THE METROPOLITAN WATER DISTRICT
OF SOUTHERN CALIFORNIA

Proposed Capital Investment Plan Appendix

Investing in Reliability

Fiscal Years
2014/15 and 2015/16

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INTRODUCTION

The primary focus of the Capital Investment Plan Appendix is to provide information on all capital programs and projects that are scheduled to begin or will be underway during FY 2014/15 and FY 2015/16. Scope, accomplishments, objectives and financial projections are given for each program along with individual project descriptions.

The CIP budget for FY 2014/15 and FY 2015/16 is estimated to be $245 million and $268 million, respectively.

The total FY 2014/15 and FY 2015/16 capital budget of $513 million is based on all anticipated costs including: labor and administrative overhead, construction, professional services, right of way, materials, operating equipment, and incidental expenses. It does not include a contingency amount.

CIP Structure

The CIP is structured into three levels. In descending order, they are:

1. PROGRAM
2. APPROPRIATION
3. PROJECT

The highest level of the CIP structure is Program. Programs are comprised of one or more appropriations. There are 11 CIP Programs described in Table 1.

Under each CIP Program there is one to several appropriations, each with multiple projects. Every project with work planned for the two budget years is listed and described under the individual appropriation descriptions starting on page 20.

Table 1 – CIP Programs

Program	Definition
Supply Reliability/System Expansion	Projects under this program will increase the capacity of Metropolitan's water supply and delivery infrastructure to meet projected demand increases.
Colorado River Aqueduct Reliability	Projects under this program will replace or refurbish facilities and components on the Colorado River Aqueduct system in order to reliably convey water to Southern California.
Treatment Plant Reliability: - Diemer Plant - Jensen Plant - Mills Plant - Skinner Plant - Weymouth Plant	Projects under this program will replace or refurbish facilities and components at Metropolitan's five water treatment plants in order to continue to reliably meet treated water demands.
Distribution System Reliability	Projects under this program will replace or refurbish existing facilities within Metropolitan's distribution system, including reservoirs, pressure control structures, hydroelectric power plants, and pipelines in order to reliably meet water demands.
Right of Way & Infrastructure Protection	Projects under this program will refurbish or upgrade above ground facilities and rights-of-way along Metropolitan's pipelines in order to address access limitations, erosion-related work, and security needs.

Program	Definition
Prestressed Concrete Cylinder Pipe Reliability	Projects under this program will refurbish or upgrade Metropolitan's Prestressed Concrete Cylinder Pipelines (PCCP) to maintain water deliveries without unplanned shutdowns.
Regulatory Compliance	Projects under this program will provide for prudent use and management of Metropolitan's assets in compliance with all applicable regulations and codes other than water quality.
Minor Capital Projects	Projects under this program will implement refurbishments, replacements, or upgrades that cost less than $250,000 at Metropolitan facilities.
Cost Efficiency & Productivity	Projects under this program will provide economic savings that outweigh project costs through enhanced business and operating processes.
System Reliability	Projects under this program will improve or modify Metropolitan's SCADA and other Information Technology systems, and other facilities that are located throughout Metropolitan's service area in order to utilize new processes, and/or technologies, and improve facility safety and overall reliability.
Water Quality/Oxidation Retrofit	Projects under this program will add new facilities to ensure compliance, with water quality regulations for treated water for Metropolitan's treatment plants and throughout the distribution system.

CAPITAL INVESTMENT PLAN DEVELOPMENT

Background

The projects that comprise the proposed CIP have been identified from many Metropolitan studies of projected needs that are embodied in board-approved documents such as the Integrated Resources Plan, Distribution System Overview Study, and the General Manager's Business Plan. Staff continue to study operational demands on aging facilities as well as new regulations, and have made recommendations for capital projects that will maintain infrastructure reliability and water quality standards. Staff have also studied business and operational processes, and have made recommendations for programs that will improve efficiency and provide future cost savings. Additionally, several projects have been identified and included that will enhance delivery of Colorado River water to portions of the service area that currently rely exclusively on deliveries from the State Water Project.

CIP Development Process

The CIP is structured to reflect Metropolitan's strategic goals of providing a reliable supply of high-quality water at the lowest cost possible. As part of the CIP process, all new and existing projects are evaluated against an objective set of criteria to ensure existing and future capital investments are aligned with Metropolitan's Business Plan Priorities for Water Supply Reliability and Water Quality.

A team comprised of staff from Water System Operations, Water Resource Management, Real Property Development and Management, Engineering Services, and Business Technology evaluate and rate all projects. Those projects that directly support the priorities of Reliability and Water Quality are prioritized for inclusion in Metropolitan's proposed CIP.

This rigorous evaluation process has resulted in a thorough review and assessment of all proposed capital projects by staff and managers prior to submittal to the evaluation team. Staff continues to conduct comprehensive field investigations that identify critical replacement and refurbishment projects and a variety of necessary facility upgrades related to infrastructure reliability as well as regulatory compliance. Project schedules are evaluated regularly in order to plan for steadily increasing capital investments in infrastructure reliability and to accommodate the urgency of each project. Additionally, current demand projections that account for ongoing conservation, planned increased local supply production, and the economy, have been evaluated to ensure that demand and growth-related projects are appropriately scheduled.

An iterative process is employed to first score and rank every new and existing project, and then solicit feedback from project sponsors, customers, and resource providers in order to establish schedules and cash flow requirements. Those schedules, along with analyses of facility shutdown requirements, environmental permitting timeframes, and contracting process requirements, also enable resource managers to identify staffing needs. The final schedule and implementation plan for FY 2014/15 and 2015/16 are reflected in the budget and objectives for each of the individual programs described later in this document.

Project Evaluation

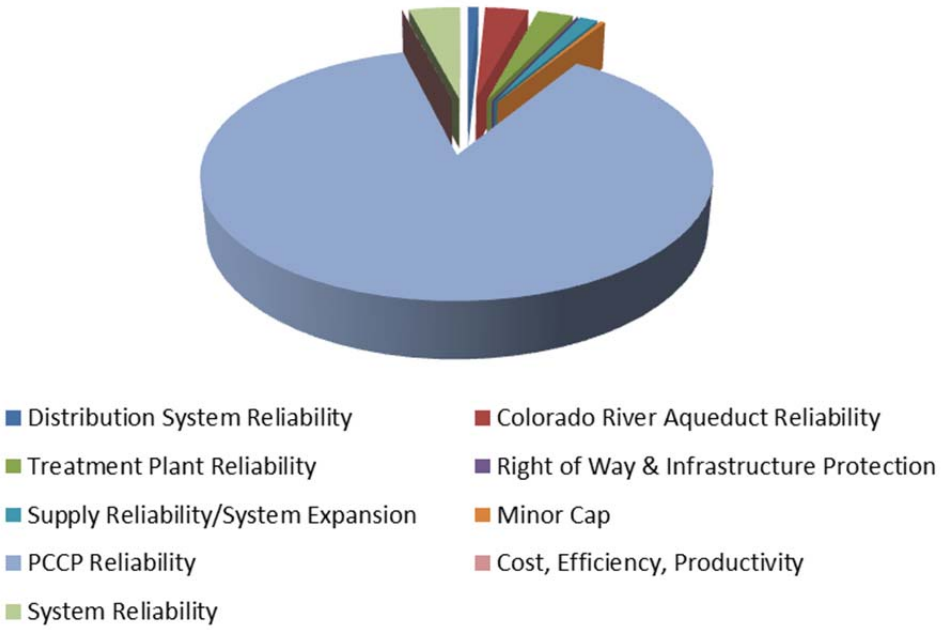
Before a project is included in the CIP, it is evaluated and rated against an established set of criteria. Staff is required to submit proposals for all projects that include scope, justification, alternatives, impacts of scheduling work for a later time, impact on operations and maintenance costs, and an estimate of total project cost. For existing projects, staff must also provide justification for continuing the project, explain any changes since inception of the project, and describe critical phases for the upcoming years. Guidelines for project proposals start on page 11. The evaluation criteria cover four characteristics or objectives for capital projects: Project Necessity, Directive, Service Disruption, and Cost/Productivity/Sustainability. In addition, a multiplier is applied to a project rating to factor in a risk assessment. See page 14 for a description of each criterion and multiplier.

New Projects for FY 2014/15 & 2015/16

This year, a total of 66 new projects, excluding Minor Capital projects, were recommended by the CIP Evaluation Team to either proceed as proposed, or be staged to perform only a portion of the work in the biennial budget period, and have been incorporated into the CIP programs.

Figure 1 shows a breakdown of the new projects identified by the CIP program. The total estimate of expenditures for all new projects is $2.5 billion. It should be noted that the largest addition, PCCP Reliability, includes the preliminary estimates for the long-term rehabilitation of the five critical prestressed concrete cylinder pipelines.

Figure 1 – New Projects by Program



Total New Project Estimates – $2.5 billion (non-escalated)

MAJOR OBJECTIVES FOR FISCAL YEAR 2014/15 and 2015/16

Below, grouped by CIP Program, are descriptions of capital project major activities anticipated to be underway or completed over the next two fiscal years.

Water Quality/Oxidation Retrofit

Weymouth Plant Oxidation Retrofit

Continue construction of the new oxidation facilities, including incorporation of the Board authorized extra work to increase the ozone treatment capacity to the full plant capacity of 520 million gallons per day (mgd).

Diemer Plant Oxidation Retrofit

Complete testing and start-up, and preparation of the record drawings.

Treatment Plant Reliability

Weymouth Plant

Complete construction of seismic upgrades to the filter buildings; complete design and begin rehabilitation of the filters and treatment Basins 5–8; complete design of the filter valve replacements.

Diemer Plant

Begin rehabilitation of all eight treatment basins; complete design and begin rehabilitation of the washwater reclamation plant; complete design and begin replacement of the filter valves; complete construction of the second stage of electrical system upgrades.

Jensen Plant

Complete design and begin replacement of the filter valves in Module 1; complete design and begin construction of facilities to transfer residual solids to the LADWP lagoons; complete upgrades of the surface wash system for filters 1- 20 and replacement of the service water pumps; complete design and begin upgrades of the plant electrical systems and refurbishment of the flocculators in Modules 2 and 3.

Mills Plant

Complete design and construction of two solids thickeners.

Distribution System Reliability

Complete first stage of the relining of the Etiwanda Pipeline.

Complete design and begin the relining of the Lakeview Pipeline.

Complete design and environmental documentation for the relining of 9 miles of the Orange County Feeder.

Complete the replacement of the liner and floating cover at the Palos Verdes Reservoir.

Right of Way & Infrastructure Protection

Continue design, preparation of Programmatic Environmental Impact Reports, and right-of-way evaluations/acquisition as part of the Distribution System Infrastructure Protection Plan.

Prestressed Concrete Cylinder Pipe Reliability

Complete the urgent repairs at 3 sites and continue design of rehabilitation of the remaining portions of the Second Lower Feeder.

Begin preliminary design of the rehabilitation of the PCCP portions of the Sepulveda Feeder.

Continue annual electromagnetic inspections of all PCCP pipelines.

Colorado River Aqueduct Reliability

A primary focus of capital projects on the CRA, in addition to regulatory compliance, safety, and overall reliability, is to prioritize projects needed to maintain 8-pump flow capability at all times. Over the next two years, projects that are a priority include design and construction of upgrades to the sand trap facilities upstream of the Eagle and Iron Mountain, and Hinds Pumping Plants; design and construction of discharge line isolation bulkheads,

standby generators at Intake, Gene, and Iron Mountain Pumping Plants, final design and construction of erosion protection over the Whitewater Siphon, and continuation of assessments of the main pump facilities including the main transformers and auxiliary power systems, motor exciters, motors and pumps, discharge valves, and cooling and lubrication systems.

Other critical projects at the CRA facilities include completion of construction of the Copper Basin Outlet Facilities; design and construction of wastewater system replacements at the Gene and Iron Mountain Villages; design and construction to refurbish the sump systems at all five pumping plants; and completion of the design of seismic retrofits of the 6.9kV switch houses.

System Reliability

LaVerne Shop Facilities

Complete construction of upgrades to the machine, fabrication, and coating shops and the first stages of equipment procurement and installation.

Information Technology

Complete the design, procurement and installation of communication infrastructure and equipment to replace outdated PBX-based equipment with unified Internet Protocol-based technology; complete design and begin deployment of the final phase of the replacement and upgrades to the two-way radio system.

Complete preliminary design of the replacement of the control system and electrical system protection facilities at the Diamond Valley Lake Wadsworth Pumping Plant.

Complete design and begin replacement of the approximately 300 Remote Terminal Units Input/Output components and operating systems utilized for monitoring and control of Metropolitan's treatment, conveyance, and distribution systems with new hardware and software.

Supply Reliability/System Expansion

Although service demand projections are not anticipated to increase in the near-term to the extent that new facilities will be needed, several projects have been identified to improve water delivery flexibility. The Inland Feeder-Lakeview Pipeline Interconnection is being expedited to complete construction by late summer 2014. Improvements to the Greg Ave. Pump Station are also currently in design and are planned for construction during FY 2014/15.

Regulatory Compliance

Chlorine Containment

Begin construction of chlorine containment facilities at the Chemical Unloading Facility.

Cost Efficiency & Productivity

Complete the upgrades of Oracle and PeopleSoft to the more recent, vendor-supported versions.

Complete the construction of modifications to the Yorba Linda Hydroelectric Power Plant.

Complete the design and installation of a new, enhanced project control and reporting system to replace the outdated Project Management Information System.

Financial Projections

The CIP budget for FY 2014/15 and FY 2015/16 is estimated to be $245 million and $268 million respectively. All of the projects in the CIP are reviewed each year as part of the budgeting process. Considerations for timing of nearby projects and facility shutdowns, urgency, aging infrastructure, updated service demand projections, and regulatory requirements are taken into account. Estimated capital expenditures are updated on a regular basis as new projects are added, other projects are completed, construction cost estimates are refined or contracts awarded. From time to time projects that have been undertaken are delayed or modified for various reasons and their completion schedule may vary from the original schedule.

Funds required for the CIP for FY 2014/15 and FY 2015/16 have been estimated based on anticipated project progress and estimated costs for the new biennial budget period. Planned capital expenditures for FY 2014/15 are approximately $50 million less than what was budgeted for FY 2013/14. This decrease in planned expenditures reflects a readjustment of project budgets and schedules as a result of some very favorable bids on construction contracts and to optimize use of resources as well as facility shutdown planning. Actual expenditures in FY 2013/14 are projected to be about $100 million less than budgeted. Therefore, planned expenditures in FY 2014/15 of $245 million reflect an increase from actual expenditures in FY 2013/14 of approximately $60 million.

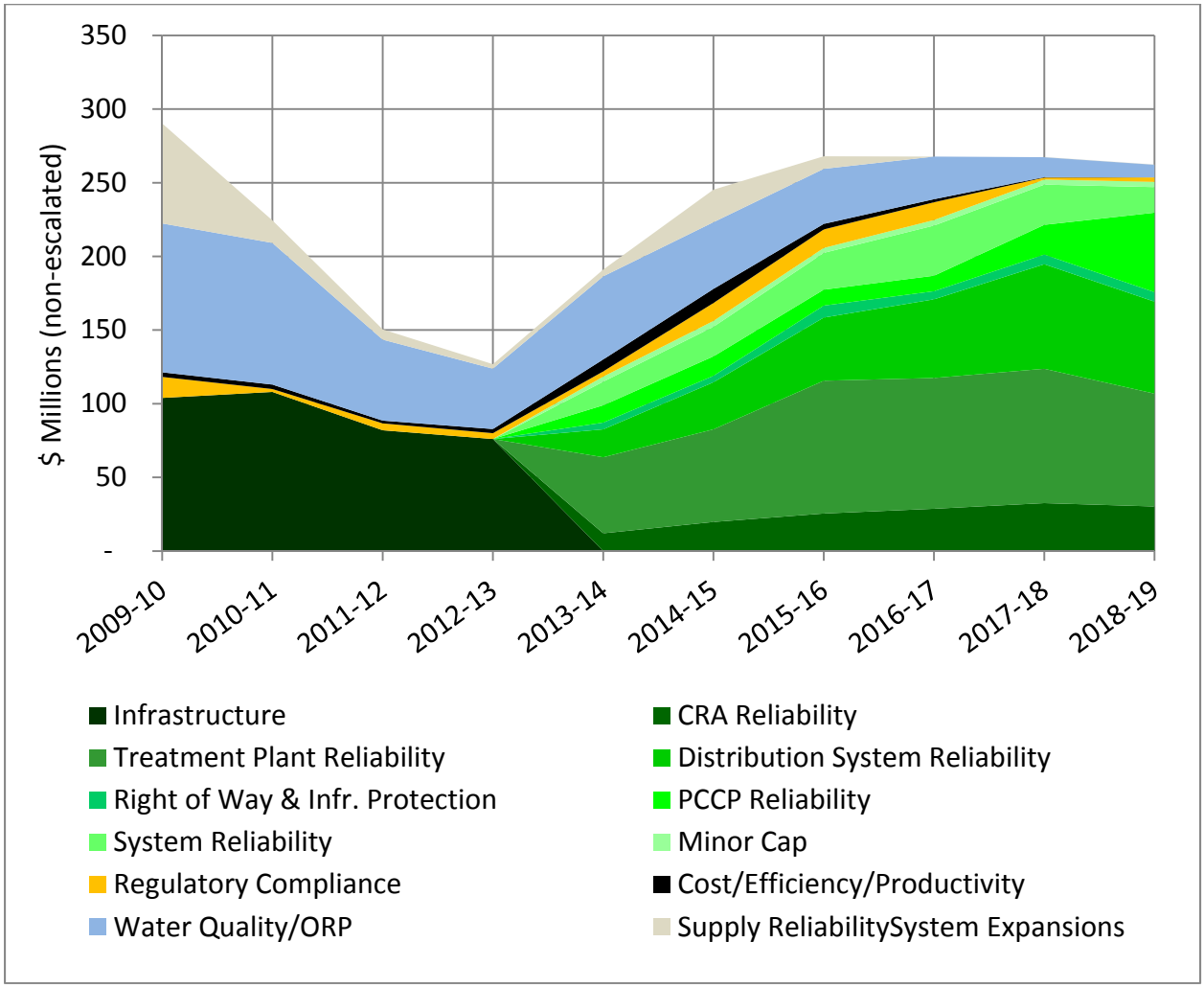
This increase reflects initiation of construction on several projects where design activities had been extended. Examples include chlorine containment at the Chemical Unloading Facility (CUF), relining of the PCCP portions of the Second Lower Feeder, liner repairs and cover replacement at the Palos Verdes Reservoir, refurbishment of the settling basins and replacement of the filter valves at the Diemer plant, and upgrades to the CRA village wastewater systems. Two additional urgent projects to enhance Colorado River water delivery flexibility – the Inland Feeder-Lakeview Pipeline Interconnection and improvements to the Greg Avenue Pump Station - are also planned to move quickly into construction during FY 2014/15.

Planned capital expenditures for FY 2015/16 are approximately $23 million more than in FY 2014/15. This increase is due to a ramp up of progress payments on the Diemer basin rehabilitation and filter valve replacements construction, chlorine containment at CUF, Second Lower Feeder PCCP relining, and rehabilitation of the filters at the Weymouth plant. Additionally, construction is anticipated to begin on relining of the Lakeview Pipeline, electrical system upgrades at the Jensen plant, and relining of the Orange County Feeder.

Figure 3 depicts the capital expenditure profile, including actual and projected cash flow, for the 10-year period from FY 2009/10 through FY 2018/19.

Figure 2 – FY 2014/15 – 2015/16 Biennium CIP by Program

10-year Window 2009/10 through 2018/19



HOW TO USE THIS DOCUMENT

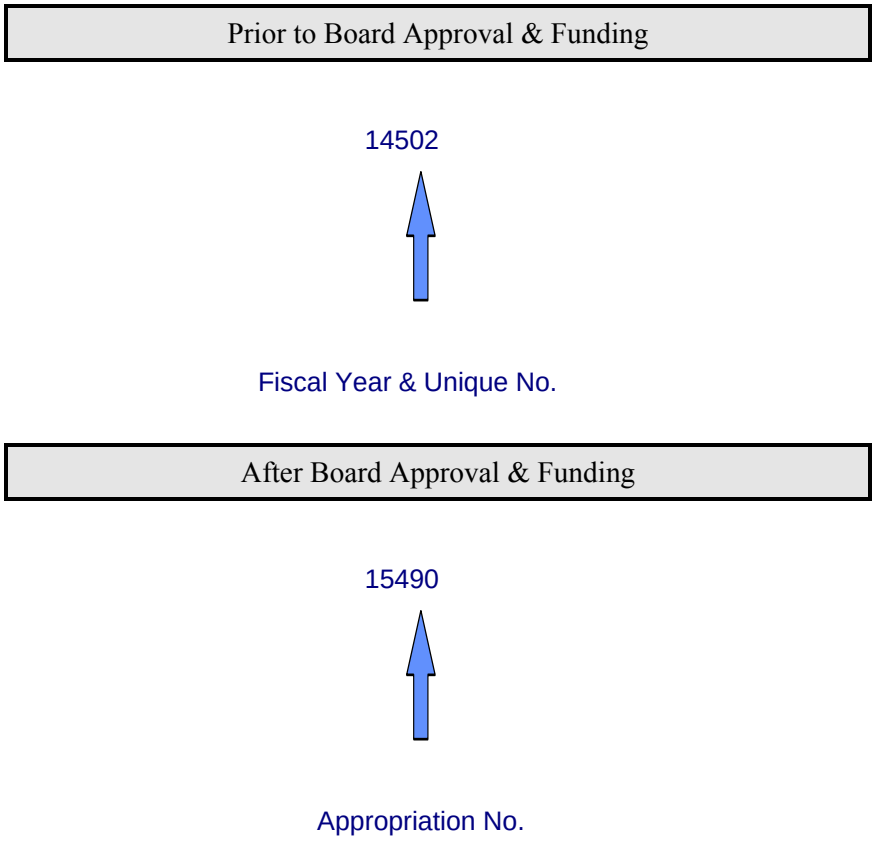
The core of this section is the Individual Appropriation Summary, which provides information for each capital project that is scheduled to begin or will be underway during FY 2014/15. The Individual Appropriation Summary is ordered by Appropriation title, starting on page 20. For assistance in locating a specific appropriation, refer to page 18.

Explanation of Capital Appropriation Numbers

Appropriation numbers are comprised of a five-digit number. The five-digit number uniquely identifies an appropriation.

If an appropriation has not yet received board approval, the first three numeric digits represent the fiscal year the appropriation was identified (e.g., "145" is FY 2014/15), the last two numeric digits uniquely identify the new appropriation placeholder number. If by board action, the authority to perform work and funding has been established, the five-digit numbers in the placeholder number change to the appropriation number. Figure 4 shows examples of the placeholder and appropriation numbers.

Figure 4 – Appropriation Number Naming Convention



Explanation of Individual Appropriation Summary

Each project planned to be underway during FY 2014/15 is included in the Individual Appropriation Summary. The information provided reflects appropriation and project details current as of the time of publication and is subject to change.

Key Information

For each appropriation, key information is highlighted at the top of the Individual Appropriation Summary page and includes total appropriation estimate, appropriated amount, FY 2014/15 and FY 2015/16 biennial estimate, total projected cost through June 30, 2014, estimated percent complete and estimated completion date. Table 2 provides an explanation of each item.

Table 2 – Key Appropriation Information

Item	Description
Total Appropriation Estimate	The total estimate of cost from inception to completion of projects in an appropriation. It includes a contingency amount, and may include actual expenditures if projects in the appropriation are underway. The total appropriation estimate may have: (a) no funding authorization from the Board; (b) partial funding from the Board; or (c) complete funding from the Board.
Appropriated Amount	Amount of expenditures the General Manager is authorized by the Board to spend on projects in an appropriation. The amounts shown reflect actual appropriated amounts as of December 31, 2013.
Biennial Estimate	Estimate of expenditures from July 2014 through June 2016. It does not include a contingency amount.
Total Projected through June 30, 2014	Actual expenditures to date and estimate of expenditures through June 2014.
Estimated Percent Complete	Estimated percent of work to be completed through June 2014.
Estimated Completion Date	Fiscal year in which all of the projects in an appropriation will be completed according to the current schedule.

GUIDELINES FOR PROJECT PROPOSALS

Project Proposal

Sponsors are required to submit proposals for all projects to be considered for inclusion into the CIP for FY 2014/15 and FY 2015/16. The projects are evaluated, rated and prioritized based on the contents of the proposals. The following guidelines are provided to the sponsors.

Table 3 – Project Proposal Guidelines

Section	Guideline
Appropriation Title	If applicable, indicate the Appropriation to which the project belongs. For instance, the Chemical Unloading Facility Chlorine Containment and Handling Facilities is part of the Chlorine Containment and Handling Facilities Appropriation.
Project Title	Provide a title for the project being proposed.
Sponsoring Group	Indicate the project sponsor from the following list of organizations: 1) Office of General Manager 2) Water System Operations 3) Water Resources Management 4) Engineering 5) Business Technology 6) Real Property Development and Management 7) Office of Chief Financial Officer 8) External Affairs 9) General Counsel Department 10) General Auditor Department 11) Ethics Office
Total Project Estimate	Show the total estimate of cost from inception to completion of a project, including administrative overhead and contingency.
GM Business Plan	Indicate which GM Business Plan Strategy/Initiative the proposed project best fits.
Project Goal	Indicate which of the CIP goals below this project supports: 1) Reliability 2) Water Quality 3) Other Board Directive 4) Both Reliability and Water Quality
Project Drivers	Indicate which of the following is driving the need for the project: 1) System Expansions/Supply Reliability 2) Infrastructure Reliability 3) Water Quality 4) Cost Efficiency/Productivity 5) Regulatory

Section	Guideline
Project Status:	
% Complete Now	Percent complete as of the date proposal submitted.
% Estimated Complete on 6/30/14	Estimated percent complete as of June 30, 2014.
No. of Repair Calls and/or Cost of Maintenance	Rehabilitation projects should include the number of component maintenance repairs to substantiate the need to do the project.
Project Description	In describing the project, include any opportunities to "stage" the work. Include if it makes sense economically to only perform a portion of a project to meet foreseeable customer needs. Consider the possibility of new technology, changing demands, as well as environmental impacts and economies of scale.
Changes to Existing Project	Explain any changes that have occurred on the project since its last evaluation.
Justification	Explain why the proposed project should be done (i.e., answer the question "why do we need to do the project?"). Describe how the project is essential for meeting the GM's goals of Reliability and Water Quality and how it fits into the Business Plan. Include an explanation of the project driver(s) and Maximo documentation when available to substantiate the need for the project.
Impact of Deferral	Assess any risk and discuss the impacts of not implementing the project in the next fiscal year. Include risks of not meeting service demands, violating regulatory requirements, increasing future costs, etc.
Project Dependency	Identify any projects that are dependent upon or linked to this project.
Alternatives	Describe any alternatives to the project. Discuss both positive and negative aspects of each alternative. Include an alternative where the project would not be done at all. For IT projects, explain what other similar companies are doing about this issue.
Background Information	Provide any supplemental information (e.g., detailed history of a problem, supporting technical information) that will help in evaluating the project. This can also be attached to the proposal.
Schedule	Provide an overall schedule for the project. Indicate if there are any time sensitivity issues (e.g., shutdown windows) and if the work can be staged. If work can be staged, indicate when subsequent stages can be implemented. A standard phasing plan is provided in the template. Indicate the proposed beginning and end dates for all appropriate phases, and when initial authorization will need to be requested from the Board.

Section	Guideline
Detailed Project Estimate	Itemized list of all costs for the project include: 1) Direct Labor with additives 2) Materials and Supplies 3) Incidental Expenses 4) Professional/Technical Services (e.g., consultants) 5) Right-of-Way and Land Purchases (e.g., easements, fee title, escrow fees) 6) Operating Equipment Use and Rental 7) Contract Payments (e.g., construction contracts) 8) Administrative Overhead 9) Credits and Contingency A phase-based estimating form is linked through the template. All new project proposals and existing projects that have not yet been board authorized must include this estimating form.
Benefit/Cost Analysis and Pay-Back Period	Perform a simple economic analysis that quantifies the cost to do the project, O&M savings and/or avoided costs. Discuss intangible benefits and costs. State assumptions. For IT projects, include Return on Investment analysis, if available.
O&M Impacts, Costs, and Benefits	To the extent available/known, provide a description of the impacts, costs, and/or benefits this capital project is anticipated to have on Metropolitan's current and future O&M expenses and services upon completion (e.g., labor, maintenance, and equipment costs; enhanced reliability; improved water quality, etc. For example, "Ozone generators will substantially increase electrical consumption by approximately $1 million annually and the number of new pieces of equipment will require periodic maintenance per the manufacturer's recommendations beginning in FY 2015/16. Preliminary design and future studies will provide additional detail on the overall lifecycle costs".) This is required for projects greater than $2 million and whose planned implementation date is within the next five fiscal years.
Approvals	1) Person submitting and/or sponsoring the proposed project 2) Team manager of the person submitting and/or sponsoring the project 3) Unit manager of the person submitting and/or sponsoring the project 4) Section manager of the person sponsoring the project (e.g., all new and existing WSO-sponsored projects) 5) Group manager sponsoring the project (e.g., all new WSO-sponsored projects) 6) Project manager signs in concurrence. (e.g., Engineering and IT organizations)

Evaluation Criteria

The evaluation criteria cover four characteristics or objectives for capital projects: Project Necessity, Directive, Service Disruption, and Cost /Productivity/Sustainability. In addition a multiplier is applied to a project rating to factor in a risk assessment. Table 4 provides a description of the criteria and multiplier.

