



- Board of Directors
Engineering and Operations Committee

7/12/2011 Board Meeting

7-1

Subject

Appropriate \$930,000; and authorize three rehabilitation projects at the Joseph Jensen Water Treatment Plant (Approp. 15442)

Description

This action authorizes three projects at the Joseph Jensen Water Treatment Plant (Jensen plant): (1) final design to replace service water pumps, (2) preliminary design to refurbish flocculators in Modules Nos. 2 and 3, and (3) Metropolitan force construction to install isolation gates inside the launders in the sedimentation basins.

Timing and Urgency

Staff recommends moving forward with these three rehabilitation projects to enhance plant reliability; to minimize impacts on plant operation resulting from failure of aged critical equipment; and to reduce the risk of water quality impacts at the Jensen plant.

- The service water pumps are essential to supply filtered water for chlorine disinfection and for carrier water for the various chemical feed systems. Four of the six existing pumps need to be replaced based on age and reliability.
- The flocculators in Modules Nos. 2 and 3 are used to gently mix coagulation chemicals with suspended solids during the flocculation process. These mechanical components have deteriorated due to corrosion and need to be refurbished.
- The isolation gates at the sedimentation basin launder troughs provide isolation capability when a basin is out of service, thereby keeping the launder troughs dry and eliminating the nuisance growth of algae and weeds, which are potential sources of taste and odor compounds. The existing gates have deteriorated over time, and need to be replaced.

These projects have been reviewed with Metropolitan's updated Capital Investment Plan (CIP) prioritization criteria. Each project is categorized as an Infrastructure Rehabilitation and Replacement project and is budgeted within Metropolitan's CIP for fiscal year 2011/12.

Background

The Jensen plant was placed into service in 1972 with an initial capacity of 350 million gallons per day (mgd). The plant was expanded to its current capacity of 750 mgd in the early 1990s. The Jensen plant exclusively treats water from the West Branch of the State Water Project and delivers it to Metropolitan's Central Pool portion of the distribution system.

The Jensen plant uses a multi-step water treatment process consisting of pre-oxidation and disinfection with ozone, coagulation, flocculation, sedimentation, granular media filtration, and chlorine-ammonia disinfection. To efficiently meet water treatment objectives in each step, Metropolitan staff conducts regular maintenance of the plant's equipment and mechanical components. Although the plant continues to perform reliably today, some of the mechanical components have neared or reached their service life and have become less reliable. Three projects are recommended to proceed at this time to maintain and enhance the Jensen plant's reliability.

Project No. 1 – Service Water Pump Replacement – Final Design and Procurement (\$462,000)

At the Jensen plant, six pumps draw filtered water from the washwater tanks and pressurize the service water system for various uses throughout the plant. Service water is used to create the chlorine solution for disinfection, to abate foam in the flocculation/sedimentation basins, to provide transport water for the sulfuric acid and hydrogen peroxide feed systems, to dilute the delivered sodium hydroxide before storage, and for wash-down in the tank farms and other plant areas.

Four service water pumps were installed during the original plant construction in the 1970s and are located in Module No. 1. Two more pumps were added when the Jensen plant was expanded in the early 1990s; these two pumps are located in Module No. 2. When the plant flow exceeds 375 mgd, five service water pumps must be in operation to meet the service water system demands.

The original four service water pumps are each 40 years old and have reached the effective limit of their service life.

Staff recommends that the four original service water pumps at Module No. 1 be replaced. New concrete support pads, piping, and electrical modifications are also needed because current-generation pumps have a different configuration than the existing pumps. For efficiency, these 40-year-old pumps should be replaced in conjunction with the Module No. 1 Filter Surface Wash Upgrades project, whose scope of work will include excavation and demolition work adjacent to the existing service water pumps. Final design of the Filter Surface Wash Upgrades project was authorized by Metropolitan's Board in March 2009 and is nearing completion. Construction of the filter upgrades and installation of the four new pumps will be performed under a single contract. Final design phase activities for the pumps will include equipment selection and preparation of drawings and specifications, development of a cost estimate, receipt of bids for the pump procurement contract, and all other activities in advance of award of the contract for pump installation.

