- **Board of Directors**
  Engineering, Operations, and Technology Committee

1/14/2025 Board Meeting

9-2

Subject

Update on the Colorado River Aqueduct High-Voltage Transformers Replacement Project

Executive Summary

The Colorado River Aqueduct (CRA) system utilizes 69 kV and 230 kV transformers to step down Hoover and Parker power to the lower voltages used to run the main pumps and other equipment at the five CRA pumping plants. The existing transformers have exceeded their design life, show signs of deterioration, and require replacement to maintain reliable CRA water deliveries. This item is being presented to update the Engineering, Operations, and Technology Committee on recent efforts to procure the high-voltage power transformers. A spring 2025 board action is planned to award a procurement contract for the 35 transformers and to authorize final design services related to the installation of these transformers at all five CRA pumping plants.

Applicable Policy

Metropolitan Water District Administrative Code Section 5108: Appropriations

Metropolitan Water District Administrative Code Section 8121: General Authority of the General Manager to Enter Contracts

Metropolitan Water District Administrative Code Section 11104: Delegation of Responsibilities

Metropolitan Water District Administrative Code Section 8150: Best Value Procurement

Related Board Action(s)/Future Action(s)

By Minute Item 52330, dated April 13, 2021, the Board authorized preliminary design to replace the CRA main pump transformers.

Board action planned for spring 2025 to award a procurement contract for 35 CRA transformers and amendment of an existing agreement for final design in support of the CRA Transformer Replacement Project.

Details and Background

Background

The CRA is a 242-mile-long conveyance system that transports water from the Colorado River to Lake Mathews. It consists of five pumping plants, 124 miles of tunnels, siphons, and reservoirs, 63 miles of canals, and 44 miles of cut-and-cover conduits. The aqueduct was constructed in the 1930s and was placed into service in 1941.

Electrical power for the CRA's five pumping plants is transmitted via 237 miles of high-voltage lines from Hoover and Parker Dams. Higher voltages are used on overhead power lines to increase transmission efficiency, and the voltage is then decreased (stepped down) at the CRA pumping plants to match the lower voltages of plant equipment. Four pumping plants have incoming voltages of 230 kV, while the incoming voltage at the Intake

pumping plant is 69 kV. Each plant uses seven single-phase power transformers to step down the voltage from its incoming voltage to the operating voltage of 6.9 kV, which is used to operate the main pumps and other equipment. There are 35 transformers across all five pumping plants. At each plant, four transformers were installed in 1939 with the initial construction of the aqueduct, and the remaining three transformers were installed in 1959 with the aqueduct's expansion. The seven transformers at each plant are arranged in two banks of three transformers, each with one common spare unit. Each transformer bank powers up to five pump units, or approximately 63 percent of the aqueduct's capacity.

While a typical power transformer service life is expected to be 40 to 50 years, the CRA's transformers have operated continuously for over 80 years due to thorough maintenance and ideal operating conditions in a dry climate. In the mid-1980s, a significant effort was undertaken to rehabilitate and refurbish the original transformers installed in 1939. Most transformers continue to operate reliably; however, recent inspections have identified elevated gas levels in the transformer oil, an early indicator of equipment failure. Analysis of this data, along with operational performance and non-destructive microscopic examinations of selected transformers' insulating materials, indicates that the transformers are nearing the end of their service life and need replacement to ensure the reliable operation of the CRA.

Due to the specialized nature of the transformers and the continued strong demand for electrical equipment, long lead times are required for manufacturing. As such, staff recommends the transformers be procured before the installation contract is ready for advertisement. This approach ensures the transformers are available when the installation contractor mobilizes to conduct on-site work and minimizes impacts on the plants' operations during installation and commissioning. Deliveries of the transformers will be staged, and they will be stored at the individual pumping plants before installation.

To ensure manufacturers could meet Metropolitan's requirements and had sufficient experience, ability, resources, and demonstrated performance to provide custom high-voltage power transformers, staff conducted extensive, worldwide outreach to transformer suppliers. A Request for Qualification No. 1240A was issued on October 8, 2021, to prequalify potential bidders. Statements of Qualifications were received on November 19, 2021. Six manufacturers and/or authorized distributors were prequalified to bid on the transformer's procurement contract. They included Delta Star Inc., Hitachi, ILJIN Electric USA Inc., Siemens Energy, Tubos Trans Electric, and WEG Transformers USA.

Specifications No. 1897 – Furnishing 69 kV and 230 kV Power Transformers for the Colorado River Aqueduct Pumping Plants was advertised on May 19, 2023, to the prequalified manufacturers. During the bidding period, manufacturers indicated to staff that market conditions had significantly changed since the prequalification list was established, and substantial exceptions would be taken concerning: (1) Technical requirements; (2) Standard contract terms and conditions, including delivery schedule and warranty; and (3) Up-front, fixed pricing for the units. Items affecting fixed pricing include unprecedented global industry demand for transformers, current global events that have caused disruptions to supply chains, and significant materials price fluctuations. Collectively, these issues result in even longer lead times to procure the transformers.

The advertisement period for Specifications No. 1897 closed on September 21, 2023, after two separate time extensions were granted at the request of the potential bidders. Metropolitan received only one bid that was deemed nonresponsive and rejected, as it only included pricing for seven of the 35 transformers. In addition, the vendor took numerous exceptions to Metropolitan's bidding requirements and technical specifications.

Following these bidding challenges, staff elected to implement best-value procurement provisions, per Metropolitan's Administrative Code Section 8150. This approach allows prequalified manufacturers to submit proposals addressing the solicitation's technical specifications while enabling the evaluation of additional factors beyond cost. These factors include payment schedules, material escalation clauses, operational performance guarantees, warranty provisions, and delivery schedules, all of which can be negotiated with manufacturers.

Request for Proposal (RFP) No. 1360 was issued on March 15, 2024. Before advertisement, staff conducted extensive outreach to each of the prequalified manufacturers and determined that only two could furnish transformers that meet all of Metropolitan's technical requirements. Metropolitan then solicited the two

manufacturers to provide proposals under RFP No. 1360. One proposal was received from Siemens Energy Inc. (Siemens), whose manufacturing facilities are in Austria, on July 18, 2024. Metropolitan completed a thorough review and analysis of the submitted proposal. Siemens has proposed commercial terms that differ materially from those included in Metropolitan's standard procurement contracts. Metropolitan entered negotiations in September 2024 with Siemens on contract pricing, technical requirements, and contractual terms and conditions.

Siemens provided a cost breakdown in 2024 U.S. dollars for proposal evaluation totaling over $110 million. These costs do not include manufacturer field services, optional testing procedures if exercised by Metropolitan, price adjustments based on escalation, or the possible imposition of tariffs. In addition, delivery terms were proposed in a cost-plus format to hedge against uncertainty with future costs. Staff contacted several entities that have recently purchased large transformers and found the initial proposal was reasonable and reflects the high demand and limited manufacturers of the specialty equipment.

Next Steps

Staff is negotiating the proposal with Siemens to achieve the best overall value for Metropolitan, including addressing potential price escalation. Upon successful completion of the negotiations, staff will return to the Board in the first half of 2025 to award a procurement contract for 35 high-voltage power transformers, as well as to authorize final engineering design services for the installation of the 69 kV and 230 kV transformers at the five CRA pumping plants.

Project Milestone

March 2025 – Board award of a procurement contract for 35 CRA main transformers

12/19/2024
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