



**2022-2023**

**Engineering, Project Management  
Capital Improvements Program**



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**Project Name:** 610180 - West Plants Discharge Valve Replacement Project Phase 3

**Location:** Bouse Hills, Little Harquahala, Hassayampa Pumping Plants

**Discipline:** Manufactured 75%, Mechanical 15%, Electrical 10%

**Delivery Method:** Purchase Order

**Scope:** Project scope and description consists of replacement of the remaining fourteen (14) valves at the west plants, plus a valve of each size for emergency standby. Installation will be by the CAP Heavy Overhaul Group (HOGs) and fabrication of ancillary components will be by CAP’s machine shop and industrial coatings group. Fabrication by the supplier occurs over three years, with one of the three (3) emergency standby valves being provided each year; 2022, 2023, and 2024. The final 66-inch valve will be received in 2024, but installed in 2025 at BSH due to the availability of the right side of the plant during the summer outage. Design will be prepared internally by CAP engineering and the seventeen (17) valve purchase will be authorized with the initial PO and the quote from the supplier received April 2021.

	Budget	Process	Advertise Date	2021	2022	2023	2024
Design	\$20-30K	Internal	X				
Construction	\$1M-1.5M	Internal	X				>



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**Project Name: 610208 – Motor Exciters**

**Location: Twin Peaks, Sandario, Snyder Hills, and Black Mountain Pumping Plants**

**Discipline: Mechanical 80% Electrical I+C 20%**

**Delivery Method: Direct Select**

**Scope:** The 26 unit pump synchronous motor exciter packages at Twin Peaks(6), Sandario(6), Snyder Hills(9), and Black Mountain(5) are out dated, and sourcing replacement parts for the individual components is nearing impossible. The current state of the motor exciters is increasingly unreliable. At TWP/SAN, the discharge resistors are located internally on the motors; in order to replace a failed OEM resistor, the rotor needs to be removed from the motor which requires extensive work. On the SND/BLK motors, there have been several failures which have required a costly rewind of the OEM spool type resistors. Additionally, all motors have established a trend of excitation trips. Numerous times, an actual problem is not found. This results in unnecessary expenditure of maintenance trouble shooting man-hours and impacts operations capability to move water through these plants. The project scope and description consists of a replacing, in kind, the current exciter packages with a brushless package. Similar to the work performed at Brawley and San Xavier in 2012, the existing OEM archaic brushless exciters will be replaced with new state-of-the-art, rotating package, which utilize new control modules and power block SCRs, Diodes and Rectifiers. Bringing constancy across each plant. The team intends to solicit bids for the equipment and procure the excitation packages in time for the Q1 2022 annual PM installation window at Twin Peaks and Sandario and Q1 2023 for Snyder hill and Black Mountain.

	Budget	Process	Advertise Date	2021	2022	2023	2024
Design	X	Internal	X				
Procurement	\$500-650K	RFP	Feb 2021				



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**Project Name:** 610317 - Condition-Based Monitoring

**Location:** Twin Peaks, Sandario, Brawley, San Xavier

**Discipline:** Mechanical 20% Electrical I+C 80%

**Delivery Method:** Job Order Contract

**Scope:** Condition-Based Monitoring (CBM) is defined as an equipment-maintenance strategy that assesses the state of major equipment for potential failures and identifies actions to prevent any such failures. CBM’s original project scope as identified in 2012 was to install monitoring equipment across all 14 pump plants and one pump-generation plant (a total of 109 pump units) using three diagnostic measures: vibration analysis (109 units), motor analysis (109 units) and partial discharge testing (37 units among the South plants). At the end of 2018, 10 of the 15 pumping plants’ associated CBM work was completed. Remaining work involves design and construction (various stages of completion) at Twin Peaks, Sandario, Brawley, San Xavier, and Waddell Pump/Generating Plant.