This action appropriates \$462,000 and authorizes final design and procurement of four service water pumps. The procurement contract is planned to be awarded under the General Manager's Administrative Code authority. Staff will return to the Board to award the construction contract for pump installation in conjunction with the Module No. 1 Filter Surface Wash Upgrades. Requested funds include \$169,500 for final design; \$51,000 for project management, advertisement, and receipt of multiple bids; \$181,500 for pump procurement; and \$60,000 for remaining budget. All design phase activities will be performed by Metropolitan staff. The cost of final design for these projects is approximately 9 percent of the estimated total construction cost. Engineering Services' goal for design of projects with construction cost greater than \$3 million is 9 to 12 percent. The total construction cost for these projects is anticipated to range from \$10 million to \$11 million.

Project No. 2 – Modules Nos. 2 and 3 Flocculator Refurbishment – Preliminary Design Phase (\$178,000)

Modules Nos. 2 and 3 each contain eight flocculation/sedimentation basins. The flocculation section of each basin contains six flocculators comprised of horizontal rotating shafts with paddle arms that gently mix the coagulation chemicals with suspended solids in the raw water, in order to form larger particles, which will later settle out during the sedimentation process. Continuous gentle mixing is needed to keep the newly formed flocculator particles suspended until they reach the sedimentation section. A functional flocculation section is needed for a treatment basin to remain in service.

The Modules Nos. 2 and 3 horizontal flocculators were installed when the Jensen plant was expanded in the early 1990s. Each 104-foot-long flocculator consists of six interlocking rotating shafts with paddle arms, connected together with seven stub shafts and seven pillow block bearings that are submerged in the water and fastened to support columns. The end of each flocculator penetrates the basin wall into an adjacent piping gallery, where it connects to its gearbox and drive motor. In total, the flocculation sections of Modules Nos. 2 and 3 have 288 interlocking rotating shafts, 336 stub shafts, and 336 pillow block bearings.

Despite receiving routine maintenance, inspections conducted by Metropolitan staff have identified that the stub shafts and pillow block bearing assemblies have deteriorated from corrosion, resulting in misalignment of the interlocking shafts. Coatings have deteriorated in some areas of the interlocking shafts and the paddle arms, and the shaft seals leak at the basin walls, causing leakage into the adjacent piping gallery.

In recent months, staff conducted a life-cycle cost analysis to evaluate whether to refurbish the existing Modules Nos. 2 and 3 flocculators or replace them with vertical shaft flocculators similar to those used in Module No. 1. The results indicated that refurbishing the flocculators at this time would be more cost-effective, and would extend the service life of the system for up to 25 years. Based on the findings of this study, and the rehabilitation work recently completed for the F. E. Weymouth Water Treatment Plant's Module No. 1 flocculators, the planned refurbishment work at the Jensen plant will include: cleaning the existing bearing housing assemblies; repairing support columns, which have shifted due to past seismic activity; replacing stub shafts; recoating interlocking shafts and paddle arms; and refurbishing shaft seals to prevent leakage. Staff recommends proceeding with preliminary design, which includes the following activities: conducting field surveys to verify alignment of columns and shafts; evaluating sandblasting and recoating alternatives, including a test program; assessing materials and metallurgy; developing final design criteria; and preparing a cost estimate for the refurbishment.

This action appropriates \$178,000 and authorizes preliminary design phase activities for the Modules Nos. 2 and 3 Flocculator Refurbishment project. All work will be performed by Metropolitan staff. Requested funds include \$118,000 for the above-noted technical analyses and preparation of a preliminary design report; \$30,000 for field surveys, environmental documentation, and project management; and \$30,000 for remaining budget.

