



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

10/12/2010 Board Meeting

7-2

Subject

Appropriate \$510,000; and authorize two Colorado River Aqueduct rehabilitation projects (Approp. 15373)

Description

This action authorizes two Colorado River Aqueduct (CRA) rehabilitation projects: (1) preliminary design for repair of the Iron Mountain tunnel; and (2) preliminary design for repair of the San Jacinto Tunnel east entrance adit.

Timing and Urgency

Several stretches of the Iron Mountain Tunnel and San Jacinto Tunnel east entrance adit have developed longitudinal and transverse cracks caused by unstable soil. A June 2010 study concluded that the tunnels will continue to deteriorate over time, and eventually could be at risk of collapse. Further, the tunnels are vulnerable to damage resulting from earthquakes generated by the nearby active faults. Given the importance of the CRA to Metropolitan's water supply, staff recommends proceeding with the preliminary design for strengthening of these two tunnels.

These projects have been reviewed with Metropolitan's updated Capital Investment Plan (CIP) prioritization criteria, and are categorized as Infrastructure Upgrade projects. Both projects are budgeted within Metropolitan's CIP for fiscal year 2010/11.

Project No. 1 – Iron Mountain Tunnel Repair– Preliminary Design Phase (\$355,000)

Iron Mountain Tunnel was constructed between 1933 and 1938. The tunnel is located downstream of the Iron Mountain Pumping Plant, and is eight miles long. The tunnel's cross-section is horseshoe-shaped, with overall dimensions of 16 feet high by 16 feet wide. In 2003, Metropolitan staff discovered longitudinal and transverse cracks up to 1 inch wide along a 2,500-foot stretch of the Iron Mountain Tunnel during a shutdown. The tunnel has been closely monitored from 2003. Monitoring included crack meters installed to measure changes in crack width. The June 2010 report documents an increase in crack widths up to 1/8 of an inch between 2005 and 2009.

The 2010 report concluded that the cracking is a result of a combination of issues. The Iron Mountain Tunnel is lined with unreinforced concrete arch sections. Concrete arch sections perform well when adequate ground support is provided. However, with unstable alluvial soil support, significant stresses occur in the arch sections over time. Alluvial soils are found where the Iron Mountain Tunnel exits the mountainous terrain at its west portal. In addition, the timber blocking placed between the concrete liner and the surrounding soil is deteriorating, causing further instability of the surrounding soil, which contributes to increased stresses on the concrete liner. Unless the liner is strengthened, deformation will continue over time.

The 2010 report also identified that the tunnel is vulnerable to seismic events. Multiple active faults are located within the vicinity of the Iron Mountain Tunnel, including the Pinto Mountain Fault and Pisgah-Bullion Mountain-Mesquite Lake Fault. These faults could generate a major earthquake up to magnitude 7.0, which

results in significant ground loading on the tunnel. A seismic-induced failure of the CRA could lead to an extended shutdown.

Staff recommends proceeding with preliminary design for repair of the Iron Mountain Tunnel. The design will address tunnel strengthening and corrosion protection of the deteriorated tunnel. Preliminary design is recommended to be performed by Jacobs Associates, as discussed below. Metropolitan staff will prepare environmental documentation and perform program management.

This action appropriates \$355,000 and authorizes preliminary design activities for repair of the Iron Mountain Tunnel. Planned activities include field surveys and geotechnical investigations, preparation of a preliminary design report and environmental documentation, and development of a cost estimate. Staff will return to the Board for authorization of final design.

Project No. 2 – San Jacinto Tunnel East Adit Repair – Preliminary Design Phase (\$155,000)

The San Jacinto Tunnel east entrance adit was constructed between 1933 and 1938. It served as one of the main ingress and egress points for construction of the eastern portion of the San Jacinto Tunnel. The 300-foot-long east entrance adit is located at the base of San Jacinto Mountain. The adit's cross-section is horseshoe-shaped, with overall dimensions of 16 feet high by 16 feet wide. The adit is the only way to move maintenance equipment into the tunnel, and serves as the primary entrance for inspection of the tunnel.

In early 2003, Metropolitan staff discovered cracks along a 100-foot reach of the San Jacinto east adit, beginning at its entrance gate. The cracks include longitudinal, transverse and oblique cracking in the crown, walls and invert. The adit has been monitored closely since the initial inspection. Further tunnel movement was observed in 2007, and a recent survey showed that the tunnel exhibited continued cracking. Tunnel access through the adit has been restricted since 2007.

A structural analysis completed in June 2010 concluded that the weakened tunnel is vulnerable to seismic events. Multiple active faults are located within the vicinity of the San Jacinto Tunnel adit, including the San Andreas Fault and the San Jacinto Fault. Specifically, the nearby San Andreas fault is capable of generating a magnitude 7.4 seismic event. A seismic-induced failure of the adit could result in an extended CRA shutdown.

Staff recommends proceeding with preliminary design for repair of the San Jacinto Tunnel east entrance adit. Preliminary design is recommended to be performed by Jacobs Associates, as discussed below. Metropolitan staff will prepare environmental documentation and perform program management.