	Budget	Process	Advertise Date	2021	2022	2023	2024
Design	\$200K-\$250K	Internal	X	<			
Construction	\$3M-\$3.5M	JOC	March 2014	<			



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**Project Name:** 610329 - Programmable Logic Controller 5 Replacement

**Location:** Waddell Pumping Plant

**Discipline:** Electrical I+C 100%

**Delivery Method:** Design Build

**Scope:** Waddell Pump / Generating Plant has been controlled by 13 Allen-Bradley programmable logic controllers (PLCs) since operation of the plant began in 1993. PLC components, including CPUs, input/output cards, and network interfaces, have reached the ends of their respective lifecycles and are no longer available. Many companies and utilities are either preparing to, or have already, migrated to the newest generation of PLCs. This project will replace and standardize the new equipment for interoperability with existing systems.



	Budget	Process	Advertise Date	2021	2022	2023	2024
Design	X	X	Jan 2020				
Construction	\$3M-\$3.5M	Design Build	Jan 2020	<			

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**Project Name:** 610333 - Electromechanical Relay Replacement Phase II

**Location:** Twin Peaks, Sandario, Brawley, San Xavier, Black Mountain, Snyder Hill, Waddell

**Discipline:** Electrical I+C 100%

**Delivery Method:** JOC

**Scope:** CAP pumping plants use a variety of protective relays for large electrical-system protection, including electromechanical (EM) relays, microprocessor base relays and solid state relays. CAP currently has some form of protective relay from several of the major equipment vendors. EM relays are reliable and effective, but have a maximum service life of about 30 years. While EM relays are still made, they are becoming more expensive and limited. Many utilities are making the switch to digital relays to circumvent the challenges of managing performance and reliability for multiple generations of in-service relays. Phase 2 work will replace EM relays with digital relays on transformers and units at Waddell Pump / Generating Plant and the South Plants (Twin Peaks, Sandario, Brawley, San Xavier, Snyder Hills and Black Mountain Pumping Plants). The project also includes integration of relay communications and exciters into the electrical system.



	Budget	Process	Advertise Date	2021	2022	2023	2024
Design	N/A	JOC	Dec 2019	<			
Construction	\$6M-\$6.5M	JOC	Dec 2019				

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**Project Name:** 610452 - Backup Power

**Location:** Checks, Turnouts, and Microwave Sites

**Discipline:** Civil 20% Electrical I+C 80%

**Delivery Method:** Job Order Contracting

**Scope:** This project addresses CAP’s need for the replacement of backup power systems at eight mountain-top microwave sites, 33 turnouts and over 30 check structures. These sites currently utilize various direct current (DC) chargers and batteries for multiple voltages, ranging from 120 volts DC (VDC) to -48 VDC. The existing chargers are to be replaced with an integrated uninterruptible power supply (UPS) and DC power distribution system. This system incorporates all existing voltages and also consolidates the power system to 24 VDC. The new battery-charger system integrates voltages that are still in use. This project will also replace emergency backup generators and automatic transfer switches (ATS) at locations where existing equipment is beyond service life and requires high levels of corrective maintenance. Since the previous budget was prepared, this project’s scope has expanded to 48 turnouts, 39 check structures and 16 mountaintop sites, for a total of 103 units. Consistent with the broader scope, project cost has increased. Higher contract costs have also contributed to the project cost increase.



	Budget	Process	Advertise Date	2021	2022	2023	2024
Design	\$700K-\$800K	Direct Select	Complete	<			
Construction	\$1M-\$2M	JOC	April 2022	<			

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**Project Name:** 610458 - Exciter and Controller Replacement

