 - Moccasin Low Head Rehabilitation Project	05/31/18	05/31/18	$ 619,140	$ 568,367
CUH10111 - Moccasin GSU Transformers & Oil Containment	02/27/15	02/27/15	$ 84,343	$ 82,369
CUH10112 - Kirkwood Powerhouse Refurbishment & TSOV	06/30/17	06/30/17	$ 62,177	$ 47,473
CUH10118 - Kirkwood PH Valve Dissipation	06/30/17	06/30/17	$ 810,613	$ 718,117
Joint Infrastructure				
CUH10205 - Small Water Systems Upgrades	06/30/14	06/30/14	$ 1,922,482	$ 1,922,482
CUH10207 - Existing Hetchy Facilities (Outside Moccasin)	11/02/18	11/02/18	$ 1,588,814	$ 1,231,168
CUH10208 - Remote Terminal Unit Replacement	09/28/18	09/28/18	$ 1,648,985	$ 1,134,513
CUH10210 - Hetchy Fiber Projects	05/29/15	05/29/15	$ 167,531	$ 115,621
TOTAL			$ 9,939,275	$ 7,898,512

10. PROGRAMS WITHIN BUDGET AND SCHEDULE

CUH100 - Water Infrastructure

Program Description: The purpose of the Hetchy R&R Water Infrastructure Program is to extend the useful life of the water conveyance facility assets including tunnels and pipelines. The R&R projects are prioritized based upon regulatory compliance, condition assessment, operation staff recommendations, and level of service goals.

Program: Water Infrastructure	**Program Status:** Multiple Phase	**Environmental Status:** Active (Various)

Program Cost:

Approved	$115.70 M
Forecast	$115.70 M
Actual	$19.38 M

Program Schedule:

Approved	Nov-10	Jun-28
Forecast	Nov-10	Jun-28

Program Percent Complete: 30.2%

Approved; Actual Cost; * Forecast Status: Meet Requirements Need Attention Exceed Limits

Key Milestones:	**Environmental Approval**	**Bid Advertisement**	**Construction NTP**	**Construction Final Completion**
Current Forecast	Various	Various	Various	Various

Progress and Status:

The CUH100 breakdown below shows the number of subprojects according to their status and / or active phase during this reporting period. Start dates for each subproject are included in parentheses. Currently there are 47 subprojects.

Planning: 1 subproject

•10034364.007 SJPL No 1 Alternatives Analysis Report (December 02, 2019)

Design: 6 subprojects

•J100-01.019 San Joaquin Pipeline System Wide Testing (April 01, 2015)

•J100-01.038 SJPL Improvement at Claratina Crossing (February 01, 2018)

•J100-01.021 SJPL Isolation Assessment and Valve Replacement (April 01, 2015)

•J100-05.001 Priest Outlet 24 (inch) Pipe Recoating (February 03, 2014)

•10034364.002 Foothill Tunnel Lining Repair at Oakdale Portal (October 02, 2019)

•10034364.006 Oakdale Portal Standpipe and Anchors System Repairs (December 02, 2019)

Bid and Award:1 subproject

•10034364.005 SJPL No 4 Oakdale Portal Flowmeter Replacement (September 03, 2019)

Construction: 6 subprojects

•J100-01.031 San Joaquin Pipeline No 1 East of River Road Damage Assessment (December 01, 2016)

•J100-01.033 SJPL No 1 Oakdale Portal to Emery Inspection and Repair (September 01, 2017)

•10034364.001 SJPL No 1 Oakdale Portal and Tesla Roll Out Installation (December 14, 2018)

•10034364.003 SJPL No 1 Pipe Replacement 2020 Outage (September 03, 2019)

•10034364.004 SJPL No 1 Air Guard and Blow-off Valve Replacement (October 01, 2019)

•10034364.008 San Joaquin Pipeline No.1 Pipe Replacement - Mile Post 91 (May 12, 2020)

Closeout: 2 subprojects

•J100-01.010 Rankin Property Acquisition (April 01, 2013)

•10034520.001 Moccasin Dam and Outlet Works (September 02, 2019)

Completed: 31 subprojects

Planned Milestones for Reporting Quarter:

Complete Closeout: Two subprojects 100-01.035 and 100-01.036 closed this quarter.

Status of Milestones for Reporting Quarter:

One subproject moved from Planning to Design, One subproject moved from Design to Bid and Award, and one subproject moved from Planning to Construction and two subprojects moved from Bid and Award to Construction. One subproject moved from Planning to Closeout.

Planned Milestones for Subsequent Quarter:

Complete Closeout: 1 subproject

Start Planning: 1 subproject

Issues and Challenges:

No new issues or challenges at this time.

CUH101 - Power Infrastructure

Program Description: The purpose of the Hetchy R&R Power Infrastructure Program is to extend the useful life of the power generation facility assets including powerhouse, switchyards, power distribution towers, and electrical distribution lines. The R&R projects are prioritized based upon regulatory compliance, condition assessments, Operations staff recommendations, and level of service goals.

Program: Power Infrastructure	**Program Status:** Multiple Phase	**Environmental Status:** Active (Various)

Program Cost:		**Program Schedule:**	
Approved	$89.51 M	Approved Dec-09	Jun-28
Forecast	$89.51 M	Forecast Dec-09	Jun-28
Actual	$39.59 M	Program Percent Complete: 48.7%	

Approved; Actual Cost; * Forecast Status: Meet Requirements Need Attention Exceed Limits

Key Milestones:	**Environmental Approval**	**Bid Advertisement**	**Construction NTP**	**Construction Final Completion**
Current Forecast	Various	Various	Various	Various

Progress and Status:

The CUH101 breakdown below shows the number of subprojects according to their status and / or active phase during this reporting period. Start dates for each subproject are included in parentheses. Currently there are 51 subprojects.