Project No. 3 – Basin Launder Gate Improvements – Construction (\$290,000)

Jensen Modules Nos. 1, 2 and 3 contain twelve flocculation/sedimentation basins. The sedimentation section of each basin contains nine launders, for a total of 108 launders. A launder is an elevated trough with V-notch weirs used to uniformly collect the clarified water from the basin. The water collected in the launder flows by gravity into the clarified water conduit leading to the filters. If a sedimentation basin is out of service, water from the clarified water conduit will back up into the launder trough, unless the basin is isolated from the downstream conduit. When water is left standing in the unused launder, it must be removed regularly or algae and weeds can grow in the launder. Before returning a basin to service, plant staff must manually remove the algae and weeds, taking precautions to not return the stagnant water from the launder into the clarified water conduit; it is instead pumped to the sanitary sewer. However, there is potential that the stagnant water may be reintroduced to the clarified water conduit through the leaking launder gates, which can cause taste and odor issues. This situation has become more prevalent recently, as the Jensen plant has been periodically operating with reduced flows and with only a portion of a module in service.

To resolve this issue, plant staff previously fabricated and installed polyvinyl chloride (PVC) launder gates to allow for the isolation of individual basins without having to remove an entire module from service. While the PVC launder gates were functional, they deteriorated quickly and are no longer effective in preventing water seepage from the clarified water conduit back into the launders.

In order to improve the operation of the launder gates, staff has fabricated and tested prototype isolation gates for the launders in two basins. Each launder has a 26-inch by 40-inch aluminum isolation gate with rubber seal and matching stainless steel seat. These prototype gates have performed successfully. As a result, staff recommends fabricating fifty-four new isolation gates and installing ninety seats for the remaining launders. The new gates and seats would be based on the prototypes tested to date. Thirty-six new gates will be used in Module No. 1, while eighteen new gates together with the gates previously fabricated will be shared by Modules Nos. 2 and 3. The gates for Modules Nos. 2 and 3 are interchangeable. Each prototype aluminum gate is light and easy to insert or remove by one person. Improved isolation capability for all launders will allow more flexibility to remove a basin from service for maintenance, or to return a basin to service.

This action appropriates \$290,000 and authorizes the installation of new isolation gates and seats for launders at the Jensen plant. The appropriated funds include \$112,800 for Metropolitan force construction; \$90,000 for procurement of the gates; \$31,300 for design and technical support during construction; \$18,500 for project management and preparation of record drawings; and \$37,400 for remaining budget. All work will be performed by Metropolitan staff.

Summary

This action appropriates \$930,000 and authorizes final design of the Jensen Service Water Pump Replacement project in conjunction with the Module No. 1 Filter Surface Wash Upgrades; preliminary design of the Modules Nos. 2 and 3 Flocculator Refurbishment; and Metropolitan force construction of the Basin Launder Gate Improvements. These three projects have been evaluated and recommended by Metropolitan's CIP Evaluation Team, and funds have been included in the fiscal year 2011/12 capital budget. See [Attachment 1](#) for the Financial Statement and [Attachment 2](#) for the Location Map.

These projects are included within capital Appropriation No. 15442, the Jensen Improvements Program Phase II, which was initiated in fiscal year 2006/07. Appropriation No. 15442 also includes projects such as the Module No. 1 Filter Surface Wash Upgrades; Washwater Tank Seismic Upgrade; Electrical System Upgrades; and Chemical Trench Extension. With the present action, the total funding for Appropriation No. 15442 will increase from \$4,096,000 to \$5,026,000.

These three rehabilitation projects are consistent with Metropolitan's goals for sustainability by enhancing the reliability of the Jensen plant, in order to maintain reliable water deliveries in the future.

Project Milestones

February 2012 – Completion of final design of the Service Water Pump Replacement

March 2012 – Completion of preliminary design of the Modules Nos. 2 and 3 Flocculator Refurbishment

July 2012 – Completion of construction of the Basin Launder Gate Improvements

Policy

Metropolitan Water District Administrative Code Section 5108: Appropriations

California Environmental Quality Act (CEQA)

Project No. 1 – Service Water Pump Replacement – Final Design and Procurement

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 involves the funding, design, and minor alterations, reconstruction or replacement of existing public facilities along with the construction of minor appurtenant structures with 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 3 Categorical Exemptions (Sections 15301, 15302, and 15303 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 3, Section 15303 of the State CEQA Guidelines).