Table 4 – Evaluation Criteria and Multiplier

Criteria	Description
Necessity	Assessment of the overall importance of a project. Criterion looks at whether or not a project does the following: ❑ Infrastructure Reliability/Integrity/Business Systems Reliability ❑ Stewardship ❑ Water Supply
Directive	Assessment of whether or not a project is specifically identified in one of the core or strategic initiatives: ❑ Regulatory/Legal Settlement ❑ Special Initiative/Directive
Service Disruption	Assessment of not doing a project. Criterion evaluates the following: ❑ Impact to Metropolitan's business operations ❑ Impact to system delivery and/or reliability ❑ Cascading impact on system due to failure ❑ Impact to operations
Cost/Productivity/Sustainability	Assessment of whether or not a project improves cost efficiency/productivity, specifically: ❑ Cost/benefit analysis ❑ Increased productivity ❑ Sustainability ❑ Customer service
Multiplier	**Description**
Risk Assessment	Assessment of the probability of: ❑ Increased future costs ❑ Dependent projects ❑ Facility/component/process failure ❑ Workplace health and safety ❑ Loss of outside funding ❑ Lost opportunity ❑ Not meeting service demands

Narratives

For each appropriation, narratives include the scope and purpose of the program, accomplishments through FY 2013/14, and objectives for FY 2014/15 and FY 2015/16. In these narratives, major activities, milestones and actions are highlighted. Following each narrative is a description for each project planned to be underway during the two-year budget period.

Capital Investment Plan Summary – Three-Year Outlook

Capital Program & Appropriations	Appn. No.	FY 2014/15	FY 2015/16	FY 2016/17
Colorado River Aqueduct Reliability Program		$19,677.4	$25,484.9	$28,656.2
Cabazon Radial Gate Facility Improvements	15320	25.0	25.0	338.9
CRA Conveyance Reliability	15373	6,104.3	3,218.3	1,031.2
CRA Electrical/Power Systems Reliability	15384	1,235.1	2,796.0	3,539.8
CRA Pumping Plant Reliability	15374	3,079.4	574.5	1,592.1
CRA Reliability for FY 2006/07 through FY 2011/12	15438	5,325.0	6,067.9	4,401.9
CRA Main Pump Reliability	15481	1,526.4	5,984.4	9,875.8
CRA Reliability for FY 2012/13 through FY 2017/18	15483	384.4	2,594.6	1,553.9
Whitewater Siphon Protection	15341	1,997.8	4,224.1	6,322.6
Conveyance and Distribution System Reliability Program		$31,897.7	$42,882.0	$53,354.0
Conveyance and Distribution System Rehabilitation	15377	1,252.8	4,421.2	5,500.0
Conveyance and Distribution System Rehabilitation for FY 2006/07 through FY 2011/12	15441	12,175.7	9,872.7	13,472.6
Conveyance and Distribution System Rehabilitation for FY 2012/13 through FY 2017/18	15480	5,314.5	17,110.5	30,184.9
Dam Rehabilitation & Safety Improvements	15419	106.3	81.7	94.3
Hydroelectric Power Plant Improvements	15458	2,482.5	787.8	3,957,7
Pipeline Rehabilitation and Replacement	15482	100.0	100.0	100.0
Reservoir Cover Replacement	15417	10,465.7	10,508.1	44.4
Right of Way and Infrastructure Protection Program		$4,402.1	$8,120.4	$5,500.0
Right of Way and Infrastructure Protection	15474	4,402.1	8,120.4	5,500.0
Prestressed Concrete Cylinder Pipe Rehabilitation Program		$13,201.0	$10,816.9	$10,519.1
PCCP Rehabilitation and Replacement	15471	13,201.0	10,816.9	10,519.1

Capital Investment Plan FY 2014/15 and 2015/16

Capital Program & Appropriations	Appn. No.	FY 2014/15	FY 2015/16	FY 2016/17
Regulatory Compliance Program		$12,118.7	$12,500.4	$12,000.0
Chlorine Containment and Handling Facilities	15346	6,517.2	10,000.4	12,000.0
CRA – Discharge Containment	15385	5,601.5	2,500.0	
Minor Capital Projects Program		$4,025.4	$3,335.2	$3,749.9
Capital Projects Costing Less Than $250,000 for FY2008/09	15454	386.2	5.6	
Capital Projects Costing Less Than $250,000 for FY2009/10	15460	250.8	53.2	
Capital Projects Costing Less Than $250,000 for FY2010/11	15468	310.5	155.9	
Capital Projects Costing Less Than $250,000 for FY2011/12	15470	608.5	196.6	
Capital Projects Costing Less Than $250,000 for FY2012/13 through FY2013/14	15476	1,969.4	1,915.8	1,733.7
Capital Projects Costing Less Than $250,000 for FY2014/15 through FY2015/16 (New Appropriation)	14501	500.0	1,008.1	2,016.2
Cost/Efficiency/Productivity Program		$9,618.9	$3,811.1	$2,099.2
Business Operations Improvements	15484	2,593.7	1,472.1	
DVL Transformation	15334	50.0	50.0	50.0
Power Reliability and Energy Conservation	15391	587.9		
Project Controls and Reporting System	03407	326.0	768.7	2,049.2
Terminations of The Center for Water Education Ground Lease	15449	331.4		
Yorba Linda Power Plant Modifications	15446	5,729.9	1,520.3	
System Reliability Program		$20,092.1	$25,042.0	$34,114.5
All Facilities – Security Systems Improvement	15295	397.2	397.9	145.1
Control System Enhancement	15397	1,278.4		
Information Technology System – Infrastructure	15376	5,214.7	9,988.6	
Information Technology System – Security	15378	451.3		
IT Infrastructure Reliability	15487	2,904.3	1,126.1	2,424.7
LaVerne Shop Facilities Upgrades	15395	3,270.1	2,906.3	4,505.2
Infrastructure Reliability Information System (New Appropriation)	14502	894.7	894.7	223.7
Operations Support Facilities Improvements	05065	547.9	1,716,4	
Union Station Headquarters Improvements	15473	500.0	1,000.0	3,500.0
Water Operations Control	15467	4,633.6	7,012.0	23,315.9

Capital Investment Plan FY 2014/15 and 2015/16

Capital Program & Appropriations	Appn. No.	FY 2014/15	FY 2015/16	FY 2016/17
Supply Reliability/System Expansion Program		$22,100.0	$8,500.0	
Perris Valley Pipeline	15425	1,100.0		
Water Delivery System Improvements (New Appropriation)	14503	21,000.0	10,000.0	
Water Quality/Oxidation Retrofit Program		$45,241.1	$37,397.7	$28,906.7
Diemer Plant Oxidation Retrofit	15389	2,888.4	35.0	
Enhanced Bromate Control	15472	403.9	977.2	3,415.6
Mills Plant Ozone System Reliability	15434	871.1		
Skinner Plant Oxidation Retrofit	15388	973.4	171.8	
Weymouth Plant Oxidation Retrofit	15392	40,104.3	36,213.7	25,491.1
Treatment Plant Reliability Program		$62,928.6	$90,091.5	$88,823.5
Diemer Plant Improvements	15380	13,148.0	19,024.0	21,533.6
Diemer Plant Improvements for FY 2006/07 through FY 2011/12	15436	11,640.3	13,748.4	10,295.9
Diemer Plant Improvements for FY 2012/13 through FY 2017/18	15478	195.4	1,618.2	1,317.8
Jensen Plant Improvements	15371	7,156.9	9,586.3	
Jensen Plant Improvements for FY 2006/07 through FY 2011/12	15442	14,875.0	12,800.5	9,261.2
Jensen Plant Improvements for FY 2012/13 through FY 2017/18	15486	1,438.7	300.5	20.7
Mills Plant Improvements	15381		175.3	784.9
Mills Plant Improvements for FY 2006/07 through FY 2011/12	15452	1,988.5	1,356.3	6,484.2
Mills Plant Improvements for FY 2012/13 through FY 2017/18	15479	500.0		
Skinner Plant Improvements	15365	969.2		
Skinner Plant Improvements for FY 2012/13 through FY 2017/18	15485	405.3	938.3	2,967.4
Weymouth Plant Improvements	15369	6,805.5	11,317.2	7,772.3
Weymouth Plant Improvements for FY 2006/07 through FY 2011/12	15440	2,410.6	5,590.2	5,350.0
Weymouth Plant Improvements for FY 2012/13 through FY 2017/18	15477	1,395.0	13,636.2	23,035.6

Index – Alphabetically By Appropriation Title

All Facilities - Security Systems Improvement 15295

Total Appropriation Estimate:	$19,600,000	**Total Projected Through June 30, 2014:**	$17,781,200
Appropriated Amount:	$19,600,000	**Estimated Percent Complete:**	95%
Biennial Estimate:	$795,000	**Estimated Completion Date:**	2017

Scope

This appropriation was established to mitigate security threats district-wide and provide security improvements based upon a comprehensive threat assessment matrix developed by staff that identifies potential risks of physical, chemical and biological threats, as well as necessary modifications and improvements at all facilities. Major components of this appropriation consist of physical security improvements, facility screening, and water quality monitoring enhancements.

Purpose

To mitigate security threats district-wide and improve the security of Metropolitan personnel and property.

Accomplishments Through FY 2013/14

Through FY 2013/14, twelve projects have been completed.

Major project milestones in FY 2013/14:

Physical Security Improvements at All Facilities – Continued implementation and oversight

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Physical Security Improvements at All Facilities	$13,643,600	2017	Continue implementation and oversight

Physical Security Improvements at All Facilities

Metropolitan safeguards its infrastructure through a combination of physical barriers, contracted security guard services, electronic access control and intrusion monitoring systems, operational patrols, water quality monitoring, and employee awareness. Through this multi-layered approach, Metropolitan protects critical infrastructure which supplies drinking water to the region. At the present time, Metropolitan's security system includes over 750 card readers, 500 cameras, and 1,000 alarm points as well as two control rooms staffed 24 hours per day, 7 days per week, and numerous field locations for remote monitoring through a complex customized system. This system was designed and installed to meet Metropolitan's specific operational and security requirements. Ongoing security improvements are prioritized based on ongoing site assessments conducted by Metropolitan security personnel and on emerging regulatory requirements and operational needs.

This project will continue to deploy security system improvements at Metropolitan sites. Improvements will include installation of new security technology to increase camera output video resolution crucial for recognition and follow-up visits, remote speakers at selected sites, wireless mobile card readers at all plants, and a license plate recognition system at the Metropolitan Headquarters parking structure.

Business Operations Improvements 15484

Total Appropriation Estimate:	$12,500,000	**Total Projected Through June 30, 2014:**	$1,178,100
Appropriated Amount:	$2,570,000	**Estimated Percent Complete:**	12%
Biennial Estimate:	$4,066,000	**Estimated Completion Date:**	2017

Scope

This appropriation was established to assess and implement projects ensuring customer service, efficiency/productivity, risk management and reliability of Metropolitan's business applications.

Purpose

To ensure reliability, efficiency and effectiveness of Metropolitan's business applications.

Accomplishments Through FY 2013/14

Through FY 2013/14, two projects have been completed.

Major project milestones in FY 2013/14:

AP Automation – Continued development

Oracle 12 Upgrade – Defined scope (O&M)

PeopleSoft HCM Upgrade – Continued development

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
AP Automation	$856,300	2015	Complete deployment
Enterprise Content Management	$4,448,000	2017	Begin design
Oracle 12 Upgrade	$3,633,300	2016	Continue development
PeopleSoft HCM Upgrade	$1,158,000	2015	Complete deployment
Risk Management, Security & Ethics Reporting System	$369,000	2016	Complete deployment

AP Automation

Accounts Payable processes approximately 4,000 to 5,000 invoices on a monthly basis. These invoices are processed entirely through manual processes without any automated assistance. In addition, Accounts Payable must often respond to both internal and external requests for invoice-related information. This is a time intensive, manual process requiring staff to find invoice information in the Oracle Financial Application, retrieve the batch number, research the date the invoice was sent to storage, complete a records request to have the information brought back on-site and provide a copy of the invoice to the requesting party. Automating the Accounts Payable process and storing the information electronically in a searchable format will greatly reduce retrieval time and cost, increase the level of reliability of the process, maximize workforce productivity, and improve throughput time for vendor invoices and payment.

This project will purchase and implement an Oracle Accounts Payable (AP) Automation System to scan paper invoices for the electronic storage of data and image files. Ongoing activities include requirements definition, system design, and infrastructure and security activities; software purchase and hardware purchase; and installation, configuration, testing, and implementation.

Enterprise Content Management

Metropolitan has established policies governing the uniform, efficient, and effective control of records using an ongoing records management program which identifies vital and historical records and monitors overall compliance with industry standard records management practices. The existing program is fully developed for managing physical records. However, over the past 20 years, the great majority of Metropolitan information has migrated from hard copy to electronic format; and almost all new information generated at Metropolitan is in electronic form. The exponential growth of electronically stored information (ESI) and the ever changing federal, state, and regulatory demands require that Metropolitan convert to a new system to continue to efficiently and effectively manage both the physical records and the increasing amount of ESI. The Enterprise Content Management (ECM) system will establish a platform to capture, declare, classify, store, and dispose of both electronic and physical records according to fiscal, legal, and regulatory requirements. The ECM system will also provide a framework for collaboration and automated workflow of document-centric processes, assist with storage space issues, and provide tools that will assist with process flow.

This project will implement an Enterprise Content Management software system to manage, catalog, store and retrieve physical and electronic documents. Ongoing activities include requirements definition, system design, and infrastructure and security activities; software purchase and hardware purchase; and installation, configuration, testing, and implementation.

Oracle 12 Upgrade

The Oracle EBusiness Suite (EBS) provides the foundation for business operations, including all financial reporting, at Metropolitan. The EBS was implemented in 1995. The suite includes the following modules: General Ledger, Accounts Payable, Accounts Receivable, Fixed Assets, Purchasing, Inventory, and Project/Grants Management. Vendor support for the current EBS version 11.5.10 ended in 2013. Metropolitan's current enterprise-class servers will soon be replaced with new Itanium servers, which requires upgrade of the EBS software from version 11.5.10 to version 12 in order to maintain compatibility.

This project will upgrade the Oracle EBusiness Suite from version 11.5.10 to version 12. Ongoing activities include system design; software purchase; and installation, configuration, testing, and implementation.

PeopleSoft Human Capital Management (HCM) Upgrade

PeopleSoft provides software applications for the management of Human Resources and Payroll information. Since1995, Metropolitan has used PeopleSoft to manage all Human Resources-related information, including payroll, benefits and employee information. Two major PeopleSoft applications, Human Capital Management (HCM) and Enterprise Learning Management (ELM) applications from the Oracle Corporation, require an upgrade to continue performing critical functions such as processing payroll and monitoring compliance training. The upgrade of the PeopleSoft applications is vital to payroll processing, tracking of employee-related information, and monitoring of required compliance training. Upgrading the PeopleSoft applications is consistent with the Information Technology Strategic Plan, and the recommendations of an internal audit.

This project will upgrade the PeopleSoft HCM and ELM applications. Ongoing activities include purchase of the software; testing and integration of the upgraded software with existing Metropolitan applications; implementation and configuring new functionality within each application; and optimizing Metropolitan's current payroll configuration.

Risk Management, Security and Ethics Reporting System

Any occurrences affecting Metropolitan employees, facilities, operations, or property that may require reporting to regulatory agencies or follow-up administrative or legal action are reported by staff and logged using an on-line incident reporting system. This system is over 13 years old and is no longer supported by the vendor. In addition, the software application is not compatible with the new 64-bit architecture introduced by the recent personal computer replacement project. Over time, the needs of the various users of the incident reporting system have also changed.

This project will provide a new Risk Management, Security and Ethics Reporting System to provide relevant tracking for specific types of incidents and features such as separation of incidents requiring attorney-client privacy. Ongoing efforts include definition of project needs by assessing Risk Management, Security and Ethics Office requirements and data inventories, in order to update the software and reporting system.

Cabazon Radial Gate Facility Improvements 15320

Total Appropriation Estimate:	$4,600,000	**Total Projected Through June 30, 2014:**	$447,300
Appropriated Amount:	$456,000	**Estimated Percent Complete:**	11%
Biennial Estimate:	$50,000	**Estimated Completion Date:**	2020

Scope

This appropriation was established to convert the Cabazon Radial Gates Facility from an "active" spillway, which requires an operator to activate the gates, to a "passive" spillway which does not require an operator, by replacing both radial gates with a weir structure. Work includes: design, environmental documentation, purchase of materials and construction by contract.

Purpose

To divert flow in the event of an emergency shutdown of the Colorado River Aqueduct into the San Gorgonio Wash, and ultimately into the Whitewater River.

Accomplishments Through FY 2013/14

Cabazon Radial Gate Facility Improvement – Environmental Impact Report certified.

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Cabazon Radial Gate Facility Improvements	$4,031,000	2020	Complete final design

Cabazon Radial Gate Facility Improvements

The Cabazon Radial Gate facility is located on the Colorado River Aqueduct (CRA) in the city of Cabazon within Riverside County and approximately one mile upstream of the San Jacinto Tunnel. The Cabazon Radial Gate facility was constructed in 1936 and consists of a 17-foot-wide by 16-foot-tall radial gate controlled by an electric motor actuator. The facility was designed to protect the downstream conduits and tunnels from becoming over-pressurized in the event a blockage by diverting water into an 800-foot-long, concrete-lined channel which flows into the San Gorgonio Wash. The existing radial gate, motor, and controls have reached the end of their service life and are no longer reliable.

This project will replace the discharge radial gate with a 125-foot-long by 25-foot-wide reinforced-concrete weir structure. The weir system is a passive overflow system which will reject water above a set hydraulic grade and thereby prevent downstream over-pressurization. Approximately 100 feet of the approximately 800-foot-long discharge channel will be widened to accommodate the weir structure. Ongoing final design activities include: preparation of drawings and specifications, code review, permit coordination, technical engineering analyses, development of a construction cost estimate, advertisement and receipt of bids, and all other activities in advance of award of the construction contract.

Capital Appropriation for Projects Costing Less Than $250,000 for FY 2008/09 — 15454

Total Appropriation Estimate:	$4,825,000	**Total Projected Through June 30, 2014:**	$4,440,400
Appropriated Amount:	$4,825,000	**Estimated Percent Complete:**	92%
Biennial Estimate:	$391,700	**Estimated Completion Date:**	2016

Scope

This appropriation was established to implement capital projects costing less than $250,000 on the distribution systems, conveyance systems, and treatment plants during FY 2008/09. In addition to the scheduled capital projects, the need invariably arises for additional unscheduled capital projects where there is no viable alternative but to perform the work. The common driver for most of the projects in this appropriation is infrastructure reliability.

Purpose

To increase operational reliability and efficiency, and decrease maintenance costs.

Accomplishments Through FY 2013/14

Through FY 2013/14, twenty-five projects have been completed.

Major project milestones in FY 2013/14:

Chemical Feed System Upgrade at the Weymouth Plant – Completed construction

Ammonia and Caustic Diffuser Replacement at the Diemer Plant – Completed construction

Electrical Transformer Replacement at the CRA's Black Metal Mountain – Completed construction

Objectives for 2014/15 – 2015/16

Thickener Pumps Replacement at Skinner Plant – Complete construction

Close-out Program – 26 of 26 projects completed.

Capital Appropriation for Projects Costing Less Than $250,000 for FY 2009/10 — 15460

Total Appropriation Estimate:	$4,150,000	**Total Projected Through June 30, 2014:**	$3,727,500
Appropriated Amount:	$4,150,000	**Estimated Percent Complete:**	92%
Biennial Estimate:	$303,900	**Estimated Completion Date:**	2016

Scope

This appropriation was established to implement capital projects costing less than $250,000 on the distribution systems, conveyance systems, and treatment plants during FY 2009/10. In addition to the scheduled capital projects, the need invariably arises for additional unscheduled capital projects where there is no viable alternative but to perform the work. The common driver for most of the projects in this appropriation is infrastructure reliability.

Purpose

To increase operational reliability and efficiency, and decrease maintenance costs.

Accomplishments Through FY 2013/14

Through FY 2013/14, twenty-three projects have been completed.

Objectives for 2014/15 – 2015/16

Close-out the appropriation – 23 of 23 projects completed.

Capital Appropriation for Projects Costing Less Than $250,000 for FY 2010/11 — 15468

Total Appropriation Estimate:	$3,500,000	**Total Projected Through June 30, 2014:**	$2,835,600
Appropriated Amount:	$3,500,000	**Estimated Percent Complete:**	86%
Biennial Estimate:	$466,400	**Estimated Completion Date:**	2016

Scope

This appropriation was established to implement capital projects costing less than $250,000 on the distribution systems, conveyance systems, and treatment plants during FY 2010/11. In addition to the scheduled projects, the need invariably arises for additional unscheduled capital projects where there is no viable alternative but to perform the work. The common driver for most of the projects in this appropriation is infrastructure reliability.

Purpose

To increase operational reliability and efficiency, and decrease maintenance costs.

Accomplishments Through FY 2013/14

Through FY 2013/14, sixteen projects have been completed.

Major project milestones in FY 2013/14:

Gene Camp Station Service Transformer Replacement – Completed construction

Jensen Washwater Tank Pumps Soft Start Retrofit – Completed construction

Lake Mathews Vehicle Maintenance Exhaust System – Completed construction

Skinner Worker Safety Access Replacement – Completed construction

Objectives for 2014/15 – 2015/16

Operations Control Center Uninterruptible Power Supply – Complete construction

Close-out Program – 17 of 17 projects completed

Capital Appropriation for Projects Costing Less Than $250,000 for FY 2011/12 — 15470

Total Appropriation Estimate:	$3,000,000	**Total Projected Through June 30, 2014:**	$2,199,000
Appropriated Amount:	$3,000,000	**Estimated Percent Complete:**	73%
Biennial Estimate:	$805,000	**Estimated Completion Date:**	2016

Scope

This appropriation was established to implement capital projects costing less than $250,000 on the distribution systems, conveyance systems, and treatment plants during FY 2011/12. In addition to the scheduled capital projects, the need invariably arises for additional unscheduled capital projects where there is no viable alternative but to perform the work. The common driver for most of the projects in this appropriation is infrastructure reliability.

Purpose

To increase operational reliability and efficiency, and decrease maintenance costs.

Accomplishments Through FY 2013/14

Through FY 2013/14, thirteen projects have been completed.

Major project milestones in FY 2013/14:

Diemer Tunnel Chlorine Detection System – Completed construction

Lakeview Pipeline Leak Repair at Station 2510+49 – Completed construction

Objectives for 2014/15 – 2015/16

Yorba Linda Feeder Discharge Return System Quagga Mussel Control Basins – Complete construction

Solids Handling Pumps Replacement at Skinner Plant – Complete construction

Drop Gate Covers Replacement at Weymouth Plant – Complete construction

Capital Appropriation for Projects Costing Less Than $250,000 for FY 2012/13 – 2013/14 **15476**

Total Appropriation Estimate:	$10,000,000	**Total Projected Through June 30, 2014:**	$2,881,900
Appropriated Amount:	$10,000,000	**Estimated Percent Complete:**	29%
Biennial Estimate:	$3,886,000	**Estimated Completion Date:**	2018

Scope

This appropriation was established to implement capital projects costing less than $250,000 on the distribution systems, conveyance systems, and treatment plants during FY 2012/13 – 2013/14. In addition to the scheduled projects, the need invariably arises for additional unscheduled capital projects where there is no viable alternative but to perform the work. The common driver for most of the projects in this appropriation is infrastructure reliability.

Purpose

To increase operational reliability and efficiency, and decrease maintenance costs.

Accomplishments Through FY 2013/14

Through FY 2013/14, nine projects have been completed.

Major project milestones in FY 2013/14:

Cajalco Creek Dam Manhole Cover Retrofit – Completed construction

CRA Protective Slab at Station 9704+77 – Completed construction

Hinds Pumping Plant Pump Unit No.8 Refurbishment – Completed construction

Jensen Chlorine Scrubber Platform – Completed construction

Oak Street Pressure Control Structure Roof Replacement – Completed construction

Santiago Control Tower Cathodic Protection – Continued construction

SCADA Communications MPLS Upgrade AT&T – Continued installation

SCADA Communications MPLS Upgrade Verizon – Continued installation

Wadsworth Pumping Plant Forebay Gantry Crane Upgrade – Completed construction

Objectives for 2014/15 – 2015/16

Irrigation Line Replacement at Jensen Plant – Complete construction

Perris Pressure Control Structure Roof Replacement – Complete construction

Santiago Pressure Control Structure Roof Replacement – Complete construction

SCADA Communications MPLS Upgrade AT&T – Complete installation

SCADA Communications MPLS Upgrade Verizon – Complete installation

Sodium Hypochlorite Piping Retrofit at Skinner Plant – Complete construction

Turbidity Meter Replacement at Weymouth Plant – Complete construction

Water Quality Lab Improvements – Complete construction

Capital Appropriation for Projects Costing Less Than $250,000 for FY 2014/15 – 2015/16 **14501**

Total Appropriation Estimate:	$10,000,000	**Total Projected Through June 30, 2014:**	$0
Appropriated Amount:	$0	**Estimated Percent Complete:**	0%
Biennial Estimate:	$1,508,000	**Estimated Completion Date:**	2020

Scope

This appropriation was established to implement capital projects costing less than $250,000 on the distribution systems, conveyance systems, and treatment plants during FY 2014/15 – 2015/16. In addition to the scheduled projects, the need invariably arises for additional unscheduled capital projects where there is no viable alternative but to perform the work. The common driver for most of the projects in this appropriation is infrastructure reliability.

Purpose

To increase operational reliability and efficiency, and decrease maintenance costs.

Accomplishments Through FY 2013/14

This is a new appropriation; no projects have been completed.

Objectives for 2014/15 – 2015/16

Capital Projects Costing Less Than $250,000 – Identify and evaluate projects and begin preliminary design

Chlorine Containment and Handling Facilities 15346

Total Appropriation Estimate:	$159,700,000	**Total Projected Through June 30, 2014:**	$125,269,000
Appropriated Amount:	$129,873,000	**Estimated Percent Complete:**	81%
Biennial Estimate:	$16,518,000	**Estimated Completion Date:**	2018

Scope

This appropriation was established to construct facilities that handle and contain chlorine to prevent a chlorine release and to comply with security and safety regulations; and other related facilities that handle chlorine to meet water treatment process requirements. Since its inception, new chlorine containment and handling facilities at all five water treatment plants have been completed.

Purpose

To enhance hazardous chemical safety by reducing the potential for exposure to plant personnel or the public of a release of chlorine, and ensure compliance with current California Fire Code requirements.

Accomplishments Through FY 2013/14

Through FY 2013/14, seventeen projects have been completed.

Major project milestones in FY 2013/14:

Chemical Unloading Facility Chlorine Containment – Completed final design

Weymouth Plant Filter Outlet Chlorine Capacity Increase – Completed final design

Jensen Plant Filter Outlet Chlorination Capacity Increase – Completed construction

Diemer Plant Filter Outlet Chlorine Capacity Increase – Completed construction

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Chemical Unloading Facility Chlorine Containment	$35,728,000	2018	Continue construction
Weymouth Plant Filter Outlet Chlorination Capacity Increase	$1,657,800	2015	Begin construction

Chemical Unloading Facility Chlorine Containment

Metropolitan's Chemical Unloading Facility (CUF) in Riverside County was constructed in 1975 and is used to transfer liquefied chlorine gas from vendor-supplied rail cars to Metropolitan-owned cargo trailers. These cargo trailers are then delivered by truck to Metropolitan's water treatment plants where they are housed within chlorine containment facilities, which provide an additional security barrier and have the capability to contain and neutralize a potential chlorine release. Chlorine withdrawn from these trailers is used at the water treatment plants for the disinfection process and to maintain the required disinfectant residual in the distribution system. Metropolitan's Board has adopted a policy to provide containment facilities where chlorine is stored at Metropolitan's facilities in order to meet up-to-date fire code requirements, and to provide a consistent level of safety. Chlorine containment facilities have been completed at Metropolitan's five water treatment plants. The CUF chlorine containment system will enhance safety and security at this location and will improve supply-chain reliability.

