



- Board of Directors
Engineering and Operations Committee

5/10/2011 Board Meeting

7-2

Subject

Appropriate \$470,000; and authorize preliminary design of seismic upgrades for the Diemer Administration Building and filter buildings (Approp. 15436)

Description

This action authorizes preliminary design of seismic upgrades for the Administration Building, the east and west filter control buildings, and the east and west filter structures at the Robert B. Diemer Water Treatment Plant. These five structures house critical plant functions which could be impacted by a major seismic event, potentially interrupting treated water deliveries. The planned upgrades will reduce the risk of significant structural failure of these facilities in the event of a major earthquake.

Timing and Urgency

Metropolitan has an ongoing program to evaluate the seismic stability of its facilities in order to maintain reliable operation and to meet current seismic design practices and code requirements. Although Metropolitan facilities have always been designed to meet up-to-date codes that were in place at the time of their construction, industry practices and code requirements are periodically updated, particularly following a major earthquake. Staff has recently completed seismic analyses which identified that the Diemer Administration Building, the two filter control buildings, and the east and west filter structures are seismically vulnerable. All of these structures require upgrades to maintain continued operation in the event of a significant earthquake. Due to the critical nature of these facilities in delivering treated water, staff recommends proceeding with preliminary design of the upgrades at this time.

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

Background

The Diemer plant was placed into service in 1963 with an initial capacity of 200 million gallons per day (mgd). In 1969, the plant was expanded to a treatment capacity of 520 mgd. The plant delivers a blend of waters from the Colorado River and the State Water Project to Orange County and to parts of Metropolitan's Central Pool portion of the distribution system. The Diemer plant is located on the top of a hill in Yorba Linda, approximately 0.3 mile south of the Whittier Fault. At the time the Diemer plant was constructed, it was designed to meet the then-current building codes of the early 1960s. Since that time, knowledge of earthquakes and seismic design has greatly improved, which has resulted in more stringent building codes.

In March 2010, Metropolitan's Board authorized a seismic risk assessment study of the Diemer Administration Building and filter structures, and the preparation of environmental documentation for planned seismic upgrade projects at the Diemer plant. The risk assessment study used up-to-date geotechnical information for the Diemer site, along with current seismic codes. The assessment has confirmed the vulnerability of these structures during a major earthquake.

For the plant's filters, the analysis showed that a 6.8 magnitude earthquake on the Whittier Fault would cause significant damage, rendering the plant only partially operable. Extensive repairs would be required, which would be difficult and time-consuming due to limited access inside the filter structures.

Project No. 1 – Diemer Administration Building Seismic Upgrades – Preliminary Design Phase (\$140,000)

The Diemer Administration Building is a three-story, 35,000-square-foot reinforced concrete building which was completed in 1963 as part of the original plant construction. The building houses the plant's control room, Incident Command Center, water quality laboratory, staff meeting rooms, and offices. The 72-foot-wide by 158-foot-long building has a flat roof, which includes a clerestory pop-up at the main entrance. At the basement level, the plant's inlet conduit runs the full length of the building.

The structural integrity of the Administration Building is important for sustained plant operation. The recent seismic evaluation utilized a three-dimensional computer analysis of the building. This analysis showed some of the building's interior and exterior walls, the clerestory roof, the south side-entry floor, and the plant's inlet conduit would be damaged in a major earthquake. Based on these results, staff recommends that structural upgrades be initiated for the Administration Building to improve its capability to withstand a major seismic event. The upgrades may consist of a combination of installing new concrete walls, reinforcing the clerestory roof system, reducing the size of openings in exterior walls, and reinforcing some structurally deficient elements, such as floors and piers. Some existing mechanical and electrical equipment may need to be relocated during the seismic upgrades. Staff recommends proceeding with preliminary design to develop the proposed retrofit concepts.

This action appropriates \$140,000 and authorizes preliminary design phase activities for seismic upgrades to the Diemer Administration Building. Planned activities include: evaluating alternatives to optimize the retrofit design; concrete and reinforcement steel testing; investigating the presence of hazardous materials; preparing a preliminary design report; and developing a preliminary cost estimate. The appropriated funds include \$48,000 for ABSG Consulting Inc. to conduct the structural analyses, as discussed below; \$29,000 for concrete testing; \$10,500 for hazardous material investigations; \$26,500 for Metropolitan technical oversight and project management; and \$26,000 for remaining budget.

