



- Board of Directors
Engineering and Operations Committee

3/11/2014 Board Meeting

7-3

Subject

Appropriate \$900,000; and authorize two rehabilitation projects at the Joseph Jensen Water Treatment Plant (Approps. 15371 and 15442)

Executive Summary

This action authorizes two rehabilitation projects at Modules Nos. 2 and 3 at the Joseph Jensen Water Treatment Plant: (1) final design to rehabilitate the flocculators, and (2) preliminary design to rehabilitate the traveling bridge sludge removal system.

Timing and Urgency

The Jensen plant's flocculators are used to gently mix coagulation chemicals with the colloidal and suspended matter present in the incoming water. This equipment has been in continuous service since its original installation. The shafts have become misaligned and the metallic components have gradually deteriorated due to corrosion. The sludge removal system's traveling bridges have also experienced misalignment, which has led to increased maintenance of the mechanical components (chain drives/sprockets, wheel shafts, and gear boxes). Replacement or refurbishment of these mechanical items is needed to maintain plant reliability and continue to meet treated water quality goals.

These projects have been reviewed with Metropolitan's Capital Investment Plan (CIP) prioritization criteria and are categorized as Infrastructure Rehabilitation projects. Funds for this action are available within Metropolitan's capital expenditure plan for fiscal year 2013/14.

Details

Background

The Jensen plant was placed into service in 1972 with an initial capacity of 400 million gallons per day (mgd). The plant was expanded to its current capacity of 750 mgd in the early 1990s. The Jensen plant treats water from the West Branch of the State Water Project and delivers it to Metropolitan's Central Pool and to exclusive service areas on the west side of the distribution system. The facility is located in Granada Hills.

The Jensen plant uses a multistep 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 goals in each step, Metropolitan staff conducts regular maintenance of the plant's electrical and mechanical equipment. Although the plant continues to perform reliably today, some of the equipment has deteriorated through use and needs to be refurbished. Two projects are recommended to move forward at this time to maintain plant reliability.

Project No. 1 – Modules Nos. 2 and 3 Flocculator Rehabilitation – Final Design Phase (\$670,000)

Modules Nos. 2 and 3 each contain eight flocculation/sedimentation basins. The flocculation portion of each basin contains six flocculators comprised of horizontal rotating shafts with paddle arms that gently mix the coagulation chemicals with colloidal and suspended matter present 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 floc particles suspended until they reach the sedimentation area. A functional flocculation process is required for a treatment basin to remain in service.

The horizontal flocculators in Modules Nos. 2 and 3 were installed when the Jensen plant was expanded in the early 1990s. Each 104-foot-long flocculator consists of interlocking rotating shafts with paddle arms, connected together with stub shafts and 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 equipment has 288 interlocking rotating shafts, 336 stub shafts, and 336 pillow block bearings.

Despite receiving routine maintenance, inspections by Metropolitan staff identified that the stub shafts and pillow block bearing assemblies have deteriorated from corrosion, resulting in misalignment of the interlocking shafts. Coatings have deteriorated on the interlocking shafts and the paddle arms, while the shaft seals leak at the basin walls, causing leakage into the adjacent piping gallery. If corrosion and misalignment of the mechanical components are not addressed, the flocculators will eventually fail in place, requiring more extensive repairs. Inspections conducted on the flocculators for Module No. 1 concluded that they are in good condition and do not require rehabilitation at this time.

In July 2011, Metropolitan's Board authorized preliminary design to refurbish the flocculators at Jensen Modules Nos. 2 and 3. The planned rehabilitation project will replace existing steel stub shafts and through-shafts with stainless steel; refurbish intermediate shafts, paddle arms, and paddle wheel hubs; and replace the basin pillow block housings and bushings. Preliminary design has been completed for the rehabilitation and staff recommends proceeding with final design at this time. Planned final design activities include: conducting detailed field surveys; preparation of drawings and specifications; receipt of competitive bids; development of a construction cost estimate; and all other activities in advance of award of the construction contract.

This action appropriates \$670,000 and authorizes final design phase activities for the Jensen Flocculator Rehabilitation project. All work will be performed by Metropolitan staff. Requested funds include \$436,000 for final design; \$49,000 for field investigations and material testing; \$85,000 for receipt of bids and project management; and \$100,000 for remaining budget. The final design cost as a percentage of the estimated construction cost is approximately 11 percent. Engineering Services' goal for the design of projects with construction cost greater than \$3 million is 9 to 12 percent. The construction cost for this project is anticipated to range from \$4 million to \$5 million. Staff will return to the Board at a later date for award of the construction contract.