This project will include the addition of an enclosed building that will house chlorine rail cars and cargo trailers, trans-loading equipment, chlorine neutralization system, process monitoring room, maintenance area, and an emergency generator. Construction of the CUF chlorine containment facility is planned to commence in April 2014.

Weymouth Plant Filter Outlet Chlorination Capacity Increase

Chlorine was originally used as the primary disinfectant at all five of Metropolitan's treatment plants. In response to stricter water quality regulations, Metropolitan initiated the Oxidation Retrofit Program to add ozonation at all five plants in order to meet the maximum contaminant level and treatment technique requirements of the U.S. Environmental Protection Agency's Disinfectants/Disinfection By-Products Rule (D/DBP Rule). When ozone disinfection commences at the Weymouth plant, the chlorine dosage supplied at the filter outlet channel will need to be increased because chlorination at upstream locations will be eliminated or significantly reduced in order to meet the D/DBP Rule requirements. This increase will be adequate to control bacteriological growth in the distribution system. Studies have shown that increasing the post-filtration chlorine dose from 4 mg/L to 6 mg/L is required to generate adequate chloramine residuals. The existing chlorine system at the Weymouth plant does not have sufficient post-filtration chlorination capacity to enable the plant to meet water quality goals at maximum flow conditions, once the ozonation facilities become operational and the filters become biologically active.

This project will increase the post-filtration chlorination capacity at the Weymouth plant by increasing the capacity of existing chlorinators serving the filter outlet injection points; replacing existing ejectors with higher capacity ejectors; modifying existing chlorine piping; and adding new piping to supply chlorine gas and potable water to the new ejectors. Construction by Metropolitan forces is planned to commence in mid-2014.

Control System Enhancement 15397

Total Appropriation Estimate:	$19,100,000	**Total Projected Through June 30, 2014:**	$17,687,000
Appropriated Amount:	$19,081,000	**Estimated Percent Complete:**	93%
Biennial Estimate:	$1,278,000	**Estimated Completion Date:**	2015

Scope

This appropriation is designed to coordinate the capabilities of Metropolitan's control system (Supervisory Control and Data Acquisition – SCADA) with new initiatives and enhancements that accommodate operational and business needs. The guiding document for this program is the Water System Control Master Plan (WSCMP). Work within this appropriation is designed to provide increased and updated functionality to meet WSO and Business System needs. The appropriation objectives include the investigation, planning and deployment of control system and core business programs for WSO and other operations support functions. Projects include; control system upgrades, improved SCADA communications reliability and security; data warehousing and reporting, hydraulic modeling, automatic meter reading (AMR) system upgrades, energy management, and other core business support projects.

Purpose

To more fully automate the distribution, treatment and conveyance systems, and replace aging and out-dated computers, software and AMR components. Investigate and prepare for Phases II and III (Integration and Optimization) of the Water System Control Master Plan.

Accomplishments Through FY 2013/14

Through FY 2013/14, sixteen projects have been completed.

Major project milestones in FY 2013/14:

Hydraulic Modeling Project – Contract executed

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Hydraulic Modeling Project	$1,699,000	2015	Complete project

Hydraulic Modeling Project

Metropolitan's distribution system extends over 5,200 square miles. The system includes 830 miles of pipelines, 16 hydroelectric plants, and hundreds of facilities and structures. Metropolitan's current hydraulic modeling tools provide a technically accurate means to evaluate individual pipelines and small sub-systems, but they are not capable of running evaluations of the complex interactions of multiple pipelines. Upcoming rehabilitation of existing pipelines will require careful planning and hydraulic analyses to minimize hydraulic impacts to Metropolitan's system and to member agencies. A hydraulic model of Metropolitan's system will be able to simulate hydraulic conditions and evaluate alternatives for maintaining deliveries to member agency service connections during and after rehabilitation of the distribution system feeders.

This project will develop a dynamic system-wide hydraulic model. The model will be tested and verified for accuracy using actual flow measurements recorded under varying operating scenarios. Ongoing activities include development of the model and verification of accuracy, and staff training.

Conveyance and Distribution System – Rehabilitation 15377

Total Appropriation Estimate:	$121,000,000	**Total Projected Through June 30, 2014:**	$66,859,000
Appropriated Amount:	$68,896,000	**Estimated Percent Complete:**	61%
Biennial Estimate:	$5,674,000	**Estimated Completion Date:**	2021

Scope

This appropriation was established to plan and implement multiple projects throughout the Distribution System. The common driver for many of the projects in this appropriation is infrastructure reliability.

Purpose

To maintain the reliability of the distribution system through specific repair and rehabilitation projects on Metropolitan's distribution pipelines, reservoirs, and control structures.

Accomplishments Through FY 2013/14

Through FY 2013/14, forty-three projects have been completed.

Major project milestones in FY 2013/14:

Garvey Reservoir Hypochlorite Feed System – Completed construction

Hydroelectric Plants Fire Alarm System Installation – Continued construction

Orange County Feeder Lining Repair – Completed preliminary design

Hydroelectric Power Plant Discharge Elimination – Completed construction

San Gabriel Tower Communication Line Replacement – Completed construction

Upper Newport Bay Blow-off Structure Rehabilitation – Continued preliminary design

West Valley Feeder No. 1. Access Roads and Valve Structure Improvements – Continued final design

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Box Springs Feeder Stage 4 Environmental Monitoring	$886,500	2016	Continue mitigation measures
Orange County Feeder Lining Repair	$33,753,000	2021	Begin final design
Upper Newport Bay Blow-off Structure Rehabilitation	$1,165,000	2016	Begin final design
Hydroelectric Plants Fire Alarm Installation	$999,600	2015	Complete construction
West Valley Feeder No. 1. Access Roads and Valve Structure Improvements	$3,414,300	2015	Complete construction

Box Springs Feeder Stage 4 Environmental Monitoring

The Box Springs Feeder is a 2.26-mile-long, 96-inch-diameter prestressed concrete cylinder pipe (PCCP). The feeder, which was constructed in 1975, conveys State Water Project supplies from the Department of Water Resources' Santa Ana Valley Pipeline to Metropolitan's Mills plant in the city of Riverside. Treated water from the Mills plant is then delivered directly to member agencies through service connections on the Mills plant site and the Perris Valley Pipeline. Stage 4 repairs to the Box Springs Feeder required repairs within the Sycamore Canyon Wilderness Park. These repairs required mitigation measures as part of the Mitigated Negative Declaration. Repairs to distressed PCCP sections on the Box Springs Feeder were completed in 2011.

This project implements mitigation measures required as part of the Mitigated Negative Declaration for Stage 4 Box Springs Feeder repairs within Sycamore Canyon Wilderness Park. These measures include biological surveys and monitoring through 2016, site restoration, and purchase of mitigation credits to offset potential impacts to sensitive habitat and species.

Orange County Feeder Lining Repair

The Orange County Feeder conveys water from the Weymouth plant to communities within Orange County. Construction of the feeder was completed in three stages. The second stage is known as the Orange County Feeder Extension, which was constructed in 1942. The Orange County Feeder Extension runs along Bristol Street in the cities of Santa Ana and Costa Mesa. The pipeline is a coal tar enamel-lined welded steel pipeline with a diameter of 36 to 39 inches and a length of approximately nine miles. The extension was constructed with used pipe due to steel shortages during the Second World War. Previous inspections identified large areas of internal lining degradation, such as blistering, disbonding, and rust. If the lining is not repaired, the pipe's steel walls will rust and eventually begin to leak.

This project will add mortar lining to the existing coal tar enamel lining. The re-lining of the Orange County Feeder Extension will halt any further deterioration of the pipe and will extend the life of the feeder. Ongoing preliminary design phase activities include evaluation of alternatives; development of final design criteria; development of a preliminary construction cost estimate; and development of environmental documentation.

Upper Newport Bay Blow-off Structure Rehabilitation

The Orange County Feeder conveys treated water from Metropolitan's Weymouth plant to the cities of Anaheim and Santa Ana, Three Valleys Municipal Water District, and the Municipal Water District of Orange County. The feeder has 15 blow-off structures which are spaced intermittently at low spots on the pipeline that enable the pipeline to be dewatered in the event of an emergency, and provide access points for routine maintenance or inspection. One blow-off structure within the city of Newport Beach is directly adjacent to the Upper Newport Bay estuary and needs to be repaired. This blow-off structure was constructed nearly 70 years ago and is situated in a harsh salt water environment. Metropolitan staff has maintained the blow-off structure in full operating condition. However, years of operation in the salt water environment have caused the blow-off valve and piping to corrode, and they now require replacement. Modification of the structure's discharge outlet is also needed to eliminate a potential cross-connection. Further, due to ongoing storm drain runoff, the only road available to access the blow-off structure has been damaged. Since vehicular access is needed to transport the large equipment used to maintain valves and appurtenant piping, an important element of this project involves the development of an all-weather access road, along with an agreement with Orange County Flood Control District that permits Metropolitan to maintain and make repairs to the road.

This project will regrade the existing road and install reinforced road crossings where the road intersects drainage channels; strengthen the existing turnaround area adjacent to the blow-off structure to allow maintenance vehicles to set up for repair activities; install new valves and replace all corroded piping; and modify the discharge outlet to comply with current state regulations to prevent potential cross connections. Ongoing preliminary design phase activities include evaluation of alternatives; development of final design criteria; development of a preliminary construction cost estimate; and development of environmental documentation.

Hydroelectric Plants Fire Alarm Installation

Metropolitan owns and operates 16 hydroelectric plants throughout its distribution system. These plants tap available energy from water moving through the distribution system to supply a small portion of Southern California's energy demands. To protect Metropolitan's assets and to comply with fire codes and Federal Energy

Regulatory Commission requirements, 13 of these plants have been equipped with carbon dioxide-based fire suppression systems. A specialized consultant evaluated each of the hydroelectric plants' fire protection systems and recommended the upgrade of the smoke detection systems at the plants.

This project will upgrade the smoke detection systems at Metropolitan's hydroelectric plants. Ongoing final design activities include preparation of drawings and specifications for the construction contract; advertisement and receipt of bids; local agency permitting; development of a construction cost estimate; and all other activities in advance of award of the construction contract.

West Valley Feeder No. 1. Access Roads and Valve Structure Improvements

West Valley Feeder No. 1 delivers treated water from the Jensen plant to Las Virgenes Municipal Water District, Calleguas Municipal Water District, and Los Angeles Department of Water and Power (LADWP). This 8.3-mile-long prestressed concrete cylinder pipeline (PCCP), whose diameter varies from 48 inches to 57 inches, has a capacity of 100 cfs and serves five member agency service connections. West Valley Feeder No. 1 was constructed in 1962 by Calleguas and was acquired by Metropolitan in 1970. A 5.5-mile reach of West Valley Feeder No. 1, extending from the Sepulveda Feeder to the De Soto sectionalizing valve, was leased to LADWP in 1977. Rehabilitation of the valves and valve structures on West Valley Feeder No. 1 is needed because these facilities have deteriorated and have reached the end of their service life. Valves do not seat properly and many are leaking. Maintenance is difficult due to tight working conditions within the vaults. Further, many valves are directly buried and cannot be accessed without excavating the pipeline.

This project rehabilitated 53 structures, which included valve replacement; addition of new vaults to house valves that were directly buried; replacement of undersized vaults; and modifications to blow-off, pumping well, and air-release/vacuum valve installations. The five remaining structures to be rehabilitated are located within Chatsworth Park. These five structures are being addressed separately due to hazardous materials that were discovered within the park boundaries. Although the hazardous waste does not impact Metropolitan's work directly, Chatsworth Park has been closed to the public since 2008. Hazardous waste remediation is the responsibility of the city of Los Angeles, which owns and operates the park. Work to modify/relocate the five structures and to provide all-weather access will resume after the remediation work is completed by the city. Ongoing final design activities include preparation of drawings and specifications for the construction contract; advertisement and receipt of bids; local agency permitting; development of a construction cost estimate; and all other activities in advance of award of the construction contract.

Conveyance and Distribution System - Rehabilitation FY 2006/07 through FY 2011/12 **15441**

Total Appropriation Estimate:	$121,000,000	**Total Projected Through June 30, 2014:**	$48,291,000
Appropriated Amount:	$51,909,000	**Estimated Percent Complete:**	45%
Biennial Estimate:	$22,048,000	**Estimated Completion Date:**	2020

Scope

This appropriation was established to plan and implement multiple projects throughout the Conveyance and Distribution System. The common driver for many of the projects in this appropriation is infrastructure reliability.

Purpose

To maintain the reliability of the distribution system through specific repair and rehabilitation projects on Metropolitan's distribution pipelines, reservoirs and control structures.

Accomplishments Through FY 2013/14

Through FY 2013/14, five projects have been completed.

Major project milestones in FY 2013/14:

Allen McColloch Pipeline Refurbishment – Completed construction

Allen McColloch Pipeline Valve Vault Repair – Completed construction

Bixby Valve Replacement – Completed construction

Collis Valve Replacement – Continued final design

Eagle Rock Tower and Puddingstone Spillway Gates Rehabilitation – Completed construction

Etiwanda Pipeline Lining Replacement – Continued final design

Glendale-01 Service Connection Rehabilitation and Upgrade – Began final design

Second Lower Feeder Cathodic Protection – Completed final design

Sepulveda Feeder Cathodic Protection System – Completed final design

Upper Feeder Cathodic Protection System – Completed construction

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Allen McColloch Pipeline Seismic Upgrade of 10 Facilities	$585,000	2016	Complete final design
Allen McColloch Pipeline Cathodic Protection	$1,525,500	2016	Continue final design
Collis Valve Replacement	$2,127,300	2015	Begin final design
DVL Inlet/Outlet Fish Screen Rehabilitation	$1,108,400	2016	Complete final design

Capital Investment Plan FY 2014/15 and 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Etiwanda Pipeline Lining Replacement	$41,164,200	2019	Complete final design
Glendale-01 Service Connection Rehabilitation and Upgrade	$1,604,000	2015	Complete final design
Lake Mathews Forebay, Headwork Facility and Equipment Upgrade	$5,525,900	2017	Complete final design
OC-88 Pumping Plant Surge Tanks Upgrades	$375,900	2015	Complete preliminary design
Orange County Feeder Cathodic Protection	$662,400	2016	Complete preliminary design
Orange County Feeder Relocation in Fullerton	$1,772,000	2015	Complete final design
Palos Verdes Reservoir Sodium Hypochlorite Feed System Upgrade	$506,700	2015	Complete final design
San Gabriel Tower Seismic Upgrade	$6,690,300	2017	Continue preliminary design
Santa Ana River Bridge Seismic Retrofit	$3,275,200	2015	Complete final design
Santiago Lateral Sectionalization Valve Replacement	$1,103,000	2016	Begin preliminary design
Second Lower Feeder Cathodic Protection System	$1,800,000	2015	Begin construction
Sepulveda Canyon Control Facility Water Storage Tanks Seismic Retrofit	$2,903,000	2018	Complete final design
Sepulveda Feeder South Cathodic Protection System	$1,721,200	2015	Complete construction
Skinner Area Facilities Pavement Repairs	$823,200	2016	Begin preliminary design
Nitrogen Storage Compliance at Diamond Valley Lake, Inland Feeder Pressure Control Structure, and Lake Mathews	$197,987	2019	Continue preliminary design

Allen McColloch Pipeline Seismic Upgrade of Ten Flow Control Facilities

The Allen McColloch Pipeline (AMP) is a 26-mile-long pipeline which delivers treated water from the Diemer plant to south Orange County. Flow control facilities on the AMP house flow meters, valves, and other equipment necessary to control pipeline flow and were built in 1978 in conformance with building codes in effect at that time. Ten of the structures were recently evaluated and found to be seismically deficient. The existing structural connections between the tops of the concrete block walls and the roof diaphragms are lacking in their ability to prevent the walls from pulling away from the roofs during the design earthquake specified by the current building code.

This project will strengthen the connections between the tops of the existing block walls and the roof diaphragms at the following AMP flow control facilities: A-07; OC-66; OC-67; OC-70; OC-72; OC-74; OC-76; OC-77; OC-78/79; and OC-80/81/82. Ongoing preliminary design activities include developing conceptual drawings, preparing environmental documentation, and developing a preliminary construction cost estimate.

Allen McColloch Pipeline Cathodic Protection

The Allen McColloch Pipeline (AMP) delivers treated water from the Diemer plant in Yorba Linda to El Toro Regional Reservoir in Mission Viejo. The AMP is approximately 25 miles long and was installed in the late 1970s. The northern 16-mile-long portion of the line consists of 78-inch-diameter welded steel pipe, while the southern 9-mile-long portion consists of prestressed concrete cylinder pipeline (PCCP) that varies in diameter from 54 to 84 inches. The PCCP portion of the AMP is paralleled by numerous cathodically-protected pipelines along its route. A recent corrosion survey of the AMP identified that the PCCP portion is experiencing corrosion due to stray current interference from the nearby cathodically-protected pipelines. While the corrosion damage is not yet extensive, continued induced stray current corrosion could cause deterioration of the PCCP prestressing wires and could potentially lead to failure of PCCP segments. Due to the high level of stray currents measured on the AMP, an impressed current system needs to be installed. Impressed current systems use an external power source to apply a protective current to the pipeline that is then discharged through an anode that is electrically connected to the pipeline metal.

This project will install thirteen impressed current stations to protect nine miles of PCCP pipeline from corrosion due to stray electrical currents. Ongoing final design phase activities include identifying and locating utilities, local agency permitting, preparation of drawings and specifications, development of a construction cost estimate, advertisement and receipt of bids, and all other activities in advance of award of a construction contract.

Collis Valve Replacement

The Palos Verdes Feeder is a 54-inch-diameter welded steel pipeline that was constructed in 1941. The feeder is one of Metropolitan's primary supply lines serving the Central Pool portion of the distribution system. The Palos Verdes Feeder extends approximately 31 miles south from the Eagle Rock Control Tower to Palos Verdes Reservoir. It delivers treated water to the cities of Los Angeles, South Pasadena, Montebello, Compton and Torrance. The Collis Valve is located within the Collis Avenue Pressure Control Structure on the Palos Verdes Feeder, just downstream of the Eagle Rock Control Tower. This facility was constructed in 1962. The 42-inch, conical plug valve controls downstream flows on the Palos Verdes Feeder and also controls the upstream grade elevation on the Upper Feeder at the Eagle Rock Control Tower. The Collis Valve has developed a tendency to freeze in position, and has become increasingly difficult to open and close. The 52-year-old Collis Valve has reached the end of its service life and has deteriorated beyond repair. Failure of the Collis Valve could result in cascading flows via the Eagle Rock Control Tower, causing entrapped air and subsequent reduced flows in the Palos Verdes Feeder. In the event of a valve failure, water levels within the control tower would drop and the ability to control flows within the Palos Verdes Feeder would be lost, increasing the risk of delivery interruptions for up to 11 service connections serving the cities of Los Angeles, Compton, and Torrance; Central Basin Municipal Water District; West Basin Municipal Water District; and the Upper San Gabriel Valley Municipal Water District.

This project will replace the 42-inch Collis Valve on the Palos Verdes Feeder. Ongoing preliminary design phase activities include field surveys; hydraulic modeling; preparation of environmental documentation; initiation of local agency permitting; hazardous material testing; preparation of a valve procurement specification; and development of a preliminary construction cost estimate.

DVL Inlet/Outlet Fish Screen Rehabilitation

Diamond Valley Lake (DVL) provides emergency storage in the event of a major earthquake, carryover storage as a reserve for drought conditions, and seasonal storage to meet annual member agency demands. DVL was completed in 2000 and is located south of the city of Hemet in Riverside County. The Inlet/Outlet Tower is located east of DVL's Owen Dam. The Inlet/Outlet Tower provides the primary means to fill and withdraw water from DVL. The tower is 266 feet high and has nine tiers of twin ports, each spaced 25 feet apart, which allow water to enter or exit from different lake elevations. Flow through each 7-foot-diameter port is controlled by a hydraulically operated butterfly valve. The ports open into a wet well that rises to the full height of the tower above the pressure tunnel at its base. When lake water passes through the tower into the pressure tunnel, it can be diverted either to Wadsworth Pumping Plant, which contains a bank of variable-speed pump-turbines, or to the adjacent pressure control structure, which contains pressure-reducing butterfly valves. When water is withdrawn through the tower, four fish screens placed over the outlet ports prevent fish, floating debris, or vegetation from passing through to the Wadsworth Pumping Plant or other downstream structures. A pulley system operated by a gantry crane mounted on top of the tower is used to raise and lower the four individual half-cylinder fish screen units (26 feet wide by 19 feet tall) to the desired port elevation. Extensive corrosion has been observed on the lifting blocks, screen supports, and other structural elements of the fish screens, and continued deterioration of the structural components could lead to collapse of the screens. Operation of the Inlet/Outlet Tower without the fish screens would risk damage to the valves at the tower, the valves at the DVL pressure control structure, and the pump-turbines at Wadsworth Pumping Plant.

This project will replace the fish screens using stainless steel components, and will refurbish corroded lifting blocks, screen supports, and other structural elements. Ongoing final design activities include preparation of drawings and specifications; advertisement and receipt of bids; development of a construction cost estimate; and all other activities in advance of award of the construction contract.

Etiwanda Pipeline - Lining Replacement

The Etiwanda Pipeline, located within the cities of Fontana and Rancho Cucamonga, was constructed in 1993 to convey untreated water from the Rialto Pipeline to the Upper Feeder. This 6.4-mile-long welded steel pipeline is 144 inches in diameter. The northern portion of the pipeline, which is 5.4 miles long, conveys high-pressure water to the Etiwanda Power Plant. From that facility, the southern portion of the pipeline continues for one mile to an interconnection with the Upper Feeder. The Etiwanda Pipeline allows Metropolitan to generate power from the high pressure flows available in the northern portion of the line, and provides flexibility in conveying untreated water from the East Branch of the State Water Project to the Weymouth plant. The Etiwanda Pipeline was constructed with a ¾-inch-thick interior mortar lining to prevent corrosion of its steel pipe cylinder. Internal inspections of the Etiwanda Pipeline have identified that approximately 37 percent of the cement mortar lining in the northern portion of the pipeline has fallen off or become delaminated from the steel pipe cylinder. The primary cause of lining damage is believed to be the daily internal pressure fluctuation within the pipeline resulting from power operations at the Etiwanda Power Plant. While the pipeline remains in service and the structural integrity of the line remains sound at present, the deteriorated condition of the cement mortar lining will expose the pipeline over time to accelerated rates of corrosion and eventual leakage.

This project will replace the Etiwanda Pipeline's damaged interior mortar lining under a multi-phase effort. The first phase of repairs will replace the cement mortar lining in approximately 2,800 feet of the pipeline with a polyurethane lining. Construction commenced in January 2014. This first phase replacement will serve as a pilot project to confirm the cost and application procedures for use of polyurethane as an internal pipe coating. Experience gained from the pilot repair will be used to determine the production rates, quality control procedures, phasing, and cost of the full-scale repair. Ongoing preliminary design phase activities for the full-scale repair include engineering analysis and evaluation of the pilot project; preparation of environmental documentation; preparation of a preliminary design report; identification of permitting and right-of-way needs; and development of a preliminary construction cost estimate.

Glendale-01 Service Connection Rehabilitation and Upgrade

The Santa Monica Feeder was constructed in 1941 as part of Metropolitan's original distribution system. The feeder is approximately 25 miles long, with a diameter ranging from 28 to 120 inches. The feeder has various reaches comprised of cast iron, welded steel, and reinforced concrete pipe. The Santa Monica Feeder delivers treated water from the Eagle Rock Control Facility in the city of Los Angeles to four member agency service

connections before reaching its terminus in the city of Santa Monica. Service connection G-01 consists of a 30-inch venturi meter located partially within a concrete vault structure. Gradual corrosion over the course of 73 years of operation has led to deterioration of the venturi meter and adjacent piping. Since Metropolitan owns and maintains the service connection, Metropolitan is responsible for the cost of the planned repairs pursuant to Administrative Code Section 4700. Staff has attempted to repair the meter using localized welding and fiberglass wraps with limited success, due to the meter's age and continued deterioration. Leakage has progressively increased. Failure of the service connection could negatively impact deliveries to the city of Glendale and potentially damage surrounding properties.

This project will replace the leaking venturi meter and rehabilitate the meter structure and piping including enlargement of the vault to remove the existing venturi meter and to fit the new meter and associated piping; installation of a new magnetic flow meter; upgrade of the electrical system; and remediation of hazardous materials. Ongoing final design activities include procurement of the magnetic flow meter via competitive bidding; preparation of drawings and specifications; advertisement and receipt of bids; local agency permitting; development of a construction cost estimate; and all other activities in advance of award of the construction contract.

Lake Mathews Forebay, Headwork Facility and Equipment Upgrade

Lake Mathews is the terminus of the Colorado River Aqueduct (CRA). Untreated water from the CRA is stored in the reservoir. Water is conveyed to the reservoir's forebay and then through the Upper Feeder and Lower Feeder to the Weymouth and Diemer plants, respectively. In 1980, the Lake Mathews hydroelectric power plant was constructed and is located adjacent to the forebay. The hydroelectric plant has a capacity to generate 4.9 megawatts of electricity each year, producing annual revenues of up to $1.3 million. Portions of the concrete roof and walls of the hydroelectric power plant building have been damaged due to a leaky chlorine injection system that treated the turbine cooling water. The chlorine injection system has since been removed. The forebay concrete lining and outlet tower are over 80 years old and have been damaged by corrosion over their lifetime. The concrete of these structures is spalled, exposing the reinforcing steel. Some of the reinforcing steel is severely corroded and needs to be remediated. The structural integrity of both the hydroelectric plant and forebay remains sound at present, but the reinforcing steel and concrete will continue to deteriorate if not remediated. In addition, the forebay discharge facility, which passes water from the lake into the forebay, has ten 32-inch-diameter cone valves that are over 60 years old. Their reliability is severely compromised because of their age and lack of availability of parts necessary to rebuild the valves when they fail.

This project will repair the concrete of the hydroelectric power plant building and the forebay lining and outlet tower. In addition, the forebay outlet tower steel walkways will be replaced, the steel building control room will be sandblasted and painted, and valve discharge deflectors will be installed to minimize the fog-like environment. The discharge facility cone valves and actuators will be replaced and the five 54-inch-diameter butterfly valves and actuators that isolate the cone valves for maintenance and four large slide gates on the forebay outlet tower will be refurbished. Ongoing final design phase activities include: preparation of conceptual layout drawings; preparation of environmental documents; development of final design criteria; preliminary design of a corrosion protection system; hazardous material testing; field survey; detailed engineering, preparation of drawings and specifications for the concrete repairs, advertisement and receipt of bids, development of a construction cost estimate, and all other activities in advance of award of a construction contract.

OC-88 Pumping Plant Surge Tanks Upgrades

The OC-88 Pumping Plant was constructed in 1990 and is located in the city of Lake Forest. Treated water from the Diemer plant is conveyed through the Allen McColloch Pipeline (AMP) to the OC-88 Pumping Plant, which in turn pumps water directly into the Municipal Water District of Orange County's (MWDOC's) South County Pipeline. The South County Pipeline extends a distance of 25 miles through south Orange County to San Clemente. The surge tank system protects the AMP and the South County Pipeline from pressure surges. Surges may be caused by sudden changes in flow velocity which result from pump failure or sudden starting and stopping of a pump. When a surge is generated, a water wave travels down the pipeline which can cause an increase in pressure beyond a pipe's normal operating range. Surge tank systems are used to control surges by dissipating excess pressure within the tanks so that pressure increases within the pipelines are minimized. Surge tanks typically have an air compressor which provides air padding to absorb the surge wave within the tanks. Two new surge tanks were added when the OC-88 Pumping Plant modifications were completed in 2005. However, the

air compressor was not upgraded at that time. A recently completed high-flow test at the OC-88 Pumping Plant identified that a second air compressor should be installed to adequately protect the AMP and the South County Pipeline.

This project will upgrade the OC-88 Pumping Plant's surge tank system and install a second air compressor. Ongoing preliminary design activities include: conducting hydraulic analyses, developing conceptual layout drawings, preparing environmental documentation, and developing a preliminary construction cost estimate.