Planning: 4 subprojects

•101-18.002 Kirkwood PH Bypass Interim Repairs (November 01, 2019)

•10036104.001 Modicon Quantum Programmable Logic Controller Upgrade to M580 (March 02, 2020)

•10036104.002 Moccasin Low Head Powerhouse Exterior and Interior Repairs (March 02, 2020)

•10036265.001 Riverbank Transmission Line Service Extension (February 10, 2020)

Design: 3 subprojects

•101-18.004 Critical Spare Procurement for Kirkwood Powerhouse Energy Dissipation Cone (August 31, 2020)

•10036104.003 Moccasin Powerhouse Gates and Valves Automation (April 02, 2020)

•10036265.002 Warnerville and Early Intake Switchyard Control Room Roof Replacements (April 13, 2020)

Construction: 2 subprojects

•101-01.021 Moccasin Switchyard Isolation Transformer Protection (September 01, 2016)

•101-17.003 Transmission Line Clearance Mitigation Project (July 03, 2017)

Closeout: 2 subprojects

•10034521.001 Moccasin Powerhouse Gantry Crane Upgrade (October 01, 2019)

•101-01.013 HPH/KPH Ridge Line Transformer Protection (October 04, 2012)

Completed : 40 subprojects

Generator Shaft at Moccasin Powerhouse

Planned Milestones for Reporting Quarter:

Complete closeout: No subprojects closed this quarter.

Status of Milestones for Reporting Quarter:

One (1) new subproject started this quarter and is already in design, 101-18.004. One (1) subproject moved from planning to design. One (1) subproject moved from planning to closeout this quarter. One (1) subproject moved from design to construction.

Planned Milestones for Subsequent Quarter:

Complete closeout of one (1) project.

Issues and Challenges:

No new issues or challenges at this time.

CUH102 - Joint Infrastructure

Program Description: The purpose of the Hetchy R&R Joint Infrastructure Program is to extend the useful life of the joint-facilities assets including dams, roads, communication systems, wastewater treatment facilities, cottages, and operational yard facilities. The R&R projects are prioritized based upon regulatory compliance, condition assessments, and Operations staff recommendations.

Program: Joint Infrastructure	**Program Status:** Multiple Phase	**Environmental Status:** Active (Various)

Program Cost:

Approved	$106.88 M
Forecast	$106.88 M
Actual	$45.04 M

Program Schedule:

Approved	Nov-10	Jun-28
Forecast	Nov-10	Jun-28

Program Percent Complete: 36.4%

Approved; Actual Cost; * Forecast Status: Meet Requirements Need Attention Exceed Limits

Key Milestones:	Environmental Approval	Bid Advertisement	Construction NTP	Construction Final Completion
Current Forecast	Various	Various	Various	Various

Progress and Status:

The CUH102 breakdown below shows the number of subprojects according to their status and / or active phase during this reporting period. Start dates for each subproject are included in parentheses. Currently there are 100 subprojects.

Planning: 8 subprojects

•102-03.011 Early Intake Dam Stability and Spillway Repairs (June 20, 2013)

•102-08.001 KPH Unit 3 Remote Terminal Unit (RTU) Replacement and PLC Stop Logic Implementation (June 20, 2013)

•102-09.016 Yosemite Park Hetch Hetchy Road Guard Rail Improvements (January 01, 2015)

•102-09.018 Hetch Hetchy Roads FY 2019-2020 (August 01, 2019)

•102-11.007 Rock River and Microwave Sites Physical Security Upgrade (September 23, 2019)

•10034501.002 Distribution PRC 4292 Equipment Replacement (November 01, 2019)

•10034501.004 Overhead Electrical Distribution Line (March 16, 2020)

•102-13.005 Moccasin Peak Communication Building Air Conditioner Replacement (May 04, 2020)

Design: 3 subprojects

•102-02.006 Moccasin Sewer Pond Upgrade (November 01, 2012)

•102-03.010 O'Shaughnessy Dam Spillway Condition Assessment (September 01, 2017)

•10034501.001 Cherry Ridgeline Transformer Rehabilitation (April 01, 2019)

Bid and Award: 1 subproject

•10034501.003 Cherry Camp Power System Upgrade (December 15, 2019)

Construction: 6 subprojects

•102-01.005 Upcountry Microwave Improvement (March 09, 2017)

•102-02.025 Moccasin Village and Shops Transformers (April 03, 2017)

•102-09.010 Small Bridge Improvement Project (January 15, 2016)

•102-09.012 Kearny Lateral Crossing (August 08, 2016)

•102-11.005 Security Upgrade for Mixed Facilities (March 27, 2017)

•102-02.028 Early Cottage No 1, 2, 3, & 4 Roof Replacement (November 01, 2019)

Closeout: 4 subprojects

•102-02.019 Moccasin Control and Server Building Boiler Work (March 01, 2016)

•102-03.005 Cherry Dam Condition Assessment (February 03, 2014)

•102-09.008 Road and Bridge Improvement (July 06, 2015)

•102-09.014 Cherry Lake Road Guardrail C-3 and 4 (May 01, 2017)

Completed : 78 subprojects

Planned Milestones for Reporting Quarter:

Complete Closeout of one (1) subproject.

Status of Milestones for Reporting Quarter:

One (1) subproject closed: 102-13.004 Duckwall Communication Site Power System Repair. One (1) new subproject moved from Planning to Design. One (1) subproject moved from Design to Bid and Award. One (1) subproject moved from Bid and Award to Construction. One (1) subproject moved from Design to Construction. One (1) subproject completed this quarter.

Planned Milestones for Subsequent Quarter:

Complete Closeout of one (1) subproject.

Issues and Challenges:

No new issues or challenges at this time.

APPENDICES

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APPENDIX A. PROJECT DESCRIPTIONS

A1-A HETCHY CAPITAL IMPROVEMENT PROJECTS (HCIP)

WATER INFRASTRUCTURE

CUH10001-HCIP - San Joaquin Pipeline Rehabilitation (Completed)
The purpose of the San Joaquin Pipeline Rehabilitation (SJPL) is to extend the useful life of these water conveyance facility assets, including tunnels and pipelines. Baseline dates and budgets for the subprojects below were presented to and approved by the Commission on 09/08/15. Since they are now considered to be active HCIP subprojects, they have been moved from CUH100 R&R.