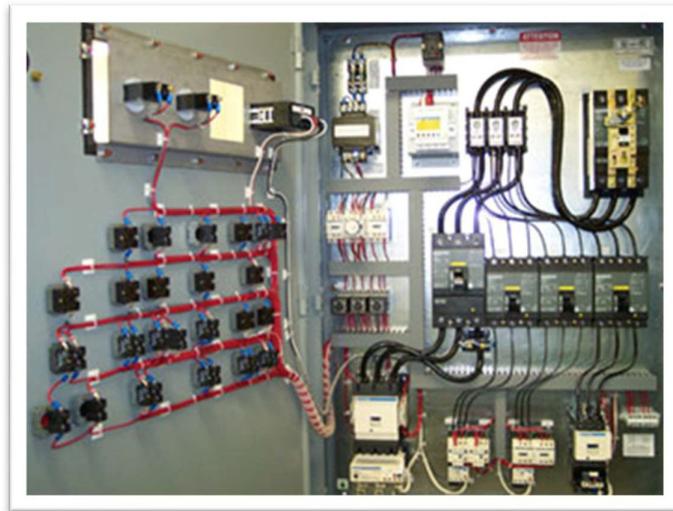
**Location:** Salt Gila, Bouse Hills, Little Harquahala, Hassayampa (West Plants)

**Discipline:** Electrical I+C 100%

**Delivery Method:** JOC

**Scope:** The current generation of static exciters for the pump motors has been in operation for over 30 years and has reached end of life. Replacement or repair parts are difficult to locate with failures. This project completely replaces the static exciters and controller with modern equivalents at Bouse Hills, Little Harquahala, Hassayampa and Salt-Gila Pumping Plants.

	Budget	Process	Advertise Date	2021	2022	2023	2024
Design	\$450K- 500K	RFQ	Jan 2018	<			
Construction	\$10-\$11M	JOC	Jan 2018	<			



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**Project Name: 610473 - Sump Pump Levels**

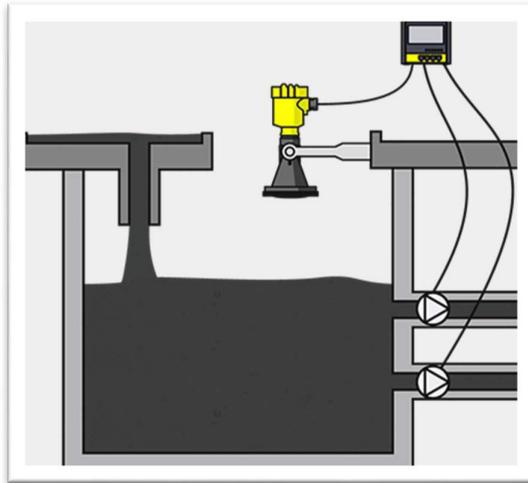
**Location: All Pumping Plants**

**Discipline: Mechanical 70% Electrical I+C 30%**

**Delivery Method: JOC**

**Scope:** This project will replace the existing controls with Programmable Logic Controller (PLC) level controls driven from ultrasonic level sensors. The replacement system will monitor sump pump performance and provide pump performance data. The original water level control instrument was a float-actuated unit with electric contact controllers. One controller operated one of two pumps and provided a high water level alarm and plant shutdown functions. The second controller operated the second sump pump two and provided left and right plant shutdown functions. Major project deliverables include electrical and fiber cable installation, ultrasonic level instrument installation and configuration, and construction of a new PLC panel with connection of wiring for sump controls.

	Budget	Process	Advertise Date	2021	2022	2023	2024
Design	\$300-\$350K	Internal	Jan 2020	<			
Procurement	\$100-\$150K	JOC	Jan 2020				



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**Project Name: 610510 - CO2 System Replacement**

**Location: Waddell Pumping Plant**

**Discipline: Mechanical 60% Electrical I+C 40%**

**Delivery Method: Design Build**

**Scope:** The four pump / generator units have been protected by high-pressure CO2 fire suppression systems, which now consist of multiple nonfunctioning or obsolete components. The current system does not comply with National Fire Protection Association NFPA-12 standards. This project replaces all mechanical and electrical components of the existing system. Carbon dioxide cylinders will be replaced annunciator panel and ONYX workstation will be installed so the system communicates and is monitored by the ONYX master station at CAP Headquarters.