Orange County Feeder Cathodic Protection

The Orange County Feeder conveys treated water from the Weymouth plant through primarily urban areas to its terminus at service connection CM-1 in the city of Newport Beach. The feeder is approximately 41 miles long and was installed in 1942. The feeder has reaches of welded steel pipe, precast concrete pipe, and prestressed concrete cylinder pipe (PCCP). In 1974, Metropolitan installed an impressed-current cathodic protection system on the 8.8-mile-long welded steel portion of the feeder. The impressed-current cathodic protection system consists of four deep-well anode groundbeds, rectifiers, and other associated equipment. Recent testing performed by staff has identified that three of the deep-well anode groundbeds located in the cities of Anaheim and Fullerton have reached the end of their service life, and are no longer able to effectively provide corrosion protection to the pipeline. Replacement of the existing cathodic protection system will continue to protect the feeder from corrosion and extend the life of the pipeline.

This project will replace the existing cathodic protection system on the Orange County Feeder to protect the feeder for approximately 8.8 miles. Ongoing preliminary design phase activities include site surveys; preparation of a preliminary design report and environmental documentation; local agency permitting; securing power supplies at two locations; and development of a preliminary construction cost estimate.

Orange County Feeder Relocation in Fullerton

The Orange County Feeder was originally installed in 1940. It is a 41-mile-long pipeline which has reaches of welded steel pipe, precast concrete pipe, and prestressed concrete cylinder pipe. Its diameter varies from 33 to 42 inches. The Orange County Feeder conveys treated water from the Weymouth plant through primarily urban areas to its terminus at service connection CM-1 in the city of Newport Beach. The city of Fullerton is proceeding with the Raymond Avenue Grade Separation project, which will lower Raymond Avenue between Santa Fe and Ash Avenues as an underpass beneath the existing Burlington Northern Santa Fe railroad tracks. Approximately 1,100 feet of the Orange County Feeder is located within the public right-of-way along Raymond Avenue where the underpass will be constructed. The Orange County Feeder was originally placed within the pre-existing road pursuant to Section 142 of Metropolitan's Act. State law holds Metropolitan responsible for the cost of protecting or relocating the pipeline to make way for reasonable street improvements by the city of Fullerton. Since the street was first in time, the cost of the feeder relocation must be borne by Metropolitan.

This project will relocate 1,100 feet of the 42-inch-diameter Orange County Feeder within the city of Fullerton. Construction is planned to commence in March 2014.

Palos Verdes Reservoir Sodium Hypochlorite Feed System Upgrade

The Palos Verdes Reservoir was constructed in 1939 and is located at the southern end of the Second Lower and Palos Verdes Feeders, in the city of Rolling Hills. The reservoir provides operational flexibility by maintaining deliveries to nearby service connections when major feeders are shut down for maintenance. In 1993, a sodium hypochlorite system was installed at the outlet of the reservoir to maintain minimum chlorine residual levels to prevent taste and odor issues at service connections downstream of the reservoir. The feed system includes pumps, motors, valves, and flow meters to add the proper dosage of sodium hypochlorite to the treated water. The reliability of the existing sodium hypochlorite feed system has deteriorated over the last several years. Failure of the system would interrupt the delivery of sodium hypochlorite to the Palos Verdes Reservoir inlet and outlet lines, and would impact water quality within Metropolitan's distribution system.

This project will upgrade the sodium hypochlorite feed system and includes installing heavy duty pumps, improving the automation capability of the system, adding chemical containment sensors and alarms to meet current fire code requirements, installing noncorrosive materials for the equipment's support structure, and modifying the piping and equipment layout to improve access for maintenance and repairs. Ongoing final design phase activities include detailed design; preparation of drawings and specifications; acquisition of permits;

advertisement and receipt of bids; development of a construction cost estimate; and all other activities in advance of award of a construction contract.

San Gabriel Tower Seismic Upgrade

The San Gabriel Tower was constructed in 1936 and is located on the Upper Feeder, north of the city of Azusa. It sits at the base of the steep and weathered San Gabriel Mountains, between the west portal of Monrovia Tunnel No. 1 and the east portal of Monrovia Tunnel No. 2. The tower is surrounded by Angeles National Forest and is adjacent to Morris Reservoir, which is owned by the county of Los Angeles. The 86-foot-tall free-standing San Gabriel Tower has a 24-foot by 14-foot rectangular base which sits atop a rock foundation. The tower houses three slide gates which regulate and isolate flows on the Upper Feeder. This structure has been in operation for 75 years and serves a critical function in the delivery of treated water from the Weymouth plant to 16 member agency service connections. An initial seismic assessment utilizing updated code requirements has identified that the San Gabriel Tower is potentially unstable in the event of a major earthquake. A failure of the tower could result in rapid closure of the gates, causing hydraulic surges which would result in damage and shutdown of the Upper Feeder.

This project will seismically upgrade the San Gabriel Tower. Ongoing detailed seismic investigations will characterize site conditions and identify potential alternatives to upgrade the tower. These investigations include: (1) evaluation of the tower's operational constraints; (2) surge analyses to determine hydraulic restrictions and impacts on the Upper Feeder and San Gabriel Spillway Structure if the tower were to be shortened; (3) mapping of topography in the immediate vicinity of the tower; (4) field investigations including geophysical testing and geologic mapping to obtain soil and rock characteristics, such as rock strength; (5) seismic and structural analyses to determine feasible retrofit schemes and options; and (6) preparation of preliminary construction cost estimates.

Santa Ana River Bridge Seismic Retrofit

The Upper Feeder was constructed in 1936 as part of Metropolitan's original water delivery system. The 116-inch-diameter welded-steel pipeline extends approximately 60 miles from Lake Mathews to the Eagle Rock Control Facility in the city of Los Angeles. The feeder conveys untreated water from Lake Mathews to the Weymouth plant, and then delivers treated water to the Central Pool portion of the distribution system. The Upper Feeder crosses the Santa Ana River with a 1,010-foot-long steel truss bridge. The pipeline is supported within the bridge superstructure, which consists of an 18-foot-wide steel deck with two 22.5-foot-high steel truss sides. The bridge superstructure is supported by 12 concrete piers which vary in height from 20 to 43 feet. The concrete piers sit on top of unreinforced concrete caissons which are embedded into bedrock at depths of 4 to 40 feet. The bridge was structurally retrofitted in the 1980s by adding base isolators between the bridge deck and the concrete piers. The purpose of base isolators is to minimize lateral movement of the bridge superstructure caused by seismic shaking of the piers. A total of 28 base isolators were installed, including four isolators on the middle two piers and two isolators on each of the remaining ten piers. Typically, base isolators have a service life of 25-30 years. The existing units at the Santa Ana River Bridge have exceeded the expected service life, have begun to deteriorate, and no longer provide the intended level of protection against seismic forces. In addition, steel truss members show signs of corrosion and the wooden walkway used by staff for inspection and maintenance showed signs of dry rot.

This project will replace the Santa Ana River Bridge's existing base isolators with new base isolation designed to meet current codes; strengthen bridge components by adding cover plates, stiffener plates, and welded connections; add steel reinforcement to the existing unreinforced caissons; and replace corroded steel truss members and the deteriorated wooden walkway. A procurement contract was awarded in 2013 to obtain thirty-six base isolators including twenty-eight for replacement, six for prototype testing, and two spare units. Ongoing final design phase activities include: detailed structural modeling; preparation of plans and specifications; development of a construction cost estimate; advertisement and receipt of bids; and all other activities in advance of award of a construction contract.

Santiago Lateral Sectionalizing Valve Replacement

The Santiago Lateral is a 7.4-mile-long precast concrete pipeline which extends southerly from the Santiago Control Tower in the city of Anaheim Hills to Irvine Lake in the city of Irvine. The Santiago Lateral has five service connections and delivers water to the city of Anaheim and the Municipal Water District of Orange County (MWDOC). The feeder uses a 42-inch sectionalizing valve located in Weir Canyon, approximately four miles

downstream from the control tower, for two purposes: (1) to isolate a portion of the Santiago Lateral; and (2) to enable water deliveries to service connection OC-13A. This valve is normally closed and is typically opened only when deliveries are requested by the member agency. Flows of less than 10 cfs are delivered via a 10-inch bypass valve. Deliveries greater than 10 cfs require operation of the 42-inch valve. The valve currently leaks at a rate exceeding one cfs. Leakage flows through the valve are below the range of the existing service connection meter, resulting in loss of revenue to Metropolitan. After 58 years of continuous service, the 42-inch valve has deteriorated beyond repair and needs to be replaced. In addition, modifications within the valve vault are recommended to improve safety during maintenance.

This project will replace the sectionalizing valve and provide a new actuator and control system capable of remote operation. The valve vault modifications will include the relocation of ladders and a platform to provide a level work surface for maintenance of the new valve. In addition, the size of the bypass valve will be increased to 20 inches to convey bypass flows up to 40 cfs. Ongoing preliminary design phase activities include: conducting field surveys and hydraulic analyses; preparing environmental documentation; initiating local agency permitting; hazardous material testing; and developing a preliminary construction cost estimate.

Second Lower Feeder Cathodic Protection System

The Second Lower Feeder conveys treated water from the Diemer plant in Yorba Linda to Palos Verdes Reservoir in the city of Rolling Hills. The feeder is approximately 39 miles long and was installed in the early 1970s. Approximately 30 miles of the feeder is comprised of prestressed concrete cylinder pipe (PCCP) in 20-foot-long segments. Corrosion surveys of the Second Lower Feeder have indicated that a 14-mile-long PCCP portion of the feeder is experiencing corrosion damage due to stray current interference from nearby cathodically-protected pipelines. While the corrosion damage is not yet extensive, continued deterioration of the line could lead to eventual leakage and possible rupture. The installation of a galvanic cathodic protection system will protect the feeder from further corrosion and extend the life of the pipeline. Under galvanic systems, which are also referred to as current drain stations, anodes are electrically connected to the pipeline metal without using a power source. Because the anodes are composed of metals that are more easily oxidized than the materials in welded steel and PCCP lines, the anodes corrode first and continue to corrode until they need to be replaced. Replacement intervals for the anodes typically range from 10 to 20 years.

This project will install 30 galvanic systems to protect 14 miles of the Second Lower Feeder from corrosion due to stray currents. Construction commenced in February 2014.

Sepulveda Canyon Control Facility Water Storage Tanks Seismic Retrofit

The Sepulveda Feeder is a 42-mile-long prestressed concrete cylinder and steel pipeline that conveys treated water from Metropolitan's Jensen plant in Granada Hills to an interconnection with the Second Lower Feeder in Torrance, and thence into Palos Verdes Reservoir. The Sepulveda Feeder varies in diameter from 50 to 86 inches and was constructed in the early 1970s. The Sepulveda Canyon Control Facility is located in the Sepulveda Pass, immediately west of the San Diego Freeway (I-405). The facility includes a pressure control structure, a control building, and two steel water storage tanks. The two water storage tanks are located in a highly visible area along Sepulveda Boulevard, in the vicinity of the J. Paul Getty Museum. The tanks are 41 feet high with diameters of 230 feet and 145 feet, and storage capacities of approximately 11.6 million and 4.6 million gallons. Both tanks were constructed of welded steel in accordance with applicable codes of their time. These tanks are used to regulate and balance flows along the Sepulveda Feeder. A recent seismic assessment identified that a 6.8 magnitude earthquake on the Santa Monica Fault, which is located within one mile of the site, would cause significant damage to both water tanks, rendering the tanks inoperable. Extensive repairs would be required which could result in a complete shutdown of the Sepulveda Feeder for up to 3 months due to the unique challenges of repairing the tanks. This outage would shut down 24 miles of pipeline downstream of the facility, impacting Metropolitan's ability to deliver treated water from the Jensen plant into the Central Pool.

This project will seismically upgrade the two water storage tanks, including reinforcing the tank shells and adding anchors to secure the tanks from overturning. Ongoing preliminary design phase activities include: field investigations, geotechnical site investigation and slope deformation analysis, detailed engineering analyses of retrofit modifications, preparation of environmental documentation, code review and permitting, development of a preliminary construction cost estimate, and preparation of a preliminary design report.

Sepulveda Feeder South Cathodic Protection System

The Sepulveda Feeder conveys treated water from the Jensen plant in Granada Hills to an interconnection with the Second Lower Feeder in the city of Torrance. The feeder is approximately 42 miles long and was installed in the early 1970s. Approximately 37 miles of the line is comprised of prestressed concrete cylinder pipe (PCCP) in 20-foot-long segments. Corrosion surveys of the Sepulveda Feeder have identified that a 7.5-mile-long PCCP portion of the feeder, between Imperial Highway in Hawthorne and the Second Lower Feeder interconnection in Torrance, is experiencing induced stray-current corrosion damage. While the damage is not yet extensive, continued stray-current corrosion could cause deterioration of the PCCP prestressing wires and could potentially lead to failure of PCCP segments. The installation of a galvanic cathodic protection system will protect the feeder from further corrosion and extend the life of the pipeline. Under galvanic systems, which are also referred to as current drain stations, anodes are electrically connected to the pipeline metal without using a power source. Because the anodes are composed of metals that are more easily oxidized than the materials in welded steel and PCCP lines, the anodes corrode first and continue to corrode until they need to be replaced. Replacement intervals for the anodes typically range from 10 to 20 years.

This project will install 22 stray current drain stations along 7.5 miles of the feeder to protect the feeder from further corrosion and extend the life of the pipeline. Construction commenced in March 2014.

Skinner Area Facilities Pavement Repairs

Over the past 40 years, the service roads and paved areas at Lake Skinner Dam and around the treatment plant have received heavy use by Metropolitan forces and construction contractors and have begun to deteriorate due to aging and surface wear. The roads are used to perform dam surveillance; monitor dam safety instrumentation such as seismic accelerometers, settlement monuments, seepage weirs, piezometers, and groundwater wells; and perform routine operation and maintenance activities such as collection of water quality samples. The deteriorated pavement exhibits raveling caused by wear and tear under traffic loads; surface deterioration; and fatigue and edge cracking caused by saturated subgrades from poor drainage and standing water.

This project will repair approximately 590,000 square feet of existing deteriorated asphalt pavement to provide all-weather, safe paved surfaces throughout the Skinner area facilities. This will include resurfacing approximately 2.2 miles of roadway and 120,000 square feet of paving adjacent to structures; removal and replacement of a 0.75 mile section of roadway and approximately 65,000 square feet of paving; regrading 30,000 square feet of earthen areas to improve drainage; and providing 115,000 square feet of new paving. Ongoing preliminary design activities include conducting site surveys; mapping; preparation of layout drawings; development of final design criteria; preparation of environmental documentation; and development of a preliminary construction cost estimate.

Nitrogen Storage Compliance at Diamond Valley Lake, Inland Feeder Pressure Control Structure, and Lake Mathews

Compressed nitrogen gas in the hydraulic power units (HPUs) at Diamond Valley Lake, the Inland Feeder Pressure Control Structure, and Lake Mathews provide backup power to operate large diameter valves in the event of an electrical power outage. Each HPU includes a hydraulic oil reservoir, oil pumps, hydraulic accumulator cylinders, nitrogen storage cylinders, instrumentation, valves, filters, and related equipment. Nitrogen is a colorless, odorless gas that is stored under pressure in the hydraulic accumulator cylinders and nitrogen storage cylinders. Nitrogen is not a hazardous substance itself, but it may create an oxygen-deficient environment by displacing oxygen from an enclosed space, such as a valve vault. Oxygen-deficient atmospheres can have serious effects and could occur due to HPU equipment failure, internal corrosion causing leakage, impact to the nitrogen supply piping, or during maintenance activities. Administrative controls have been imposed at these sites to reduce potential safety hazards until a long-term solution is implemented.

This project will implement feasible means to reduce the nitrogen hazard risk. Ongoing assessment phase activities include: evaluation of options such as removing nitrogen cylinders from the enclosed areas, providing physical secondary enclosures for nitrogen storage cylinders, investigating the use of compressed air instead of nitrogen, and using different types of valve actuators to replace the HPU systems; development of final design criteria; and development of a conceptual cost estimate.

Conveyance and Distribution System - Rehabilitation FY 2012/13 through FY 2017/18 **15480**

Total Appropriation Estimate:	$255,000,000	**Total Projected Through June 30, 2014:**	$2,826,4000
Appropriated Amount:	$2,000,000	**Estimated Percent Complete:**	1%
Biennial Estimate:	$22,425,000	**Estimated Completion Date:**	2022

Scope

This appropriation was established to plan and implement multiple projects throughout the Conveyance and Distribution System. The common driver for many of the projects in this appropriation is infrastructure reliability.

Purpose

To maintain the reliability of the distribution system through specific repair and rehabilitation projects on Metropolitan's distribution pipelines, reservoirs and control structures.

Accomplishments Through FY 2013/14

Through FY 2013/14, no projects have been completed.

Major project milestones in FY 2013/14:

Lakeview Pipeline Repairs – Completed preliminary design

Orange County C&D Service Center – Continued preliminary design

Upper Feeder Protection at Railroad Crossing – Completed final design

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
All Feeders Manhole Locking Devices Retrofit	$3,403,100	2018	Complete preliminary design
Cajalco Creek Mitigation Flows	$229,600	2016	Begin construction
Casa Loma Siphon Barrel 1 & 2, DVL and San Diego Canal Flow Meter Replacement	$1,157,400	2016	Complete final design
Corona HEP Seepage Remediation	$325,400	2016	Complete preliminary design
Distribution System Electrical Improvements	$3,974,500	2020	Complete study
DVL East Dam Power Line Realignment	$630,093	2017	Complete design

Capital Investment Plan FY 2014/15 and 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Eagle Rock Operations Control Center Upgrades for Fire Protection	$2,864,000	2016	Begin final design
Etiwanda Test Facility	$1,110,000	2016	Complete preliminary design
Facility Infrastructure Mapping	$1,431,200	2016	Complete Weymouth Plant mapping
Greg Avenue Facility Rehabilitation	$545,100	2018	Complete preliminary design
Hollywood Tunnel Portal Sleeve Valve Equipment Upgrade	1,426,600	2016	Complete preliminary design
Lake Skinner Dam Remediation	$2,500,100	2017	Begin preliminary design
Lake Skinner Outlet Tower Chlorine System Modifications	$250,000	2016	Complete preliminary design
Lakeview Pipeline Repairs	$178,445,700	2022	Complete final design
OC-88 Pump Station Variable Speed Drive, Motor, and Flow Meter Upgrade	$627,000	2017	Complete preliminary design
Olinda PCS and Santiago Tower Emergency Generators	$660,100	2017	Complete preliminary design
Orange County C&D Service Center	$10,983,900	2019	Begin final design
Red Mountain Hydroelectric Plant Emergency Generator Replacement	$650,500	2017	Complete preliminary design
San Diego Canal Radial Gate Rehabilitation	$690,100	2018	Complete final design
San Diego Pipeline #3 Blow-off to Pump Well Conversion	$690,100	2017	Complete final design
San Dimas Control Structure Fuel Tank Replacement	$304,300	2016	Complete preliminary design
Wadsworth Pumping Plant Recoating Yard Piping	$865,900	2016	Complete final design
Wadsworth Pumping Plant Stop Logs Addition	$939,400	2018	Complete final design
West Orange County Feeder Valve Replacement	$410,000	2017	Complete final design
Upper Feeder Protection at Railroad Crossing	$1,210,000	2015	Complete construction
Deodara PCS Pavement Upgrades	$400,000	2018	Begin preliminary design
Inland Feeder SBMWD Intertie	$492,800	2015	Complete construction
Lake Skinner East Bypass Screens	3,982,200	2018	Continue final design
Lake Mathews Electrical Reliability Upgrades	100,000	2020	Begin preliminary design

All Feeders - Manhole Locking Device Retrofit

Manhole covers that are in the public right-of-way have become increasingly vulnerable to theft because of the scrap value of the metal. This increases risks to safety and security. These risks can be mitigated by using manhole locking devices, which can be installed inside existing manhole cover frames as a more secure barrier to entry. An inventory of all of Metropolitan's manholes concluded that a total of 1,469 manholes still require installation of manhole locking devices. Many of Metropolitan's manholes are already secured in this manner; however, current locking devices are heavy and not easy to remove or re-install. A new design for improved accessibility for maintenance is recommended.

This project will install manhole locking devices on approximately 1,500 manholes located throughout Metropolitan's conveyance and distribution system. Highest priority will be assigned to manholes located in public areas where easy access is of concern. Alternative designs/materials to secure the manhole covers will be assessed. Ongoing preliminary design phase activities include field investigations, identification of traffic control and permit requirements, preparation of preliminary layout drawings, development of final design criteria, and development of a preliminary construction cost estimate.

Cajalco Creek Mitigation Flows

Prior to the creation of Lake Mathews, the Cajalco Creek, on average, drained 500 acre-feet per year of water into the Temescal Wash, a tributary of the Santa Ana River. With the construction of Lake Mathews, drainage from the Cajalco Creek watershed is now collected in the lake and becomes part of Metropolitan's water supply. Pursuant to a 2003 agreement between Metropolitan and the State Water Resources Control Board, Metropolitan must annually release to the Santa Ana River an amount of water equal to that collected in the lake from the watershed. Measured seepage below the Lake Mathews dam partially satisfies the mitigation requirement; the remainder is satisfied by discharge into the river. Due to the discovery of quagga mussels in the Colorado River Aqueduct (CRA) in 2007, surface discharge of CRA or lake water to meet the mitigation requirement is no longer allowed per Assembly Bill 1683, as enforced by the California Department of Fish and Game. In order to meet the requirements of both the 2003 agreement and AB1683, Metropolitan discharges State Water Project water from the Inland Feeder into Plunge Creek, which also drains into the Santa Ana River. Metropolitan's ability to continue mitigation releases at Plunge Creek may be impacted by a low State Water Project allocation and by potential construction activities in the vicinity of Plunge Creek. Therefore, Metropolitan may be required to use CRA water to meet the mitigation requirements. An acceptable quagga mussel control measure when discharging infested waters into non-infested watersheds is percolation/desiccation. CRA or lake water could be used if it were intermittently percolated into the groundwater basin at the Santa Ana River. The surface of the percolation basin acts as a filter to capture the quagga mussels, which then die off during the drying periods. The percolation basin would also provide additional operational flexibility by allowing more rapid and efficient dewatering of the Upper Feeder during planned and unplanned shutdowns while eliminating any potential release of quagga mussels into the Santa Ana River.

This project will construct a CRA water discharge percolation basin within the Santa Ana River watershed to meet the Cajalco Creek mitigation flow and AB1683 requirements. Ongoing preliminary design phase activities include identification of potential sites along the Upper Feeder for the percolation basin; right-of-way planning; geotechnical investigations; hydraulic analyses; identification of permit requirements; preparation of environmental documentation; preparation of preliminary layout drawings; development of final design criteria; and development of a preliminary construction cost estimate.

Casa Loma Siphon Barrels Nos. 1 and 2, Diamond Valley Lake, and San Diego Canal Flow Meter Replacement

Flow meters throughout the conveyance and distribution system provide real-time flow information used to adjust and balance the flows throughout the system. The flow meters installed on Casa Loma Siphon Barrels Nos. 1 and 2 measure flows from the Casa Loma Canal into Lake Mathews. The flow meter on the Diamond Valley Lake Forebay Connection Canal measures flows into and out of the Wadsworth Hydroelectric/Pumping Plant. The flow meter on the San Diego Canal measures flows into Lake Skinner and the Skinner plant. The expected service life for this type of electronic equipment is 15 to 20 years. These four acoustic flow meters have been in service between 14 and 16 years, and have begun to deteriorate. Technical support and spare parts are no longer available, which makes repairs difficult and increases their downtime. Changes made in system water flow can take hours to be seen in different areas. Without accurate and timely information about flow in a canal, an unplanned spillage

due to overtopping caused by higher than expected flows, or damage to canal concrete panels from decreasing flows too rapidly could occur and go unnoticed.

This project will install four new acoustic flow meters to measure flow in three canals. Ongoing preliminary design phase activities include field investigations, development of final design criteria, and development of a preliminary construction cost estimate.

Corona Hydroelectric Plant Seepage Remediation

The Corona Hydroelectric Plant (HEP) was constructed in 1982 along the Lower Feeder. From Lake Mathews, the Lower Feeder conveys untreated water sequentially through the Temescal HEP and the Corona HEP before reaching the Diemer plant. Under peak flow conditions, the Corona HEP can generate up to 2.8 megawatts of electricity. The Corona HEP is a reinforced concrete structure located on top of a large pad that was constructed at the base of a hill. The structure features a main level and a basement level which houses the Lower Feeder. In late 2009, a sinkhole appeared on the east side of the Corona HEP, and severe damage was found on the southern exterior wall of the basement. The damage was attributed to subsurface seepage. Immediate structural repairs of the damaged reinforcing bars and adjacent concrete were performed. To prevent further damage to the HEP, a subsurface drainage system is recommended to remediate seepage as well as installation of monitoring wells to determine the source of the seepage.

This project will install monitoring wells with sump pumps, a subsurface drainage system, and a waterproofing system to protect the basement level of the Corona HEP structure from water intrusion and structural degradation. Ongoing preliminary design phase activities include preparation of preliminary layout drawings, development of final design criteria, and development of a preliminary construction cost estimate.

Distribution System Electrical Improvements

Metropolitan's distribution system includes over 1,000 structures which house equipment used to measure pipeline flow, control pipeline flow and/or pressure, relieve pressure or vacuum, and isolate or sectionalize a pipeline. Over 80 percent of these structures were built over 30 years ago. Each of these structures typically contains electrical panels, lights, exhaust fan, a sump pump if the structure is below ground, wall receptacles, wall switches, motors, and the powered equipment, such as motor-operated regulating valves. Recent field investigations at four randomly selected Orange County locations identified a deficient electrical grounding condition that needs correction. At the time these structures were constructed, electrical conduits were considered an acceptable method of equipment grounding. However, the conduits at these four sites have corroded and do not provide an adequate ground return path. Current code requirements mandate separate grounding conductors. In the four structures investigated, the neutral conductor from the electric utility service connection was not bonded to ground, there was no ground rod, and there was no equipment grounding conductor from the service panelboard to the electrical loads inside the structure. An improperly grounded system poses a safety hazard and could electrically shock personnel or the general public, if nearby, when there is a ground fault that is not properly conveyed to the ground. The field investigation of these four facilities also identified that many of the local instrumentation display panels, used by system operators inside the structures to locally adjust the opening of regulating valves to control the flow, hydraulic grade, and pressures within the pipelines, have deteriorated and need to be replaced. Numerous repairs to the instrumentation panels have already been made. The vendors no longer provide support, and spare parts are difficult to obtain.

This project will correct electrical deficiencies in structures throughout Metropolitan's distribution system bringing them into compliance with the latest codes and replace deteriorated instrumentation display panels. Ongoing preliminary design phase activities include continuing field investigations of the remaining structures, identification of electrical deficiencies, determination of traffic control and permit requirements, preparation of environmental documentation, preparation of preliminary layout drawings, development of final design criteria, and development of a preliminary construction cost estimate.

DVL East Dam Power Line Realignment

The East Dam at Diamond Valley Lake (DVL) was constructed in 2000. Five seepage wells and sump pumps were installed as part of the East Dam construction project to pump out the seepage collected from the dam and keep the toe of the dam dry. Thirty-seven temporary wooden power poles supplied 480-volt power to the five sump pumps and to a domestic well used for dust control and irrigation. However, ongoing pole maintenance required entry into

the East Dam Wildlife Corridor, and the temporary poles were recently removed to lessen the risk of wildfire in the wildlife corridor. A temporary underground conduit was installed to provide power to the seepage well pumps and the domestic well. The East Dam safety surveillance system uses four geodetic monitoring instruments with solar-powered repeaters to collect data used to monitor dam deformation which is reported to the California Division of Safety of Dams (DSOD). The existing solar powered repeaters, presently on the crest of each of the dams, have had significant maintenance and reliability issues. When a repeater fails, the DSOD-required data is not gathered automatically and has to be collected by hand, creating a personnel safety issue. The DSOD is requiring enhancements to the instruments. Lastly, the DVL marina facility, located near the East Dam is currently supplied power by two stationary diesel-fueled engine-generators. A 480V utility service is recommended to provide reliable power to the five seepage well sump pumps and the domestic well, the four geodetic monitoring stations, and the DVL marina facility.

This project will provide a permanent 480V power line to the East Dam sump pumps, the East Dam Geodetic Monitoring Stations, and the DVL marina facility. The power line route will be aligned to avoid the wildlife corridor. Ongoing preliminary design phase activities include preparation of preliminary layout drawings, development of final design criteria, and development of a preliminary construction cost estimate.