CUH10003 - Lower Cherry Aqueduct (Completed)
The Lower Cherry Aqueduct (LCA) delivers water from Cherry Creek to supplement the primary Hetch Hetchy reservoir supply during a drought year. Due to current drought conditions, as described in the Declaration of Emergency issued on February 21, 2014, there is a need for this reliable backup water supply to be re-established in the LCA. However, due to damage during the Rim Fire Emergency and age, the LCA is in need of restoration before it can become a reliable asset. This project consists of improvements such as emergency debris removal and tunnel cleaning, temporary structures installation, monitoring and instrumentation, and forebay and diversion dam repairs.

10035574 - SJPL Tesla Valves Replacement
This project intends to replace all the under rated inline valves, Tesla Ultra Violet (TUV) 101 to 401, with properly rated valves to improve safety and entry into all 4 San Joaquin Pipelines (SJPL). In addition, all cross- over valves and bypass valves may need to be replaced or made safe. Modification to the pipes, flanges, spool pieces, actuators, and valve controls are needed. The valve vault will need modification to accommodate the new valves. New facilities may need to be constructed if additional new valves are not designed for direct burial.

10035575 - SJPL Valve and Safe Entry Improvement
The San Joaquin Pipeline (SJPL) Entry Assessment and Valve Improvement Project involves the three parallel transmission pipelines that stretch approximately 48-miles across the San Joaquin Valley from Oakdale Portal to Tesla Portal, with a partial fourth pipeline consisting of a 6.4-mile Eastern Segment and an 11-mile Western Segment. The four pipelines were built between 1932 and 2012, respectively, and range from 56- to 79.5-inches in diameter. As part of the Water System Improvement Program (WSIP), valve vaults were constructed along the SJPL System at various locations to increase operational flexibility and the overall reliability of the SJPL System. Since the commissioning of the valve vaults, Hetch Hetchy Water & Power (HHWP) has expressed concern that 1) valves may not be sufficiently rated and may fail due to a pressure transient surge event using certain operational assumptions 2) there is an inability to establish double isolation and bleed configurations along the SJPL System, resulting in insufficient protection for maintenance personnel, and 3) multiple isolation valves are not adequately rated for hydrostatic head. In order to achieve the safety and access goals, the scope is to: install a surge shaft upstream of Tesla Treatment Facility (TTF) to reduce maximum pressure from unplanned reactor valve closure and upgrade line valves to resist transient pressure from unplanned line valve closure; install new double isolation and bleed valves at all locations where major upgrades and construction are required; and retain single isolation where no upgrades are needed. There

are four primary locations where major upgrades and construction are required: Emery, Roselle, Pelican, and Tesla.

10033156 – Moccasin Reservoir Perimeter Security Fence
Hetch Hetchy Water & Power (HHWP) will install an approximately 6,500 feet long perimeter security fence system around Moccasin Reservoir to discourage trespassers. Moccasin Reservoir covers approximately 32 acres. Fence monitoring alarms, signs, lighting, and security camera will be considered as part of the design.

CUH100PD – WATER ONLY/PROJECT DEVELOPMENT
The Project Development (PD) Account captures Program level expenditures. There are four types of charges that will be allocated to the PD Account: 1) charges for task orders for overall program management and project prioritization tasks, where the costs should be distributed over all Capital Improvement Program (CIP) Projects; 2) charges for Infrastructure and Hetchy staff performing program level tasks including: capital plan development, budget management (including fund management, and cost reallocations), and quarterly report generation tasks, where the costs should be distributed over all CIP Projects; 3) charges for portal support for the existing SharePoint Portal (includes document management and project dashboard reporting); and 4) charges for work outreach programs.

POWER INFRASTRUCTURE

CUH10102 - Holm and Other Powerhouse Projects
This project will provide funding for Holm Powerhouse (HPH) Unit 2 upgrades and other items under $1 million regarding power generation renewal and equipment replacement. The upgrade and rehabilitation of Holm Unit 2 includes 13.8 kV equipment upgrades, addition and integration of a generator breaker, replacement of two 13.8kV feed breakers, replacement of Unit 2 Main Control Board, and any necessary tasks to match Unit 2 to Unit 1. System integration work will be done to integrate exciter, governor Programmable Logic Controllers (PLC), and Generator 2 PLCs into existing plant control and Supervisory Control and Data Acquisition (SCADA) system. Additionally, this project includes upgrades to turbine and generators, and alternating current stations intended to extend the life of the unit by 20 years. Lastly, the project will upgrade the existing oil containment system at Kirkwood Powerhouse (KPH) and HPH to prevent oil discharge into the environment. The existing oil-water separators will be replaced, and other modifications will be made to the powerhouse interiors and to the transformer decks to discourage contaminated discharges into the adjacent streams. A monitoring system will be installed to alert Hetch Hetchy Water & Power (HHWP) of excessive leakage and the need to manually pump oil containment vessels. Failure of the oil containment systems at the powerhouses would likely result in environmental contamination, fines, additional regulatory exposure, and the need for rehabilitation & cleanup.

CUH10113 - Kirkwood Penstock (Completed)
Kirkwood Penstock was built in 1964 and conveys the SFPUC water supply from Canyon Tunnel to KPH. Kirkwood Penstock has experienced significant foundation movement without impact to the service utility. In February 2007, however, there was significant movement on the penstock, and the penstock partially detached from one fixed saddle directly below anchor block 2. The scope of this project includes an internal and external inspection; development of an Emergency Action Plan and a Penstock Monitoring Plan;

repairs to the damaged saddle; installation of a monitoring system; and procurement of emergency spare equipment.

