



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

3/8/2016 Board Meeting

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**7-2**

**Subject**

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Appropriate \$840,000; and authorize preliminary investigations to rehabilitate the auxiliary power systems at the Colorado River Aqueduct pumping plants (Approp. 15384)

**Executive Summary**

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This action authorizes condition assessments of the auxiliary power distribution systems at Metropolitan's five Colorado River Aqueduct (CRA) pumping plants. These systems supply power to critical pumping plant equipment such as cooling water pumps, lubrication oil pumps, and circuit breaker control systems.

**Timing and Urgency**

The existing auxiliary power distribution systems at the CRA pumping plants were installed in the 1930s through the 1950s as part of the original aqueduct construction and subsequent expansion. These systems provide the electricity which powers critical support systems for the CRA main pumps. After nearly 75 years of continuous service, these systems have begun to deteriorate and need to be rehabilitated. As the initial step in the rehabilitation project, a comprehensive condition assessment is planned to identify, prioritize, and stage the needed work.

This project has been reviewed with Metropolitan's Capital Investment Plan (CIP) prioritization criteria and is included in the CRA Reliability Program. Funds for this action are available within Metropolitan's capital expenditure plan for fiscal year 2015/16.

**Details**

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**Background**

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

At each of the five CRA pumping plants, most of the incoming electrical power is used to operate the main pumps. However, a portion of the power is used for station lighting and general station power, which together comprise the auxiliary power distribution system. The auxiliary system includes transformers that step down the voltage from 2,400 Volts (V) to 480 V and 120 V; inverters that convert the power from alternating current to direct current; and a battery rack to store back-up power for critical control systems. At each plant, the auxiliary power system includes dozens of circuit breaker panels, hundreds of circuit breakers, thousands of feet of conduits and cable trays, and miles of wiring. Since this system powers the cooling water pumps, lubrication oil pumps, and control systems, its failure could potentially stop pumping operations, damage the main pumps, or lead to unsafe working conditions.

Most of the auxiliary power system components were installed during the 1930s through the 1950s. Over the decades, additional electrical loads have been added without upgrading the system capacity. The distribution panels' circuit breakers, which protect electrical circuits from damage caused by overload or short circuit, are now

obsolete. Spare parts are no longer available, and the power and control cables have exceeded their expected service life. Most of the distribution panels are at full capacity, leaving no room for the needed addition of lighting, monitoring devices, and other modern equipment. In some cases, the cables which provide power to the distribution panels are undersized and need to be upgraded to meet current National Electrical Code (NEC) standards.

While the auxiliary power systems at each pumping plant serve a similar purpose, each configuration is different and the actual electrical loads are different, requiring a detailed assessment of each plant. For example, the cooling water pump loads vary at each plant due to the differing sizes of the main pumps. In addition, new electrical loads have been added over time at each plant according to each location's particular needs. Under the planned rehabilitation project, staff will seek to standardize new electrical equipment such as circuit breakers and panels wherever practical.

A comprehensive condition assessment is needed to determine the required size and rating of panels, breakers, and conductors based on current codes and industry standards, and to identify and evaluate options for rehabilitation of the auxiliary power systems. The rehabilitation work will be staged in order to maintain reliable water deliveries through the CRA. Staff will return to the Board at a later date for authorization to design the needed repairs.

### **CRA Pumping Plant Auxiliary Power Systems – Preliminary Investigations (\$840,000)**

The planned scope of the assessments of the auxiliary power systems consists of determining current electrical loads and estimating future loads; conducting detailed field inspections of the entire power distribution system including all panels and sub-panels, along with tracing of wiring and conduits between panels; evaluating the condition of cable trays and conduits; evaluating wiring for hazardous materials; reviewing existing drawings and documentation; and evaluating compliance with current NEC standards. It is estimated that up to 1,250 circuits will need to be traced and evaluated. The results of this assessment will include updated record drawings for each pumping plant, a comprehensive assessment report, an initial staging plan for the needed upgrades, and a construction cost estimate.

This action appropriates \$840,000, and authorizes preliminary investigations of the auxiliary power systems at all five CRA pumping plants. The requested funds include \$569,000 for site investigations, data gathering, and hazardous material testing; \$163,000 for load flow analyses, detailed evaluations, and cost estimates; and \$108,000 for shutdown planning and project management. All work will be performed by Metropolitan staff.

