



- Board of Directors  
*Engineering and Operations Committee*

10/9/2012 Board Meeting

---

**8-2**

---

## **Subject**

Appropriate \$3.5 million; award two contracts to J.F. Shea Construction, Inc. in the amounts of \$798,000 and \$1,068,000; and authorize design to rehabilitate delivery pipeline supports at the Colorado River Aqueduct pumping plants (Approp. 15483)

---

## **Executive Summary**

This action awards two construction contracts for urgent replacement of corroded pipe support bolts on two of the three delivery lines at each pumping plant on the Colorado River Aqueduct (CRA). This action also authorizes an engineering assessment and final design activities for rehabilitation of the third delivery line. Due to the critical role of these delivery lines in conveying Colorado River water to Metropolitan's service area, the rehabilitation work is recommended to proceed without delay under reduced CRA flow conditions which have already been scheduled for November and December 2012.

### **Timing and Urgency**

Each of the five CRA pumping plants has three aboveground 10-foot-diameter delivery lines that convey water from the pump-house up to the headgate structure at the top of the hill. Each delivery line stands on a series of pipe supports that are located at fixed intervals over the steep, rocky terrain. These pipe supports are designed to rotate back and forth as the pipeline expands and contracts due to temperature fluctuations. Delivery line No. 1, which is over 70 years old, uses two steel pins to limit the rocking movement of the pipe support. Delivery lines Nos. 2 and 3, which are over 50 years old, use steel bolts instead of pins.

On delivery line No. 3 at Gene Pumping Plant, the steel bolts recently sheared on one of the pipe supports, causing the support arm to fall. Due to the loss of support, the pipeline deflected several inches at that location. During the subsequent repair, an inspection by Metropolitan staff determined that there was no structural damage to the pipeline. However, a significant number of adjacent support bolts on delivery lines Nos. 2 and 3 were found to be severely corroded. Given the degraded condition of the existing bolts and the repetitive motion caused by thermal expansion and contraction of the pipe, there is a significant risk that additional bolts could shear and their supports could fall. A seismic event could exacerbate this risk. Without proper support, the delivery line could deflect or break, which could result in an unplanned outage of the CRA.

Rehabilitation of the pipe supports on the delivery lines at all five pumping plants is recommended to proceed without delay. The work will be completed in two phases. Under Phase 1, approximately 1,000 corroded bolts on delivery lines Nos. 2 and 3 will be replaced. Under Phase 2, the pins on delivery line No. 1 will be replaced, and the pipe supports on all three delivery lines will be modified to prevent failure in case multiple bolts/pins are damaged in the future.

This action authorizes final design and awards two construction contracts to replace corroded pipe support bolts on delivery pipelines Nos. 2 and 3. This construction will complete Phase 1 of the rehabilitation work. The subject action also authorizes final design to replace the pins on delivery pipeline No. 1, and a detailed study to identify the most cost-effective means to permanently reinforce the pipe supports for all three delivery lines. Staff

will return to the Board in the future to award a construction contract to replace the pins on delivery line No. 1, and to authorize design of the permanent reinforcement work on the pipe supports.

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 2012/13.

## Details

---

### Background

Each of the five CRA pumping plants has nine main pump units within each pump-house. Each pump lifts water through nine individual 6-foot-diameter steel pipelines, which converge into three 10-foot-diameter aboveground delivery lines that convey water up to the headgate structure at the top of the hill. The 10-foot-diameter delivery lines vary in length from 500 feet to 1,360 feet, and extend up steep, rocky slopes. Each delivery line is restrained by pipe supports located at intervals of approximately 40 feet. Each pipe support consists of a saddle that cradles the bottom of the pipe, along with two rocker arms that transfer the weight of the pipe from the saddle to its concrete foundation. The rocker arms, which vary in height from 2 feet to over 15 feet, serve to minimize pipe deflection and keep the pipeline properly aligned over the rocky terrain. The arms are designed to rotate back and forth as the pipe expands and contracts as a result of temperature fluctuations. The rocker arms on delivery line No. 1, which are over 70 years old, use two steel pins to restrict the rocking movement. The rocker arms on delivery lines Nos. 2 and 3 are over 50 years old and use two steel bolts instead of pins.