CUH10114 - Moccasin Powerhouse and GSU Rehabilitation

The two Moccasin Powerhouse generators were completed in 1969 and generate a combined maximum output of 110 megawatts. Both generator units have exceeded their life expectancy and are in need of repair in order to continue operating reliably. The objective of this project is to replace stator cores and coils. The scope of work also includes rehabilitation of the rotor field poles with new pole cores and re-insulated field coils, replacement of the rotor pole/rim tail connection system with a new T-tail connection system, and supply of a new rotor rim for each generator following inspection and testing. This is a design-build project and was advertised twice in 2011 and 2013. Bids were unresponsive. The project will also involve replacement of two generator step-up transformers (GSUs) with new oil containment barriers, and remaining plant work including: replacing 480V switchgear, 13.8kV switchgear, motor control centers, main control boards, protective relays, and cooling water piping.

CUH10115 - Warnerville Substation Rehabilitation

Warnerville Substation facilities and equipment have reached the end of their life expectancy. The facility needs to be upgraded to meet regulatory and safety requirements. This project will address major renewal and replacement of the substation components, including grounding, fence, circuit breaker, control room, electrical equipment, and disconnect switch. This project will also improve grading in the substation.

CUH10116 - Moccasin Penstock

The Moccasin Penstock conveys San Francisco Public Utilities Commission (SFPUC) water nearly one mile from Moccasin Tunnel to the Moccasin Powerhouse. The lower 1,084 foot section of welded steel pipe replaced the original penstocks when the new Moccasin Powerhouse was completed in the 1960s. The upper 4,000 feet of penstock dates back to 1924 and has been in service for more than 90 years. Condition assessments based on external inspection and imaging have identified a number of deficiencies along the original pipe. The 104-inch diameter (narrowing to 98-inch) riveted steel penstocks extend 1,554 feet from the downstream Moccasin Tunnel portal then bifurcate to four 66-inch diameter hammer-forged welded steel conduits extending about 2,384 feet to the lower welded steel pipe. Additionally, in September of 2018 the penstock experienced significant leakage in two separate areas, necessitating emergency repairs. This rehabilitation project is intended to enhance the reliability of the penstock system and will include: repair or replacement of some sections of corroded pipe; repair or replacement of four badly cracked concrete anchors and damaged penstock saddles; installation of new manways and a rollout pipe section to provide better access for inspection and maintenance; and recoating the outside pipe, where needed, to reduce future corrosion. The project scope was expanded to include: 1) The installation of additional penstock pipe between the valve house and the first downstream anchor; 2) The replacement of the butterfly valve pneumatic actuator with an electronic actuator, which will include new controls with SCADA connectivity; and 3) A new backup generator.

CUH10119 - Early Intake Switchyard Slope Hazard Mitigation (Completed)

The Hetch Hetchy Water and Power (HHWP) Early Intake Switchyard (ISY) is a 230 kV switchyard located alongside the Tuolumne River, downstream of HHWP's Kirkwood Powerhouse (KPH). The switchyard is a critical HHWP asset that provides the transmission of

electrical power generated at Kirkwood and Holm powerhouses to Moccasin, as well as the local distribution of power to HHWP's upcountry facilities. The slope requiring hazard mitigation, located next to ISY, was severely burned in the Rim Fire. The purpose of the project is to reduce the risk of slope failure which may cause damage to the switchyard and loss of power transmission capability.

CUH101PD - POWER ONLY/PROJECT DEVELOPMENT

The Project Development (PD) Account captures Program level expenditures. There are four types of charges that will be allocated to the PD Account: 1) charges for task orders for overall program management and project prioritization tasks, where the costs should be distributed over all Capital Improvement Program (CIP) Projects; 2) charges for Infrastructure and Hetchy staff performing program level tasks including: capital plan development, budget management (including fund management, and cost reallocations), and quarterly report generation tasks, where the costs should be distributed over all CIP Projects; 3) charges for portal support for the existing SharePoint Portal (includes document management and project dashboard reporting); and 4) charges for work outreach programs.

JOINT INFRASTRUCTURE

10032903 – O'Shaughnessy Dam Outlet Works Phase 1

O'Shaughnessy Dam (OSD) was completed in 1923 and raised in 1938. Condition assessment of the dam outlet works revealed deficiencies. This rehabilitation project addresses deficiencies of the existing outlet works system at OSD, including the drum gates and release system through OSD to Canyon Tunnel and the Tuolumne River. A recent condition assessment identified deficiencies in the OSD release system. Seven projects were identified and have been prioritized. Phase 1 will include three of these projects: drum gate rehabilitation (upgrading the hinges and rivets, recoating the gate and existing seals, and repairing the spillway concrete), installation of a new bulkhead system, and rehabilitation of slide gates & installation of a diversion pipe butterfly valve.

CUH10214 – Moccasin Facilities New Construction (Completed)

The existing HHWP shops and buildings are original and vary in age from between 45 to 80 years old. Some maintenance crews are currently working in buildings that were not originally intended to be used as shops. Many of these facilities do not meet current codes, require extensive repairs, and are not efficient work environments. The primary objective of this project is to build a 10,000-square-foot, combined-function building consisting of a plumbing shop, vegetation management shop, right-of-way shop, electric technician chop, lockers, shower facilities, break room, and new materials bins.

CUH10215 – Canyon Tunnel Rehabilitation

Canyon Tunnel was built over 45 years ago. A condition assessment was performed on the tunnel in 2009 and the tunnel is in generally good condition, with the exception of the Hetchy Adit, a tunnel access point. Temporary repairs have been made to the plug at this adit twice (once in 1989 and once in 2009), but permanent repairs are needed to reduce leakage and increase reliability of the system. The project scope includes installation of a new reinforced concrete plug downstream of the existing plug.

CUH10216 – Cherry Dam Outlet Works Rehabilitation (Completed)

The outlet facilities for Cherry Dam have reached the end of their service life at nearly 60 years old. The stream release assets must work

sufficiently well to meet U.S. Department of Interior's stream flow requirements, and these requirements cannot currently be met at low lake elevations. The 66" valves will be replaced in order to safely operate the dam during storm conditions with heavy inflows to Cherry Lake. The valves are critical for maintaining maximum carryover storage and meeting the SFPUC's water supply objectives. The scope of work includes replacement of the stream release valves and associated piping as well as the Low Level Outlet (LLO) 66" hollow jet valves. The project also replaced both butterfly valves that serve as isolation valves upstream of the hollow jet valves as change orders during construction.

