



- Board of Directors
Engineering and Operations Committee

2/10/2015 Board Meeting

7-1

Subject

Appropriate \$450,000; and authorize replacement of protection relays at Intake and Gene Pumping Plants (Approp. 15384)

Executive Summary

This action authorizes Metropolitan forces to replace over-current protection relays at Intake and Gene Pumping Plants on the Colorado River Aqueduct (CRA). Replacing the relays will safeguard the incoming 69 kV transmission lines and pumphouse equipment from electrical faults.

Timing and Urgency

The existing over-current protection relays at Intake and Gene Pumping Plants were installed in the 1940s as part of the original CRA construction. These relays need to be replaced after more than 70 years of continuous service. Their role is to protect the 69 kV transmission line system and the pumphouse equipment from electrical faults.

The existing over-current relays are no longer able to maintain the designated fault current setting. As a result, the relays can open unexpectedly, causing the main CRA pumps to shut down. Alternately, if the relays do not open as designed, fault currents could damage the pumphouse equipment. Staff recommends proceeding with replacement of the over-current relays at this time.

This project has been reviewed with Metropolitan's Capital Investment Plan (CIP) prioritization criteria and is categorized as an Infrastructure Reliability project. Funds for this action are available within Metropolitan's capital expenditure plan for fiscal year 2014/15.

Details

Background

The CRA's electrical system includes over 300 miles of overhead lines, electrical equipment to operate the main pumps, and lower voltage power for general lighting, communications, shop functions, and critical support equipment. Recent inspections have identified that the electrical system is deteriorating after more than 70 years in continuous operation. The frequency of needed repairs is increasing. In order to maintain reliability of the CRA's electrical system, staff has established a comprehensive rehabilitation program that will systematically upgrade facilities in a cost-effective and efficient manner. This action authorizes an initial project under this long-term rehabilitation effort.

The power to operate Intake Pumping Plant is transmitted from Gene Pumping Plant via three miles of 69 kV overhead lines. In order to protect the transmission line and pumphouse equipment from fault currents, over-current relays are located at both of the plants. The purpose of over-current relays is to detect excessive current which may be caused by lightning or transmission line damage. The over-current relays send a signal to circuit breakers to open and isolate the faults, thereby protecting pump motors, overhead lines, and lower voltage equipment.

The existing over-current protection relays at Intake and Gene Pumping Plants were installed in the 1940s. These relays are no longer able to maintain the designated fault current setting. This can result in false readings where the protection relays open unexpectedly, which can shut down pumping through the CRA. Alternately, if the relays do not open as designed, fault currents could damage the pumphouse equipment. In addition, these protection relays rely on electromagnetic coils and components that have become unreliable. Due to their age, spare parts are no longer available from their manufacturers. Staff recommends that the existing electromechanical over-current relays at Gene and Intake Pumping Plants be replaced with modern microprocessor-based units which are cost-effective and able to provide redundant fault protection, enhancing their reliability. Replacing the relays will reduce the potential for unintended shutdowns and equipment damage.

At the Hinds, Eagle Mountain, and Iron Mountain Pumping Plants, the original protection relays were replaced approximately ten years ago. The present units are in good condition and do not need to be replaced at this time.

In June 2014, Metropolitan's Board authorized design to replace the over-current protection relays at Intake and Gene Pumping Plants. Design has been completed, and staff recommends proceeding with construction at this time.

Gene and Intake Pumping Plants Protection Relay Replacement – Construction (\$450,000)

The planned work includes replacement of 12 over-current protection relays, fabrication of electrical panels, replacement of cables, fiber optic routing, and start-up. All construction will be performed by Metropolitan forces. This work will be completed during a scheduled shutdown of the CRA in winter 2015/16.

This action appropriates \$450,000 and authorizes construction to replace protection relays at Intake and Gene Pumping Plants. The requested funds include \$361,000 for Metropolitan force construction; \$38,000 for preparation of record drawings and for project management; and \$51,000 for remaining budget. The total cost of construction is \$543,000, which includes \$182,000 for procurement of the relays. These items have been pre-purchased and delivered to the sites.

