



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

12/12/2017 Board Meeting

7-1

Subject

Adopt CEQA determination and appropriate \$700,000; and authorize preliminary design of seismic upgrades to Whitewater Tunnel No. 2 on the Colorado River Aqueduct (Appropriation No. 15483)

Executive Summary

This action initiates a project that will reduce the risk of damage and delivery interruptions on the Colorado River Aqueduct (CRA) due to a major earthquake on the southern San Andreas Fault.

Timing and Urgency

A recent seismic vulnerability assessment of the CRA identified that Whitewater Tunnel No. 2 is the most likely component of the CRA system to sustain major damage due to a strong earthquake on the southern San Andreas Fault. This vulnerability could lead to an extended outage of the CRA while repairs are executed. Given the CRA's importance as one of the primary sources of imported water for Southern California, staff recommends moving forward with a project to mitigate potential damage and reduce the time needed to restore operation.

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 2017/18.

Details

Background

The CRA is a 242-mile-long conveyance system that transports water from the Colorado River to Lake Mathews in Riverside County. 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 CRA was constructed in accordance with current building codes of that time. While there was no specific seismic design criteria that applied to water conveyance facilities, historical records show that the CRA designers were aware of faults and incorporated some features into the design to address seismic risk. For example, the aqueduct was designed to cross known active faults near the ground surface in inverted siphons at right angles to the fault traces. This approach was intended to confine any damage to a short section of the aqueduct and to simplify access for repairs. In the decades following completion of the CRA, industry knowledge of earthquakes and structural analysis has greatly improved, which has led to significant advancements in seismic design of water tunnels and pipelines.

The CRA's Whitewater Tunnel No. 2 was constructed between 1934 and 1935. The tunnel is located approximately 70 miles downstream of Hinds Pumping Plant, northwest of the city of Palm Springs in the San Gorgonio Pass area. The 1.5-mile-long tunnel has a horseshoe-shaped cross-section, with overall dimensions of 16 feet high by 16 feet wide. The tunnel's depth below ground surface varies from 50 feet near the portals to a maximum of approximately 650 feet.

A recent seismic risk assessment of the CRA identified that Whitewater Tunnel No. 2 is vulnerable to major damage from a strong earthquake on the southern San Andreas Fault, and is the component of the CRA system

that is most likely to be damaged. The tunnel's alignment closely parallels the southern San Andreas Fault and crosses a splay of the fault approximately one-third mile from the west portal. A 7.8 magnitude earthquake has been postulated for the southern San Andreas Fault. An earthquake of this magnitude could damage the tunnel both at the fault crossing and at shallow tunnel sections near the portal. The damage could potentially interrupt CRA deliveries for an extended period.

Given the specialized nature of tunnel repairs, staff conducted a workshop with industry experts in the fields of tunnel engineering and construction to identify tunnel repair options and to estimate the repair durations. The group concluded that if a number of pre-event planning, design, and upgrade steps were taken, the repairs to Whitewater Tunnel No. 2 could be completed within a six-month period. These pre-event steps include: (1) design and construction to strengthen vulnerable tunnel sections near the two portals; (2) design and construction of a new access structure at the west portal; (3) completion of design of a new tunnel section to bypass any collapsed and/or blocked portions of the existing tunnel, which would enable construction to proceed quickly after an event; (4) stockpiling of steel sets, which are a key material needed to commence construction; and (5) prequalification of tunnel repair contractors. Staff recommends moving forward with preliminary design of these tunnel upgrades at this time.

Whitewater Tunnel No. 2 Seismic Upgrades – Preliminary Design Phase (\$700,000)

The scope of this project includes completion of near-term upgrades to strengthen vulnerable tunnel sections at the east and west portals of Whitewater Tunnel No. 2, and to improve access at the west portal. In order to expedite post-earthquake repairs of damaged tunnel sections, the design of a new bypass tunnel will be prepared in advance, steel sets will be procured and stockpiled, and tunnel repair contractors will be prequalified so that specialized equipment and crews may mobilize rapidly.

Planned preliminary design phase activities include: (1) conducting field investigations, topographic surveys, and geotechnical investigations; (2) preparation of environmental documentation; (3) development of technical design criteria and conceptual layout drawings; and (4) development of a construction cost estimate.

This action appropriates \$700,000 and authorizes preliminary design of seismic upgrades to Whitewater Tunnel No. 2. Requested funds include \$252,000 for the field investigations and surveys, structural analysis of vulnerable tunnel sections, development of design criteria, preparation of conceptual layout drawings, and development of cost estimates by Metropolitan staff; \$242,000 for geotechnical investigations by GeoPentech, Inc., as discussed below; \$149,000 for preparation of environmental documentation and project management; and \$57,000 for remaining budget.