Project No. 2 – Diemer Filter Control Buildings and Filter Structures Seismic Upgrades – Preliminary Design Phase (\$330,000)

The Diemer plant has 48 filters in two modules. The East Filter Control Building and underlying east filters, which are part of Module No. 1, were completed in 1963 during the original plant construction. The West Filter Control Building and underlying west filters, which are part of Module No. 2, were completed in 1969 when the plant was expanded. The filter basins on the east and west sides of the plant are essentially two perforated reinforced concrete shear-wall structures, each 177 feet wide by 424 feet long and 18 feet deep, consisting of pipe galleries, box conduits, 24 multimedia filters, troughs, and filtration system appurtenances. Each filter control building, which is a reinforced concrete superstructure approximately 24 feet wide and 11 feet tall, is located at the operating deck on top of the filters and extends the full length of the filter structure (424 feet) in the north-south direction. The two filter control buildings house process control equipment.

The filters are supported by concrete walls and piers on a concrete mat foundation. Below the filters is an open sump which collects used filter backwash water. The recent seismic evaluation showed that the wall piers located in this difficult-to-access sump at the bottom of the filters would likely be damaged in a major earthquake. Another area that would be damaged is the walkway area at the top of the filters where large openings result in weakened decks. Each filter control building would likely sustain seismic damage at the central clerestory roof and at the interior concrete frames. The structural upgrades to the filter control buildings and filter structures may consist of a combination of installing new concrete frames in each filter control building, reinforcing each clerestory at the roof line, enlarging or adding new piers inside the filters, and filling in some openings in the perforated concrete shear-wall system. Some existing mechanical and electrical equipment may need to be relocated during the seismic upgrades.

Staff recommends proceeding with preliminary design to develop the proposed retrofit concepts and the potential cost. Comprehensive testing to evaluate the existing structural concrete and reinforcement steel strength will also be conducted based on guidelines specified by the American Society of Civil Engineers, as the concrete could deteriorate and reinforcement steel could corrode over time. Obtaining the concrete and steel samples will be labor-intensive due to the confined nature of the normally submerged sump area beneath the filter media level. This sampling can only proceed during a full plant shutdown, which is planned to occur at the end of 2011.

The preliminary design phase activities will primarily be performed by Metropolitan staff, with specialized structural support by ABSG Consulting Inc., as discussed below.

This action appropriates \$330,000 and authorizes preliminary design phase activities for seismic upgrades to the Diemer filter control buildings and filters. Planned activities include: conducting a hydraulic flow study to evaluate flow regimes when structural elements within the filter structure are enlarged, changing flow patterns for the backwash water; concrete and reinforcement steel testing of both the control buildings and underlying filters; investigating the presence of hazardous materials; reviewing the constructability of the proposed retrofit concepts for the confined and limited-access filter structures; preparing a preliminary design report; developing a preliminary cost estimate; and conducting a third-party value engineering review. The appropriated funds include \$17,500 for Metropolitan staff to prepare the hydraulic flow study; \$96,000 for concrete and reinforcement steel testing by Metropolitan staff; \$68,000 for ABSG Consulting Inc. to perform the structural analyses; \$10,500 for hazardous material investigation; \$35,000 for value engineering; \$25,000 for constructability review by Metropolitan staff; \$43,000 for Metropolitan technical oversight and project management; and \$35,000 for remaining budget.

ABSG Consulting Inc. – New Agreement for Specialized Technical Services (No action required)

ABSG Consulting Inc. performed the initial seismic risk assessment study for both projects, and is recommended to perform the structural analysis portion of the preliminary design. ABSG Consulting Inc. was selected via Request for Qualifications No. 884, and this work will be performed under a new agreement planned to be awarded by the General Manager under his Administrative Code authority. Due to the specialized nature of the work, no Small Business Enterprise participation level has been established. The estimated amount of the agreement with ABSG Consulting Inc. is \$116,000.

Summary

This action appropriates \$470,000 and authorizes preliminary design of seismic upgrades for the Diemer Administration Building, the two filter control buildings, and the east and west filter structures. Staff will return to the Board at a later date for authorization of final design for the upgrade projects. Final design will be conducted by Metropolitan staff.

These projects have been evaluated and recommended by Metropolitan's CIP Evaluation Team, and funds have been included in the fiscal year 2010/11 capital budget. See [Attachment 1](#) for the Financial Statement and [Attachment 2](#) for the Location Map.

