



● **Board of Directors**
Engineering and Operations Committee

10/12/2010 Board Meeting

7-5

Subject

Appropriate \$790,000; and authorize final design to replace 230 kV disconnect switches on the Colorado River Aqueduct (Approp. 15438)

Description

This action authorizes final design to replace 42 outdated 230 kiloVolt (kV) disconnect switches at the Colorado River Aqueduct's (CRA) Gene, Eagle Mountain, Iron Mountain, and Hinds Pumping Plants. These high-voltage switches provide the primary means for isolating the pumping plants' main transformer banks and circuit breakers for maintenance and repair and are critical to maintaining reliable Colorado River deliveries.

Timing and Urgency

Replacement of the 42 230 kV disconnect switches is needed to enhance CRA reliability. These motor-actuated disconnect switches, which are the primary means of isolating substation equipment, were installed in the 1930s and 1950s. The switches have reached the end of their useful life. Due to weathering and wear, several are deteriorating and have greater risk of failure. Further, spare parts are no longer available.

Whenever a planned CRA power outage is initiated to maintain or repair electrical equipment, the nearest switches to the equipment are disconnected. If a switch is inoperable, a more distant switch must then be disconnected instead, which may be located at another pumping plant. This disrupts operation of the pumping plants, requires mobilization of additional staff, and may lead to reduced CRA flows.

This project has been reviewed with Metropolitan's updated Capital Investment Plan (CIP) prioritization criteria, and staff recommends moving forward with final design at this time to enhance CRA reliability. This project is categorized as an Infrastructure Refurbishment project and is budgeted within Metropolitan's CIP for fiscal year 2010/11.

Background

The CRA is a 242-mile-long conveyance system which transports water from the Colorado River to Lake Mathews. It consists of five pumping plants, 124 miles of tunnels, 63 miles of canals, and 55 miles of conduits, siphons and reservoirs. The aqueduct was constructed in the late 1930s and was placed into service in 1941.

Rehabilitation of the CRA was initiated in 2001. The program includes a comprehensive multi-year effort to assess the various components of the CRA, prioritize upgrades, and execute projects. The four elements of the CRA rehabilitation program are the water conveyance system (canals, siphons, tunnels and infrastructure), the pumping plants (mechanical and structural upgrades), the electrical system (transmission lines, switchgear, and motors), and on compliance with environmental regulations (discharge prevention). Over \$106 million has been expended to date on the CRA rehabilitation program. The work included in this action addresses electrical components located at the CRA pumping plants.

Each of the CRA's five pumping plants has an electrical substation which converts high-voltage transmission grid power (230 kV or 69 kV) to 6,900 Volts, which is utilized by the plants' main pumps. Each substation consists of

two transformer banks and associated buses, circuit breakers, and disconnect switches. The disconnect switches provide the primary means for isolating equipment in the substations for maintenance and repair.

The existing disconnect switches were installed in the 1930s and 1950s as part of the original CRA construction and expansion. The switches are operated during planned or emergency outages in order to isolate electrical equipment such as the main pumping plant transformers, the transformer bank circuit breakers, or sections of the 230 kV transmission lines. The high-voltage disconnect switches have exceeded their typical service life of 40 to 60 years. Over time, normal use has led to wear and tear on the bearings and linkages, and misalignment of the switch mechanism. Worn-out switches eventually become inoperable and require a shutdown in order to realign the switch mechanism.

CRA 230 kV Disconnect Switches Replacement – Final Design Phase (\$790,000)

In September 2006, Metropolitan's Board authorized preliminary design phase activities to evaluate alternatives for replacement of all CRA 230 kV and 69 kV disconnect switches. The 230 kV disconnect switches are located at Hinds, Eagle Mountain, Iron Mountain, and Gene Pumping Plants. The 69 kV disconnect switches are located at Gene and Intake Pumping Plants.

The investigations identified that all existing 69 kV switches at Gene and Intake Pumping Plants, as well as eight 230 kV transfer bus switches at Iron Mountain and Gene Pumping Plants, are operable and do not require replacement at this time. All other 230 kV switches were found to have reached the end of their useful life and are recommended to be replaced. Needed upgrades include the replacement of forty-two 230 kV disconnect switches, complete with associated motor operators and control panels, and new fiber-optic cables from the substations to the pumping plant control rooms for remote monitoring.

This action appropriates \$790,000 and authorizes final design phase activities for the CRA 230 kV Disconnect Switches Replacement project. Planned activities include: engineering design; preparation of drawings and specifications; development of a construction cost estimate; receipt of bids; and all other activities in advance of award of a construction contract. Final design will be performed by Kennedy/Jenks Consultants, as discussed below. Requested funds include \$540,500 for final design; \$66,600 for hazardous materials investigations, potholing, and surveying; \$142,900 for project management and receipt of bids; and \$40,000 for remaining budget. The anticipated cost of final design for this project is approximately 12 percent of the estimated total construction cost. Engineering Services' goal for design of projects with construction cost greater than \$3 million is 9 to 12 percent. The construction cost for this project is anticipated to range from \$4.5 million to \$5.5 million.