Eagle Rock Operations Control Center Upgrades for Fire Protection

The Eagle Rock Operations Control Center (OCC) facility was built in 1995 in the city of Pasadena. The facility includes the two-story OCC (10,360 square feet total), a two-story Business Incident Command Center (2,860 square feet total), an emergency generator building, and a valve structure. Metropolitan controls and coordinates its raw water conveyance, overall water treatment, and finished water distribution operations from the OCC at Eagle Rock. As the main hub for control of both the conveyance and distribution systems, the OCC is a pivotal structure to the daily operations of Metropolitan. The bowl-shaped topography of the site encompasses about 15 acres, with only 5 acres suitable for development after extensive grading was performed. The site may be accessed through two gates and winding access roads. An assessment of the fire protection infrastructure and vegetation around the OCC identified potential fire protection system upgrades and improvements to increase the fire resistance and reduce fire risk at the facility.

This project will upgrade the fire protection infrastructure at the site, including upgrading fire hydrants, upsizing the potable water line for efficient fire-fighting, increasing the fire resistance of the buildings, upgrading the access roads to improve fire department truck access, and replacing flammable vegetation along the access roads and near the buildings. Ongoing preliminary design activities include: conducting hydraulic analyses, developing conceptual layout drawings, preparing environmental documentation, and developing a preliminary construction cost estimate.

Etiwanda Test Facility

Metropolitan's infrastructure has been constructed over the course of 80 years. As the infrastructure ages, Metropolitan will continue to invest in rehabilitation projects which often include the replacement of mechanical equipment such as valves, actuators, and flow meters. A new test facility is needed to test various valves, actuators, pumps, flow meters, and materials under typical operating conditions found in Metropolitan's distribution system. Metropolitan previously operated a test facility located in Yorba Linda that was used to prequalify equipment for use in the system. The Yorba Linda Test Facility received raw water from the Santiago Lateral and discharged into a tributary of the Santa Ana River. In the 1990s, the facility was closed due to noise and environmental concerns due to the discharge of effluent into the Santa Ana River. Retaining the in-house capability to perform the functions of the Yorba Linda Test Facility is important to Metropolitan because existing facilities do not have the capability of testing equipment at combined flows and pressures that are typical to Metropolitan's system. The proposed facility at Etiwanda will provide Metropolitan with improved quality control of purchased equipment by prequalifying equipment to be used in new designs or replacement applications. In addition, the test facility will allow Metropolitan to test newly developed valve, flow meter, chemical feed system, and pump products; provide additional means of analysis of proposed designs via hydraulic modeling; and enable Metropolitan to validate the accuracy of existing flow meters, train personnel on the use of new or specialized equipment, and provide another service to member agencies and other outside agencies such as the Department of Water Resources. The Etiwanda site was chosen because the Etiwanda Pipeline can provide high pressures and flows that are typical to Metropolitan's distribution system. Locating the test facility at Etiwanda will also allow for recovery of the test water for eventual potable use.

This project will construct the Etiwanda Test Facility, and includes a new 24-inch-diameter piped connection to the Etiwanda Pipeline, inlet control facilities consisting of isolation and control valves and metering equipment, a test area, and collection and discharge facilities. Additionally, a new control building will be provided for data collection and test oversight. The facility will be designed to allow for future expansion, allowing for increased flows and a wider range of testing opportunities. Ongoing preliminary design phase activities include verification of existing pipeline coordinates and connection locations, detailed analysis of the layout, hydraulic analyses, preparation of environmental documentation, development of final design criteria, and preparation of a preliminary construction cost estimate.

Facility Infrastructure Mapping

Considerable information has been collected on the underground infrastructure at Metropolitan's treatment plants and the conveyance and distribution systems. Record drawings are prepared when construction nears completion in order to document the as-built condition of a facility, which typically varies somewhat from the details shown on the contract drawings. Record drawings are used for staff training, efficient system operations, troubleshooting, and for showing the baseline of existing conditions used in subsequent designs of facility improvements. In the past, the approximate locations of underground utilities were shown on record drawings. Construction change orders often result when the existing conditions differed from what was shown on the record drawings. Currently, the as-built locations of underground utilities are typically documented using 3-dimensional (3-D) survey technology to efficiently detail and record the locations of as-built underground valves, piping, and electrical conduits and duct banks. The information is collected on a project-by-project level as the construction contractors or Metropolitan forces excavate and backfill areas and is not integrated with other sets of record drawings. The Weymouth plant is a critical Metropolitan facility whose underground infrastructure has been recently upgraded via multiple construction contracts, such as the Inlet Conduit Relocation, the Power System Upgrade, and Oxidation Retrofit Program ozonation facilities projects. Development of an intelligent underground infrastructure map of the Weymouth facility will consolidate the recently collected as-built and survey data into a single master file to update older, existing drawings, and for developing more complete and accurate drawings for future Weymouth plant improvements. The mapping will reduce the potential for underground infrastructure related change orders on future projects.

This project will develop an intelligent underground infrastructure map of the entire Weymouth plant to take advantage of recently collected as-built and survey data. The ongoing activities include: (1) consolidation of multiple information sets (3-D surveys, record drawings, shop drawings, submittals, etc.) for the Weymouth plant into a single master file; (2) determining the confidence level and criticality of data for each plant component contributing to that master file; (3) increasing the accuracy of the information on selected components/data by employing field surveys, potholing, ground penetrating radar, or other field location technology to make the data more complete and accurate; and (4) development of computer-aided design (CAD) and non-CAD 3-D models. As part of this project, staff will determine the type of hardware and software required to integrate the base model with staff's day-to-day design and operational work; develop processes/procedures to update and maintain the data/model; and develop a process to assess which other Metropolitan facilities should be mapped, including the level of mapping required and the feasibility of adding aboveground facility infrastructure data the model.

Greg Avenue Facility Rehabilitation

The Greg Avenue Facility is located on the corner of Greg Avenue and San Fernando Road within the San Fernando Valley. The facility houses a pressure control structure and pump station, both built in the early 1960s, and a hydroelectric plant built in 1979. The pressure control structure and hydroelectric plant receive treated water flows from the Jensen plant via the East Valley Feeder and deliver them to the cities of Los Angeles, Beverly Hills, Glendale and Burbank. The hydroelectric plant can produce up to 1 megawatt of electricity with its single turbine. When the hydroelectric plant is not operating, flow is diverted through the pressure control structure in order to maintain continuous water deliveries from the Jensen plant. The pump station can pump up to 60 cfs into the Sepulveda Feeder or, if required, west to the Calleguas and Las Virgenes Municipal Water Districts. The aging mechanical and electrical equipment has made the facility's operation unreliable. In addition, the asphalt surfacing at the facility has cracked and reached the end of its service life; poor subsurface support and drainage has resulted in two sink holes.

This project will rehabilitate the facility equipment, improve local drainage, and replace the asphalt surfacing. Ongoing preliminary design phase activities include field investigations, development of final design criteria, and development of a preliminary construction cost estimate.

Hollywood Tunnel Sleeve Valve Equipment Upgrade

The Santa Monica Feeder distributes treated water to the cities of Glendale, Burbank, Los Angeles, Beverly Hills, and Santa Monica. The North Portal of the Hollywood Tunnel, built in 1937, is a part of the Santa Monica Feeder, and is one of the three control points along the 25-mile-long feeder. The water elevation in the tunnel sets the delivery pressure of the downstream service connections. If the water elevation in the tunnel drops too low, the pressure at the downstream service connections will decrease and disrupt water deliveries. The North Portal structure consists of two 24-inch-diameter control pipelines, along with a 16-inch-diameter manually operated bypass line. The control lines are each equipped with a 24-inch hydraulically operated sleeve valve, which is manually set to maintain a target water elevation of 778.2 feet in the Hollywood Tunnel. Only one control line is in operation at a time. The second control line is kept on standby in case the primary line develops problems. The existing equipment is over 35 years, and repair parts are no longer available. Consequently, upkeep of the equipment requires substantial labor and commitment to maintain reliability.

This project will upgrade the sleeve valves, actuators, and other equipment at the North Portal. Additionally, the instrumentation and controls will be modernized to integrate the system into the Supervisory Control and Data Acquisition (SCADA) system. Ongoing preliminary design phase activities include field investigations, development of final design criteria, and development of a preliminary construction cost estimate.

Lake Skinner Dam Remediation

Lake Skinner was created in 1973 by the construction of an earthen embankment dam on Tucalota Creek. The dam is under the jurisdiction of the California Division of Safety of Dams (DSOD). Over time, rain and wind have eroded the downstream lower berm of the dam face. The erosion has undermined the unreinforced, shotcreted collection and drainage channels, which are buckled, cracked, and crumbling. The drainage channels do not properly drain and leave pools of standing seepage flows. Routine monitoring of the toe-drain manholes requires staff to walk across uneven rip-rap for access, creating personnel safety issue. In addition, the existing accelerograph slabs have been undermined. The DSOD has raised concerns regarding the aging of the Lake Skinner dam following recent field inspections.

This project will repair the erosion damage on the downstream berm and regrade the drainage channels so that they freely drain. In addition, concrete access walkways to the toe drain manholes will be installed, the damaged accelerograph slab will be replaced, and new head and wing walls on the corrugated metal pipe drainage channels will be installed. Ongoing preliminary design phase activities include preparation of preliminary layout drawings, development of final design criteria, and development of a preliminary construction cost estimate.

Lake Skinner Outlet Tower Chlorine System Modification

The Lake Skinner Outlet Tower, built in 1973, provides the primary means to withdraw water from the lake, which can be treated at the Skinner plant or conveyed, untreated, to downstream users. The tower has four outlet ports – Tier 1 port is near the top of the tower and Tier 4 is near the bottom. In the late 1980s, a chlorine diffuser was installed inside the outlet tower at Tier 4 to control asiatic clams, which, at that time, were accumulating at the bottom of the outlet tower and outlet conduit. In 2007, while conducting a shutdown of the Colorado River Aqueduct, quagga mussels were discovered at Lake Skinner in low numbers. Since that time, intermittent chlorination has been used at the Lake Skinner Outlet Tower to control transport of the mussel larvae, known as veligers, to downstream users. The location of the original Tier 4 chlorine diffuser has not been effective in controlling the populations of quagga mussels growing throughout the normally submerged portions of the outlet tower. To counter this, staff occasionally isolates the tower, manually applies calcium hypochlorite ("pool" chlorine) to the stored water, and allows the tower to sit isolated for five days. This five-day period of "shock" chlorination has proven effective in decimating the population of mussels between Tier 1 and Tier 4. After emptying the water, the tower walls are pressure washed to remove attached mussels, and the accumulated loose quagga mussel shells are removed. The addition of a second chlorine diffuser near Tier 2 is recommended to control the growth of mussels attaching to the upper tower walls.

This project will install a second chlorine diffuser in the Lake Skinner Outlet Tower, repair the broken diffuser at Tier 4, repair Tier 4 concrete surfaces damaged by the chlorine application, and apply coatings to existing outlet tower metallic surfaces, such as the hydraulic lines and actuators, to minimize corrosion. Ongoing preliminary design phase activities include preparation of preliminary layout drawings, development of final design criteria, and development of a preliminary construction cost estimate.

Lakeview Pipeline Repairs

The Lakeview Pipeline was installed in 1973 to enable the Skinner service area to receive supplies from the State Water Project (SWP). The 11-foot-diameter pipeline is approximately 11.5 miles long and is comprised of 1,520 steel pipe segments with rubber-gasket bell and spigot joints. The line conveys untreated water delivered through the Department of Water Resources' Santa Ana Valley Pipeline and Lake Perris facilities. In combination with the Inland Feeder, Metropolitan uses the Lakeview Pipeline to balance salinity levels in the Skinner area by blending flows from the SWP and the Colorado River Aqueduct. The Lakeview Pipeline also delivers untreated water to two member agency service connections. Since it entered service in 1973, the Lakeview Pipeline has been shut down on numerous occasions to repair leaking joints. During comprehensive internal inspections conducted in December 2012, staff identified that the 11-foot-diameter welded steel pipe has deflected in excess of 4 inches at over 660 locations and as much as 12 inches at four locations along its 11.5-mile length. In many locations, the pipe is oval-shaped rather than circular, which is caused by a combination of insufficient pipe stiffness and deficient soil embedment around the pipe. This deflection causes pipe leakage at the rubber-gasket joints and cracking of the pipe's interior mortar lining. If not repaired, the lack of mortar lining will result in accelerated corrosion and potential pipeline failure. While the Lakeview Pipeline can remain in service on an interim basis in its present condition, permanent repairs should proceed expeditiously.

This project will repair the Lakeview Pipeline with a steel liner designed as a stand-alone pipe section which can accommodate full internal and external pressures on the line. The annular space between the new and existing steel sections will be filled with concrete grout to improve pipe stiffness. In addition, a sectionalizing valve will be installed to allow deliveries to continue to member agency service connections while the repairs are underway. Ongoing preliminary design phase activities include right-of-way planning, geotechnical investigations, hydraulic analyses, identification of staging areas for isolation bulkheads and roll-out sections, identification of traffic control and permit requirements, preparation of environmental documentation, preparation of preliminary layout drawings, development of final design criteria, and development of a preliminary construction cost estimate.

OC-88 Pump Station Variable Speed Drive, Motor, and Flow Meter Upgrade

The OC-88 Pump Station is located on the Allen McColloch Pipeline, which delivers treated water from the Diemer plant into south Orange County. The pump station consists of seven pumps that pump the water to the Municipal Water District of Orange County's service connection via a turnout to the South County Pipeline. The station has seven 1,500-horsepower variable speed pumps. Four of the pumps have induction motors and modern variable frequency drive units. The other three pumps are equipped with 23-year-old synchronous motors and variable speed drive (VSD) units which utilize outdated technology. The VSD units are no longer supported by the vendor, and service and repairs parts are no longer available. The station also has eight acoustic flow meters, one for each of the seven pumps and one for the master flow reading. The flow measurements are used to control the pump operations and for billing. The expected service life for this type of electronic equipment is approximately 15 to 20 years. The existing acoustic flow meters have been in service for over 10 years, but the meters were procured many years before their installation. Technical support and spare parts are no longer available, which makes repairs difficult and increases the downtime of the meters.

This project will replace the three VSD units with modern variable frequency drive units, replace the three synchronous motors with induction motors, install vibration monitoring equipment, and install new acoustic flow meters for the seven pumps and master flow measurement. Ongoing preliminary design phase activities include field investigations; development of final design criteria; and development of a preliminary construction cost estimate.

Olinda Pressure Control Structure and Santiago Control Tower Emergency Generators

The Santiago Control Tower is located in the city of Yorba Linda, and diverts untreated water from Lake Mathews between the Santiago Lateral, the Santiago Lateral Spillway, and the Lower Feeder, which supplies the Diemer plant. Constructed in the mid 1950's, the tower contains motor-operated slide gates for flow diversion and for

emergency dewatering of the Lower Feeder. The Olinda Pressure Control Structure (PCS) is located approximately one mile downstream of the Santiago Control Tower and 3.5 miles upstream of the Diemer plant. The PCS was constructed in 1969 to regulate flows in the Lower Feeder between the Santiago Control Tower and the Diemer plant. The PCS also serves to maintain the hydraulic grade elevation in the pipeline and prevent cascading flows from occurring downstream of the tower. Cascading flows entrain air bubbles into the water, which can disrupt the treatment processes at the Diemer plant. The two facilities are not equipped with emergency generators. In the event of loss of commercial power, flow control would be lost until a portable generator could be delivered and connected. Loss of flow control could damage pipelines, cause flooding, and allow water to back up and spill from the OC-11 structure, resulting in quagga mussel infested water discharging into the Santa Ana River.

This project will procure and install emergency generators at the Santiago Control Tower and Olinda Pressure Control Structure to provide emergency power for critical systems at the facilities. The new generators will be provided with alarms; valves; meters; and control systems capable of automatic start-up upon loss of primary power, automatic transfer back to primary power once the normal source is reestablished, and remote status monitoring. The generators will be located in new buildings, each with a fuel unloading area and spill containment that complies with current building codes. Ongoing preliminary design phase activities include field investigations; selection of generator placement sites; coordination to meet stringent permitting requirements, including Orange County Fire Authority and South Coast Air Quality Management District permits; preparation of environmental documentation; and development of final design criteria and a preliminary construction cost estimate.

Orange County Conveyance and Distribution Service Center

To efficiently perform needed operation and maintenance activities across the service area, the conveyance and distribution system is divided into three major operating regions: the Desert, Eastern, and Western Regions. Within each region there are several service centers that support local maintenance activities. Typical maintenance activities routinely performed within the distribution system include repairing and recoating deteriorated valves, welding spool pieces and piping, and repairing air vents and meter cabinets. A permanent, aging service center located at the Diemer plant was demolished so that the plant's south slope stabilization project could proceed in preparation for ozonation facilities. The service center was responsible for the Orange County portion of the conveyance and distribution system, which consists of over 140 miles of pipelines, a total of 1,114 vault structures, four pressure control structures, three hydroelectric power plants, one regulating reservoir, and one pumping plant. The Orange County area extends from Corona on the east and Buena Park and Huntington Beach on the west, Yorba Linda on the north, and Newport Beach on the south. Currently, routine maintenance and repairs for the Orange County area are conducted at the Diemer plant from a temporary facility, which includes an aging warehouse building with limited utilities, two 40-foot-long trailers, and shipping containers. Repairs performed at these temporary facilities are limited because of space and lifting restrictions, and regulatory limitations. Equipment and valves that cannot be repaired at the temporary facilities are either replaced or must be transported to the La Verne shops for repair, resulting in delays and transportation challenges. Field maintenance supplies and dewatering equipment (which includes large pumps, piping, dechlorination trailers, blowers, and portable generators) are stored in shipping containers, which are inefficient for use as a warehouse due to their limited access and inadequate ventilation and lighting. A new Orange County Conveyance and Distribution Service Center is recommended to increase the efficiency of maintenance work, improve emergency response capability, and meet increasingly stringent regulatory requirements.

This project will provide a new Orange County Conveyance and Distribution Service Center. The service center will be located on a newly created pad at the Diemer plant's northwest hill, separate from the main plant facilities, and will include a welding/fabrication shop, sandblasting booth, painting and coating shop, pipe and conduit bending area, work bench and parts cleaning areas, tool crib, storage areas for paint and welding supplies, and offices for activities such as shutdown planning and utility investigations. Ongoing preliminary design phase activities include an assessment of work flow processes, equipment needs, floor space requirements, and circulation in order to provide a safe and efficient workspace; preparation of layout drawings; development of final design criteria; geotechnical investigations; and development of a preliminary construction cost estimate.

Red Mountain Hydroelectric Plant Emergency Generator Replacement

The Red Mountain Hydroelectric Plant (HEP) was constructed in 1983 and is located on San Diego Pipeline No. 5. The plant can produce up to 5.9 megawatts of electricity with its single turbine. When the hydroelectric plant is

shut down, flows are diverted through a separate pressure control structure (PCS) in order to maintain continuous water deliveries into the San Diego County Water Authority's (SDCWA's) system. The HEP and PCS are required due to the elevation difference between Lake Skinner and the SDCWA system. Back-up power to the HEP is provided by a 50-kilowatt emergency generator that was installed during the original plant construction. The emergency generator enables automatic flow transfer from the HEP to the PCS if commercial power is lost. The generator has reached the end of its service life. It requires frequent repairs, and parts are becoming increasingly unavailable. The inability to transfer flow from the HEP to the PCS could result in flow interruptions leading to air entrapment and severe hydraulic fluctuations (water hammer) which could severely affect pipeline stability and reliability. In addition, electrical operating equipment has been added to the HEP in the last eight years, and the load has exceeded the capacity of the generator. Consequently, certain loads must be shed while operating on emergency power. Replacement of the existing 50-kilowatt emergency generator with a larger generator is recommended.

This project will replace the 50-kilowatt emergency generator with a new 80-kilowatt, diesel-fueled engine generator and upgrade the generator's ancillary equipment to meet current fire codes and environmental regulations. The replacement generator will include alarms; valves; meters; and a control system capable of automatic start-up upon loss of primary power, automatic transfer back to primary power once the normal source is reestablished, and remote status monitoring. Ongoing preliminary design phase activities include field investigations, selection of a generator placement site, preparation of environmental documentation, and development of final design criteria and a preliminary construction cost estimate.

San Diego Canal Radial Gate Rehabilitation

The San Diego Canal conveys water from the Colorado River Aqueduct and the State Water Project to Lake Skinner and the Skinner plant. The San Diego Canal Radial Gate diverts water from the Casa Loma Canal, which is part of the Colorado River Aqueduct, into the San Diego Canal. The radial gate is also used to isolate the downstream San Diego Canal from the Casa Loma Canal for maintenance. The gate has a width of 10.75 feet and a height of 15 feet, and is constructed of a steel framework with a curved plate that rotates vertically to block flow when the gate is in the closed position. An electric motor actuator is used to pivot the gate upward from the closed to the open position. The electric motor, hoisting mechanism, and radial gate are mounted on a concrete structure. The radial gate was replaced in the 1990s when the San Diego Canal was enlarged. Recent inspections have identified that the gate is corroded, and the original protective coating on the steel members has failed, which could lead to gate failure if left unabated. Refurbishment or replacement of the San Diego Canal Radial Gate is recommended.

This project will refurbish or replace the San Diego Canal Radial Gate, including the motor actuators and the electrical and control equipment. Ongoing preliminary design phase activities include field investigations to determine whether the gate may be refurbished or will need to be replaced, testing for hazardous materials, assessing gate and guide materials and metallurgy, evaluating alternate gate configurations in case full replacement is required, preparing conceptual design drawings, preparing environmental documentation, and developing a preliminary construction cost estimate.

San Diego Pipeline No. 3 Blow-off to Pump Well Conversion

San Diego Pipeline No. 3 was constructed in 1958 and delivers untreated Colorado River Aqueduct (CRA) water to Eastern Municipal Water District, Western Municipal Water District of Riverside County, and the San Diego County Water Authority. The pipeline has 19 subsurface blow-off structures spaced intermittently at low spots on the pipeline. These structures enable the pipeline to be quickly dewatered in the event of an emergency, and provide access points for routine maintenance or inspection. Each blow-off structure contains piping which taps into the pipeline crown, followed by a primary 12-inch-diameter isolation valve, a secondary 12-inch-diameter throttling valve, and discharge piping. Normal maintenance procedures for servicing a blow-off require flushing of both valves, which releases between 500 and 1,000 gallons of water to the surface. As a result of Assembly Bill 1683 and the presence of quagga mussels in the CRA, direct surface discharge of CRA water during maintenance of the blow-offs is no longer allowed. Acceptable quagga mussels control measures when discharging infested waters are percolation/desiccation and filtration. Because of this flushing limitation, valve maintenance has been reduced and many of the valves no longer function properly. Percolation/desiccation is not always feasible because of the large areas of land required to store the water, and the current configuration does not allow for the use of any type of filtration system. Converting the nineteen existing blow-off structures to pump wells will

allow for connection of a filtration system that will prevent quagga mussels from entering the ecosystem during maintenance and dewatering.

This project will convert the blow-off structures to pump well structures at 19 locations. Work will include removal of existing valves and piping, replacement of the primary 12-inch-diameter isolation valves, and installation of new piping to facilitate installation of quagga mussel filtration systems prior to discharge into state waterways. Ongoing preliminary design phase activities include field investigations, identification of traffic control and permit requirements, preparation of preliminary layout drawings, development of final design criteria, and development of a preliminary construction cost estimate.

San Dimas Hydroelectric Facility Control Structure Fuel Tank Replacement

The San Dimas Hydroelectric Facility, constructed in 1981, receives high pressure flows of untreated State Water Project water from the Department of Water Resources' Devil Canyon facility via the Rialto Pipeline. After utilizing the high pressure flows to generate power, the water is then delivered to the Weymouth plant through the La Verne Pipeline. The facility can generate up to 9.9 megawatts of power under peak flow conditions. Southern California Edison provides primary power to the facility. A 60-kilowatt emergency generator at the facility provides a secondary source of power. A single-walled, 500-gallon fuel storage tank provides diesel fuel to the emergency generator. Recent fuel filtering samples revealed large amounts of rust within the fuel; and further testing indicated that the tank wall thickness has decreased about 10 percent. Replacement of the fuel storage tank is recommended.

This project will replace the fuel tank with a double-walled tank and provide an alarm monitor system and other upgrades to meet current fire code regulations. Ongoing preliminary design phase activities include field investigations, preparation of preliminary layout drawings, development of final design criteria, and development of a preliminary construction cost estimate.

Wadsworth Pumping Plant Stop Logs Addition

The Hiram W. Wadsworth Pumping Plant at Diamond Valley Lake (DVL), which was commissioned in 2000, can pump water into DVL or generate power as water flows out of the lake. The plant was originally constructed with 12 pump/generator units. However, to be eligible for California certification as "renewable energy," the nameplate power generation capacity of the plant had to be reduced requiring three of the pump/generator units to be removed from service and decommissioned. Removal and decommission of the three units allowed the energy produced from the remaining nine units to be purchased and used by electric utilities to meet the requirement that, by year 2020, 33 percent of the energy used to serve customers be "renewable energy." The configuration of each unit requires three stop logs to isolate single a pump/generator unit. Nine stop logs are currently available for use at the plant to isolate pump/generator units for maintenance, annual inspection, or emergencies. These stop logs are routinely used on the nine operational units. The three decommissioned pump/generator units are typically submerged in water and subject to corrosion.

This project will fabricate and install nine new corrosion-resistant stop logs to isolate the three decommissioned pump/generator units and keep them in a dry state. Ongoing preliminary design phase activities include field investigations, development of final design criteria, and development of a preliminary construction cost estimate.

Wadsworth Pumping Plant Yard Piping Recoating

The Hiram W. Wadsworth Pumping Plant at Diamond Valley Lake (DVL), which was commissioned in 2000, can pump water into DVL or generate power as water flows out of the lake. During a December 2010 shutdown, it was discovered that the interior coatings of the DVL yard piping at multiple locations between the pressure tunnel, pumping plant and pressure control structure is cracking, blistering and peeling. At some locations where the epoxy coating had failed, minor corrosion was also observed. Although the internal lining is damaged, the structural integrity of the pipelines remains sound. Over time, however, the loss of epoxy lining will expose each pipeline to accelerated rates of corrosion and eventual leakage.

This project will refurbish or replace the epoxy coatings on the internal surfaces of the 144-inch-diameter pipes at the Wadsworth pumping plant. Planned preliminary design phase activities include field investigations, development of final design criteria, and development of a preliminary construction cost estimate.

West Orange County Feeder Valve Replacement

The West Orange County Feeder is part of the Lower Feeder system and delivers water primarily to the northwestern section of Orange County. The feeder, constructed in 1956, is 12.9 miles long and ranges in diameter from 54 inches to 42 inches. Fourteen valves along the West Orange County Feeder no longer function properly and should be replaced to maintain reliability of the feeder. Thirteen of the valves, which are located in subsurface vaults, are part of the air release and vacuum valve piping system. Of these valves, five are frozen in place, four no longer seal properly, and three have worn or damaged gears that can no longer be replaced because of unavailability of replacement parts. The last valve is a 14-inch conical plug valve used for isolation of service connection OC-09. The valve leaks at a rate of 1 cfs. Consequently, the service connection cannot be maintained without shutting down the feeder. In addition, the OC-09 meter readings may be inaccurate due to the meter's location upstream of a turnout.

This project will replace fourteen valves on the West Orange County Feeder. In addition, the location and configuration of the OC-09 meter will be evaluated to determine if meter accuracy is impacted. Ongoing preliminary design phase activities include preparation of preliminary layout drawings, development of final design criteria, and development of a preliminary construction cost estimate.

Upper Feeder Railroad Protection

The Upper Feeder was constructed in 1936 as part of Metropolitan's original water delivery system. The welded steel pipeline varies in diameter from 136 to 152 inches, and extends 63 miles from Lake Mathews to the Eagle Rock Control Facility in the city of Los Angeles. The feeder conveys untreated water from Lake Mathews to the Weymouth plant, and then delivers treated water to the Central Pool portion of the distribution system. Approximately 2,500 feet of the Upper Feeder are located within property owned by Union Pacific in the city of Fontana. The Upper Feeder was constructed along this alignment under an easement granted in 1936. At that time, Metropolitan encased approximately 80 feet of the Upper Feeder with reinforced concrete pursuant to the terms of the easement agreement. The easement agreement holds Metropolitan responsible for the cost of protecting or relocating the pipeline due to changes in rail operations or improvements. Union Pacific is now in the process of adding a third rail line to the two existing sets of tracks, which will improve rail operations and allow for handling of increased rail traffic. As a result of the new line, an additional length of approximately 25 feet of the Upper Feeder will need to be protected. This portion of the feeder is adjacent to the I-10 freeway. Due to spacing constraints, some construction activities will occur within Caltrans' right-of-way. Union Pacific notified Metropolitan on November 4, 2013 that construction of the protection must be completed by August 31, 2014.