	Budget	Process	Advertise Date	2021	2022	2023	2024
Design	X \$800K-	Design Build	Complete	<			
Construction	\$1M	Design Build	Complete	<			



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**Project Name: 610512 - Elevator Modernization Phase 2**

**Location: Mark Wilmer, Bouse Hills, San Xavier, Waddell, Red Rock, Brawley, and Hassayampa**

**Discipline: Mechanical 70% Electrical I+C 30%**

**Delivery Method: Design Build**

**Scope:** A priority list of 15 elevators was previously established and the top five elevators were upgraded between 2014 and 2016. This phase addresses the seven elevators at Mark Wilmer, Bouse Hills, Hassayampa, Red Rock, Brawley and San Xavier Pumping Plants and Waddell Pump / Generating Plant. Existing elevators are typically 20 years old. This project is currently in the design phase of a design-build contract. Installation is scheduled for early 2020, beginning at Mark Wilmer Pumping Plant.

	Budget	Process	Advertise Date	2021	2022	2023	2024
Design	X	Design Build	April 2018	<			
Construction	\$5M-\$6M	X	April 2018	<			





**Project Name: 710041 - Reline Right Discharge Manifold**

**Location: Bouse Hills**

**Discipline: Civil 100%**

**Delivery Method: CMAR**

**Scope:** The project scope and description consists of the removal and disposal of the existing coal-tar enamel lining and the application of a new epoxy coating system to the interior of the right discharge manifold at the Bouse Pumping Plant. Additionally, caulking within the sleeve couplings in the Unit 3 pipe is to be removed, the pipe dried, rust removed, the steel recoated, and new caulking installed. The intent is for the work to take place during the 2022 Summer Outage. CAP personnel will establish the required clearances and dewater the right side of the plant, including the discharge manifold where the contract work will take place. The Contractor will control the environment for personnel access and provide any equipment necessary for the coatings removal and application; including ventilation, safety and quality control systems to complete the work during the outage.

	Budget	Process	Advertise Date	2021	2022	2023	2024
Design	\$30-50K	Internal	X				
Construction	\$650-800K	CMAR	Dec 2021				



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**Project Name:** 610179 - Air Compressors

**Location:** Brady, Picacho, and Red Rock Pumping Plants

**Discipline:** Mechanical 80% Electrical 20%

**Delivery Method:** Job Order Contracting

**Scope:** The air compressors on the original skids provide 1+1 operational redundancy, both can operate simultaneously with a lead / lag function determined by pressure switches on the air receiver tank (see Figure 1.0). Both compressors are powered from a common electrical feed from a single 30A 3ph/480VAC circuit. The current compressors are rated at 7 SCFM at 1300psi, and are each powered by a 7.5HP motor. The actual maximum system pressure is determined by pressure switch 63VSAH/L located on the air receiver located at the discharge of the air compressors. The 63VSAH/L pressure switch is set to start the compressors at 575 psig, and stop at 600 psig. The system pressure is prevented from exceeding 660 psig by relief valves on the compressors and the air receiver upstream of the hydraulic accumulator system.

	Budget	Process	Advertise Date	2021	2022	2023	2024
Design	X	Internal	X				
Construction	\$800K-\$1M	JOC	June 2023				



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**Project Name: 610181 - Elevator System Replacement Phase 3**

**Location: Headquarters, Black Mountain, and Snyder Hills Pumping Plant**

**Discipline: Mechanical 75% Electrical I+C 25%**

**Delivery Method: Design-Build**

**Scope:** This project, Elevator Control System Upgrade Phase III, is the continuation of approved elevator projects phases I & II where twelve elevators have been previously replaced across the pumping plants. The key difference between this project and previous phases are the type of elevators being replaced. The underlining maintenance concerns on the hydraulic elevators are age of equipment, controls, and drive systems being obsolete. Spare parts are also no longer available. CAP currently has in place a state elevator maintenance contract for general maintenance, however this contract is limited to readily available parts and does not include major retrofitting or upgrading of the elevator system.