On delivery line No. 3 at Gene Pumping Plant, the steel bolts recently sheared on one of the pipe supports. Due to the loss of support, the pipeline deflected several inches. An inspection by Metropolitan staff identified that the two rocker arm bolts were severely corroded and had sheared. After the bolts sheared, movement of the rocker arm was no longer restricted, and it became dislodged from the saddle. As a result, one of the two pipe supports fell to the ground. Since only a single support was affected, the resulting pipe deflection was localized and no structural damage occurred to the pipeline. Metropolitan forces quickly completed the repair. A subsequent inspection of several nearby support bolts identified that they were also corroded. During removal of these nearby bolts for inspection, most of the bolts suffered brittle failure.

Given the degraded condition of the existing bolts and the repetitive motion caused by thermal expansion and contraction of the pipe, there is a significant risk that additional bolts could shear and their supports could fall. In addition, since the southern segment of the San Andreas Fault passes approximately 21 miles from the Julian Hinds Pumping Plant, there is an increased risk that several bolts could break during a seismic event. Without proper support, the delivery line could deflect or break, which could result in an unplanned outage of the CRA.

Rehabilitation of the pipe supports on the delivery lines at all five pumping plants is recommended to proceed without delay. The work will be addressed in two phases. Under Phase 1, approximately 1,000 corroded bolts on delivery lines Nos. 2 and 3 will be replaced. In order to expedite repairs, the Phase 1 work will be accomplished via two construction contracts. Under Phase 2, the pins on delivery line No. 1 will be replaced, and the pipe supports on all three delivery lines will be modified to prevent failure in case multiple bolts/pins are damaged in the future.

### **CRA Delivery Line Rehabilitation, Phase 1 – Final Design and Construction (\$3,200,000)**

Planned repair activities at the five CRA pumping plants include dewatering of delivery lines Nos. 2 and 3, jacking of the pipeline at support locations to allow removal of corroded bolts, replacement of the bolts, and return of the pipelines to service. This work will be logistically challenging due to the elevated position of the 10-foot-diameter pipelines above the steep, rocky slopes. The construction will take place during a planned reduced-flow period for the CRA in November and December 2012.

Specifications No. 1738 was advertised for bids on September 10, 2012 for the rehabilitation of pipe supports for delivery lines Nos. 2 and 3 at Gene and Intake Pumping Plants. As shown in [Attachment 2](#), four bids were received and opened on September 20, 2012. The low bid from J.F. Shea Construction, Inc., in the amount of \$798,000, complies with the requirements of the specifications. The three higher bids ranged from approximately

\$1.33 million to \$2.1 million. The engineer's estimate was \$1 million. Due to the specialized nature of the work, no SBE participation level was established for this contract.

Specifications No. 1739 was advertised for bids on September 10, 2012 for the rehabilitation of pipe supports for delivery lines Nos. 2 and 3 at Iron Mountain, Eagle Mountain, and Julian Hinds Pumping Plants. As shown in [Attachment 2](#), three bids were received and opened on September 20, 2012. The low bid from J.F. Shea Construction, Inc., in the amount of \$1,068,000, complies with the requirements of the specifications. The two higher bids ranged from approximately \$1.9 million to \$2.45 million. The engineer's estimate was \$920,000. Due to the specialized nature of the work, no Small Business Enterprise (SBE) participation level was established for this contract.

This action appropriates \$3.2 million, authorizes final design, and awards \$798,000 and \$1,068,000 contracts to J.F. Shea Construction, Inc. for rehabilitation of pipe supports on delivery lines Nos. 2 and 3 at the five CRA pumping plants. The total estimated cost of construction for this work is \$2,206,000, which includes the amount of the contracts; \$105,000 for procurement of bolts, other materials and equipment use; and \$235,000 for Metropolitan force activities to establish clearances, dewater the delivery lines, and return the system to service. Requested funds also include: \$120,000 for the preparation of drawings and specifications; \$85,000 for receipt of bids, environmental monitoring, and project management; \$375,000 for construction inspection; \$20,000 for submittals review and preparation of record drawings; and \$394,000 for remaining budget.