CUH10220 – Mountain Tunnel Inspection & Repairs (Completed)

The objective of this project is to assess the current condition of the Mountain Tunnel and complete any urgent interim repairs to reduce the risk of tunnel lining failure until the completion of the long-term Mountain Tunnel Improvements project in 2026. The project consists of:

- A tunnel inspection in 2017 to update the Condition Assessment conducted in 2008; and
- Short term repairs in 2017 and 2018-19 to reduce the risk of failures in the concrete lining.

CUH10221 – Mountain Tunnel Improvement Project

Mountain Tunnel conveys the SFPUC water supply from Kirkwood Powerhouse to Priest Reservoir. Mountain Tunnel has been in service since 1925. Due to its age, deferred maintenance, and construction deficiencies in the early 1900s, sections of the tunnel lining have deteriorated, some extensively. This project provides:

- Initial evaluation of alternatives for the Mountain Tunnel facility, and
- Eventual design and construction of the preferred engineering alternative that will keep this vital component of the Hetch Hetchy Water and Power System in reliable service for years to come.

The 2016 scope consisted of just the Planning Phase for the project. The primary focus was on the development of viable alternatives for the project including:

- Rehabilitation of the existing tunnel,
- Relining the existing tunnel,
- Construction of a new bypass tunnel within the tunnel right-of-way, and
- Construction of a new bypass tunnel outside the tunnel right-of-way.

In 2017, the existing tunnel was shut down for 60 days and a detail inspection was performed. The inspection and subsequent condition assessment found many defects in the tunnel lining. However, all the defects were repairable, and the tunnel was still structurally sound. This substantiated the viability of the rehabilitation alternative with downstream valve control, and the City adopted this as the preferred project for design and construction in July 2017. The rehabilitation option met almost all of the project performance standards with the least cost. The project consists of:

- Repairs of all significant concrete lining defect with wire mesh reinforcement and shotcrete,
- Contact grouting of the entire lining to further reinforce and seal the lining to the surround rock,
- A new downstream flow control facility at Priest Reservoir with valving to meter flows and keep the tunnel running full during all operations and mitigate future erosion of the lining,
- A new tunnel adit at Priest Reservoir to allow maintenance access to Mountain Tunnel without having to drain the reservoir in order to expose the current access portal,
- An extension of the South Fork Siphon crossing under the Tuolumne River to bypass a problematic section of the tunnel that infiltrates excessive groundwater into the tunnel, and causes adverse water quality

issues,
• An enlarged concrete portal at Early Intake to accommodate maintenance equipment access at the upstream section of the tunnel,
• Access road widening and improvements to accommodate safer maintenance access to Adit 5/6 and Adit 8/9, and
• Temporary construction staging areas, environmental mitigations, and site restoration improvements.

CUH10223 – OSH Dam Access and Drainage Improvements
The key objective of this project is to provide safe access for Hetch Hetchy Water and Power operators inside the O'Shaughnessy Dam by improving fall protection, access, and drainage. The key elements include:
• Replace Access Structures in Ladder Wells. The existing access structures in the four (4) vertical ladder wells (shafts) include vertical ladders and horizontal grating platforms that are spaced throughout the ladder wells.
• Install Fall Protection Systems. Install new Occupational Safety and Health Administration (OSHA)□compliant ladders and landings with safety cage and/or install fall restraint systems.
• Seal or Mitigate Existing Leakage. Address flowing water by sealing leaks or otherwise diverting, collecting and disposing of flows.
• Drainage Improvements. Clear the drains in the dam so that water can drain as designed and/or install sump pumps, if appropriate.
• Replace Watertight Door between Ladder Wells 3 & 4. This scope item includes replacing the existing watertight door between Ladder Wells 3 & 4.

10035086 – Bridge Replacement (4 Bridges)
HHWP is responsible for maintaining 14 bridges located in the Cherry, Eleanor, and Hetch Hetchy region. Condition assessment has identified the need for rehabilitation and/or replacement (both due to age and to meet current seismic design criteria). Four of the fourteen bridges require substantial modification or replacement and have been combined into this project. This project includes rehabilitation and/or replacement of Cherry Lake Road Bridge (public access), Early Intake Bridge (public access), and O'Shaughnessy Adit Access Bridge.

CUH102PD – JOINT - PROJECT DEVELOPMENT
The Project Development (PD) Account captures Program level expenditures. There are four types of charges that will be allocated to the PD Account: 1) charges for task orders for overall program management and project prioritization tasks, where the costs should be distributed over all Capital Improvement Program (CIP) Projects; 2) charges for Infrastructure and Hetchy staff performing program level tasks including: capital plan development, budget management (including fund management, and cost reallocations), and quarterly report generation tasks, where the costs should be distributed over all CIP Projects; 3) charges for portal support for the existing SharePoint Portal (includes document management and project dashboard reporting); and 4) charges for work outreach programs.

2018 MOCCASIN STORM EVENT

10033233 - 2018 March Storm Event Emergency Repairs and Interim Improvements

On March 22, 2018, a storm event caused widespread damage to Tuolumne County. Hetch Hetchy Water and Power (HHWP) sustained considerable damage to assets associated with water supply, drainage, and power generation, including Moccasin Lower Dam and auxiliary spillway, Moccasin Upper Diversion Dam, Moccasin Reservoir, Priest Reservoir, Moccasin Powerhouse, and Moccasin Lowhead Powerhouse. On March 29, 2018, the Mayor of SF, Mark E Farrell officially declared the storm damage a Local Emergency Event. This project addresses the emergency repairs and interim improvements to the water-related assets located in Moccasin. Various contracts will be utilized to complete construction activities associated with: debris removal from the Moccasin Upper Diversion Dam and Moccasin Reservoir; repairs to the Moccasin Upper Diversion Dam; repairs to the Moccasin Lower Dam; replacement of the Leithold Line water distribution line; replacement of drainage systems (culverts and piping); access improvements to the Gate 3 structure located in the Moccasin Reservoir; installation of debris barriers upstream of the Moccasin Upper Diversion Dam and within the Moccasin Reservoir; and installation of a flood control berm downstream of the Moccasin Lower Dam.