This work is included within capital Appropriation No. 15384, the CRA Electrical Reliability Appropriation, which was initiated in fiscal year 2002/03. With the present action, the total funding for Appropriation No. 15384 will increase from \$22,275,000 to \$22,725,000. See [Attachment 1](#) for the Financial Statement and [Attachment 2](#) for the Location Map.

The total estimated cost to complete this project, including the amount authorized to date and current funds requested, is \$900,000.

Project Milestone

February 2015 – Completion of construction to replace the over-current protection relays at Intake and Gene Pumping Plants

Policy

Metropolitan Water District Administrative Code Section 5108: Appropriations

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 proposed project involves the funding; final design; and minor alterations, reconstruction or replacement of existing public facilities with no expansion of use and no possibility of significantly impacting the physical environment. In addition, the proposed project involves minor modifications in the condition of land, water, and/or vegetation which does not involve removal of healthy, mature, scenic trees. Accordingly, the proposed action qualifies under Class 1, Class 2, and Class 4 Categorical Exemptions (Sections 15301, 15302, and 15304 of the State CEQA Guidelines).

The CEQA determination is: Determine that pursuant to CEQA, the proposed action qualifies under four Categorical Exemptions (Class 1, Section 15301; Class 2, Section 15302; and Class 4, Section 15304 of the State CEQA Guidelines).

CEQA determination for Option #2:

None required

Board Options

Option #1

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

- a. Appropriate \$450,000; and
- b. Authorize construction to replace protection relays at Intake and Gene Pumping Plants.

Fiscal Impact: \$450,000 of capital funds under Approp. 15384

Business Analysis: This option will reduce the risk of costly emergency repairs and reduce the risk of unscheduled disruption of CRA deliveries.

Option #2


Do not proceed with the project at this time.


Fiscal Impact: None

Business Analysis: This option would forgo an opportunity to reduce the risk of unplanned outages of the CRA due to electrical component failure.

Staff Recommendation

Option #1


 _____ 1/27/2015
 Gordon Johnson Date
 Manager/Chief Engineer
 Engineering Services


 _____ 1/27/2015
 Jeffrey Lightlinger Date
 General Manager

Attachment 1 – Financial Statement

Attachment 2 – Location Map

Financial Statement for CRA Electrical Reliability Appropriation

A breakdown of Board Action No. 9 for Appropriation No. 15384 to replace protection relays at Gene and Intake Pumping Plants is as follows:

| | Previous Total Appropriated Amount (June 2014) | Current Board Action No. 9 (Feb. 2015) | New Total Appropriated Amount |
|-----------------------------------|---|---|--|
| Labor | | | |
| Studies & Investigations | \$ 671,000 | \$ - | \$ 671,000 |
| Final Design | 2,149,700 | - | 2,149,700 |
| Owner Costs (Program mgmt.) | 1,746,100 | 38,000 | 1,784,100 |
| Submittals Review & Record Drwgs | 24,000 | - | 24,000 |
| Construction Inspection & Support | 1,930,500 | - | 1,930,500 |
| Metropolitan Force Construction | 2,030,500 | 352,000 | 2,382,500 |
| Materials & Supplies | 682,000 | 9,000 | 691,000 |
| Incidental Expenses | 109,300 | - | 109,300 |
| Professional/Technical Services | 473,000 | - | 473,000 |
| Equipment Use | 29,000 | - | 29,000 |
| Contracts | 11,111,000 | - | 11,111,000 |
| Remaining Budget | 1,318,900 | 51,000 | 1,369,900 |
| Total | \$ 22,275,000 | \$ 450,000 | \$ 22,725,000 |

Funding Request

| | | | |
|-----------------------------------|---|--------------------------------------|---------------|
| Appropriation Name: | CRA Electrical Reliability Appropriation | | |
| Source of Funds: | Revenue Bonds, Replacement and Refurbishment or General Funds | | |
| Appropriation No.: | 15384 | Board Action No.: | 9 |
| Requested Amount: | \$ 450,000 | Budget Page No.: | 278 |
| Total Appropriated Amount: | \$ 22,725,000 | Total Appropriation Estimate: | \$ 44,500,000 |

¹ The total amount expended to date on the CRA Relay Replacement project is \$450,000. The total estimated cost to complete this project, including the amount expended to date, current funds requested, and construction cost is \$900,000.

Location Map