Metropolitan staff will perform design and inspection of the construction contracts. The cost of final design is approximately 5.4 percent of the total construction cost. The anticipated cost of inspection is approximately 16.9 percent of the total construction cost. Engineering Services' goal for design and inspection of projects with construction cost less than \$3 million is 9 to 15 percent. The inspection costs for this project are expected to exceed the goal because the work requires round-the-clock inspection to ensure timely completion within the reduced-flow window, and due to the remote locations of the work sites.

#### **CRA Delivery Line Rehabilitation, Phase 2 – Investigations and Final Design (\$300,000)**

Under Phase 2 of the project, the pins on delivery line No. 1 will be replaced, and the pipe supports on all three delivery lines will be modified to prevent failure in case multiple bolts/pins are damaged in the future. Activities planned under the present action include conducting a detailed study of the support pins on delivery line No. 1, identifying repair methods, preparing drawings and specifications for the pin replacement work, receiving competitive bids for the pin replacement, and evaluating potential permanent modifications for all three delivery lines. The detailed study will include the removal and inspection of representative samples of the 1-inch support pins on delivery line No. 1 at each of the pumping plants, metallurgical analyses, pin strength testing, and possible radiographic inspection of the pins in the field. A structural analysis will also be conducted to determine if additional modifications to the rocker arms on all three delivery lines are needed. Modifications could include the addition of a retainer plate to prevent the rocker arm from becoming dislodged from the pipe support, modifications to the rocker arm joints, or the installation of a different type of pipe support.

This action appropriates \$300,000 and authorizes detailed investigations and final design phase activities. The requested funds include: \$225,000 for the technical activities described above; \$45,000 for preparation of environmental documentation and project management; and \$30,000 for remaining budget. All work will be performed by Metropolitan staff. Staff will return to the Board at a later date to award a construction contract to replace the pins on delivery line No. 1 and to authorize design of permanent reinforcement for the pipe supports.

#### **Summary**

This action appropriates \$3.5 million; awards two construction contracts to replace the rocker arm support bolts on delivery lines Nos. 2 and 3 at all five CRA pumping plants; and authorizes design and detailed investigations to complete the rehabilitation of all delivery line supports. This work has been evaluated and recommended by Metropolitan's CIP Evaluation Team, and funds are available within the fiscal year 2012/13 capital expenditure plan. See [Attachment 1](#) for the Financial Statement, [Attachment 2](#) for the Abstracts of Bids, and [Attachment 3](#) for the Location Map.

This project is included within capital Appropriation No. 15483, the CRA Reliability Program – FY 2012/13 Through FY 2017/18. This is the initial action for Appropriation No. 15483.

### ***Project Milestones***

December 2012 – Completion of construction to replace bolts on the pipe supports on delivery lines Nos. 2 and 3

June 2013 – Completion of final design to replace the pins for delivery line No. 1

### **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 overall activities involve funding, design, minor alterations and replacement of existing public facilities; and minor modifications in the condition of land, water, and/or vegetation which do not involve removal of healthy, mature, scenic trees. In addition, these activities involve negligible or no expansion of use and no possibility of significantly impacting the physical environment. 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 three Categorical Exemptions (Class 1, Section 15301; Class 2, Section 15302; and Class 4, Section 15304).

CEQA determination for Option #2:

None required

### **Board Options**

---

#### **Option #1**

Adopt the CEQA determination and

- a. Appropriate \$3.5 million;
- b. Award \$798,000 contract to J.F. Shea Construction, Inc. for rehabilitation of pipe supports on delivery lines Nos. 2 and 3 at Gene and Intake Pumping Plants;
- c. Award \$1,068,000 contract to J.F. Shea Construction, Inc. for rehabilitation of pipe supports on delivery lines Nos. 2 and 3 at Julian Hinds, Eagle Mountain, and Iron Mountain Pumping Plants; and
- d. Authorize detailed studies and final design for rehabilitation of the delivery line supports.

**Fiscal Impact:** \$3.5 million in capital funds under Approp. 15483

**Business Analysis:** This option will enhance reliability and long-term operation of the CRA.

#### **Option #2**

Do not award the construction contracts and readvertise in an attempt to receive more favorable bids.