A1-B HETCHY RENEWAL AND REPLACEMENT PROGRAM

WATER INFRASTRUCTURE

CUH10001 - SJPL Rehabilitation
The San Joaquin Pipelines (SJPLs) convey water from Foothill Tunnel to Coast Range Tunnel. The asset varies in age from 5 to almost 80 years old. Hetch Hetchy Water and Power (HHWP) have developed an annual program to inspect, monitor and manage the SJPLs and extend the life of the asset prior to replacement.

CUH10005 - Priest Pipe Recoating (Completed)
The coating on a 24" pipe located in a tunnel at Priest Reservoir has failed. The project scope will be to recoat the pipe.

POWER INFRASTRUCTURE

CUH10103 - Powerhouse Control Upgrade (Completed)
This project will upgrade the powerhouse protection, control, indication, and monitoring system. The electromechanical relays will be replaced with multifunction digital relays to improve reliability and functionality of the electrical protection system. The scope of work includes de-terminating the wiring, removing relays from the main control board, and installing new relays and internal wiring. Digital relays have diagnostics that will notify or alarm the operator if there is relay trouble, thus preventing potential consequential failures, damage, and electrical safety hazards. The existing electromechanical type relays do not have diagnostic capability and present a higher overall risk of failure. If an electromechanical relay does fail, there is a loss of protection on the electric system that could prevent generation. Furthermore, the digital type requires less maintenance at once every five years instead of annually as required for the electromechanical type under regulatory requirement PRC-005.

CUH10108 - Step-Up Transformers (Completed)
These projects include replacing step-up transformers at Kirkwood and Cherry Ridge Line.

CUH10109 - Moccasin Low Head Rehabilitation Project (Completed)
This project is for the rehabilitation of the Moccasin Low Head Powerhouse, which includes the following components: Replace Roof - Repair or replacement of the aging powerhouse roof. Oil Spill Containment / Prevention - Provision on an oil separation system or other modification should be installed inside the powerhouse to prevent contamination. Upgrade Excitation System - Replacing the existing excitation system with a modern digital excitation system to improve unit availability. A reliable, functioning excitation system is required for unit generation. Upgrade Electrical Protective System - Replace the single function, solid state relays with multifunctional digital relays to improve reliability and functionality of the electrical protection system. The scope includes de-terminating the wiring, removing relays from the main control board, and installing new relays and internal wiring. Upgrade Unit Control System - this project upgrades the unit control system and re-locates the control panel to improve safety conditions for operations personnel. Governor Upgrades - this project provides for the upgrade of the mechanical governor to digital governor. This project is required so we can backfeed from the low head for the Moccasin Compound while upgrades are performed at Moccasin Switchyard.

CUH10110 - Early Intake Switchyard (Completed)
This project is for the rehabilitation of the Early

Intake Switchyard, which includes the following work: replace existing oil circuit breakers (OCBs) with new gas powered circuit breakers on Kirkwood and Holm section of 230kv bus; install gas powered circuit breakers and related components including bus conductors, structural steel, control cables, and galvanized rigid steel conduits. Install City furnished capacitive voltage transformer (CVTs) and surge arresters. Replace main bus-side and line-side disconnects bay 1 through 7, replace Aux bus disconnects bays 1 through 7, replace main bus-side breaker and aux bus disconnect within bay 0. Replace cap and pin insulator stacks with equivalent replacement post insulators within the main and aux buses, including underhung T-drop bus supports. Replace insulators associated with main bus sectionalizing switch. Removal of wave trap remnants, install new support structures. Remove and dispose of existing above grade oil transfer piping system. Connect into new programmable logic controllers (PLC) system. Install a Shoe-fly-bypass using a job order contract (JOC) contractor.

CUH10111 - Moccasin GSU Transformers & Oil Containment (Completed)

This project will provide replacement for two Generator Step Up transformers. The project scope also includes the concurrent design of oil containment of the specified transformers. The assessment will provide a cost estimate to develop the scope and specification criteria to be provided to a consultant engineer to develop construction drawings and specifications.

CUH10112 - Kirkwood Powerhouse Refurbishment & TSOV (Completed)

This project will provide funding for the rehabilitation of Kirkwood Powerhouse to increase life expectancy of the asset as well as improve safety by replacement of the two turbine shutoff valves (TSOVs). The scope of work for the proposed project includes the following:

- Remove and replace TSOVs for Unit 1 and Unit 2 at Kirkwood Powerhouse.
- Replace the 480V breakers, complete switchgear lineup, Motor Control Centers (MCCs) and panel board with provision for an additional.
- Refurbish / replace various auxiliary systems including: cooling generators, exciters, turbines, transformers, building mechanical equipment, and building structure.
- Add Partial Discharge Analysis Instrumentation to Generator Unit 3 which includes monitoring the Unit 3 generator stator winding insulation and generator with a partial discharge analysis (PDA) instrument.
- Upgrade Vibrator Monitor System including removing the existing system, installing three independent systems with associated sensors and cabling, and incorporating systems into unit controls.

CUH10117 - Transmission Clearance

Moccasin Powerhouse Generators No. 1 and No. 2 were completed in 1969 and generate a combined maximum output of 110 Megawatts. Both generator units have exceeded their life expectancy and are in need of repair in order to continue operating reliably. The objective of this project is to replace the Generator No.1 and/or No. 2 stator cores and coils to uprate from 57.5 (MVA) to new rating of 61 MVA. The scope of work also include rehabilitation of the rotor field poles with new pole cores and re-insulated field coils, replacement of the rotor pole/rim tail connection system with a new T-tail connection system, and to supply a new rotor rim for each generator following inspection and testing.

