



- Board of Directors
Engineering and Operations Committee

1/8/2013 Board Meeting

7-1

Subject

Appropriate \$790,000; authorize (1) preliminary design of seismic upgrades for the 6.9 kV switch houses at the Colorado River Aqueduct pumping plants; and (2) \$900,000 agreement with Ninyo & Moore for environmental services (Approp. 15438)

Executive Summary

This action authorizes preliminary design of seismic upgrades for the 6.9 kV switch houses at the Colorado River Aqueduct (CRA) pumping plants. These switch houses contain critical electrical equipment used to power the aqueduct's pumping plants, and are essential to maintaining reliable water deliveries from the CRA. This action also authorizes an agreement with Ninyo & Moore for environmental site assessments of areas impacted by the upgrades.

Timing and Urgency

Metropolitan has an ongoing program to evaluate the seismic stability of its facilities in order to maintain reliable water deliveries and to meet current seismic design practices and code requirements. Although Metropolitan facilities have always been designed to meet codes that were in place at the time of their construction, industry practices and code requirements are periodically updated, particularly following a major earthquake.

Recent seismic analyses of the 6.9 kV switch house buildings at each of the five CRA pumping plants identified that the buildings may be damaged during a major earthquake, which could lead to an extended shutdown of the CRA. Given the CRA's importance as one of the primary sources of imported water for Southern California, staff recommends moving forward with seismic upgrades at this time.

This project has been reviewed with Metropolitan's Capital Investment Plan (CIP) prioritization criteria, and is categorized as an Infrastructure Upgrade project. Funds for the preliminary design effort are available within Metropolitan's capital expenditure plan for fiscal year 2012/13. The environmental site assessment will be conducted with operations and maintenance funds.

Details

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. The 6.9 kV switch houses located at each of the five CRA pumping plants contain electrical circuit breakers and other equipment used to control, protect, and isolate the high voltage power that serves the nine aqueduct pumps located in the nearby pump houses. The switch houses were constructed in 1938 in accordance with the code requirements in effect at that time. Since that period, knowledge of earthquakes and seismic design has greatly improved, which has resulted in more stringent building codes.

In October 2009, Metropolitan's Board authorized a seismic risk assessment of the 6.9 kV switch houses. The study identified that these structures are vulnerable to damage during a major seismic event. A 7.9 magnitude earthquake on the San Andreas Fault could damage the switch houses, potentially interrupting CRA deliveries for an extended period.

The Hinds pumping plant is located approximately 20 miles from the San Andreas Fault, while Eagle Mountain and Iron Mountain pumping plants are located 33 and 64 miles from the fault, respectively. Gene and Intake pumping plants are located approximately 110 miles from the San Andreas Fault.

The outward appearance of all five switch house buildings is similar. Each building is constructed of reinforced concrete and features a main level and a basement level. The buildings at Hinds, Eagle Mountain, Iron Mountain, and Gene pumping plants are each approximately 163 feet long by 15 feet wide and 22 feet high. The building at Intake pumping plant is slightly smaller at 148 feet long by 14 feet wide and 21 feet high. Each building has a flat roof constructed of concrete decks with several large skylights. At the basement level, a tunnel and an underground duct bank extend from the switch house to the nearby pump house, containing the electrical cables that feed the main pumps. Steel lattice towers with a height of 50 feet are mounted on top of the switch house buildings at Hinds, Eagle Mountain, Iron Mountain, and Gene pumping plants, and with a height of 12 feet at Intake pumping plant. The towers support the high voltage electrical lines which supply power to the pumping plants.

The seismic risk assessment utilized a three-dimensional computer analysis of the switch house buildings which showed that extensive damage could occur at the Hinds, Eagle Mountain, and Iron Mountain pumping plants during a major earthquake. Due to its further distance from the San Andreas Fault, damage at Gene pumping plant would be less extensive than the other plants. At Intake pumping plant, any damage would likely be minor due to its distance from the fault and the shorter steel lattice towers.

Based on the results of the recent seismic evaluation, staff recommends that preliminary design of structural upgrades for the 6.9 kV switch houses be initiated to improve their capability to withstand a major seismic event.

Project No. 1 - CRA 6.9 kV Switch House Buildings Seismic Upgrades – Preliminary Design Phase (\$790,000)

Planned structural upgrades to the Hinds, Eagle Mountain, and Iron Mountain 6.9 kV switch houses include bracing of walls to support the steel towers mounted on the roofs; reinforcement of roof decks; addition of an exterior buttress wall; bracing of interior partition walls; and injection grouting of cracks in the walls and roof decks.

The addition of the buttress wall and bracing of interior walls at the Hinds, Eagle Mountain, and Iron Mountain switch houses will require excavation of the underlying soils. There is a possibility that these soils may be contaminated with polychlorinated biphenyl (PCB), a substance used as an additive in transformer and circuit breaker insulating oil until its use was banned by the U.S. Environmental Protection Agency (EPA) in 1979. As a result, site assessment activities will be undertaken at the Hinds, Eagle Mountain, and Iron Mountain pumping plants, in compliance with environmental regulations. This work is discussed below in Project No. 2.