The elevators will be prioritized and installed based on current conditions. Where allowable, useable parts can be transferred, salvaged, and maintained as inventory to perform repairs at the other locations until such time as they are upgraded within the project. Scope only reflects the known general assessment of existing conditions. Design variations between plants may uncover required additional replacement components.

	Budget	Process	Advertise Date	2021	2022	2023	2024
Design	\$300-400K	Design Build	March 2023			>	
Construction	\$1.5-2M	Design Build	March 2023				>



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**Project Name: 610182 - Fire Protection Phase II**

**Location: Tucson Field Office, Sandario, Twin Peaks, San Xavier, and Brawley Pumping Plants**

**Discipline: Mechanical 80% Electrical 20%**

**Delivery Method: CMAR**

**Scope:** The project scope includes replacing all plant fire protection systems per the currently adopted Codes and Standards and the Performance Based Design (PBD) at San Xavier and Brawley. These upgrades would replace the current fire alarm, fire sprinkler, suppression systems, stairwell pressurization and all ancillary systems such as the HVAC dampers and elevator recall systems. The project would begin with a design phase at all four plants including the PBD design at Sandario and Twin Peaks. The upgrades at TFO would not be as extensive as the plant locations but would include replacing the current fire alarm and all ancillary systems such as the HVAC dampers. The goal at TFO would be to tie the fire alarm system into the Notifier Onyx Works network and validate the fire sprinkler system functionality. The entire fire alarm system will be designed to meet the requirements of the currently adopted version of NFPA 72 - National Fire Alarm and Signaling Code.

	Budget	Process	Advertise Date	2021	2022	2023	2024
Design	\$300-450K	RFQ	Jan 2022				
Construction	\$6.5-7.5M	CMAR	Jan 2023				>



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**Project Name: 610183 - Fire Hydrant Valves**

**Location: Headquarters**

**Discipline: Mechanical 100%**

**Delivery Method: Job Order Contract**

**Scope:** There are 43 buried gate valves and 2 above-ground gate valves (sizes 4", 6", and 8"). These control and isolate the flow of water to the fire hydrants as well as building sprinkler systems at project headquarters. Of the 43 valves there are 17 that do not close at all, close completely or are leaking. Many, if not all, of these valves are from the original construction some 35 years ago. In the event of an emergency or a corrective work order to replace a fire hydrant or riser valve, water isolation is not currently possible with valves frozen open. There is also the possibility of a valve freezing in the closed position which would leave an area without fire protection. If a fire hydrant is hit, local isolation would not be possible and a valve further upstream would then have to be closed which increases the area without fire protection. There are currently 4 fire hydrants that leak where corrective maintenance cannot be completed due to frozen valves not allowing for hydrant isolation. The project scope and description consists of replacement of 45 gate valves, as well as adding post indicators to those valves in landscaped areas and position indicators to those in paved areas. It is recommended to excavate and examine four frozen gate valves during design to assess cause of failure. This will also allow for solidification of scope and constructability requirements prior to full project.

	Budget	Process	Advertise Date	2021	2022	2023	2024
Design	X	Internal	Jan 2022				
Construction	\$300K-\$500K	JOC	April 2023				



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**Project Name: 610184 - HVAC Replacement Project**

**Location: Headquarters Building 2**

**Discipline: Mechanical 80% Electrical 20%**

**Delivery Method: CMAR**

**Scope:**

There are periods during summer time when the evaporative coolers are ineffective at producing a comfortable working environment in the CAP Auto Shop, Warehouse, and Machine Shop. Summer 2020 set several heat records with 145 days above 100°F, 53 days above 110°F, and 14 days above 115°F. Due to the possibility of extreme heat in current and future years, there is a risk to Life Safety of CAP employees in addition to risk of damage of CAP equipment stored in these areas. Replacing the evaporative cooling systems on the North, South and West Quadrants with packaged DX units should result in less unplanned maintenance work. The systems should provide superior environmental control compared to the original EC systems, which should help extend the life of spare parts in the warehouse, and help control corrosion issues in the machine shop and auto shop.