CUH10121 - MPH Bypass Valves

Following the 2013 Rim-Fire, the City was invited to apply for a FEMA Hazard Mitigation Grant. A grant application was prepared and submitted in 2014 to provide

mitigation measures for the potential hazards posed by the steep mountainside situated southeast of the Early Intake Switchyard (ISY). In the past there have been damage and shutdowns of the switchyard due to mudflows, rock falls, and landslides. The Rim Fire burned vegetation from much of the slope, thereby increasing the likelihood of future damage.

JOINT INFRASTRUCTURE

CUH10203 - Reservoirs and Dams
This project includes a condition assessment on all reservoirs and dams as well as more immediate projects to address safety or environmental concerns. The project includes a condition assessment of all storage and regulating reservoirs (six total) to identify work to be performed. Work is being prioritized and included in the Hetch Hetchy 10-Yr CIP Plan.

CUH10205 - Small Water Systems Upgrades (Completed)
Upgrade small water systems at Moccasin Compound, O'Shaughnessy and Early Intake in order to meet state regulatory compliance requirements. HHWP must upgrade their small water systems with ultraviolet (UV) treatment equipment.

CUH10207 - Existing Hetchy Facilities (Outside Moccasin) (Completed)
This project will fund the rehabilitation of all HHWP facilities outside of Moccasin (approximately 80 facilities). Within the work included are: Maintenance - Painting, Roof Replacement, Gutters, Dry Rot, Foundations and Drainage upgrades. Hazardous Material Abatement - Lead and asbestos removal. Building and Electrical Code Violations, Water Distribution System, Waste Water and or Septic Tanks and Energy Efficient Projects. The scope of work on the Industrial Buildings will consist of repairs to the Arc Flash deficiencies and provide Emergency Power for the Support Facilities.

CUH10208 - Remote Terminal Unit Replacement (Completed)
The project includes removing the unit annunciator remote terminal unit and installing a Modicom I/O rack, wiring signals to new I/O, and migrating signals through the new programmable logic controllers for access by the new supervisory control and data acquisition system. This project is an upgrade to the existing system and will improve reporting and operations. This project is part of an ongoing HHWP program to upgrade the SCADA and unit controls for both the water and power systems.

CUH10209 - Road Improvements
This project includes maintaining almost 50 miles of paved roads and rehabilitation of eleven bridges. Preliminary findings in the condition assessment indicate that some of the bridges will require replacement and/or retrofit. Also, signage, reflectors, guardrails, slope stabilization, and selective road widening will be required to enhance the safety of road users.

CUH10210 - Hetchy Fiber Projects (Completed)
This project will install fiber between Modesto and Moccasin Peak on lines 5/6 and lines 7/8, as well as replace the fiber system within the Moccasin compound. Fiber will become the primary means of communication, with our existing licensed microwave functioning as the redundant system. Communication channels will include the business network, control network, security network, protection network, and voice over internet protocol (VoIP) network. The upgraded system will not only meet regulatory requirements but provide a more secure, reliable communication and power protection system. By 2022, the fiber electronic hardware will have reached the end

of its technical life expectancy and will require upgrades.

CUH10211 - Facilities Security Project
HHWP is updating security fences and installing card access at remote locations. HHWP is also evaluating new security requirements that are now required to meet North American Electric Reliability Corporation (NERC) regulatory requirements. HHWP only has door alarms at many remote sites. Increased security is required including fencing, card access and camera monitoring to minimize the risk of intrusion at these facilities. In addition, HHWP has to address regulatory security requirements.

CUH10212 - Moccasin Penstock
Moccasin Penstock was built in the early 1920s and conveys the SFPUC water supply from Moccasin Tunnel to Moccasin Powerhouse. HHWP is currently in the process of performing a penstock condition assessment. The penstock includes about four miles of hammer-forged welded steel penstock and may be subject to failure. In addition, issues have been identified regarding the anchor/saddle system. The short-term program includes completing the condition assessment, performing repairs at locations with significant corrosion, and addressing concerns with the anchor/saddle system. In 2015, coating and lining issues will be addressed on the non-hammer-forged welded sections. The long-term project is to replace the hammer-forged welded section if this is the most cost-effective alternative identified during the condition assessment.

CUH10213 - Communication System Upgrade
The project will provide funding for replacement and expansion of the HHWP two-way radio system resulting in better coverage in the up-country river canyons as well as inter-divisional communication with other water enterprise operating divisions in the Bay Area. In addition, the project will extend 6GHz microwave communication to remote locations such as O'Shaughnessy and Cherry Valley Dams and Cherry Pump Station, allowing for remote monitoring and control of assets, enhanced security capabilities as well as business network connectivity at those sites. Lastly, this project will complete redundant paths of communication for control network systems between critical facilities such as HPH, KPH, and ISY using both microwave and fiber technology for those short hops.