**Fiscal Impact:** None

**Business Analysis:** This option may or may not result in more favorable bids, and would risk an unplanned outage of the CRA if emergency repairs were required on delivery lines Nos. 2 and 3.

**Staff Recommendation**

---

Option #1

  
\_\_\_\_\_  
Gordon Johnson  
Manager/Chief Engineer  
Engineering Services

9/26/2012

Date

  
\_\_\_\_\_  
Jeffrey Kightlinger  
General Manager

9/27/2012

Date

**Attachment 1 – Financial Statement**

**Attachment 2 – Abstracts of Bids**

**Attachment 3 – Location Map**

Ref# es12620524

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

A breakdown of Board Action No. 1 for Appropriation No. 15483 for the CRA Reliability Program – FY 2012/13 Through FY 2017/18<sup>1</sup>, is as follows:

	<b>New Total Appropriated Amount</b>
Labor	
Studies & Investigations	\$ 75,000
Final Design	270,000
Owner Costs (Program mgmt. bidding, envir. monitoring)	130,000
Submittals Review & Record Drwgs	20,000
Construction Inspection & Support	375,000
Metropolitan Force Construction	235,000
Materials & Supplies	100,000
Incidental Expenses	-
Professional/Technical Services	-
Equipment Use	5,000
Contracts	1,866,000
Remaining Budget	424,000
<b>Total</b>	<b>\$ 3,500,000</b>

**Funding Request**

<b>Program Name:</b>	CRA Reliability Program - FY 2012/13 Through FY 2017/18		
<b>Source of Funds:</b>	Revenue Bonds, Replacement and Refurbishment or General Funds		
<b>Appropriation No.:</b>	15483	<b>Board Action No.:</b>	1
<b>Requested Amount:</b>	\$ 3,500,000	<b>Capital Program No.:</b>	15483-I
<b>Total Appropriated Amount:</b>	\$ 3,500,000	<b>Capital Program Page No.:</b>	N/A
<b>Total Program Estimate:</b>	\$ 16,217,000	<b>Program Goal:</b>	I-Infrastructure Reliability

<sup>1</sup> This is the initial action for the CRA Reliability Program – FY 2012/13 Through FY 2017/18.

**The Metropolitan Water District of Southern California**  
**Abstract of Bids Received on September 20, 2012 at 10:00 A.M.**  
**Specifications No. 1738**  
**Gene and Intake Pumping Plants**  
**Delivery Lines Nos. 2 & 3 Pipe Support Rehabilitation**

The scope of work includes replacing pipe support bolts on 10-foot-diameter delivery lines at Gene and Intake Pumping Plants.

**Engineer's Estimate: \$1 million**

<b>Bidder and Location</b>	<b>Total*</b>
<b>J.F. Shea Construction, Inc., Walnut, CA</b>	<b>\$ 798,000</b>
Gantry Constructors, Inc., Clarkdale, AZ	\$ 1,332,024
Kiewit Infrastructure West Co., Santa Fe Springs, CA	\$ 1,988,300
L.H. Woods & Sons, Inc., Vista, CA	\$ 2,095,555

\*Due to the specialized nature of this work, no SBE participation level was established for this contract.

**The Metropolitan Water District of Southern California**  
**Abstract of Bids Received on September 20, 2012 at 2:00 P.M.**

**Specifications No. 1739**

**Iron Mountain, Eagle Mountain, and Hinds Pumping Plants**  
**Delivery Lines Nos. 2 & 3 Pipe Support Rehabilitation**

The scope of work includes replacing pipe support bolts on 10-foot-diameter delivery lines at Iron Mountain, Eagle Mountain, and Hinds Pumping Plants.

**Engineer's Estimate: \$920,000**

<b>Bidder and Location</b>	<b>Total</b>
<b>J.F. Shea Construction, Inc., Walnut, CA</b>	<b>\$ 1,068,000</b>
Kiewit Infrastructure West Co., Santa Fe Springs, CA	\$ 1,912,900
L.H. Woods & Sons, Inc., Vista, CA	\$ 2,450,000

\*Due to the specialized nature of this work, no SBE participation was established for this contract.

### Location Map