This project will construct a concrete protective structure over a 136-inch-diameter portion of the Upper Feeder. Ongoing design activities include preparation of design drawings, permitting with Caltrans, construction planning with Union Pacific, and development of a construction cost estimate. Construction is planned to commence in mid-2014.

Deodera Pressure Control Structure Pavement Upgrade

The Deodara Pressure Control Structure, located in the city of Brea, regulates pressure on the interconnection between the Lower Feeder and the Orange County Feeder. This structure provides flexibility in water deliveries by allowing deliveries from the Lower Feeder to the Orange County Feeder during high demand periods and can also allow deliveries from the Orange County Feeder to the Lower Feeder when portions of the Lower Feeder are out of service. The area surrounding the structure is paved to provide parking and access to inspect and maintain the facility. Improper drainage is causing erosion and deterioration and uneven settlement of pavement. Continued erosion and settlement could lead to exposure of the buried structure walls and impact the structure's integrity.

This project will install a drainage system that eliminates erosion and pavement settlement, and replace the existing deteriorated pavement. Ongoing preliminary design activities include field investigations; development of final design criteria; and development of a preliminary construction cost estimate.

Inland Feeder SBMWD Intertie

Inland Feeder/Highland Pipeline Interconnection Bypass Line Rehabilitation

The Inland Feeder/Highland Pipeline Interconnection was constructed in 2003, and connects the San Bernardino Valley Municipal Water District's (SBVMWD's) Foothill Feeder/Highland Pipeline to the Inland Feeder downstream of the Arrowhead Tunnels. The interconnection was constructed under an agreement of mutual cooperation with SBVMWD to transport up to 250 cfs of State Water Project flows to Diamond Valley Lake

(DVL) prior to the completion of the upstream portions of the Inland Feeder. The interconnection also has use as an emergency bypass of the upper section of the Inland Feeder pipeline. The interconnection consists of a 78-inch diameter butterfly valve with a 24-inch diameter stainless steel bypass line and three 24-inch diameter butterfly valves. Beginning in 2008, pinhole leaks have appeared in the bypass line upstream of the 24-inch butterfly valves. Numerous repairs to the pinholes have been made, but leaks continue to occur. Failure of the bypass line would result in structure flooding, damage to the electrical and control systems equipment, and probable erosion and flooding issues in the surrounding areas, and would require shutdown of the Highland Pipeline.
This project will replace the 24-inch diameter bypass line at the Inland Feeder/Highland Pipeline Interconnection to eliminate ongoing corrosion which is jeopardizing pipe integrity. Ongoing preliminary design phase activities include field investigation; materials selection; development of final design criteria; and development of a preliminary construction cost estimate.

Lake Skinner East Bypass Screening Facility Upgrades

The Lake Skinner East Bypass Screening Facility is located at the terminus of the San Diego Canal, which is the starting point for water which bypasses Lake Skinner to downstream users. The facility provides a transition from the open canal to downstream San Diego Pipeline No. 5, San Diego Pipeline No. 2, and the Skinner plant, and includes trash racks, algae removal screens, and slide gates. The trash racks remove large debris which may damage downstream equipment and prevent debris or animals from entering the downstream pipeline. The galvanized steel trash racks upstream of San Diego Pipeline No. 5 have corroded, and, during a severe algae bloom in 2009, they partially collapsed. The trash racks upstream of San Diego Pipeline No. 2 require occasional lifting out of the water for cleaning. The configuration of the lifting mechanism places excessive strain and torque on the wire rope, pulleys and supporting devices, which may lead to premature failure. The algae screen prevents algae mats from entering the pipelines and damaging the equipment of downstream users. The screen extends across the channel, submerged just below the water surface to intercept and collect algae mats and other floating debris. The collected material is discharged to a concrete pad, where it is allowed to dry. If the screen clogs, deliveries to downstream users are reduced. The screening system includes shaker screens which function to separate the water from the algae allowing for easier transport of the collected algae. The shaker screens' finer mesh frequently plugs during heavy algae blooms, requiring staff to physically remove the algae from the screen. Three slide gates control the delivery of San Diego Canal water into San Diego Pipeline No. 5 during Lake Skinner bypass operations. The slide gates are 45 years old and experience mechanical binding within the gate guides due to corrosion.

This project will rehabilitate the three slide gates and their guides, modify the algae screens to enable bypass of the shaker screens during heavy algae blooms in the canal, replace the corroded trash rack and upgrade the lifting mechanism on the other trash rack. Ongoing preliminary design phase activities include field investigations, preparation of preliminary layout drawings, development of final design criteria, and development of a preliminary construction cost estimate.

Lake Mathews Electrical Reliability Upgrades

Untreated Colorado River Aqueduct water stored in Lake Mathews is withdrawn through the lake's forebay and hydroelectric plant, and is then conveyed through the Upper Feeder and Lower Feeder to the Weymouth and Diemer plants, respectively. The original electrical power distribution system at Lake Mathews was built in the 1930s during the construction of the main dam embankment, main outlet tower, and the forebay and its outlet tower. The system used a now obsolete 2,400-volt system to distribute power to the dam's operating equipment. The power distribution system was extended when the Lake Mathews Support Facility was constructed in 1940 and expanded in the 1960s. The 90 acres of the Lake Mathews Support Facility contain multiple buildings housing approximately 100 Metropolitan staff who provide construction services, conveyance and distribution system operations, health and safety oversight, water compliance monitoring, security, fleet operations, and warehousing. Other minor power distribution system changes were made when a new outlet tower and Metropolitan's Disaster Recovery Facility were constructed in the early 2000s. Currently, a single 480-volt service from Southern California Edison (SCE) supplies electricity to the Lake Mathews facilities. The system voltage is stepped up to 2,400 volts for distribution to the Lake Mathews operating equipment and then the voltage is reduced back to 480 volts at several distribution points. The 2,400-volt electrical system is designed as a radial system, with power running through a single path to each local unit power center for distribution to powered equipment. Many critical electrical components at Lake Mathews are over 70 years old, and their performance has begun to deteriorate. As

the equipment continues to age, its ability to operate safely and reliably will diminish. The current industry standard is 4,160 volts for main distribution equipment and large motors. Spare parts and voltage-compatible equipment for the 2,400-volt system, when available, are expensive and difficult to obtain. In order to safely perform maintenance on the 2,400-volt distribution system, the SCE service is temporarily turned off. During this maintenance, critical loads such as the dam underdrain pumps, dam monitoring equipment, and the Disaster Recovery Facility's IT servers are powered by seven emergency generators.

This project will replace aging electrical equipment, reconfigure process loads to improve process reliability, and provide a modern distributed power system. Ongoing condition assessment phase activities include: detailed visual inspections; materials testing; assessment of new technologies for equipment and performance monitoring; review of compiled operation and maintenance data; preparation of conceptual design reports for improvements; and preparation of conceptual-level cost estimates.

CRA Conveyance Reliability 15373

Total Appropriation Estimate:	$128,400,000	**Total Projected Through June 30, 2014:**	$82,714,000
Appropriated Amount:	$85,508,000	**Estimated Percent Complete:**	68%
Biennial Estimate:	$9,322,000	**Estimated Completion Date:**	2023

Scope

This appropriation was established to plan and implement multiple projects throughout the Colorado River Aqueduct Conveyance System. The common driver for many of the projects in this appropriation is infrastructure reliability.

Purpose

To ensure the reliability and operational efficiency of the Colorado River Aqueduct.

Accomplishments Through FY 2013/14

Through FY 2013/14, twelve projects have been completed.

Major project milestones in FY 2013/14:

Copper Basin Reservoir Outlet Gates Rehabilitation – Completed construction

CRA Discharge Line isolation gates – Completed final design

San Jacinto Tunnel East Adit Rehabilitation – Began construction

Sand Trap Equipment Upgrade – Completed final design

Siphons, Transition Structure and Manhole Covers Replacement – Completed construction

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Copper Basin and Gene Dam Wash Dam Sluiceways Rehabilitation	$12,916,400	2023	Complete final design and valve procurement
Discharge Line isolation gates	$5,584,700	2016	Complete construction
Iron Mountain Tunnel Rehabilitation	$18,565,300	2019	Complete final design
San Jacinto Tunnel East Entrance Adit Rehabilitation	$2,860,700	2015	Complete construction
Sand Trap Equipment Upgrades	$5,531,900	2016	Continue construction

Copper Basin and Gene Wash Dam Sluiceway Valve Replacement

The Gene Wash and Copper Basin Reservoirs, which were constructed in 1937, help maintain continuous flow in the Colorado River Aqueduct (CRA) when the Intake or Gene pumping plants are shut down or in limited operation for short periods. In the event of an emergency, the sluiceway at each dam would be opened to lower the reservoir elevation. Each sluiceway consists of a 4-foot-diameter pipe embedded at the base of the dam, a gate valve, and an energy dissipating discharge valve. Under normal operation, the sluiceways are closed and the outlet gates at Copper Basin Reservoir are relied upon to regulate flow in the CRA. Although these facilities have operated satisfactorily for over 70 years, the valves have reached the end of their useful life. The valves are leaking and have deteriorated beyond repair; spare parts for electrical equipment are not available; and communications and control equipment are obsolete. Additionally, the steep slopes adjacent to the Copper Basin Dam sluiceway valve house experience rock falls, creating a potential safety hazard to maintenance personnel.

This project will upgrade equipment and improve operational safety at the dam sluiceways, including upgrading the valve house electrical system; replacing the gate valves and converting them from hydraulic to electric actuation; replacing the energy dissipating valves; replacing a 120-foot-high vertical ladder with a stairway from the dam crest to the valve house at the base of the dam; and other safety related improvements. Ongoing final design phase activities include preparation of plans and specifications, coordination with the California Division of Safety of Dams, development of a construction cost estimate; advertisement and receipt of bids; and all other activities in advance of award of construction and procurement contracts.

Discharge Line Isolation Gates

In order to repair individual features along the Colorado River Aqueduct (CRA), gates are used to isolate segments or divert flows and thereby minimize disruption to water deliveries and reduce draining of the aqueduct or reservoirs to perform scheduled maintenance or emergency repairs. At each CRA pumping plant, the main pumps add energy and lift the water to meet the required elevation for the aqueduct. Each pump discharges the water into an individual 6-foot-diameter discharge line; the nine individual discharge lines from the nine pumps merge and transition into three 10-foot-diameter delivery pipelines that convey flow to the top of the lift and discharge into a headgate structure/surge chamber, which empties the water into the next section of the aqueduct. The surge chamber allows the water from all three delivery lines to mix in the open air chamber and seek its own level before entering the next CRA pipeline or tunnel. Each 10-foot-diameter delivery line has one or two top-of-pipe air release vents which discharge into the surge chamber. These 26-inch and 36-inch diameter piped vents allow entrained air-and-water to discharge into the surge chamber. When its 10-foot-diameter delivery pipeline is taken out of service for inspection or maintenance, each vent line must be manually isolated using a drop gate cover at the surge chamber. If it were not isolated, water from the in-service surge chamber could enter the vent pipe and fill the isolated delivery pipeline, thus creating a safety hazard for the staff working inside the isolated delivery pipe.

This project will enhance safety by providing remotely operated gate covers on the air release vents. At each pumping plant's surge chamber, guides and operators will be installed to allow remote opening and closure of the vent line isolation gates. In addition, hand railing and external ladders will be installed to enhance safe access. Ongoing final design phase activities include engineering design; preparation of drawings and specifications; development of a construction cost estimate; advertisement and receipt of bids; and all other activities in advance of award of a construction contract.

Iron Mountain Tunnel Rehabilitation

The Iron Mountain Tunnel was constructed between 1933 and 1938 as part of the Colorado River Aqueduct (CRA) system. The tunnel is located downstream of the Iron Mountain pumping plant, and is eight miles long. The tunnel's cross-section is horseshoe-shaped, with overall dimensions of 16 feet high by 16 feet wide. Longitudinal and transverse cracks up to 1 inch wide have developed along a 2,500-foot-long stretch of the tunnel. The cracking is a result of a combination of issues. The Iron Mountain Tunnel is lined with unreinforced concrete arch sections. Concrete arch sections perform well when adequate ground support is provided. However, with unstable alluvial soil support, significant stresses occur in the arch sections over time. Alluvial soils are found where the Iron Mountain Tunnel exits the mountainous terrain at its west portal. In addition, the timber blocking placed between the concrete liner and the surrounding soil is deteriorating, causing further instability of the surrounding soil, which contributes to increased stresses on the concrete liner. Unless the liner is strengthened, deformation will continue over time. Further, the tunnel is vulnerable to damage resulting from earthquakes generated by the nearby active

faults, including the Pinto Mountain Fault and Pisgah-Bullion Mountain-Mesquite Lake Fault. These faults could generate a major earthquake up to magnitude 7.0, which would result in significant ground loading on the tunnel. A seismic-induced failure of the CRA could lead to an extended shutdown.

This project will address tunnel strengthening and corrosion protection of the deteriorated tunnel. Ongoing preliminary design activities for repair of the Iron Mountain Tunnel include field surveys and geotechnical investigations, preparation of a preliminary design report and environmental documentation, and development of a preliminary construction cost estimate.

San Jacinto Tunnel East Adit Rehabilitation

The San Jacinto Tunnel was constructed between 1933 and 1938 as part of the Colorado River Aqueduct (CRA) system, and was placed into service in 1941. The tunnel is 13 miles long and extends below the San Jacinto Mountains between Cabazon and Gilman Springs in San Bernardino County. The San Jacinto East Adit was positioned near the tunnel's midpoint to serve as an access point for construction of the eastern portion of the tunnel. The adit is 300 feet long, horseshoe-shaped, and has overall dimensions of 16 feet high by 16 feet wide. The adit was constructed by excavating through soft soil for the initial 200 feet, and by using drill-and-blast methods into hard rock through the final 100 feet. The excavation is supported by timber sets and is lined with unreinforced concrete. The San Jacinto East Adit provides the only location where maintenance equipment can enter the San Jacinto Tunnel, and serves as the primary entrance for tunnel inspections. The adit has developed longitudinal and transverse cracks in its concrete lining. A recent investigation concluded that shifting soils above the adit caused the cracks, and that the cracking will increase over time. The investigation also concluded that the adit is vulnerable to seismic damage from nearby faults during a major earthquake. Multiple active faults are located nearby, including the San Andreas Fault and the San Jacinto Fault, which are located three and ten miles from the adit, respectively. The southern San Andreas Fault is capable of generating a magnitude 8 seismic event. A seismic-induced failure of the adit could obstruct flows through the San Jacinto Tunnel, and could lead to an extended shutdown of the CRA to make repairs.

This project will install steel support frames, known as sets, within the adit to resist ground and seismic loading. The steel sets will be encased with concrete for additional strength and corrosion protection. In addition, the voids surrounding the existing concrete liner and geologic formation will be filled with grout to stabilize the ground above the adit. Construction commenced in August 2013.

Sand Trap Equipment Upgrades

During construction of the Colorado River Aqueduct (CRA) in the 1930s, sand traps were placed upstream of the Iron Mountain, Eagle Mountain, and Hinds pumping plants. These rectangular sand traps are each 40 feet wide and 420 feet long, and are located adjacent to the canal. CRA water passes through each of the three sand traps before reaching its adjacent pumping plant. The sand traps reduce water velocity and allow wind-blown desert sand to settle to the bottom of the basins. Each sand trap has a traveling bridge with crane, control cabin, pump hoist, and a dredge pump to remove the accumulated sand. Metropolitan staff removes sand from the sand traps on a one-to-three-month cycle to prevent excess sand from being conveyed to the downstream pumping plants. If sand reached the pumping plants, it could damage the pump bearings and impellers, erode the piping systems, and cause a substantial decrease in pump efficiency. Failure to remove the sand would increase maintenance costs and could lead to a reduction of CRA flow capacity. The 70-year-old sand removal equipment has exceeded its useful life. The mechanical and electrical equipment are requiring more frequent repairs, and, because replacement parts are no longer available, repairs are often difficult. Additionally, the traveling bridges' truss structures are experiencing corrosion and must be replaced.

This project will improve the sand traps by replacing the traveling bridge and control cabin equipment including the pump apparatus, electrical equipment, bridge rails, and chain link fence around the perimeter of the sand traps. Ongoing final design phase activities include engineering design; preparation of drawings and specifications; development of a construction cost estimate; advertisement and receipt of bids; and all other activities in advance of award of construction and procurement contracts.

CRA Discharge Containment 15385

Total Appropriation Estimate:	$17,200,000	**Total Projected Through June 30, 2014:**	$3,386,000
Appropriated Amount:	$4,304,000	**Estimated Percent Complete:**	28%
Biennial Estimate:	$8,152,000	**Estimated Completion Date:**	2019

Scope

This appropriation was established to implement multiple projects throughout the Colorado River Aqueduct. The common driver for many of the projects in this appropriation is regulatory compliance.

Purpose

To decrease risk of discharging chemicals and waste to the environment and violating regulations.

Accomplishments Through FY 2013/14

Through FY 2013/14, four projects have been completed.

Desert Sewer System Rehabilitation Study – Completed study phase

Hinds Pumping Plant Equipment Wash Area Upgrades – Completed construction

Wastewater System Replacement at Gene and Iron Pumping Plants – Completed final design

Wastewater System Replacement at Hinds and Eagle Pumping Plants – Completed final design

Wastewater System Replacement at Intake Pumping Plants – Completed preliminary design

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Wastewater System Replacement at Gene and Iron Mountain Pumping Plants	$6,422,600	2016	Complete construction
Wastewater System Replacement at Hinds and Eagle Mountain Pumping Plants	$2,533,600	2015	Complete construction
Wastewater System Replacement at Intake Pumping Plant	$925,000	2016	Complete final design

Metropolitan's five pumping plants along the Colorado River Aqueduct (CRA) are located in remote areas of Riverside and San Bernardino Counties, where municipal wastewater collection and treatment facilities are not available. Each plant is instead served by a community on-site wastewater system. These on-site systems collect, treat, and dispose of domestic wastewater generated from bathrooms and kitchen facilities at the pumping plants, maintenance buildings, training/meeting rooms, guest lodges, and staff residences. The wastewater systems consist of three primary components: community septic tanks and leach fields; collector lines which convey wastewater to the septic tanks from throughout the pumping plant villages; and sewer laterals which convey wastewater from individual buildings to the collector lines. All of the on-site wastewater systems are permitted by the respective county Department of Environmental Health. The systems are also subject to review by the Colorado River Basin Regional Water Quality Control Board to ensure that adequate setbacks from natural water courses are provided.

The existing systems have been in operation for over 70 years and have deteriorated significantly. In general, the service life of septic tanks ranges from 40 to 60 years. The existing wastewater systems at Metropolitan's CRA pumping plants have deteriorated through continual use and need to be replaced. All five systems are experiencing recurring problems such as plumbing and septic tank backups, clogged leachfields, broken and slow-draining collection pipes, and odors. Metropolitan staff has replaced sections of the collection pipes and cleaned out septic tank backups repeatedly in recent years. When wastewater systems fail to operate effectively, groundwater and surface water pollution may occur.

Pumping Plant Wastewater System Replacement – Gene and Iron Mountain

The Gene pumping plant has the largest staff of Metropolitan's five pumping plants and includes housing for up to 120 residents. The plant's wastewater system includes four septic tanks which process 18,000 gallons per day of wastewater. At Gene, a lift station pumps liquid effluent from the septic tanks to a leachfield located at a higher elevation so that adequate setback is provided from drainage courses leading to the Colorado River. At the Iron Mountain pumping plant, the on-site wastewater system can process up to 8,500 gallons per day of wastewater and features a gravity-collection system.

This project will replace the wastewater systems at the Gene and Iron Mountain pumping plants. The systems will include new main-line pipes and building laterals which have code-compliant diameters, slopes, and depths for the Gene and Iron Mountain pumping plants. New manholes and cleanouts will also be provided. At the Gene pumping plant, the collector lines and septic tanks will be relocated, thereby reducing the length of pipeline by over one-half mile and eliminating the need for effluent pumping. The septic tanks and leachfields at the Gene and Iron Mountain pumping plants will be replaced with code-compliant septic tank installations. Ongoing final design phase activities for the wastewater systems include preparation of drawings and specifications; permitting with San Bernardino County and the Regional Water Quality Control Board; advertisement and receipt of bids; development of construction cost estimates; and all other activities in advance of award of construction contracts.

Pumping Plant Wastewater System Replacement – Hinds and Eagle Mountain

The Hinds and Eagle Mountain pumping plants' on-site wastewater systems can process up to 4,000 gallons per day of wastewater and 6,000 gallons per day of wastewater, respectively.

This project will upgrade the existing wastewater systems at the Hinds and Eagle Mountain pumping plants by replacing all of the main and lateral sewer lines. New manholes, cleanouts, septic tanks and leach fields will also be provided. On-going final design phase activities for the wastewater systems include preparation of drawings and specifications; permitting with Riverside County and the Regional Water Quality Control Board; advertisement and receipt of bids; development of construction cost estimates; and all other activities in advance of award of construction contracts.

Pumping Plant Wastewater System Replacement – Intake

At the Intake pumping plant, which requires the least number of staff to operate and maintain the facility, a single septic tank is used to process up to 850 gallons per day of wastewater and features a gravity-collection system. Due to this pumping plant's close proximity to the Colorado River, more stringent discharge requirements apply at this location.

This project will upgrade the existing wastewater system at the Intake pumping plant by replacing all of the main and lateral sewer lines. New manholes, cleanouts, a septic tank and a leach field will also be provided. Furthermore, due to its close proximity to the Colorado River, a tertiary type of treatment process may be required.

Ongoing preliminary design phase activities include development of design criteria for the new on-site wastewater treatment system, based on projected flows, code requirements, and discussions with local permitting agencies; initiation of permitting; field investigations; preparation of environmental documentation and local surface drainage maps; potholing of utilities; siting studies for the collection system piping and treatment system components; development of preliminary construction cost estimates; and preparation of preliminary layouts.

CRA Electrical/Power Systems Reliability 15384

Total Appropriation Estimate:	$44,500,000	**Total Projected Through June 30, 2014:**	$18,535,000
Appropriated Amount:	$19,715,000	**Estimated Percent Complete:**	56%
Biennial Estimate:	$4,031,000	**Estimated Completion Date:**	2023

Scope

This appropriation was established to plan and implement multiple projects throughout the Colorado River Aqueduct's electrical and power systems. The common driver for many of the projects in this appropriation is infrastructure reliability.

Purpose

To ensure reliability of the power systems along the Colorado River Aqueduct by repairing or replacing aging and/or deteriorated electrical equipment/parts.

Accomplishments Through FY 2013/14

Through FY 2013/14, nine projects have been completed.

Major project milestones in FY 2013/14:

Danby Tower Foundation Rehabilitation – Completed construction

Main Transformer Replacement/Rehabilitation – Completed preliminary design

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Main Transformer Reliability and Transformer Oil Containment	$13,106,500	2023	Complete final design
Pumping Plant Auxiliary Power System Rehabilitation/Upgrades	$1,846,800	2020	Complete final design
Gene Pumping Plant Standby Generator Replacement	$3,200,000	2018	Complete final design
Intake Pumping Plant Standby Generator	$2,877,900	2017	Complete final design
Main Pump Power Cable Replacement	$1,386,000	2020	Begin construction
CRA Pumping Plant Uninterruptable Power Supply System Upgrade	$405,513	2018	Begin preliminary design

CRA Bank Transformer Reliability and Transformer Oil Containment

Two transformer banks, with each bank containing three transformers, provide electrical power to each Colorado River Aqueduct (CRA) pumping plant to maintain continuous operation. The transformers step down voltage from 230,000 volts (at the Gene, Iron Mountain, Eagle Mountain, and Hinds pumping plants) or from 69,000 volts (at the Intake pumping plant) down to 6,900 volts, the voltage used by the CRA's main pumps. All existing transformer units are original equipment, with many dating back the 1940s. The CRA main transformers are currently operating reliably; however, the typical modern transformer life span ranges between 30 to 40 years. Some units were rebuilt in the early 1980s. Recent inspections revealed oil leakage and other signs of aging for some of the transformers. Failure of an existing transformer would disrupt power supply to a pumping plant and interrupt water delivery.

This project will develop a comprehensive study to assess the current condition of the transformers and recommend rehabilitation or replacement alternatives to ensure the reliability of CRA. Work will include rehabilitation of existing transformers, replacement of transformers, and/or the addition of spare transformers along with spill containment structures. This work also includes replacement of leaky circulating oil pumps that are used to cool the transformers and construction of secondary spill containment for the transformer banks. Ongoing preliminary design phase activities include: development of alternatives; preparation of conceptual design drawings; preparation of environmental documentation; and development of preliminary construction cost estimates.

Pumping Plant Auxiliary Power System Rehabilitation/Upgrades

All five Colorado River Aqueduct pumping plants have the following auxiliary power systems: 480 volts alternating current (AC), 120/240 volts AC, and 125 volts direct current (DC). These medium and low voltage systems were constructed to the design standards of the 1930s-1950s. They provide power for general lighting, cranes, computers, shop equipment, and critical equipment such as the pumping plant sump pumps and lubrication oil pumps. The low voltage systems consist of load panels, conduits, cables, grounding systems, and receptacles. The low voltage DC systems supply all control power, such as for the high voltage power control systems, and emergency lighting for the plants. Over the years, numerous additional electrical loads have been added to the auxiliary power systems. As a result, the distribution panel capacity limits have been exhausted, some wiring is now undersized, and some loads are doubled up on the same breaker, all of which do not comply with the current National Electrical Code (NEC) and safety standards.

This project will rehabilitate and upgrade the auxiliary power systems at the Intake, Gene, Iron Mountain, Eagle Mountain, and Hinds pumping plants. The upgrades will include upsizing the distribution panels to allow additional capacity and space for future loads, and replacing the cables and conduits to comply with the NEC and safety standards. Ongoing condition assessment phase activities include: detailed visual inspections; review of compiled operation and maintenance data; preparation of conceptual design reports for improvements; and preparation of conceptual-level construction cost estimates.

Gene Pumping Plant Standby Generator Replacement

Back-up power for critical auxiliary systems at the Gene pumping plant is provided by a 500-kilowatt stand-by diesel generator. Critical auxiliary systems powered by the generator include fire water pumps, the village's potable water treatment and delivery system, emergency lighting, sump pumps which prevent flooding of the pumping plant, and cooling water pumps servicing the main CRA pumps. The standby generator at Gene pumping plant is 50 years old, requires frequent repairs, and has reached the end of its service life. In addition, upgrades to the generator's ancillary equipment are required to meet current fire codes and environmental regulations.

This project will improve the reliability of emergency power for critical auxiliary systems at the pumping plant. Upgrades will be similar to those being implemented for the Iron Mountain pumping plant standby generator replacement project. Ongoing preliminary design phase activities include field investigations; selection of a generator placement site; preparation of preliminary layout drawings and environmental documentation; and development of a preliminary construction cost estimate.

Intake Pumping Plant Standby Generator Replacement

Back-up power for critical auxiliary systems at the Intake pumping plant is provided by a 500-kilowatt stand-by diesel generator. Critical auxiliary systems powered by the generator include fire water pumps, the village's potable water treatment and delivery system, emergency lighting, sump pumps which prevent flooding of the

pumping plant, and cooling water pumps servicing the main CRA pumps. The standby generator at Intake pumping plant is 50 years old, requires frequent repairs, and has reached the end of its service life. In addition, upgrades to the generator's ancillary equipment are required to meet current fire codes and environmental regulations.

This project will improve the reliability of emergency power for critical auxiliary systems at the pumping plant. Upgrades will be similar to those being implemented for the Iron Mountain pumping plant standby generator replacement project. Ongoing preliminary design phase activities include field investigations; selection of a generator placement site; preparation of preliminary layout drawings and environmental documentation; and development of a preliminary construction cost estimate.

Main Pump Power Cable Replacement

Each of the five Colorado River Aqueduct (CRA) pumping plants has an electrical switch house which directs 6.9 kV power to the nine aqueduct pumps located in the nearby pump house. Power is transmitted through multiple three-inch-diameter power cables, which run through a tunnel connecting each plant's switch house to the pump house. Tunnel lengths vary from 700 feet to 1,000 feet and carry from 9 to 27 power cables – 1, 2 or 3 cables per pump depending on the pump horsepower. Each cable consists of a copper core wrapped with oil-soaked paper strip insulation and a lead jacketed cover. Within each tunnel, each parallel set of cables is supported by four-inch tall and six-inch wide aluminum cable support trays that are arranged in a stacking configuration for Pump Units Nos. 1 to 5 and Pump Units Nos. 6 to 9 on each side of the tunnel. These cables were installed in four phases between 1939 through 1959 as part of the original CRA construction and expansion. After 55 to 75 years in service, the power cables have deteriorated beyond repair and require replacement. Oil has begun to leak through cracks in the lead jacketed cover, cable connection joints, and the cable's termination points. Frequent repairs are made to address leaks and to maintain the cables at full strength. Continual leaks could result in a pump unit outage or reduced pump output.