This project is included within capital Appropriation No. 15442, the Jensen Improvements Appropriation – FY 2006/07 Through FY 2011/12, which was initiated in fiscal year 2006/07. With the present action, the total funding for Appropriation No. 15442 will increase from \$28,346,000 to \$29,016,000. The total estimated cost to complete this project, including the amount authorized to date, current funds requested, and future construction cost, is anticipated to range from \$4.9 million to \$5.9 million.

Project No. 2 – Modules Nos. 2 and 3 Traveling Bridge Rehabilitation – Preliminary Design Phase (\$230,000)

Each sedimentation basin in Modules Nos. 2 and 3 is equipped with a traveling bridge that spans the 100-foot width of the basin and moves along its length. The bridges have wheels that ride on 425-foot-long metal rails mounted on top of the basin walls. Each bridge carries a high-torque, slow-speed motor and drive system that moves the bridge, pumps, sweep arms, and other equipment necessary for the vacuum removal of settled solids from the sedimentation basin floor. The eight traveling bridges have been in operation since the plant was expanded in the early 1990s.

A review of corrective maintenance activities at Modules Nos. 2 and 3 in recent years highlighted frequent misalignment problems with the traveling bridges, with five incidents reported within twelve months. Cranes were needed to realign the bridges on several occasions. As the equipment ages, the frequency of misalignment problems has increased.

In March 2009, Metropolitan's Board authorized a demonstration study of a self-aligning motor drive system for the traveling bridges, along with conceptual design of rail modifications. The recommended modifications include repairing gaps and anchor systems in the rails, and correcting the wheel straightness by either field alignment or replacing the end trucks with new pre-aligned wheels.

Staff recommends proceeding with preliminary design to repair the rails, replace the end-wheels, and refurbish the motor-drive system on all traveling bridges of Modules Nos. 2 and 3. Planned preliminary design activities include: evaluating rail repair alternatives to meet current Crane Manufacturers Association of America standards, evaluating replacement alternatives for the end-wheels, evaluating refurbishment options for the existing motor drive system, developing final design criteria, and preparing a preliminary cost estimate.

This action appropriates \$230,000 and authorizes preliminary design phase activities to rehabilitate the traveling bridges at Jensen Modules Nos. 2 and 3. All work will be performed by Metropolitan staff. Requested funds include \$163,600 for the above-noted technical analyses and preparation of a preliminary design report; \$25,400 for project management and solicitation of vendors; and \$41,000 for remaining budget. Upon completion of preliminary design, staff will return to the Board to request authorization for final design.

This project is included within capital Appropriation No. 15371, the Jensen Improvements Appropriation, which was initiated in fiscal year 2001/02. With the present action, the total funding for Appropriation No. 15371 will increase from \$37,322,000 to \$37,552,000. The total estimated cost to complete this project is anticipated to range from \$2.6 million to \$3.1 million.

Summary

This action appropriates \$900,000 and authorizes two rehabilitation projects at the Jensen plant. Both projects have been evaluated and recommended by Metropolitan's CIP Evaluation Team, and funds are available in the fiscal year 2013/14 capital expenditure plan. See [Attachment 1](#) for the Financial Statements and [Attachment 2](#) for the Location Map.

Project Milestones

December 2014 – Completion of final design to refurbish the flocculators in Modules Nos. 2 and 3

December 2014 – Completion of preliminary design to refurbish the traveling bridges in Modules Nos. 2 and 3

Policy

Metropolitan Water District Administrative Code Section 5108: Appropriations

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 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 a Categorical Exemption (Class 6, Section 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 categorically exempt, and

- a. Appropriate \$900,000; and
- b. Authorize design to rehabilitate flocculators and traveling bridges at Jensen Modules Nos. 2 and 3.

Fiscal Impact: \$670,000 of capital funds under Approp. 15442; and \$230,000 of capital funds under Approp. 15371.

Business Analysis: These projects are needed to maintain plant reliability and continue to meet treated water quality goals.

Option #2

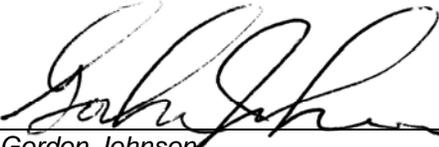
Do not proceed with the two projects at this time.