Design Services by Kennedy/Jenks Consultants – No Action Required

Final design for replacement of the CRA 230 kV disconnect switches is recommended to be performed by Kennedy/Jenks Consultants under an existing board-authorized professional services agreement. This work requires highly specialized experience in high-voltage electrical design, and Metropolitan has insufficient technical resources in-house to conduct the design. Kennedy/Jenks was selected through a competitive process via Request for Qualifications No. 927. The planned scope includes preparation of plans and specifications, and technical support during the bid advertisement period. The estimated cost to provide these services is \$407,000. For this agreement, Metropolitan has established a Small Business Enterprise participation level of 18 percent. No amendment to the existing Kennedy/Jenks agreement is required for this work.

This project has been evaluated and recommended by Metropolitan's CIP Evaluation Team, and funds have been included in the fiscal year 2010/11 capital budget. See [Attachment 1](#) for the Financial Statement and [Attachment 2](#) for the Location Map.

This project is consistent with Metropolitan's goals for sustainability by enhancing the reliability of the existing conveyance and distribution system in order to maintain reliable water deliveries in the future.

Project Milestone

June 2011 – Completion of final design

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

California Environmental Quality Act (CEQA)

CEQA determination for Option #1:

The proposed action is categorically exempt under the provisions of CEQA and the State CEQA Guidelines. The overall activities involve the funding, design, minor alterations and replacement of existing public facilities with negligible or no expansion of use and no possibility of significantly impacting the physical environment. Accordingly, the proposed action qualifies under Class 1 and Class 2 Categorical Exemptions (Sections 15301 and 15302 of the State CEQA Guidelines).

The CEQA determination is: Determine that pursuant to CEQA, the proposed action qualifies under two Categorical Exemptions (Class 1, Section 15301 and Class 2, Section 15302 of the State CEQA Guidelines).

CEQA determination for Option #2:

None required

Board Options

Option #1

Adopt the CEQA determination and

- a. Appropriate \$790,000; and
- b. Authorize final design to replace 230 kV disconnect switches at the CRA pumping plants.

Fiscal Impact: \$790,000 in budgeted funds under Approp. 15438

Business Analysis: This option will reduce the risk of extended outages due to inoperable disconnect switches, and will thus enhance CRA reliability.

Option #2

Do not authorize final design to replace 230 kV disconnect switches at the CRA pumping plants.

Fiscal Impact: Unknown

Business Analysis: This option would forego an opportunity to replace outdated 230 kV disconnect switches and improve the reliability of the CRA.

Staff Recommendation

Option #1

 Roy L. Wolfe Manager, Corporate Resources	9/27/2010 Date
 Jeffrey Lightlinger General Manager	9/29/2010 Date

[Attachment 1 – Financial Statement](#)

[Attachment 2 – Location Map](#)

Financial Statement for CRA Reliability – Phase II Program

A breakdown of Board Action No. 11 for Appropriation No. 15438 for the CRA 230 kV Disconnect Switches Replacement project* is as follows:

	Previous Total Appropriated Amount (Aug. 2010)	Current Board Action No. 11 (Oct. 2010)	New Total Appropriated Amount
Labor			
Studies and Investigations	\$ 1,196,000	\$ -	\$ 1,196,000
Final Design	1,268,100	131,500	1,399,600
Owner Costs (Program mgmt., bidding process)	1,760,590	205,500	1,966,090
Submittals review	180,100	-	180,100
Construction Inspection and Support	628,800	-	628,800
Metropolitan Force Construction	1,301,700	-	1,301,700
Materials and Supplies	2,172,405	-	2,172,405
Incidental Expenses	84,800	6,000	90,800
Professional/Technical Services	1,120,000	-	1,120,000
Kennedy/Jenks Consultants	-	407,000	407,000
Equipment Use	-	-	-
Contracts	5,301,000	-	5,301,000
Remaining Budget	922,505	40,000	962,505
Total	\$ 15,936,000	\$ 790,000	\$ 16,726,000

Funding Request

Program Name:	CRA Reliability – Phase II Program		
Source of Funds:	Revenue Bonds, Replacement and Refurbishment or General Funds		
Appropriation No.:	15438	Board Action No.:	11
Requested Amount:	\$ 790,000	Capital Program No.:	15438-I
Total Appropriated Amount:	\$ 16,726,000	Capital Program Page No.:	283
Total Program Estimate:	\$ 45,170,000	Program Goal:	I-Infrastructure Reliability

* The total amount expended to date on the CRA 230 kV Disconnect Switches Replacement is approximately \$125,000.

Location Map