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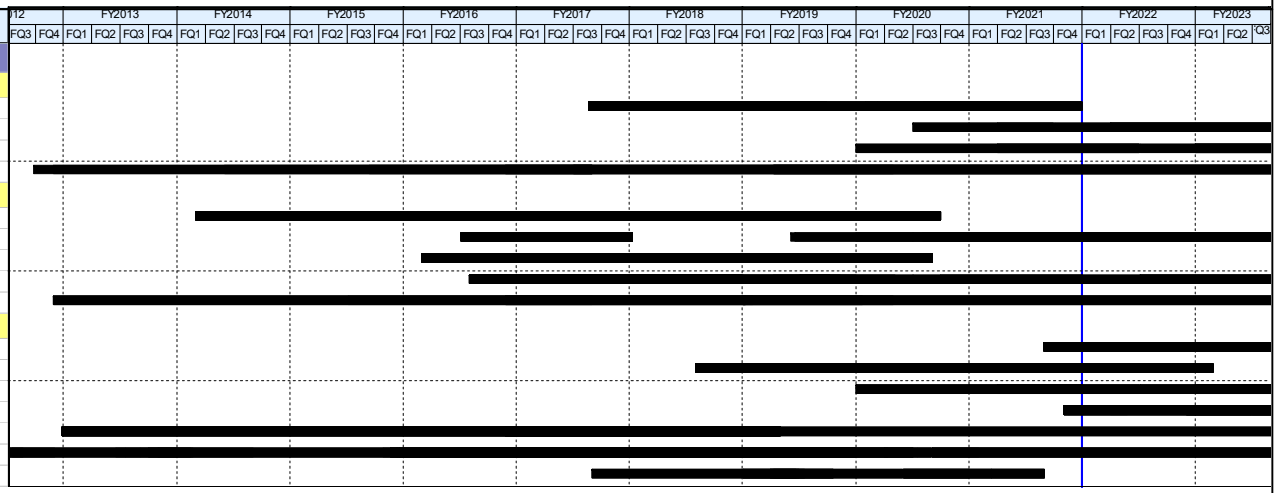
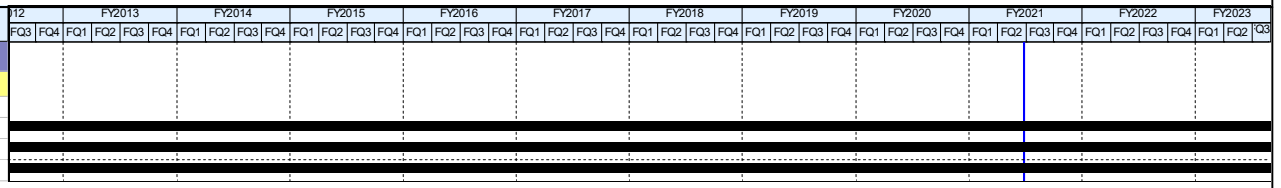
APPENDIX B. Hetch Hetchy Enterprise Approved Project Level Schedules

Project Name	Start	Finish
Hetchy Capital Improvement Projects	03-Oct-11	30-Jun-28
Water Infrastructure	26-Mar-12	30-Jun-28
10033156 Moccasin Reservoir Perimeter Security Fence	20-Feb-17	01-Jul-21
10035574 SJPL Tesla Valves Replacement	02-Jan-20	28-Jun-24
10035575 SJPL Valve and Safe Entry Improvement	01-Jul-19	01-Jul-25
CUH100PD WATER ONLY/PROJ DEV	26-Mar-12	30-Jun-28
Power Infrastructure	29-May-12	30-Jun-28
CUH10102 Holm and Other Powerhouse Projects	03-Sep-13	30-Mar-20
CUH10114 Moccasin Powerhouse and GSU Rehabilitation	04-Jan-16	28-Jun-24
CUH10115 Warnerville Substation Rehabilitation	01-Sep-15	04-Mar-20
CUH10116 Moccasin Penstock	01-Feb-16	31-Dec-24
CUH101PD POWER ONLY/PROJ DEVELP	29-May-12	30-Jun-28
Joint Infrastructure	03-Oct-11	30-Jun-28
10014115 Cherry Dam Spillway - Short Term Improvements	01-Mar-21	01-Jul-27
10032903 O'Shaughnessy Dam Outlet Works Phase I	01-Feb-18	25-Aug-22
10035086 Bridge Replacement (4 - Bridges)	01-Jul-19	30-Dec-25
10037351 Moccasin Dam Long-Term Improvements (NEW)	03-May-21	30-Jun-28
CUH102-PD JOINT - PROJECT DEVELOPMENT	25-Jun-12	30-Jun-28
CUH10221 Mountain Tunnel Improvement Project	03-Oct-11	31-Dec-26
CUH10223 OSH Dam Access and Drainage Improvements	01-Mar-17	26-Feb-21



Project Name	Start	Finish
SFPUC San Francisco Public Utilities Commission	22-Dec-09	30-Jun-28
HHE Hetch Hetchy Enterprise	22-Dec-09	30-Jun-28
HRNR Renewal and Replacement Program (R&R)	22-Dec-09	30-Jun-28
CUH100 Water Infrastructure	04-Nov-10	30-Jun-28
CUH101 Power Infrastructure	22-Dec-09	30-Jun-28
CUH102 Joint Infrastructure	02-May-11	30-Jun-28



APPENDIX C. LIST OF ACRONYMS

AC	Alternating Current
AMI	Advanced Metering Infrastructure
CATEX	Categorical Exemption
CEQA	California Environmental Quality Act
CER	Conceptual Engineering Report
CIP	Capital Improvement Program
COVID-19	Coronavirus Disease of 2019
CVT	Capacitor Voltage Transformers
DB	Design, Build
FEMA	Federal Emergency Management Agency
FY	Fiscal Year
Ghz	Gigahertz
GSU	Generator Step-Up
GWH	Gigawatt Hours
HCIP	Hetchy Capital Improvement Projects
HH	Hetch Hetchy
HHWP	Hetch Hetchy Water and Power
HPH	Holm Powerhouse
ISY	Intake Swithyard
JOC	Job Order Contract
KPH	Kirkwood Powerhouse
LCA	Lower Cherry Aqueduct
LLO	Low Level Outlet
MCC	Motor Control Centers
MPH	Moccasin Powerhouse
NERC	North American Electric Reliability Corporation
NTP	Notice to Proceed
OCB	Oil Circuit Breakers
OSD	O'Shaughnessy Dam
OSHA	Occupational Safety and Health Administration
PD	Project Development
PDA	Partial Discharge Analysis
PG&E	Pacific Gas and Electric Company
PLC	Programmable Logic Controllers
PUC	Public Utilities Commission
R&R	Renewal and Replacement
RTU	Remote Terminal Unit
SCADA	Supervisory Control and Data Acquisition
SF	San Francisco
SFPUC	San Francisco Public Utilities Commission
SJPL	San Joaquin Pipeline
SJVH	San Joaquin Valvehouse
TSOV	Turbine Shutoff Valves
TTF	Tesla Treatment Facility
TUV	Tesla Ultra Violet
UV	Ultra Violet
VoIP	Voice Over Internet Protocol
WSIP	Water System Improvement Program

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