This project will replace the deteriorated main power cables with modern "dry" cables at each of the five CRA pumping plants. Ongoing preliminary design phase activities include: development of specifications for new power cables; development of construction shutdown sequences for all pumping plants; structural evaluation of the existing cable trays; preparation of environmental documentation and a preliminary design report; hazardous material investigations including establishment of a waste disposal procedure; value engineering constructability review; and development of a preliminary construction cost estimate.

CRA Pumping Plant Uninterruptable Power Supply System Upgrade

Each Colorado River Aqueduct (CRA) pumping plant has an uninterruptable power supply (UPS) system, which protects computers, servers, telecommunication equipment, and other process equipment from power disruption, such as power surges or spikes, which could cause damage to hardware and equipment. The UPS also provides emergency electrical power when primary power is lost. The UPS provides Metropolitan staff time to correctly power down crucial systems until the emergency generator can be activated. The existing 20-year-old UPS systems are outdated and beginning to fail. Typically, these UPS systems have a service life of approximately ten years. The manufacturer no longer supports the equipment and new UPS components are not compatible with the existing UPS systems. Further, the existing systems are undersized and lack up-to-date features typical of newer systems, such as built-in system redundancies. UPS failures and power disturbances could lead to loss of critical data.

This project will replace the UPS system at each CRA pumping plant with new, larger sized UPS units that are more efficient, reliable, and economical. In addition, UPS panels will be added to allow flexible control of loads, and spare capacity breakers for future expansion. Ongoing preliminary design phase activities include: development of conceptual layout drawings; preparation of environmental documentation and a preliminary design report; hazardous material investigations including establishment of a waste disposal procedure; value engineering constructability review; and development of a preliminary construction cost estimate.

CRA Pumping Plant Reliability 15374

Total Appropriation Estimate:	$45,100,000	**Total Projected Through June 30, 2014:**	$21,580,000
Appropriated Amount:	$24,468,000	**Estimated Percent Complete:**	53%
Biennial Estimate:	$3,654,000	**Estimated Completion Date:**	2022

Scope

This appropriation was established to plan and implement multiple projects at the five Colorado River Aqueduct pumping plants. The common driver for many of the projects in this appropriation is infrastructure reliability.

Purpose

To rehabilitate and/or replace aging equipment at the pumping plants to ensure reliability.

Accomplishments Through FY 2013/14

Through FY 2013/14, fifteen projects have been completed.

Major project milestones in FY 2013/14:

Gene Pumping Plant Expansion Joint Rehabilitation – Completed construction

Hinds Pumping Plant Delivery Pipe Expansion Joint Replacement – Completed construction

Delivery Line Expansion Joint Rehabilitation – Completed preliminary design

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Delivery Line Expansion Joint Rehabilitation	$4,152,600	2016	Complete construction
CRA Main Pump Motor Exciters Rehabilitation	$15,981,600	2022	Complete final design

Delivery Line Expansion Joint Rehabilitation

The five Colorado River Aqueduct (CRA) pumping plants have nine main pump units within each plant's pump house. Each pump lifts water through nine individual above-ground, 6-foot-diameter steel pipelines. These nine pipelines converge into three parallel 10-foot-diameter steel pipelines, which convey water to the downstream aqueduct. Each 10-foot-diameter pipeline has either two or three expansion joints per pipe, depending on the length of the pipe at the plant. Typically, these joints are located at pipeline supports or anchors. The expansion joints are composed of steel plates, pipe and packing material that allow for thermal expansion and contraction of the pipeline caused by ambient temperature changes. The delivery lines have been in continuous service for 55 to 75 years. Leaks have been detected for several years at the expansion joints at all five CRA pumping plants, and, while the volume of leakage is low, the leakage has begun to corrode the pipe joints. Over time, corrosion of these expansion joints has increased. If left unabated, the corroded joints would eventually fail, resulting in an extended shutdown of the CRA for repairs. The expansion joints for the Eagle Mountain, Gene, Hinds, and Iron Mountain pumping plants were recently repaired. Rehabilitation of the expansion joints at Intake Pumping Plant is needed to maintain reliable water deliveries from the CRA and to avoid costly emergency repairs.

This project will rehabilitate the delivery line expansion joints at the Intake Pumping Plant. Rehabilitation work will include disassembly, blast cleaning, recoating, repacking, and reassembly of the expansion joints on the 10-foot-diameter pump delivery pipes. Ongoing final design phase activities include detailed shutdown planning; preparation of drawings and specifications; advertisement and receipt of bids; development of construction cost estimates; and all other activities in advance of award of the construction contract.

CRA Main Pump Motor Exciter Rehabilitation

Each of the five Colorado River Aqueduct (CRA) pumping plants has nine main pumps. At each pumping plant, a motor exciter is housed inside each pump motor to provide direct current power to maintain the synchronous motor at synchronous speed. The original equipment installed beginning in the 1940s has experienced normal wear and tear over its 70 years of operation. At this time, the exciters require excessive maintenance and extensive refurbishment. This refurbishment currently requires a pump motor to be shut down for several weeks. There is a potential for water deliveries to be impacted if an unexpected problem arises with an exciter while another is out of service for refurbishment.

This project will rehabilitate the motor excitation systems. Rehabilitation will include replacing the motor exciter and refurbishing the main exciter armature, slip ring assembly, commutators, and coils. Ongoing condition assessment phase activities include: detailed visual inspections; materials testing; assessment of new technologies for equipment and performance monitoring; review of compiled operation and maintenance data; preparation of conceptual design reports for improvements; and preparation of conceptual-level construction cost estimates.

CRA Reliability for FY 2006/07 through FY 2011/12 **15438**

Total Appropriation Estimate:	$73,300,000	**Total Projected Through June 30, 2014:**	$33,629,000
Appropriated Amount:	$34,624,000	**Estimated Percent Complete:**	51%
Biennial Estimate:	$11,393,000	**Estimated Completion Date:**	2020

Scope

This appropriation was established to continue to implement multiple projects throughout the Colorado River Aqueduct system. The common driver for many of the projects in this appropriation is infrastructure reliability.

Purpose

To ensure the reliability and operational efficiency of the Colorado River Aqueduct and related facilities and equipment.

Accomplishments Through FY 2013/14

Through FY 2013/14, five projects have been completed.

Major project milestones in FY 2013/14:

Canal Improvements – Completed preliminary design

Gene Storage Building Replacement – Completed preliminary design

Hinds Pumping Plant Standby Generator Replacement – Completed construction

Intake Power and Communications Line Relocation – Completed preliminary design

Iron Mountain Service Pit Rehabilitation – Completed final design

Pumping Plants 230kV & 69k Disconnect Switch Replacement – Completed construction

Seismic Upgrade of 6.9kV Switch Houses – Completed preliminary design

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Gene Storage Building Replacement	$1,650,000	2015	Complete construction
Intake Power and Communications Line Relocation	$2,087,400	2016	Complete final design
Iron Mountain Service Pit Rehabilitation	$606,600	2015	Complete construction
Mile 12 Flow and Chlorine Monitoring Station Upgrade	$1,636,100	2015	Complete construction
All Pumping Plant Flow Meter Replacement	$1,979,000	2016	Complete construction
Pumping Plant Sump System Rehabilitation	$12,426,000	2020	Complete final design
Seismic Upgrade of 6.9kV Switch Houses	$6,895,200	2018	Complete final design

Project	Total Project Estimate	Estimated Completion	Planned Activity
CRA Canal Improvements	$3,278,000	2019	Begin final design
CRA Radial Gates and Slide Gate Rehabilitation	$6,715,200	2020	Continue preliminary design
Iron Mountain Generator Replacement	$2,671,800	2016	Complete construction

Gene Storage Building Replacement

The Gene pumping plant serves as headquarters for maintenance of the Colorado River Aqueduct system. Equipment stored at the plant includes boats, pumps, maintenance tools, and water quality test equipment. Three 70-year-old metal-sided buildings were formerly used to store this equipment. Due to severe structural deficiencies, two of these buildings were recently demolished and the equipment was moved to exterior storage. Rehabilitation of the remaining building, which has corroded metal siding and roofing and deteriorated timber frames, would involve substantial modifications to bring it up to current building codes. The replacement of storage buildings at Gene pumping plant will protect Metropolitan's investment in this stored equipment and prevent premature failure due to the extreme desert environment.

This project will provide two prefabricated buildings constructed of steel and with a storage space of 7,000 square feet, which will be approximately equal to the size of the three original buildings. The replacement buildings will be installed on new concrete slab foundations. Minor grading will be performed at the site to facilitate access and allow for proper drainage. Ongoing final design phase activities includes engineering design, preparation of drawings and specifications, development of a construction cost estimate, advertisement and receipt of bids, and all other activities in advance of award of a construction contract.

Intake Pumping Plant 2.4 kV Power Line Relocation

Electrical power for the Colorado River Aqueduct's (CRA's) five pumping plants is transmitted from Hoover Dam via 237 miles of 230-kilovolt overhead power lines. At each of the pumping plants, this transmission voltage is stepped down to a lower distribution voltage for use by the main pumps, the cooling water and fire protection pumps, the potable water treatment and delivery system, communication systems, lighting, and the sump pumps which prevent flooding of the plants. At the Gene pumping plant, the incoming power is stepped down to 2.4 kV and distributed via a 2-mile-long overhead power line to Gene Wash Dam, the Black Metal Mountain communication towers, Intake Village, and the Intake pumping plant. This wood-pole line was installed over 70 years ago during the original CRA construction as a telephone line stretching over mountainous terrain from the Gene pumping plant to the Intake pumping plant. In the 1950s, the line was upgraded to carry power cables by retrofitting the poles with extensions and cross arms to support insulators and provide adequate clearance between the power and communications cables. These pole extensions added 10 feet to the height of the original 30-foot height of the poles. This wood-pole line has deteriorated due to severe weathering in the desert environment. The pole cross arms, insulators, and pole extensions require frequent repairs. In addition, some poles are inaccessible by motor vehicle, which increases repair times and costs. The line needs to be replaced to maintain a reliable power supply to the Intake pumping plant and other key CRA facilities.

This project will include relocation of the existing power line to a new alignment that will facilitate maintenance and repairs. The existing line will be relocated from steep mountain slopes to areas adjacent to patrol and maintenance roads within existing Metropolitan fee property. The relocated power line will be approximately 2.5 miles long. Each pole will be fabricated of galvanized steel and will be approximately 40 feet in height. Ongoing final design phase activities include design of the overhead electric lines per the National Electrical Code and state of California regulations, design of pole foundations and temporary systems during construction, preparation of drawings and specifications, development of a construction cost estimate, advertisement and receipt of bids, and all other activities in advance of award of a construction contract.

Iron Mountain Service Pit Rehabilitation

The garage at Metropolitan's Iron Mountain pumping plant, which was constructed in the 1960s, is the desert region's primary vehicle service center. The garage services all types of Metropolitan construction and

maintenance vehicles. The 17,000-square-foot facility has a 15-foot by 48-foot reinforced concrete service pit that is used on a daily basis to maintain vehicles. Nearly 1,650 pieces of mobile equipment are maintained in the desert region, including cranes, bulldozers, road graders, and light- and heavy-duty utility trucks. These vehicles are required to support Colorado River Aqueduct (CRA) maintenance activities and capital projects. Examples of these activities include: pumping plant maintenance, structure repair and upgrades, facility maintenance and painting, grading of access roads, fee property maintenance, quagga mussel control, aqueduct shutdown services, and security patrols. The concrete flooring and walls above the pit have severely cracked, and staff has determined that the pit is unsafe for operation. While the pit remains out of service, Metropolitan's maintenance staff must tow vehicles more than 80 miles to privately owned garages that are large enough to handle the maintenance vehicles and are typically located in Indio or Lake Havasu City. This transport has increased maintenance costs and the repair time for equipment. When the equipment is not readily available, staff has deferred maintenance, borrowed equipment from distant facilities, such as Lake Mathews, or has rented equipment from an outside vendor.

This project will include demolition of the existing structure and construction of a new service pit that will be able to withstand equipment weighing up to 75,000 pounds. Ongoing final design activities include engineering design; preparation of drawings and specifications; development of a construction cost estimate; advertisement and receipt of bids; and all other activities in advance of award of the construction contract.

Mile 12 Flow and Chlorine Monitoring Station Upgrades

One of the Colorado River Aqueduct's (CRA's) critical points for monitoring flow rates and chlorine levels is located at Mile Marker 12 (Mile 12) along the aqueduct. The Mile 12 monitoring station is located approximately five miles downstream of Copper Basin reservoir at an isolated site. Monitoring equipment includes a set of flow meters with instrumentation, chlorine analyzers, communication equipment, solar panels, and batteries. The information collected at the monitoring station is used to adjust flow rates at each pumping plant and reservoir outlet gate, and to adjust chlorine injection rates at Copper Basin reservoir. The flow data and chlorine residual concentrations at Mile 12 are monitored continuously. These data are needed to enable the CRA to convey its maximum available flow capacity; to prevent pumping beyond the aqueduct's capacity, which could cause spills; and to inject the proper amount of chlorine for quagga mussel control. The Mile 12 monitoring station is presently located below ground within a manhole structure, directly above a pipeline portion of the aqueduct. The existing monitoring equipment was placed into operation in the early 1990s. Typically, these types of devices have a useful service life of approximately 15 years. Although the equipment has performed well, it has exceeded its life span and is beginning to fail, which has led to unreliable readings and interruptions in transmission of data. The manufacturers no longer support much of the equipment, and replacement parts are difficult to obtain. In addition, following the introduction of chlorine at Copper Basin reservoir in 2007 to control quagga mussels, the equipment at this monitoring station became exposed to residual chlorine vapors. Chlorine vapors are extremely corrosive to a number of metals. This exposure has accelerated the deterioration of key equipment components. At the present time, staff makes frequent trips to this isolated site to verify the flow rates and the chlorine residual measurements, requiring entry into the manhole. Prior to entering the structure, chlorine concentrations must be tested to ensure that the manhole is safe to enter.

This project will replace the existing deteriorated flow meters with new ultrasonic models that are compatible with other meters in use throughout the CRA; relocate the data and communications equipment from the underground manhole to a new aboveground monitoring station with air-conditioned cabinets to enable stable operation; and construct a reliable power source. Construction by Metropolitan forces is planned to commence in mid-2014.

Pumping Plant Flow Meter Replacement

The five Colorado River Aqueduct (CRA) pumping plants have nine main pump units within each plant's pump house. Depending on seasonal demands, pumping operations at each plant vary from one- to eight-pump flow, with a maximum capacity of approximately 1,800 cfs. Each pump lifts water through nine individual above-ground, 6-foot-diameter steel pipelines. These nine pipelines converge into three parallel 10-foot-diameter steel pipelines, which convey water to the downstream aqueduct. Acoustic flow meters are installed on each 10-foot-diameter delivery line. Flow measurements are used to adjust pumping rates and balance the flows from plant to plant. The existing acoustic flow meters have been in service for nearly 17 years. For this type of electronic equipment, the expected service life is approximately 15 to 20 years. The existing units have begun to deteriorate due to their age and exposure to harsh desert conditions. Continued loss of accuracy could lead to incorrect flow adjustments or unsynchronized pumping rates, which could cause flooding at the plants or

overtopping of the aqueduct.

This project will install new acoustic flow meters on the delivery lines which will connect to nearby flow meter consoles housed inside new pre-fabricated equipment enclosures. The flow data will be transmitted from the new consoles to the Supervisory Control and Data Acquisition (SCADA) system through new fiber-optic cable installations. These upgrades will improve meter accuracy, add local read-out capability, and improve the quality of the electronic signals by shortening the length of the transducer cables. Procurement of the flow meters, fiber-optic cable, and electrical enclosures has been completed. Design and procurement of access platforms needed to install and maintain the equipment is ongoing. Metropolitan forces will install the equipment.

Pumping Plant Sump System Rehabilitation

Each of the five Colorado River Aqueduct (CRA) pumping plants has two independent main sumps that collect water leakage from the main pumps and discharge valves. Each main sump is approximately 9 feet wide, 20 feet long, and 35 feet deep, and can hold up to 48,000 gallons, or approximately one day's worth of leakage water. The sump piping system pumps this water back to the pumping plant's main intake manifold or to its forebay, depending on the plant. In addition, circulating water pipes, which supply water to the pumping plant cooling, fire, and potable water systems, also run through the sumps. The 70-year-old sump piping systems and support structures are deteriorating and have exceeded their service lives. Failure of the sump piping systems has the potential to cause extensive flooding and damage to valves and pumps within the pumping plants. Replacement of corroded sump valves, piping, and support structures will enhance CRA pumping plant reliability.

This project will rehabilitate the pumping plant sump systems, including replacement of corroded sump mechanical equipment, piping, and access structures at all five CRA pumping plants. Access features will be upgraded by replacing corroded catwalks, ladders and handrails within the sumps. Ongoing preliminary design phase activities include selection of replacement valves and other materials; preparation of a preliminary design report with mechanical and structural layouts; development of a preliminary construction cost estimate; and preparation of environmental documentation.

6.9 Kilovolt Switch House Buildings Seismic Upgrades

The 6.9 kilovolt switch houses located at each of the five Colorado River Aqueduct (CRA) pumping plants contain critical electrical circuit breakers and other equipment used to control, protect, and isolate the high voltage power that serves the nine aqueduct pumps located in the nearby pump house. The switch houses were constructed in 1938 and are essential to maintaining reliable water deliveries from the CRA. The outward appearance of all five switch house buildings is similar. Each building is constructed of reinforced concrete and features a main level and a basement level. The buildings at the Hinds, Eagle Mountain, Iron Mountain, and Gene pumping plants are each approximately 163 feet long by 15 feet wide and 22 feet high. The building at the Intake pumping plant is slightly smaller at 148 feet long by 14 feet wide and 21 feet high. Each building has a flat roof constructed of concrete decks with several large skylights. At the basement level, a tunnel and an underground duct bank, which contains the electrical cables that feed the main pumps, extend from the switch house to the nearby pump house. Steel lattice towers, with a height of 50 feet, are mounted on top of the switch house buildings at the Hinds, Eagle Mountain, Iron Mountain, and Gene pumping plants. A 12-foot-tall steel lattice tower is mounted on the switch house at the Intake pumping plant. The towers support the high voltage electrical lines which supply power to the pumping plants. A recent seismic risk assessment of the 6.9 kilovolt switch houses identified that these structures are vulnerable to damage during a major seismic event, such as a magnitude 8 earthquake on the San Andreas Fault. The Hinds pumping plant is located approximately 20 miles from the San Andreas Fault, while Eagle Mountain and Iron Mountain pumping plants are located 33 and 64 miles from the fault, respectively. The Gene and Intake pumping plants are located approximately 110 miles from the San Andreas Fault. Extensive damage could occur at the Hinds, Eagle Mountain, and Iron Mountain pumping plants during a major earthquake. Due to its further distance from the San Andreas Fault, damage at Gene pumping plant would be less extensive than the other plants. At the Intake pumping plant, any damage would likely be minor due to its distance from the fault and the shorter steel lattice towers.

This project will seismically upgrade the Hinds, Eagle Mountain, and Iron Mountain 6.9 kilovolt switch houses including bracing of walls to support the steel towers mounted on the roofs; reinforcement of roof decks; addition of an exterior buttress wall; bracing of interior partition walls; and injection grouting of cracks in the walls and roof decks. For the Gene switch house, seismic upgrades will include bracing of walls, reinforcement of the roof deck,

and injection grouting of cracks in the walls and roof deck. For the Intake pumping plant, the only seismic upgrade anticipated is injection grouting of cracks. Ongoing preliminary design phase activities for the five switch house buildings include conducting field surveys, geotechnical investigations, hazardous materials investigations, development of final design criteria, preparation of environmental documentation and a preliminary design report, and development of preliminary construction cost estimates.

CRA Canal Improvements

During the mid-1980s, the Colorado River Aqueduct (CRA) main pumps were upgraded, which increased the system's maximum flow rate to 1,750 cfs. At this maximum flow rate, the canal freeboard is reduced to less than one foot. At certain locations, water overtops the canal sidewalls. These locations are typically found along curves where the velocities are high, at locations where sedimentation occurs, or at low spots where the canal sidewalls may have settled. In the past, overtopping has resulted in concrete damage to the canal where the water undermined the canal sidewall and eroded the adjacent soil embankment. Overtopping of the canal sidewalls has been observed at several locations between Mile Markers 28 and 104, which are downstream of Copper Basin Reservoir. It is estimated that a total of ten miles of canal may require sidewall extensions to accommodate the system's maximum flow rate. In some areas where overtopping has been observed, staff previously installed approximately 1.5-foot-high steel plates to extend the top of the canal walls as a temporary measure. A comprehensive permanent solution is needed to ensure that adequate freeboard is available when the CRA is operated at its maximum flow rate, in order to enhance Metropolitan's ability to convey surplus supplies from the Colorado River, and to reduce potential damage to the CRA.

This project will improve the open canal by extending the sidewalls at several locations between Mile Markers 28 and 104. Different materials such as cast-in-place concrete and concrete masonry units will be considered for the extension. Site grading and drainage improvements will be made in the locations where the sidewalls are extended. Ongoing preliminary design phase activities include field surveys, hydraulic modeling, development of final design criteria, preparation of environmental documentation, and development of a preliminary construction cost estimate.

CRA Radial Gates and Slide Gate Rehabilitation

There are a total of 14 hydraulic radial gates located along the Colorado River Aqueduct (CRA). The gates are needed to dewater and isolate various reaches of the CRA for maintenance and repairs. The radial gates are opened or closed to divert water into diversion channels or spillways to isolate reaches for maintenance or repairs, and to quickly dewater the aqueduct in case of blockage or an emergency event. The gates have widths ranging from 10 to 22 feet, and heights ranging from 11 to 19 feet. Each gate is constructed of a steel framework that resembles a slice of pie, with a curved plate that rotates to block flow when the gate is in the closed position. An electric motor actuator is used to pivot a gate upward from the closed to the open position. The electric motor, hoisting mechanism, and radial gate are mounted on a concrete structure. Recent inspections have identified that nine gates are corroded and require refurbishment or replacement. These nine gates are located at the Coxcomb Wasteway, Eagle Mountain Sand Trap, Eagle Mountain Spillway, Eagle Mountain Wasteway, Hinds Sand Trap, Iron Mountain Reservoir Spillway, Iron Mountain Wasteway, Rice Wasteway, and Vidal Junction Wasteway. Protective coatings on various components of the gates have begun to fail. Several of the gates have a fiberglass laminate applied to the face of the curved plate that is in contact with water. This laminate is deteriorating and has pulled away from the curved plate in several instances. Significant metal loss has occurred on portions of the steelwork and mounting brackets. The existing motor actuators used to open and close the gates have also deteriorated from 70 years of use in the harsh desert environment. The inspections also identified that the concrete diversion channels are in need of repair. The 10-foot-wide reinforced concrete channels are used to reduce velocities and direct discharge flows away from the gates. The channels vary from 200 to 1,000 feet in length. Most are severely cracked and have voids in the subgrade beneath the concrete. In addition, three reservoir slide gates at the Eagle Mountain Reservoir and the Iron Mountain Reservoir need repair. Failure of the reservoir slide gates could limit use of these reservoirs, which are required to dampen fluctuations in flow between pumping plants.

This project will involve refurbishment or replacement of nine radial gates located in open canal segments of the aqueduct and the three reservoir slide gates. The motor actuators and the gates' electrical and control equipment will also be replaced. In addition, the concrete walls and floors within the diversion channels will be repaired. Ongoing preliminary design phase activities include hydraulic testing and field investigations to determine whether individual gates may be refurbished or will need to be replaced; testing for hazardous materials; assessing gate and

guide materials and metallurgy; evaluating alternate gate configurations in case full replacement is required; preparing conceptual design drawings; preparing environmental documentation; and developing a preliminary construction cost estimate.

Iron Mountain Standby Generator Replacement

The Iron Mountain pumping plant was originally completed in 1939. The plant has nine 4,300-horsepower pumps whose auxiliary mechanical systems rely on a 500-kilowatt standby diesel generator for backup power supply. Critical auxiliary systems powered by the generator include fire water pumps, the village's potable water treatment and delivery system, emergency lighting, sump pumps which prevent flooding of the pumping plant, and cooling water pumps servicing the main CRA pumps. The standby generator at Iron Mountain pumping plant is 50 years old, requires frequent repairs, and has reached the end of its service life. In addition, unlike modern generators, the existing generators must be manually started in the event of a power loss. Upgrades to the generator's ancillary equipment are also required to meet current fire codes and environmental regulations, including the addition of a fuel unloading area and a spill containment structure. In addition to the generator, a step-up transformer is required to increase the generator's voltage to match the driven equipment at the pumping plant. The transformer is necessary because small generators are no longer manufactured in the higher voltages used by the existing pumping plant equipment.

This project will improve the reliability of emergency power for critical auxiliary systems at the pumping plant. Upgrades include the relocation and installation of a new 600 kilowatt (KW) generator and transformer to replace an existing 500 KW generator assembly. The larger capacity unit is needed to power current auxiliary system loads at the pumping plant. The replacement generator will include alarms, valves, meters, and a control system capable of automatic start-up upon loss of primary power, automatic transfer back to primary power once the normal source is reestablished, and remote status monitoring. This generator will be located in a new building with a fuel unloading area and spill containment that complies with current building codes. Ongoing final design activities include engineering design; preparation of procurement packages and receipt of bids for the standby generator and transformer; preparation of drawings and specifications for the construction contract; development of a construction cost estimate; coordination to meet stringent permitting requirements, including San Bernardino County Fire Department and Mojave Desert Air Quality Management District permits; advertisement and receipt of bids for construction; and all other activities in advance of award of the construction contract.

CRA Reliability for FY 2012/13 through FY 2017/18 **15483**

Total Appropriation Estimate:	$49,100,000	**Total Projected Through June 30, 2014:**	$3,547,000
Appropriated Amount:	$3,500,000	**Estimated Percent Complete:**	13%
Biennial Estimate:	$2,979,000	**Estimated Completion Date:**	2020

Scope

This appropriation was established to implement multiple projects throughout the Colorado River Aqueduct system. The common driver for many of the projects in this appropriation is infrastructure reliaibility.

Purpose

To ensure the reliability and operational efficiency of the Colorado River Aqueduct and related facilities and equipment.

Accomplishments Through FY 2013/14

Through FY 2013/14, two projects have been completed.

Major project milestones in FY 2013/14:

Delivery Line 1 Supports Rehabilitation at Five Plants – Completed preliminary design

Delivery Lines 2&3 Supports Rehabilitation at Gene and Intake – Completed construction

Delivery Lines 2&3 Supports Rehabilitation at Iron, Eagle and Hinds – Completed construction

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Cut-and-Cover Conduit Erosion Control Upgrades	$1,063,000	2016	Complete preliminary design
CRA 230kV System Inter-Agency Operability Upgrades	$6,496,000	2018	Complete preliminary design
CRA 6.9kV Panel Upgrade	$368,200	2017	Complete construction
CRA Protective Slab	$8,780,000	2020	Complete preliminary design
CRA 230kV Transmission Line Clearance	$100,000	2016	Complete construction
CRA Villages Domestic Water Main Distribution Replacement	$11,842,300	2017	Complete preliminary design
Delivery Line Supports Rehabilitation	$330,600	2015	Complete final design
Gene and Intake Pumping Plant Surge Chamber Outlet Gates Re-Coating	$700,000	2019	Complete final design
Hinds, Eagle and Iron Mountain Pumping Plants Storage Buildings	$1,200,000	2019	Complete preliminary design

Project	Total Project Estimate	Estimated Completion	Planned Activity
Pumping Plant Delivery Line No. 1 Relining	$1,563,000	2017	Complete preliminary design
Pump Plant Switch Rack Rehabilitation	$210,000	2018	Complete preliminary design
Pumping Plant Water Treatment System Replacement	$7,000,000	2020	Complete preliminary design
Switch Rack and Ancillary Structures Erosion Control	$200,000	2018	Complete final design
Iron Mountain and Eagle Mountain Reservoir Spillway Auto Rejection	$215,000	2018	Begin preliminary design

Cut-and-Cover Conduit Erosion Control Upgrades

The Colorado River Aqueduct (CRA) is comprised of 92 miles of tunnels, 63 miles of canals, 29 miles of siphons, and 58 miles of cut-and-cover conduit and pipelines. The cut-and-cover conduits are arch or horseshoe shape, unreinforced, cast-in-place concrete. The minimum backfill for the conduits specified at the time of construction was three feet. Consequently, many sections of the conduits have shallow cover. Over the past decade, stream flows caused by heavy storms have eroded the soils over several sections of these conduits, leaving them exposed until repairs were made. Storm flows regularly erode the soil cover over the conduits at Fornat Wash near Cabazon, Mission Creek, CRA Mile Marker 145, and CRA Mile Marker 137. Flows over successive winter seasons can damage the conduits as storm-related debris may impact the exposed conduit. This damage could lead to an unplanned shutdown of the CRA to perform emergency repairs.