This action appropriates \$155,000 and authorizes preliminary design phase activities for repair of the San Jacinto Tunnel east entrance adit. Planned activities include field surveys and geotechnical investigations, preparation of a preliminary design report and environmental documentation, and development of a cost estimate. Staff will return to the Board at a later date for authorization of final design.

Specialized Technical Support by Jacobs Associates – No Action Required

Preliminary design of both the Iron Mountain Tunnel and San Jacinto Tunnel east entrance adit repairs is recommended to be performed by Jacobs Associates under a new professional services agreement, which is planned to be executed under the General Manager's Administrative Code authority. This work is highly specialized, and Metropolitan has insufficient technical resources in-house to conduct the design. Jacobs Associates was selected through a competitive process via Request for Qualifications No. 931. For this agreement, Metropolitan has established a Small Business Enterprise participation level of 18 percent. Jacobs will perform analyses of the tunnels, evaluate retrofit options, and prepare a preliminary design report. The estimated cost for these services is \$130,000.

Summary

This action appropriates \$510,000 and authorizes two CRA rehabilitation projects. See [Attachment 1](#) for the Financial Statement, and [Attachment 2](#) for the Location Map.

These projects are consistent with Metropolitan's goals for sustainability by enhancing reliability of the existing conveyance system in order to maintain reliable water deliveries in the future.

Project Milestone

April 2011 – Completion of preliminary design of two tunnel rehabilitations

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 exempt under the provisions of CEQA and the State CEQA Guidelines, since it involves only a conceptual plan associated with feasibility and planning studies for possible future actions, as well as basic data collection and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource. These activities may be strictly for information gathering purposes, or as part of a study leading to actions which a public agency has not yet approved, adopted, or funded. Accordingly, this proposed action qualifies both as a feasibility and planning studies exemption (Section 15262 of the State CEQA Guidelines) and as a categorical exemption (Class 6, Section 15306 of the State CEQA Guidelines).

The CEQA determination is: Determine that pursuant to CEQA, the proposed action qualifies under both the feasibility and planning studies exemption and a categorical exemption (Class 15262 and Class 6, Section 15306 of the State CEQA Guidelines).

CEQA determination for Option #2:

None required

Board Options

Option #1

Adopt the CEQA determinations and

- a. Appropriate \$510,000;
- b. Authorize preliminary design for repair of the Iron Mountain Tunnel; and
- c. Authorize preliminary design for repair of the San Jacinto Tunnel east entrance adit.

Fiscal Impact: \$510,000 in budgeted funds under Approp. 15373

Business Analysis: These projects will protect Metropolitan's assets, increase service reliability to member agencies, and reduce the risk of costly emergency repairs.

Option #2

Do not proceed with the two projects at this time.

Fiscal Impact: Unknown

Business Analysis: This option would forego an opportunity to enhance reliability of the CRA.


Staff Recommendation

Option #1



Roy L. Wolfe
Manager, Corporate Resources

9/28/2010
Date



Jeffrey Kightlinger
General Manager

9/29/2010
Date

Attachment 1 – Financial Statement

Attachment 2 – Location Map

Ref# cr12607417

Financial Statement for CRA Conveyance Reliability Program

A breakdown of Board Action No. 12 for Appropriation No. 15373 for the Iron Mountain Tunnel Repair and San Jacinto Tunnel East Adit Repair projects* is as follows:

	Previous Total Appropriated Amount (April 2008)	Current Board Action No. 12 (Oct. 2010)	New Total Appropriated Amount
Labor			
Studies and Investigations	\$ 3,182,300	\$ -	\$ 3,182,300
Preliminary Design	3,291,700	111,000	3,402,700
Owner Costs (Program mgmt., envir. doc., permitting)	4,412,600	223,000	4,635,600
Construction Inspection and Support	5,023,220	-	5,023,220
Metropolitan Force Construction	7,483,870	-	7,483,870
Materials and Supplies	1,660,300	-	1,660,300
Incidental Expenses	387,800	-	387,800
Professional Services	3,793,000	130,000	3,923,000
Right of Way	10,000	-	10,000
Equipment Use	101,450	-	101,450
Contracts	40,203,861	-	40,203,861
Remaining Budget	3,837,899	46,000	3,883,899
Total	\$ 73,388,000	\$ 510,000	\$ 73,898,000

Funding Request

Program Name:	CRA Conveyance Reliability Program		
Source of Funds:	Revenue Bonds, Replacement and Refurbishment or General Funds		
Appropriation No.:	15373	Board Action No.:	12
Requested Amount:	\$ 510,000	Capital Program No.:	15373-I
Total Appropriated Amount:	\$ 73,898,000	Capital Program Page No.:	E-16
Total Program Estimate:	\$ 106,800,000	Program Goal:	I-Infrastructure Reliability

*This action is the initial appropriation for the Iron Mountain Tunnel Repair and San Jacinto Tunnel East Adit Repair projects.

Location Map