The Diemer Administration Building and filter buildings seismic upgrade projects are included within capital Appropriation No. 15436, the Diemer Improvements Program Phase II, which was initiated in fiscal year 2006/07. Appropriation No. 15436 also includes other projects such as the Hatch Cover Replacement and the Lower Maintenance Road Rehabilitation projects. With the present action, the total funding for Appropriation No. 15436 will increase from \$17,789,000 to \$18,259,000.

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

Project Milestone

April 2012 – Completion of preliminary design

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 Options #1 and #2:

The proposed action is categorically exempt under the provisions of CEQA and the State CEQA Guidelines. 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 as a Class 6 Categorical Exemption (Section 15306 of the State CEQA Guidelines).

The CEQA determination is: Determine that pursuant to CEQA, the proposed action qualifies under a Categorical Exemption (Class 6, Section 15306 of the State CEQA Guidelines).

CEQA determination for Option #3:

None required

Board Options

Option #1

Adopt the CEQA determination and

- a. Appropriate \$470,000; and
- b. Authorize preliminary design of seismic upgrades for the Diemer Administration Building and filter buildings.

Fiscal Impact: \$470,000 of budgeted funds under Approp. 15436

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

Option #2

Adopt the CEQA determination and

- a. Appropriate \$140,000;
- b. Authorize preliminary design of seismic upgrades for the Diemer Administration Building; and
- c. Do not proceed with seismic upgrades of the Diemer filter buildings.

Fiscal Impact: \$140,000 of budgeted funds under Approp. 15436

Business Analysis: This option would focus on occupied areas of the Diemer plant. It would forego an opportunity to enhance reliability of deliveries to member agencies, and to reduce the risk of costly emergency repairs.

Option #3


Do not proceed with the seismic upgrade projects at this time.

Fiscal Impact: None

Business Analysis: This option would forego an opportunity to protect Metropolitan's assets, increase service reliability to customers, and reduce the risk of costly emergency repairs.


Staff Recommendation

Option #1



Gordon L. Johnson
Manager/Chief Engineer,
Engineering Services

4/18/2011
Date



Jeffrey Kightlinger
General Manager

4/25/2011
Date

Attachment 1 – Financial Statement

Attachment 2 – Location Map

Ref# es12609843

Financial Statement for Diemer Improvements Program – Phase II

A breakdown of Board Action No. 12 for Appropriation No. 15436 for seismic upgrades of the Diemer Administration Building and Diemer filter buildings* is as follows:

	Previous Total Appropriated Amount (Mar. 2011)	Current Board Action No. 12 (May 2011)	New Total Appropriated Amount
Labor			
Studies and Investigations (Testing program & hydraulic model)	\$ 653,300	\$ 96,300	\$ 749,600
Final Design	2,389,300	-	2,389,300
Owner Costs (Program mgmt., envir. docs., haz. material testing)	1,822,838	63,600	1,886,438
Submittals and Design Review	344,400	52,000	396,400
Construction Inspection & Support	1,135,191	-	1,135,191
Metropolitan Force Construction	1,717,900	15,600	1,733,500
Materials and Supplies	871,258	9,000	880,258
Incidental Expenses	99,193	1,500	100,693
Professional/Technical Services	850,943	-	850,943
ABSG Consulting Inc.	-	116,000	116,000
Value Engineering Consultant	-	35,000	35,000
Equipment Use	23,155	20,000	43,155
Contracts	6,663,366	-	6,663,366
Remaining Budget	1,218,156	61,000	1,279,156
Total	\$ 17,789,000	\$ 470,000	\$ 18,259,000

Funding Request

Program Name:	Diemer Improvements Program – Phase II		
Source of Funds:	Revenue Bonds, Replacement and Refurbishment or General Funds		
Appropriation No.:	15436	Board Action No.:	12
Requested Amount:	\$ 470,000	Capital Program No.:	15436-I
Total Appropriated Amount:	\$ 18,259,000	Capital Program Page No.:	283
Total Program Estimate:	\$ 155,182,000	Program Goal:	I- Infrastructure Reliability

* The total amount expended to date on the Diemer Administration Building Seismic Upgrade project is approximately \$144,000. The total amount expended to date on the Diemer Filter Buildings Seismic Upgrade project is approximately \$175,000.

Robert B. Diemer Water Treatment Plant