For the Gene switch house, planned structural upgrades include bracing of walls, reinforcement of the roof deck, and injection grouting of cracks in the walls and roof deck. For Intake pumping plant, the only upgrade anticipated is injection grouting of cracks.

Planned preliminary design phase activities for the five switch house buildings include conducting field surveys, geotechnical investigations, hazardous materials investigations, development of final design criteria, preparation of environmental documentation and a preliminary design report, and development of a construction cost estimate.

This action appropriates \$790,000 and authorizes preliminary design phase activities for seismic strengthening of the CRA's 6.9 kV switch house buildings. Requested funds include \$332,000 for preliminary design; \$223,000 for geotechnical investigations; \$10,000 for lead and asbestos testing; \$50,000 for a value engineering assessment; \$81,000 for preparation of environmental documentation, development of a construction cost estimate, and for project management; and \$94,000 for remaining budget. Geotechnical investigations are recommended to be performed primarily by Fugro West, Inc., as discussed below, with technical review by Metropolitan staff. The lead and asbestos testing is recommended to be performed by Clark Seif Clark, Inc., as discussed below. All other work will be performed by Metropolitan staff.

Geotechnical Investigations (No Action Required)

Geotechnical investigations at the Hinds, Eagle Mountain, and Iron Mountain pumping plants are recommended to be performed by Fugro West, Inc., under a professional services agreement which will be awarded under the General Manager's Administrative Code authority. Fugro West will perform exploratory excavations and prepare geotechnical reports where foundation improvements are recommended. Fugro West was selected through a competitive process via Request for Qualifications No. 931. For this agreement, Metropolitan has established a Small Business Enterprise (SBE) participation level of 18 percent. The estimated cost for services is \$185,000.

Hazardous Material Testing (No Action Required)

Hazardous material testing at all five switch houses is recommended to be performed by Clark Seif Clark, Inc., under an existing professional services agreement. Clark Seif Clark will collect soil material samples, perform laboratory analyses, and prepare reports on existing building materials which may be disturbed as a result of the retrofit work. Clark Seif Clark was selected through a competitive process via Request for Proposals No. 899. For this agreement, Metropolitan has established a SBE participation level of 20 percent. The estimated cost for these services is \$10,000.

Project No. 2 – Environmental Site Assessments (No Capital Funds Required)

From 1929 until 1979, PCB was commonly used in the electrical industry to insulate transformers and circuit breakers, and for hundreds of other industrial and commercial applications due to its nonflammability, high boiling point, and electrical insulating properties. All five of the CRA pumping plants' main transformers and high voltage circuit breakers formerly used PCB-containing oil for insulation and cooling. Following the EPA's ban on the use of PCBs in 1979, Metropolitan discontinued its use and replaced all PCB-containing oil with non-PCB oil.

Abandoned insulating oil lines, formerly used to transport the oil from storage tanks to the electrical equipment, extend parallel with and into the 6.9 kV switch houses. This project will investigate the presence of PCB in the vicinity of the switch houses, and will outline sampling locations, methods of analysis, and the criteria for any required remediation.

In accordance with GASB provisions, the site assessment work will be conducted with operation and maintenance funds instead of a capital appropriation. The cost of the environmental site assessment, which is estimated to be \$900,000, was not identified in Metropolitan's operations and maintenance budget for fiscal year 2012/13.

This action authorizes an increase of \$900,000 in the expenditure of operations and maintenance funds for Water System Operations in fiscal year 2012/13, and an environmental site assessment of the Hinds, Eagle Mountain, and Iron Mountain pumping plants. Planned activities include soil sampling, testing, and chemical analyses; development of a site characterization report; coordination with regulatory agencies; and preparation of environmental documentation. The investigations and site assessments are recommended to be performed by a specialty consultant, Ninyo & Moore, as discussed below. The anticipated cost of the assessment includes \$90,000 for initial sampling and testing of soils; \$690,000 for full site characterization; and \$120,000 for preparation of a work plan.

Site Assessment Services (New Agreement)

Site assessment services for the switch houses at the Hinds, Eagle Mountain, and Iron Mountain pumping plants are recommended to be provided by Ninyo & Moore. Ninyo & Moore will obtain soils samples, conduct laboratory analyses, develop a full site assessment to determine the extent of contamination, if applicable, and prepare the necessary work plans for approval by the EPA. Ninyo & Moore was selected through a competitive process via Request for Qualifications No. 962. For this agreement, Metropolitan has established a SBE participation level of 18 percent. The estimated cost for Ninyo & Moore's services is \$900,000.