Geotechnical Investigations (GeoPentech, Inc.) – No Action Required

Geotechnical investigations will be performed by GeoPentech, Inc. under a new agreement planned to be awarded under the General Manager's Administrative Code authority. GeoPentech, Inc. was prequalified via Request For Qualifications No. 1134 and was selected based on its experience with tunnel projects including site investigations, evaluation of geohazards, and tunnel design. The planned scope of work includes: (1) review of historical reports; (2) field investigations and geophysical surveys; (3) drilling of borings; (4) laboratory testing; (5) development of technical recommendations; and (6) design support. The estimated cost for these services is \$242,000.

No action is required for GeoPentech, Inc. to provide these services. GeoPentech is a Small Business Enterprise (SBE) firm, and thus achieves 100 percent SBE participation for this work. The subconsultants under this agreement are Ruen Drilling, Inc. and AP Engineering and Testing, Inc.

This project is included within Appropriation No. 15483, the CRA Reliability Appropriation – FY 2012/13 Through FY 2017/18, which was initiated in 2012/13. With the present action, the total funding for Appropriation No. 15483 will increase from \$11.62 million to \$12.32 million.

This project has been evaluated and recommended by Metropolitan's CIP Evaluation Team, and funds are available within the fiscal year 2017/18 capital expenditure plan. See **Attachment 1** for the Financial Statement and **Attachment 2** for the Location Map.

Project Milestone

December 2018 – Completion of preliminary design

Policy

Metropolitan Water District Administration Code Section 5108: Appropriations

Metropolitan Water District Administration 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 consists of preliminary design activities 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. 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 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 a feasibility and planning studies exemption and a categorical exemption (Sections 15262 and 15306 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 exempt from CEQA, and

- a. Appropriate \$700,000; and
- b. Authorize preliminary design of seismic upgrades to Whitewater Tunnel No. 2 on the Colorado River Aqueduct.

Fiscal Impact: \$700,000 of capital funds under Appropriation No. 15483

Business Analysis: This option will enhance delivery reliability of the CRA and reduce the risk of flow disruption in the event of a major earthquake on the southern San Andreas Fault.

Option #2

Do not proceed with the project.

Fiscal Impact: None

Business Analysis: This option would forego an opportunity to reduce the risk of an unplanned outage of the CRA due to a major earthquake on the southern San Andreas Fault.

Staff Recommendation

Option #1



Gordon Johnson
Manager/Chief Engineer
Engineering Services

11/20/2017
Date



Jeffrey Kightlinger
General Manager

11/22/2017
Date

Attachment 1 – Financial Statement

Attachment 2 – Location Map

Ref# es12658925

Financial Statement for CRA Reliability Appropriation – FY 2012/13 Through FY 2017/18

A breakdown of Board Action No. 7 for Appropriation No. 15483¹ is as follows:

	Previous Total Appropriated Amount (June 2017)	Current Board Action No. 7 (Dec. 2017)	New Total Appropriated Amount
Labor			
Studies & Investigations	\$ 1,802,000	\$ 252,000	\$ 2,054,000
Final Design	2,236,000	-	2,236,000
Owner Costs (Program mgmt. & envir. doc.)	929,000	139,000	1,068,000
Submittals Review & Record Drwgs.	88,000	-	88,000
Construction Inspection & Support	591,000	-	591,000
Metropolitan Force Construction	947,000	-	947,000
Materials & Supplies	104,000	-	104,000
Incidental Expenses	7,000	10,000	17,000
Professional/Technical Services	640,000	-	640,000
GeoPentech, Inc.		242,000	242,000
Equipment Use	63,000	-	63,000
Contracts	2,975,254	-	2,975,254
Remaining Budget	1,237,746	57,000	1,294,746
Total	\$ 11,620,000	\$ 700,000	\$ 12,320,000

Funding Request

Appropriation Name:	CRA Reliability Appropriation – FY 2012/13 Through FY 2017/18		
Source of Funds:	Revenue Bonds, Replacement and Refurbishment or General Funds		
Appropriation No.:	15483	Board Action No.:	7
Requested Amount:	\$ 700,000	Budget Page No.:	222
Total Appropriated Amount:	\$ 12,320,000	Total Appropriation Estimate:	\$ 67,600,000

¹ This is the initial action for seismic upgrades to Whitewater Tunnel No. 2 on the CRA.

Location Map