Project No. 2 – Modules Nos. 2 and 3 Flocculator Refurbishment – Preliminary Design Phase

CEQA determination for Option #1:

The proposed action is categorically exempt under the provisions of CEQA and the State CEQA Guidelines. The proposed project will consist 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 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 three Categorical Exemptions (and Class 6, Section 15306 of the State CEQA Guidelines).

CEQA determination for Option #2:

None required

Project No. 3 – Basin Launder Gate Improvements – Construction

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, design, and minor alterations, reconstruction or replacement of existing public facilities along with the construction of minor appurtenant structures with 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 3 Categorical Exemptions (Sections 15301, 15302, and 15303 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 3, Section 15303 of the State CEQA Guidelines).

CEQA determination for Option #2:

None required

Board Options

Option #1

Adopt the CEQA determinations and

- a. Appropriate \$930,000;
- b. Authorize final design of the Jensen Service Water Pump Replacement project;
- c. Authorize preliminary design to refurbish Jensen Modules Nos. 2 and 3 flocculators; and
- d. Authorize construction of the Jensen Basin Launder Gate Improvements.

Fiscal Impact: \$930,000 of budgeted funds under Approp. No. 15442

Business Analysis: This option will maintain and enhance Jensen plant reliability.

Option #2

Adopt the CEQA determination and

- a. Appropriate \$462,000;
- b. Authorize final design of the Jensen Service Water Pump Replacement project;
- c. Do not authorize preliminary design to refurbish Jensen Modules Nos. 2 and 3 flocculators; and
- d. Do not authorize construction of the Jensen Basin Launder Gates Improvements.

Fiscal Impact: \$462,000 of budgeted funds under Approp. No. 15442

Business Analysis: This option addresses the pump replacement project, which is the most urgent rehabilitation project at the Jensen plant, in order to maintain reliable deliveries of service water. This option would forego an opportunity to improve reliability of the flocculators, which are important to maintain treatment capacity.


Staff Recommendation

Option #1


Gordon Johnson
Manager/Chief Engineer,
Engineering Services

6/20/2011

Date


Jeffrey Kightlinger
General Manager

6/23/2011

Date

Attachment 1 – Financial Statement

Attachment 2 – Location Map

Ref# es12611902

Financial Statement for Jensen Improvements Program - Phase II

A breakdown of Board Action No. 7 for Appropriation No. 15442 for the Service Water Pump Replacement, Modules Nos. 2 and 3 Flocculator Refurbishment, and Basin Launder Gate Improvement projects* is as follows:

	Previous Total Appropriated Amount (July 2010)	Current Board Action No. 7 (July 2011)	New Total Appropriated Amount
Labor			
Studies and Investigations	\$ 841,495	\$ 117,000	\$ 958,495
Final Design	914,000 **	180,800	1,094,800
Owner Costs (Program mgmt)	503,463	99,500	602,963
Construction Inspection and Support	44,000	18,000	62,000
Metropolitan Force Construction	647,000	131,800	778,800
Materials and Supplies	455,000	250,000	705,000
Incidental Expenses	43,000	5,500	48,500
Professional/Technical Services	402,840 **	-	402,840
Equipment Use	19,000	-	19,000
Contracts	-	-	-
Remaining Budget	226,202 **	127,400	353,602
Total	\$ 4,096,000	\$ 930,000	\$ 5,026,000

Funding Request

Program Name:	Jensen Improvements Program - Phase II		
Source of Funds:	Revenue Bonds, Replacement and Refurbishment or General Funds		
Appropriation No.:	15442	Board Action No.:	7
Requested Amount:	\$ 930,000	Capital Program No.:	15442-I
Total Appropriated Amount:	\$ 5,026,000	Capital Program Page No.:	295
Total Program Estimate:	\$ 42,512,000	Program Goal:	I – Infrastructure Reliability

* This action is the initial appropriation for the Jensen Service Water Pump Replacement, Modules Nos. 2 and 3 Flocculator Refurbishment, and Basin Launder Gate Improvement projects.

** Includes previous reallocation of \$68,000 from Remaining Budget to Final Design (\$30,000) and Professional/Technical Services (\$38,000) to develop contract documents and bid the Chemical Trench Extension project, which was originally planned for Metropolitan force construction.

Joseph Jensen Water Treatment Plant