The existing system requires a high level of maintenance, high water usage, and low human comfort during the warmer/ humid months of the year. Additionally, it has been noted that there are material storage issues related to the high humidity climate that the evaporative coolers pose. The four areas to be improved are: 1. Machine Shop 2. Auto Maintenance Shop 3. Shipping and Receiving Warehouse 4. HDQ2 Central Quad The four separate areas have been evaluated individually so that each area could be looked at as separate entities in deciding whether or not to move forward with one or the other. In other words, the decision to move forward with conditioning one space is not contingent on all the spaces as a whole.

	Budget	Process	Advertise Date	2021	2022	2023	2024
Design	\$250-350K	RFQ	Jan 2022				
Construction	\$3.5-4M	CMAR	Feb 2022				



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**Project Name: 610209 - Potable Water Storage and Delivery System**

**Location: Pinal Field Office**

**Discipline: Mechanical 60% Electrical I+C 25% Civil 15%**

**Delivery Method: Job Order Contract**

**Scope:**

The water available at the Pinal Field Office has been found to be high in both Arsenic and Fluoride. OSHA and the EPA requires that potable water is provided at point of use locations that have the potential to come in contact with the person to include showers, sinks, toilets, and eye wash stations. A design study was complete to determine that reverse osmosis and media filtration would be too expensive from the maintenance perspective to continue utilizing the well for indoor purposes. The preliminary scope of this project includes design and installation of a 2500 gallon storage tank, booster pump, circulation pump, electrical, and associated piping routed to the indoor water line, isolating the outdoor hose bibs for non-potable use coming from the well.

	Budget	Process	Advertise Date	2021	2022	2023	2024
Design	\$50-60K	Internal	Internal				
Construction	\$100-120K	JOC	March 2023				



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**Project Name: 610256 - Building 2 Reconfigure and Refresh**

**Location: Headquarters**

**Discipline: Civil 80% Electrical 20%**

**Delivery Method: Low Bid**

**Scope:**

Building 2 Level 1 is the last remaining originally constructed office area at CAP Headquarters and has not been remodeled since initial construction in 1987. It currently houses occupants from the Maintenance Control Department, Maintenance South Department, Maintenance West Department, Centralized Maintenance Department, Environmental Health & Safety Department, Centralized Learning and Development Department and the Operational Technology Department. The physical condition of the building needs improvement. Although most of the building systems are in good condition, the interior finishes and office furniture are degraded and have exceeded the typical useful life of these assets of 15 to 20 years. Additionally, the suitability of the space is not optimal and is inconsistent with typical government office standards such as minimum office space for professional positions, dedicated private office space for supervisory positions.

	Budget	Process	Advertise Date	2021	2022	2023	2024
Design	\$150-180K	Direct Select	Jan 2023				
Construction	\$500-800K	Low Bid	Nov 2023				



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**Project Name: 610257 - Roof Replacement**

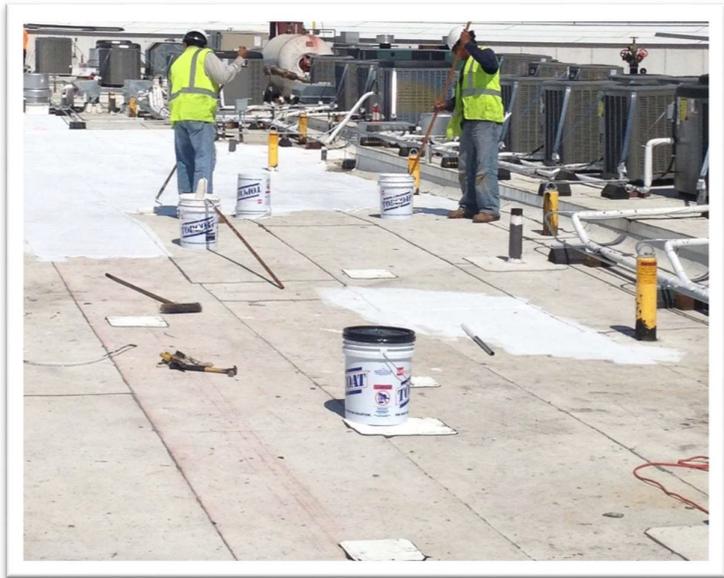
**Location: Black Mountain and Snyder Hills Pumping Plant**