Summary

This action appropriates \$790,000, authorizes preliminary design of seismic upgrades for the 6.9 kV switch houses at the CRA pumping plants, authorizes an agreement with Ninyo & Moore for environmental site assessment services, and authorizes an increase of \$900,000 in the expenditure of operations and maintenance

funds for Water System Operations in fiscal year 2012/13. This work has been evaluated and recommended by Metropolitan's CIP Evaluation Team, and funds for the preliminary design effort are available within the fiscal year 2012/13 capital expenditure plan. See [Attachment 1](#) for the Financial Statement and [Attachment 2](#) for the Location Map.

Preliminary design of the seismic upgrades will be performed under the CRA Reliability Program – FY 2006/07 Through FY 2011/12 (Appropriation No. 15438), which was initiated in fiscal year 2006/07. Other projects authorized under Appropriation No. 15438 include the CRA 6.9 kV Fault Current Protection Upgrades; CRA 230 kV Disconnect Switches Replacement; and the Eagle Mountain, Iron Mountain, and Julian Hinds Standby Generator Replacements. The total appropriated amount for this program will increase from \$31,624,000 to \$32,414,000.

Project Milestones

October 2013 – Completion of preliminary design of the seismic upgrades

December 2013 – Completion of site assessments

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 proposed action involves the funding of a study and minor modifications to existing public facilities with negligible or no expansion of use and no possibility of significantly impacting the physical environment. In addition, 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 for both Class 1 and Class 6 Categorical Exemptions (Sections 15301 and 15306 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 6, Section 15306 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;
- b. Authorize preliminary design of seismic upgrades for the 6.9 kV switch houses on the Colorado River Aqueduct; and
- c. Authorize agreement with Ninyo & Moore in an amount not to exceed \$900,000 for site assessment services.

Fiscal Impact: \$790,000 in capital funds under Approp. 15438 and an increased expenditure of \$900,000 in operation and maintenance funds for fiscal year 2012/13

Business Analysis: This option will reduce the risk of structural failure of key CRA buildings in the event of a major earthquake, and will enhance CRA reliability, in accordance with provisions of current seismic/building codes.

Option #2

Do not authorize preliminary design at this time.

Fiscal Impact: None

Business Analysis: This option would defer seismic upgrades of the CRA's 6.9 kV switch houses, and would forego an opportunity to reduce the risk of a prolonged and unplanned outage of the CRA in the event of a major earthquake.

Staff Recommendation

Option #1

	12/19/2012
Gordon Johnson	Date
Manager/Chief Engineer	
Engineering Services	
	12/20/2012
Jeffrey Kightlinger	Date
General Manager	

Attachment 1 – Financial Statement

Attachment 2 – Location Map

Ref# es12620320

Financial Statement for CRA Reliability Program – FY 2006/07 Through FY 2011/12

A breakdown of Board Action No. 21 for Appropriation No. 15438 for the CRA 6.9 kV switch houses¹ is as follows:

	Previous Total Appropriated Amount (July 2012)	Current Board Action No. 21 (Jan. 2013)	New Total Appropriated Amount
Labor			
Studies & Investigations	\$ 1,531,800	\$ 367,000	\$ 1,898,800
Final Design	2,166,900	-	2,166,900
Owner Costs (Program mgmt. & permitting)	2,574,090	81,000	2,655,090
Submittals Review & Record Drwgs	501,600	-	501,600
Construction Inspection & Support	2,072,000	-	2,072,000
Metropolitan Force Construction	3,218,700	-	3,218,700
Materials & Supplies	2,592,405	-	2,592,405
Incidental Expenses	132,800	3,000	135,800
Professional/Technical Services	1,607,000	-	1,607,000
Fugro West	-	185,000	185,000
Clark Seif Clark	-	10,000	10,000
Value engineering consultant	-	50,000	50,000
Equipment Use	25,505	-	25,505
Contracts	14,015,340	-	14,015,340
Remaining Budget	1,185,860 ²	94,000	1,279,860
Total	\$ 31,624,000	\$ 790,000	\$ 32,414,000

Funding Request

Program Name:	CRA Reliability Program – FY 2006/07 Through FY 2011/12		
Source of Funds:	Revenue Bonds, Replacement and Refurbishment or General Funds		
Appropriation No.:	15438	Board Action No.:	21
Requested Amount:	\$ 790,000	Capital Program No.:	15438
Total Appropriated Amount:	\$ 32,414,000	Capital Program Page No.:	292
Total Program Estimate:	\$ 64,826,000	Program Goal:	I-Infrastructure Reliability

¹ The total amount expended to date on the CRA 6.9 kV Switch House Seismic Retrofit project is approximately \$299,000.

² Includes previous allocation of \$187,000 from remaining budget to the CRA 6.9 kV Switch House Seismic Retrofit project for detailed structural modeling (\$60,000); to the CRA Pumping Plant Sump Rehabilitation project for preliminary design to replace deteriorated circulating water pumps and sump pumps (\$75,000); and to the CRA Isolation Gates Replacement project for a higher-than-expected fabrication bid (\$52,000).

Location Map