This project is included within capital Appropriation No. 15384, the CRA Electrical Reliability appropriation, which was initiated in fiscal year 2001/02. With this action, the total funding for Appropriation No. 15384 will increase from \$22,725,000 to \$23,565,000.

This project has been evaluated and recommended by Metropolitan's CIP Evaluation Team, and funds are available within the fiscal year 2015/16 capital expenditure plan. See [Attachment 1](#) for the Financial Statement and [Attachment 2](#) for the Location Map.

#### ***Project Milestone***

July 2017 – Completion of assessment of the CRA pumping plant auxiliary power systems

### **Policy**

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Metropolitan Water District Administrative Code 5108: Appropriations

## California Environmental Quality Act (CEQA)

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### CEQA determination for Option #1:

The proposed action is categorically exempt under the provisions of CEQA and the State CEQA Guidelines. The proposed action consists of basic data collection and resource evaluation activities, which do not result in a serious or major disturbance to an environmental resource. This may be strictly for information gathering purposes, or as part of a study leading to an action which a public agency has not yet approved, adopted, or funded. Accordingly, the proposed action qualifies as a Class 6 Categorical Exemption (Section 15306 of the State CEQA Guidelines).

The CEQA determination is: Determine that pursuant to CEQA, the proposed action qualifies under a Categorical Exemption (Class 6, Section 15306 of the State CEQA Guidelines).

### CEQA determination for Option #2:

None required

## Board Options

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### Option #1

Adopt the CEQA determination that the proposed action is categorically exempt, and

- a. Appropriate \$840,000; and
- b. Authorize preliminary investigations to rehabilitate the auxiliary power systems at the Colorado River Aqueduct pumping plants.

**Fiscal Impact:** \$840,000 of capital funds under Approp. No. 15384

**Business Analysis:** This option will enhance reliability of the CRA and enhance worker safety.

### Option #2

Do not proceed with the investigations at this time.

**Fiscal Impact:** None

**Business Analysis:** This option would forgo an opportunity to enhance reliability of CRA deliveries, and to reduce the risk of unplanned outages of the pumping plants.

## Staff Recommendation

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### Option #1



Gordon Johnson  
Manager/Chief Engineer  
Engineering Services

2/17/2016

Date



Jeffrey Nightlinger  
General Manager

2/23/2016

Date

**Attachment 1 – Financial Statement**

**Attachment 2 – Location Map**

**Financial Statement for CRA Electrical Reliability Appropriation**

A breakdown of Board Action No. 10 for Appropriation No. 15384 for preliminary investigations of the auxiliary power systems at the Colorado River Aqueduct pumping plants<sup>1</sup> is as follows:

	<b>Previous Total Appropriated Amount (Feb. 2015)</b>	<b>Current Board Action No. 10 (Mar. 2016)</b>	<b>New Total Appropriated Amount</b>
Labor			
Studies & Investigations	\$ 671,000	\$ 725,000	\$ 1,396,000
Final Design	2,149,700	-	2,149,700
Owner Costs (Program mgmt.)	1,784,100	108,000	1,892,100
Submittals Review & Record Drwgs	24,000	-	24,000
Construction Inspection & Support	1,930,500	-	1,930,500
Metropolitan Force Construction	2,382,500	-	2,382,500
Materials & Supplies	691,000	-	691,000
Incidental Expenses	109,300	3,000	112,300
Professional/Technical Services	473,000	-	473,000
Hazardous materials testing	-	4,000	4,000
Equipment Use	29,000	-	29,000
Contracts	11,111,000	-	11,111,000
Remaining Budget	1,369,900	-	1,369,900
<b>Total</b>	<b>\$ 22,725,000</b>	<b>\$ 840,000</b>	<b>\$ 23,565,000</b>

**Funding Request**

<b>Appropriation Name:</b>	CRA Electrical Reliability		
<b>Source of Funds:</b>	Revenue Bonds, Replacement and Refurbishment or General Funds		
<b>Appropriation No.:</b>	15384	<b>Board Action No.:</b>	10
<b>Requested Amount:</b>	\$ 840,000	<b>Budget Page No.:</b>	278
<b>Total Appropriated Amount:</b>	\$ 23,565,000	<b>Total Appropriation Estimate:</b>	\$ 44,500,000

<sup>1</sup> This action is the initial appropriation for rehabilitation of the Colorado River Aqueduct auxiliary power systems.

### Location Map