**Discipline: Civil 100%**

**Delivery Method: Low Bid**

**Scope:** The project scope consists of removal and disposal of the existing spray foam roofing down to structural concrete deck throughout the area of both pumping plant structures. Installation of the new roofing system would use a foam adhesive to adhere an engineered tapered iso-board substrate system with crickets leading to drains in the roof deck. Two inches of new urethane foam will be spray applied on the poly-iso board to the entire roof surface. The new foam will be protected by three coats of elastomeric roof coating with a safety yellow perimeter edge warning strip 15 feet from outer roof edge for fall prevention.

	Budget	Process	Advertise Date	2021	2022	2023	2024
Design	X	Internal	X				
Construction	\$500-600K	Low Bid	Oct 2023				



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**Project Name: 610322 - Cofferdam Design and Fabrication**

**Location: Aqueduct South**

**Discipline: Structural 100%**

**Delivery Method: CMAR**

**Scope:** Aqueduct Maintenance does not currently have a method of repairing broken middle and lower panels on the canal without a full dewatering of the canal pool. This project was created to provide a tool to allow the damaged middle and lower panels to be repaired without full dewatering. The project plan calls for delivery of two 100-foot cofferdams — one sized for the smaller southern sections and the other for the larger west sections of the canal. A Construction Manager at Risk (CMAR) will be selected early in the design phase



and will participate in workshops, preliminary design, and will prepare mock-ups or proof-of-concept of the proposed design. Preliminary work will be to construct full-sized pieces in accordance with the preliminary design direction, which allows for evaluation of different design options. Precast sections from the mock-up will be used and the full scale effort will build more of the dam segments. The full-scale construction will be to provide additional longitudinal segments to provide a 100-foot cofferdam for CAP use. A smaller version will be built for the south and a larger one for the west. This approach will be done in parallel with the west and south sections being designed and prototyped separate. Due to the width of the invert for the south section and the added weight and difficulty in working with the larger west segments, having a south dam and a west dam was determined to be the best approach. This will also minimize time to deploy due to the location that the dam segments would be stored.

	Budget	Process	Advertise Date	2021	2022	2023	2024
Design	\$250K-\$300K	Direct Select	Jan 2021				
Construction	\$800K-\$1M	CMAR	July 2021				

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**Project Name:** 610324 - SCADA Replacement at Control Center

**Location:** Headquarters

**Discipline:** Electrical I+C 100%

**Delivery Method:** TBD

**Scope:** The CAP system was designed to rely on centralized, remote operations to divert and deliver Colorado River water. The current Supervisory Control and Data Acquisition (SCADA) system was placed into service in 2012, with most hardware purchased in 2010. A hardware/software replacement is vital to keep up with changes and technological advancements to address security concerns. CAP owns and maintains IT architecture to support multiple SCADA systems (operations and maintenance).. Within the 2020 / 2021 cycle, an interdisciplinary team will select a consultant to help the team establish a viable option from which to define the final project scope. Once the team has developed the project’s scope, it will proceed with designing the system through June 2021. Once the project’s assessment and scope statement are complete, the project will issue a full project planning document to execute the agreed-upon scope by April 2021.