Fiscal Impact: None

Business Analysis: This option would forgo an opportunity to extend the service life of the flocculators and traveling bridges. This option would likely result in equipment failures, more extensive repairs, and reduced plant capacity as treatment basins are removed from service until the repairs are completed.

Staff Recommendation

Option #1

 2/12/2014

 Gordon Johnson Date
 Manager/Chief Engineer
 Engineering Services

 2/24/2014

 Jeffrey Kightlinger Date
 General Manager

Attachment 1 – Financial Statements

Attachment 2 – Location Map

Financial Statement for Jensen Improvements Appropriation – FY 2006/07 Through FY 2011/12

A breakdown of Board Action No. 12 for Appropriation No. 15442 for the Modules Nos. 2 and 3 Flocculator Rehabilitation¹ project is as follows:

	Previous Total Appropriated Amount (July 2013)	Current Board Action No. 12 (Mar. 2014)	New Total Appropriated Amount
Labor			
Studies & Investigations	\$ 1,195,495	\$ -	\$ 1,195,495
Final Design	4,151,800	436,000	4,587,800
Owner Costs (Program mgmt., bidding)	1,580,963	85,000	1,665,963
Submittals Review & Record Drwgs	536,000	-	536,000
Construction Inspection & Support	1,864,500	-	1,864,500
Metropolitan Force Construction	1,998,256	-	1,998,256
Materials & Supplies	985,000	-	985,000
Incidental Expenses	72,500	34,000	106,500
Professional/Technical Services	480,840	-	480,840
Materials Testing	-	15,000	15,000
Equipment Use	19,000	-	19,000
Contracts	13,566,528	-	13,566,528
Remaining Budget	1,895,118	100,000	1,995,118
Total	\$ 28,346,000	\$ 670,000	\$ 29,016,000

Funding Request

Appropriation Name:	Jensen Improvements Appropriation – FY 2006/07 Through FY 2011/12		
Source of Funds:	Revenue Bonds, Replacement and Refurbishment or General Funds		
Appropriation No.:	15442	Board Action No.:	12
Requested Amount:	\$ 670,000	Budget Page No.:	313
Total Appropriated Amount:	\$ 29,016,000	Total Program Estimate:	\$81,445,000

¹The total amount expended to date on the Modules Nos. 2 and 3 Flocculator Rehabilitation project is approximately \$146,000. The total estimated cost to complete this project, including the amount authorized to date, current funds requested, and future construction cost, is anticipated to range from \$4.9 million to \$5.9 million.

Financial Statement for Jensen Improvements Appropriation

A breakdown of Board Action No. 21 for Appropriation No. 15371 for the Modules Nos. 2 and 3 Traveling Bridge Rehabilitation¹ project is as follows:

	Previous Total Appropriated Amount (July 2013)	Current Board Action No. 21 (Mar. 2014)	New Total Appropriated Amount
Labor			
Studies & Investigations	\$ 2,259,290	\$ 161,600	\$ 2,420,890
Final Design	3,661,553	-	3,661,553
Owner Costs (Program mgmt.)	3,875,523	25,400	3,900,923
Submittals Review & Record Drwgs	115,000	-	115,000
Construction Inspection & Support	2,211,400	-	2,211,400
Metropolitan Force Construction	2,153,400	-	2,153,400
Materials & Supplies	2,167,219	-	2,167,219
Incidental Expenses	220,184	2,000	222,184
Professional/Technical Services	4,036,198	-	4,036,198
Equipment Use	84,000	-	84,000
Contracts	16,270,497	-	16,270,497
Remaining Budget	267,736 ²	41,000	308,736
Total	\$ 37,322,000	\$ 230,000	\$ 37,552,000

Funding Request

AppropriationName:	Jensen Improvements Appropriation		
Source of Funds:	Revenue Bonds, Replacement and Refurbishment or General Funds		
Appropriation No.:	15371	Board Action No.:	21
Requested Amount:	\$ 230,000	Budget Page No.:	312
Total Appropriated Amount:	\$ 37,552,000	Total Program Estimate:	\$100,925,000

¹The total amount expended to date on the Modules Nos. 2 and 3 Traveling Bridge Rehabilitation project is approximately \$397,500. The total estimated cost to complete this project, including the amount authorized to date, current funds requested, and future construction cost, is anticipated to range from \$2.6 million to \$3.1 million.

²Includes previous reallocation of \$48,000 from Remaining Budget for the Jensen Modules Nos. 2 and 3 Traveling Bridge Repairs project to complete the demonstration study.

Distribution System