	Budget	Process	Advertise Date	2021	2022	2023	2024
Design	\$400K-\$500K	RFQ	June 2021				
Construction	\$7M-\$7.5M	TBD	Oct 2022				

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**Project Name: 610328 - Potable Water Skids**

**Location:** Mark Wilmer, Bouse Hills, Little Harquahala, Hassayampa, Brady, Picacho, and Red Rock

**Discipline:** Mechanical 80% Electrical I+C 20%

**Delivery Method:** Job Order Contracting

**Scope:** Potable water systems at seven pumping plants (Mark Wilmer, Bouse Hills, Little Harquahala, Hassayampa, Brady, Picacho and Red Rock) use ultra-high filtration (UHF) membrane modules manufactured by GE Homespring. These modules were installed as part of the Pumping Plant Potable Water project in 2010-2011, are now obsolete, and no longer supported by the manufacturer or vendors. Obtaining replacement filter membranes, as well as other parts for these skids, is no longer possible as the manufacturer has discontinued production of this system. This project will replace existing water treatment skids with a modular system that fits in place and provides comparable water quality. Innovative Water Technologies, the original installation vendor, installed the GE Homespring filtration system and has developed an alternative system to replace the now obsolete system (Model UF40). The company is able to match CAP’s existing input and output components, due to having designed and installed the original system and retaining all related drawings and specifications. Replacement with VAFTM or a similar filter would provide a system of coarse/fine screens to achieve treatment requirements. Backwash would be performed by hydraulic power, in which the backwash valve at the flush outlet opens to atmospheric pressure, and pressure differential powers the backwash system. This backwash technique will reduce equipment downtime.



	Budget	Process	Advertise Date	2021	2022	2023	2024
Design	N/A	RFQ	Q4 2022				
Construction	\$800K-\$1M	JOC	February 2023				

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**Project Name: 610330 - Isolation Valve Upgrade**

**Location: Snyder and Black Mountain Pumping Plant**

**Discipline: Mechanical 100%**

**Delivery Method: Purchase Order**

**Scope:** This project replaces the original suction, check and discharge valve types at Black Mountain and Snyder Hill Pumping Plants. While the butterfly valves have performed as expected, the associated check valves have had issues since installation. The check valves perform their main function of protecting the pumping



units from reverse flow but are unable to function per the final hydraulic transient analysis, which requires a fast closing, first-stage check-valve closing followed by a delayed, second-stage closing. The current valves and dampening system have been unable to slow the closure of the valve disk. This single-stage closure is causing a localized pressure surge on the downstream side of the discharge piping. During a normal unit shutdown, the pump runs until the discharge butterfly valve is closed. Therefore, the potential for a check valve leak only applies to an emergency shutdown, unit trip or loss of plant power. After an emergency shutdown or trip, the discharge butterfly valve will still close in approximately 60 seconds and stop any reverse flow. The only potential situation for leakage over the long term is if the plant loses power. This would require plant personnel to manually close the discharge valves to prevent draining the discharge line back through the check valves. A pilot valve test at Black Mountain Pumping Plant showed that a nozzle-check valve has the ability to close even faster than a swing-check valve, eliminating the need for the second-stage closing. The advantage of nozzle-check valves is that they fully close, eliminating current concerns with leaking or spinning the pump backwards.

	Budget	Process	Advertise Date	2021	2022	2023	2024
Design	In House	X	X				
Construction	\$1-\$1.5M	Internal	Jan 2022				

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**Project Name:** 610389 - Switchyard Non-Segregated Bus Duct Replacement

**Location:** Waddell Pumping Plant

**Discipline:** Electrical I+C 100%

**Delivery Method:** JOC

**Scope:** The current state of the Waddell Pump/Generating Plant’s high-voltage, nonsegregated-phase bus creates a risk to continued reliable plant operation. After an inspection identified insulation readings that had degraded, intensive cleaning and maintenance was performed. Readings were considerably improved but quickly degraded, again, in adverse weather conditions. The original duct design was susceptible due to failure to protect electrical components from the weather elements. The bus was temporarily covered with roofing material in 2007 and performed well. Covers were removed in mid-2018 and sealed, however, functionality was lost due to subsequent rainwater infiltration. Only the design phase of this project is planned for the current budget period.



	Budget	Process	Advertise Date	2021	2022	2023	2024
Design	\$200K-\$250K	RFQ	Feb 2021				
Construction	\$800K-\$1M	JOC	Jan 2022				

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