This project will provide erosion control measures to protect the CRA cut-and-cover conduits from flood damage. Potential erosion control measures include installation of concrete protective slabs, adjacent drainage improvements, or other regional enhancements to direct flooding away from the conduits. Ongoing preliminary design phase activities include: hydrological and geomorphological analyses; right-of-way investigations; development of conceptual layout drawings; preparation of environmental documentation and a preliminary design report; value engineering constructability review; and development of a preliminary construction cost estimate.

CRA 230 Kilovolt System Inter-Agency Operability Upgrades

Electrical power to operate the five Colorado River Aqueduct (CRA) pumping plants is transmitted from Hoover Dam via a 230 kilovolt power system. The electrical system was constructed to the design standards of the 1930s. Since then, numerous transmission lines and generating plants have been constructed near the CRA system. Due to Metropolitan's integration into this expanded regional power grid, an electrical shutdown of a single CRA facility could affect interconnected agencies and other downstream CRA facilities. In addition, new testing regulation and maintenance requirements from the North American Electric Reliability Corporation (NERC) and the California Independent System Operator (CAISO) may require more shutdowns of the CRA electrical system, which could affect CRA water deliveries.

This project will develop alternates to allow delivery of power to CRA pumping plants and other interconnected utilities while a single CRA electrical facility is de-energized. Work may include construction of inter-agency connections, parallel electrical systems at selected locations, and additional electrical system instrumentation and controls. Ongoing assessment phase activities include field investigations; development of alternatives; review of potential regulatory issues concerning NERC and CAISO; development of a comprehensive report; and development of a conceptual construction cost estimate.

CRA 69 Kilovolt Over-current Relay Panel Upgrade

Electrical power to operate the Colorado River Aqueduct's (CRA's) five pumping plants is transmitted from Hoover Dam via 237 miles of 230 kilovolt and 69 kilovolt overhead lines. Seventy-year-old over-current relays located at the Intake pump house and the Gene pump house protect the 69 kilovolt transmission line and pump house equipment from current faults. Such faults could be caused by lightning strikes or transmission line wind

damage. In the event of a fault, the over-current protective relays would send signals for the circuit breakers to open and isolate the fault, thereby protecting the pump motors and electrical buss work from extensive damage. Without protection, these faults could result in unintended shutdowns, equipment damage, fire hazards, and unsafe working conditions. The existing over-current relays are electromechanical relays based on 1940's technology. The over-current relays have begun to fail and require more frequent maintenance, and calibration. Replacement parts are becoming increasingly difficult to obtain. In addition, the existing over-current relays no longer maintain the designated fault current values; the values begin to vary shortly after they are set. An inaccurate relay setting may cause an unwarranted opening of the circuit breaker, which would shut down the CRA's operation. Once the relays detect a fault, troubleshooting the fault results in a relatively lengthy time delay until safe conditions can be confirmed. Until the fault is cleared, the downstream equipment is inoperable. An inaccurate relay setting could also prevent the circuit breaker from opening during a fault condition, which could result in fault current damage to pump house equipment.

This project will replace the existing electromechanical over-current relays with modern microprocessor relays to protect Intake and Gene pump house equipment from fault current damage. In addition, differential relays will be provided for protection of the 69 kilovolt transmission line segment between the Intake and Gene pumping plants. Ongoing preliminary design phase activities include development of conceptual layout drawings, preparation of environmental documentation, hazardous material testing, and development of a preliminary construction cost estimate.

Concrete Protective Slabs

The Colorado River Aqueduct (CRA) conveyance system consists of 92 miles of tunnels, 62 miles of canals, 50 miles of cut-and-cover conduits, and 30 miles of siphons. The cut-and-cover conduits were not designed to withstand heavy vehicular loading, and, in some are areas, were constructed with less than four feet of soil cover. The heavy vehicular loading primarily occurs in areas adjacent to aqueduct openings, such as tunnel portals, siphon transition structures and manholes, which are used for maintenance activities or emergency repairs. Maintenance activities often require that cranes and other heavy equipment be placed next to the aqueduct. These activities expose the aqueduct's conduits to potential damage from excessive loading such as cracking or failure of the conduit.

This project will install 26 reinforced concrete protective slabs, each approximately 30 feet by 50 feet, over portions of the CRA conveyance system to protect the aqueduct from excessive loading from heavy equipment. Ongoing preliminary design phase activities include: development of conceptual layout drawings; preparation of environmental documentation and a preliminary design report; value engineering constructability review; and development of a preliminary construction cost estimate.

Village Domestic Water Distribution Replacement

Metropolitan's five pumping plants along the Colorado River Aqueduct (CRA) are located in remote areas of Riverside and San Bernardino Counties where municipal water treatment and distribution systems are not available. Each plant is instead served by a community on-site water treatment system. Water from the CRA is treated and conveyed to each village house and to the industrial portions of the pumping plants through a gravity-fed water distribution system. Most of the buried water distribution piping and all of the isolation valves and valve boxes were built in the 1930s during original construction of the CRA. In total, there are nearly 45,000 linear feet of distribution water lines and several hundred valves and other appurtenant structures at the five pump plants. Piping repairs and upgrades have occurred over the years to address leaks. The water pipelines are currently a mixture of galvanized steel and PVC pipes. The water distribution systems were not constructed to meet modern small water system supply guidelines, and water pressure is often diminished at the end user locations.

This project will replace the domestic water distribution systems at the five CRA pumping plants. Also, because piping replacement will require extensive trench excavations throughout each village, the severely deteriorated asphalt roadways within each village will be repaired or replaced. Ongoing preliminary design phase activities include: development of conceptual layout drawings; hydraulic analyses; preparation of environmental documentation and a preliminary design report; hazardous material investigations; value engineering constructability review; and development of a preliminary construction cost estimate.

Gene and Intake Pumping Plant Surge Chamber Outlet Gates Recoating

Each of the five Colorado River Aqueduct (CRA) pumping plants has nine main pumps that lift water from the pump house through a series of converging delivery lines that convey water from the pump house to a headgate structure/surge chamber at the top of a hill. The reinforced concrete headgate structures are circular, 40 feet in diameter, and approximately 40 feet tall. These structures convey water to the downstream portion of the aqueduct. Flow from each headgate structure is regulated by three 9-foot square steel gates. A recent inspection at the Intake and Gene pumping plants revealed that the protective coatings on various components of the gates have begun to crack and peel. Over time, the loss of the protective coating will result in significant metal loss due to corrosion.

This project will recoat the six headgate structure outlet gates at the Intake and Gene pumping plants. The head gates will be recoated with high solids epoxy during a planned CRA shutdown. Ongoing preliminary design phase activities include: testing for hazardous materials; preparation of conceptual design drawings; preparation of environmental documentation; and development of a preliminary construction cost estimate.

Hinds, Eagle Mountain and Iron Mountain Pumping Plant Storage Buildings

The Hinds, Eagle Mountain, and Iron Mountain pumping plants each have storage units to house electrical and mechanical parts, maintenance tools and water quality testing equipment. The existing 70-year-old, metal-sided buildings are corroded and deteriorated. They do not seal properly against the elements and are impossible to seal against animal entry. Rehabilitation of these buildings would involve substantial modifications to bring them up to current building codes.

This project will replace the three old storage buildings with new prefabricated, code-compliant buildings. The prefabricated buildings will be constructed of steel and will be installed on concrete foundations. They will also include roll up doors, electrical service, lights and fire sprinklers. Ongoing preliminary design phase activities include: development of conceptual layout drawings; preparation of environmental documentation and a preliminary design report; and development of a preliminary construction cost estimate.

Pumping Plant Delivery Line No. 1 Relining

Each of the nine main pumps at the five Colorado River Aqueduct (CRA) pumping plants discharges the water into an individual 6-foot-diameter discharge line. The nine discharge lines merge and transition into three 10-foot- diameter pipelines, Delivery Lines Nos. 1, 2, and 3, that convey flow to the top of the lift and discharge into a headgate structure/surge chamber, which empties the water into the next section of the aqueduct. The five Delivery Lines No. 1 were constructed in the 1930s in conjunction with main Pumping Unit Nos. 1 through 3 at each of the five pumping plants. The pipelines were lined with coal tar enamel to protect the steel pipe interior from corrosion. Delivery Lines Nos. 2 and 3 were constructed in the late 1950s in conjunction with Main Pump Unit Nos. 4 through 9, and were lined with cement mortar. After over 70 years of service, the existing coal tar enamel lining on the Delivery Line No. 1 at each pumping plant is cracking and flaking, and the steel is starting to corrode. The mortar linings for Delivery Lines Nos. 2 and 3 are still in good condition and do not require repair. If the linings in Delivery Lines No.1 continue to deteriorate, corrosion of the pipelines will increase, resulting in loss of structural strength and higher repair costs.

This project will reline Delivery Line No. 1 at each of the five CRA pumping plants to replace the coal tar enamel with a cement mortar lining. Ongoing preliminary design phase activities include: development of conceptual layout drawings; preparation of environmental documentation and a preliminary design report; hazardous material investigations including establishment of a waste disposal procedure; value engineering constructability review; and development of a preliminary construction cost estimate.

Pumping Plant 2.4 kV and 480 V Switch Rack Rehabilitation

The housing village electrical systems, circulating water pumps, and fire protection pumps of all five Colorado River Aqueduct (CRA) pumping plants operate at 2.4 kV and 480 volts. At each plant, this power is delivered through an open switch rack, approximately 20 feet by 30 feet in size, which allows the electrical systems to be isolated for maintenance and fault protection. Each switch rack consists of breakers, buss, disconnect switches, insulators, stress cones, transformers, relays and structural steel, which are located in an open air exposed yard. The switch racks have been in service since 1939 and are beginning to fail, even with ongoing maintenance. Replacement parts are difficult to find since much of the equipment is obsolete.

This project will replace the switch rack and associated equipment and provide modern enclosed metal clad switchgear housings to protect the equipment. Ongoing condition assessment phase activities include field investigations; development of alternatives; development of a comprehensive report; and development of a conceptual-level construction cost estimate.

Pumping Plant Water Treatment System Replacement

Microfiltration units for treatment of domestic water supply at the five Colorado River Aqueduct (CRA) pumping plants were installed in 1993 to comply with the federal Surface Water Treatment Rule. To comply with the Stage 1 Disinfectants/Disinfection By-Product Rule, granular activated carbon (GAC) filtration vessels were added to the treatment process in 2005. In the microfiltration membrane process, raw water from the CRA is filtered by passing through a polypropylene membrane material which contains millions of small pores. Filtering occurs because the membrane pores are large enough to allow water to pass through, yet small enough to restrict the passage of undesirable materials, such as particulate matter and pathogenic organisms. Periodic backwashing is performed to remove filtered materials from the membrane surface. The membrane-filtered water then enters the GAC vessels, which remove organic carbon in the water and minimize disinfection by-product formation. Chlorine is then added to the treated water to maintain disinfection within the distribution systems at the pumping plants. The microfiltration units have reached the end of their useful service life, vendor support is limited, and frequent parts replacement is needed to keep the units operational. The original design of the microfiltration units did not specify chlorine resistant membranes. Because control of quagga mussel infestation now requires continuous chlorination of the CRA starting at Copper Basin, some of the pumping plants have switched to special order chlorine-resistant membranes, which cost three to five times the normal cost, while other plants have kept the non-chlorine-resistant membranes and replace them frequently. The high backwash water pressures used to clean the membranes have caused the PVC pipes to vibrate and crack, leading to numerous leaks. In addition, the GAC vessels are currently located outside and the desert heat adversely affects the operation of the GAC filters.

This project will replace the microfiltration units at each of the five CRA pumping plants with non-proprietary, low backwash pressure microfiltration units that use chlorine-resistant PVDF membranes. Water treatment capacity at the Gene pumping plant will be increased because the Gene Village has a higher occupant load and visitor traffic than the other pumping plants. In addition, the GAC vessels will be relocated to temperature-controlled environments to stabilize their operation. Ongoing preliminary design phase activities include: development of conceptual layout drawings; preparation of environmental documentation and a preliminary design report; hazardous material investigations including establishment of a waste disposal procedure; value engineering constructability review; and development of a preliminary construction cost estimate.

Switch Racks & Ancillary Structure Erosion Control and Protection

Each of Metropolitan's five Colorado River Aqueduct (CRA) pumping plants is located adjacent to steep slopes that drain onto the desert facilities. The slope soils are predominately silty sands that are fine-grained and susceptible to erosion. Over the past few years, storm runoff has caused rockslides and mudslides that have threatened critical pumping plant facilities, such as the switch racks, transformers, valve farms and sand strainers. In 2013, a severe summer storm caused flash flooding at the Eagle Mountain pumping plant. The flash floods resulted in a mudslide piled 3-foot deep up against the exterior perimeter fencing at the Eagle Mountain plant's 2.3 kV switch rack. The fencing held back the debris and staff later removed over 300 cubic yards of debris and repaired the damaged fencing. Failure of the 2.3 kV switch rack, which provides power to control the domestic water, fire water and main pump cooling water systems, would interrupt CRA deliveries.

This project will install erosion control and protection measures to protect CRA pumping plant facilities from storm water runoff, rockslides, and mudslides. Potential measures include installation of drainage ditches, retaining walls, or other enhancements to direct flooding and rocks away from critical facilities. Ongoing preliminary design phase activities include: development of conceptual layout drawings; preparation of environmental documentation and a preliminary design report; and development of a preliminary construction cost estimate.

Pumping Plant Delivery Line Supports Rehabilitation – Phase 2

Each of the five Colorado River Aqueduct (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/surge chamber 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. If these bolts or pins were to break, the pipe support assembly would become unstable and potentially collapse causing damage to the delivery line. Due to observed corrosion, approximately 1,000 corroded bolts on Delivery Lines Nos. 2 and 3 were recently replaced at the Intake and Gene pumping plants under Phase 1 of this project.

This project will replace corroded pipe supports, as needed, on the delivery lines. Ongoing Phase 2 activities include field investigations, a detailed study to identify the most cost-effective means to permanently reinforce the pipe supports for all three delivery lines and, if needed, final design to replace the pins on Delivery Pipeline No. 1 at each of the pump plants, including identifying repair methods, preparing drawings and specifications for the pin replacement work, and receiving competitive bids for the pin replacement work.

230 Kilovolt Transmission Line Clearance Upgrades

Electrical power for the Colorado River Aqueduct's (CRA's) five pumping plants is transmitted from Hoover Dam via 237 miles of 230-kilovolt overhead power lines installed in the 1930s. In 1960, 75 miles of a second 230 kV power line were installed between Hoover Dam and the Camino Substation near the Gene pumping plant. The 230 kV transmission lines consist of approximately 75-foot-high steel towers with concrete or wood footings, aluminum or copper conductors, insulator strings, and brackets or supports to attach the conductors and insulators to the towers. Spans between the towers average 1,200 feet with varying ground elevations. Recent rough measurements in 2013 found that ground clearances for 100 spans were less than 30 feet and for 7 spans were between 24 and 27 feet. Current electric industry standards recommend at least a 20-foot vertical clearance for rural areas. Vertical clearances between the lowest conductor and the ground in a span can vary with temperature, wind speeds, and power loads. Under maximum power loads and summer temperatures, the vertical clearances for 16 spans are estimated to be less than 22 feet. Insufficient clearances can adversely impact public safety and reduce the reliability of the transmission lines.

This project will assess ground clearances of the conductor spans and increase clearances, as needed, by raising the heights of existing towers and/or adding new towers between spans. Ongoing assessment activities include field measurements using 3-dimensional survey equipment on up to 30 spans and engineering analyses.

Iron Mountain and Eagle Mountain Reservoir Spillway Auto Rejection

The Iron Mountain Reservoir and the Eagle Mountain Reservoir are located on the upstream side of the Iron Mountain pumping plant and Eagle Mountain pumping plant, respectively. The reservoirs are operated to dampen fluctuations in flow between Colorado River Aqueduct (CRA) pumping plants. Each reservoir contains a spillway which allows discharge of water to the desert in the event of a power outage of the main pumps. The two spillways were designed in the 1930s to safely reject up to approximately 1,200 cfs, which corresponds to a 5-pump operation. The pumping plants were expanded in the 1950s and the CRA is now routinely operated with 8 pumps in service, which corresponds to approximately 1,750 cfs. Rejection of flows greater than 1,200 cfs would cause uncontrolled release of water, which could damage nearby facilities and public roads or property.

This project will modify the reservoir spillways to allow safe rejection of up to 1,750 cfs of water in the event of a power outage of the main pumps. Ongoing assessment activities include field surveys and evaluation of the hydrological conditions.

CRA Main Pump Reliability 15481

Total Appropriation Estimate:	$91,000,000	**Total Projected Through June 30, 2014:**	$558,200
Appropriated Amount:	$950,000	**Estimated Percent Complete:**	1%
Biennial Estimate:	$7,511,000	**Estimated Completion Date:**	2024

Scope

This appropriation was established to continue to implement multiple projects throughout the Colorado River Aqueduct Pumping plants. The common driver for many of the projects in this appropriation is infrastructure reliaibility.

Purpose

To complete rehabilitation work necessary to ensure reliability and operation performance, provide operational flexibility and prolong the useful like for the pumping plants.

Accomplishments Through FY 2013/14

This is a new appropriation; no projects have been completed.

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Main Pumping Plant Rehabilitation Reliability Investigations	$380,000	2015	Complete study
Main Pump Controls and Instrumentation	$7,300,000	2019	Complete preliminary design
Main Pump Discharge Valve Refurbishment	$14,400,000	2023	Complete preliminary design
Main Pump and Motor Refurbishment	$23,350,100	2023	Begin preliminary design
Main Pumping Plant Discharge Line Isolation Bulkhead Couping	$13,916,600	2018	Complete final design
Main Pumping Plant Lubrication System	$3,650,000	2018	Complete preliminary design
Main Pumping Plant Service Water and Sand Removal System	$5,450,000	2019	Complete preliminary design
Main Pumping Plant Unit Coolers and Heat Exchangers	$6,550,000	2019	Complete preliminary design
Pumping Plants Crane Improvements	$1,700,000	2018	Complete preliminary design
Pump Suction Joint Refurbishment	$4, 100,000	2015	Complete preliminary design

Main Pump Reliability Investigations

Each of the five Colorado River Aqueduct (CRA) pumping plants has nine main pumps. These pumps were installed in several phases over time to meet increasing water demands. At each plant, Pumping Units Nos. 1 through 3 commenced operation in 1941. Units Nos. 4 and 5 came on-line in 1956, while Unit No. 6 was added in 1958. The final units, Nos. 7 through 9, commenced operation in 1959. In the mid-1980s, detailed inspections on the 45 main pumps indicated that the pumps were approaching the end of their expected service lives, and a major rehabilitation effort was undertaken. The rehabilitation work included extensive testing and evaluation of the pumps and motors; replacement of impellers; refurbishment of the pump casings; refurbishment of the discharge valves; and rehabilitation of the motor fire protection systems and motor transformers. The pumps have performed well over the past 25 years since the rehabilitation work was completed. However, recent field reports and performance measurements indicate that the pumps and related systems have begun to deteriorate. Increased wear on the pumps is expected as the units are run for extended periods to meet current water delivery projections. Based on these reports, coupled with the 25 years of near-continuous operation, the CRA Main Pump Reliability Investigations project was initiated. The objectives of the project are to complete a comprehensive condition assessment of the main pumps and support systems; develop a strategy for monitoring of pump performance using modern technology; and implement projects necessary to maintain reliability and extend the service life of the main pumps and support systems at each CRA pumping plant.

This project will perform site investigations to assess the condition of the CRA main pumps and related systems at all five pumping plants. These investigations will include inspection of the pump suction piping, suction valves, suction joints, pump casings, impellers, and discharge valves. All inspection activities will be performed by Metropolitan staff during planned CRA shutdowns or equipment outages that will be scheduled at each pumping plant. Dewatering and disassembly of major equipment items and piping will be performed to allow internal inspections. Ongoing activities include: detailed visual inspections; materials testing; assessment of new technologies for equipment and performance monitoring; review of compiled operation and maintenance data; preparation of conceptual design reports for improvements; and preparation of conceptual-level construction cost estimates. The activities will also include pump and motor performance testing to determine operating efficiency, which is a measure of the pump's overall condition. Based on the results of these investigations, staff will identify improvements to address reliability of the main pump units and related systems. Improvement projects will be implemented in a coordinated manner that will consider project priorities, proper sequencing of work, and available shutdown opportunities.

Main Pump Controls and Instrumentation Upgrades

The Colorado River Aqueduct (CRA) main pump controls and instrumentation systems have enabled decades of reliable pump operation. The systems, which were installed between 1941 and 1959, use industrial quality relays, switches, and instrumentation that are still maintainable. However, the remaining vendor-supported lifespan of several components is limited. The original instrumentation was designed and rated for 20-amp components. The current industry standard is 10-amp components, and a 20-amp replacement instrument must be custom designed and built. Additionally, replacement parts, switches, and gauges are extremely difficult to obtain.

This project will rehabilitate and upgrade the CRA main pump controls and instrumentation systems. The new systems will follow modern industry open standards, be consistent with Metropolitan's current electrical protection and control system practices, be compatible with planned upgrades to the Metropolitan-wide Supervisory Control and Data Acquisition (SCADA) system, and not be a proprietary system. Ongoing preliminary design activities include field investigations; development of system and operational requirements for software and hardware, network communications, electrical protection, vibration monitoring, and pump power controls; preparation of preliminary layout drawings; development of final design criteria; and development of a preliminary construction cost estimate.

Main Pump Discharge Valve Refurbishment

Each of the nine main pumps at the five Colorado River Aqueduct (CRA) pumping plants discharges water into an individual 6-foot-diameter discharge line. Each pump has a 42-inch conical plug discharge valve located immediately downstream of the pump. The valve is used to isolate the pump from the 6-foot-diameter discharge line to perform routine maintenance and to protect the pump following an unplanned shutdown. The valves were in installed in four phases between 1941 and 1959 and have been in continuous operation since their installation date. During routine operation, each valve may be closed in 20 seconds. In emergency operation, the valve closes in

3 seconds to prevent the stopped pump from rotating backwards. This quick closure imposes impact loading on the valve's internal components and has damaged the valve shaft bearings and actuator components. In the past, discharge valves have failed to close during an unplanned pump unit shutdown, which has allowed water from the delivery line to rush backwards through the pump, causing the pump to rotate backwards. This backwards rotation has the potential to damage the pump's electric motor excitation system brushes or internal pump components.

This project will refurbish the 45 CRA main pump discharge valves. Refurbishment may include the replacement or repair of internal valve components, valve seats, upper and lower shaft bearings, bearing lubricator piping, and grease fittings. An automatic valve lubricator system may be added. Ongoing condition assessment phase activities include: detailed visual inspections; materials testing; assessment of new technologies for equipment and performance monitoring; review of compiled operation and maintenance data; preparation of conceptual design reports for improvements; and preparation of conceptual-level construction cost estimates.

Main Pump and Motor Refurbishment

Each of the five Colorado River Aqueduct (CRA) pumping plants has nine main pumps. The pumps add energy and lift the water to meet the required elevation to continue flow down the aqueduct. Each pump discharges the water into pipelines that convey flow to the top of the lift and discharge into a headgate structure/surge chamber, which empties the water into the next section of the aqueduct. Each of the 45 main pumps is nominally rated at 200 cubic feet per second (129 million gallons per day), and each pump's motor size depends on the lift needed. Pump motor sizes are as follows: Intake – 9,000 horsepower (hp); Gene – 9,000 hp; Iron Mountain – 4,300 hp; Eagle Mountain – 12,500 hp; and Hinds – 12,500 hp. In the mid-1980s, detailed inspections on the 45 main pumps indicated that the pumps were approaching the end of their expected service lives, and a major rehabilitation effort was undertaken. The rehabilitation work included extensive testing and evaluation of the pumps and motors; replacement of impellers; refurbishment of the pump casings; refurbishment of the discharge valves; and rehabilitation of the motor fire protection systems and motor transformers. The pumps have performed well over the past 25 years since the rehabilitation work was completed. However, recent field reports and performance measurements indicate that the pumps and pump motor systems have begun to deteriorate. Increased wear on the pumps is expected as the units are run for extended periods to meet current water delivery projections.

This project will refurbish the main pumps and motors systems. Pump refurbishment will include recoating the pump casing, replacing the upper rotating and stationary wear rings, and refurbishing the impeller. Motor refurbishment will include refurbishing the fan wheel; refurbishing the rotor and stator; and refurbishing the upper guide bearing, thrust block, thrust runner, and thrust shoes. Ongoing condition assessment phase activities include: detailed visual inspections; materials testing; assessment of new technologies for equipment and performance monitoring; review of compiled operation and maintenance data; preparation of conceptual design reports for improvements; and preparation of conceptual-level construction cost estimates.

Main Pumping Plant Discharge Line Isolation Bulkhead Coupling Construction

Each of the nine main pumps at the five Colorado River Aqueduct pumping plants discharges the water into an individual 6-foot-diameter discharge line. The nine discharge lines merge into three 10-foot-diameter pipelines that convey flow to the top of the lift and discharge into a headgate structure/surge chamber, which empties the water into the next section of the aqueduct. The three 10-foot-diameter delivery lines each have a separate isolation gate at the headgate structure. In order to provide isolation of a single pump or its discharge valve, the isolation gate to the pump's corresponding 10-foot diameter delivery line must be closed. Closing the gate isolates the 10-foot-diameter delivery line, the three 6-foot diameter discharge lines feeding that delivery line, and the three main pumps that discharge into the lines. Isolating a single main pump, in effect, removes three main pumps from service. In past years, when a single pump required isolation for an extended period, the 10-foot-diameter delivery line was isolated, the selected pump's 6-foot-diameter discharge line was cut and a bulkhead installed, and the delivery line's isolation gate was opened to allow operation of the two pumps still in service. To return the repaired pump to service, the isolation gate was closed, the bulkhead was removed, a buttstrap was welded onto the cut pipe, and the isolation gate was opened. This operation was labor-intensive, and required more than 72 hours to complete the isolation and the removal of isolation.

This project will install a removable pipe spool on each of the forty-five 6-foot-diameter discharge lines and provide a same size closure spool piece with internal bulkhead for each pumping plant. Removal of the pipe spool and insertion of the closure spool piece with internal bulkhead will allow quicker isolation of an individual main pump and its return to service. Ongoing preliminary design phase activities include field investigations;

preparation of preliminary layout drawings; development of final design criteria; and development of a preliminary construction cost estimate.

Main Pumping Plants Lubrication System

Each of the five Colorado River Aqueduct pumping plants has nine main pumps. Each pump has a lubrication system to oil the pump's motor bearings and the guide bearings. The lubrication systems consist of an oil storage sump tank, piping, valves, lube oil pumps, head tank, and heat exchangers. Lube oil stored in a sump tank is pumped up to an elevated head tank and then gravity fed through a heat exchanger and then to the application point. The first set of lubrications systems was installed during the original construction of the aqueduct in 1939 to support the main Pumping Unit Nos.1 through 3. The remaining systems were completed with construction of Pumping Unit Nos. 4 through 9 with the second expansion of the aqueduct in the late 1950s. The entire system has been operational for more than 70 years and is starting to deteriorate. Leaks have been observed in the piping systems, resulting in insufficient amounts of lubrication being applied to the motor bearings and guides. Insufficient lubrication can cause a potential burnout of these components leading to an extended shutdown of the affected pumps.

This project will refurbish or replace components of the lubrication system. Ongoing condition assessment phase activities include: detailed visual inspections; materials testing; assessment of new technologies for equipment and performance monitoring; review of compiled operation and maintenance data; preparation of conceptual design reports for improvements; and preparation of conceptual-level construction cost estimates.

Main Pumping Plant Sand Removal System Upgrades

At each of the five Colorado River Aqueduct (CRA) pumping plants, water is withdrawn from the CRA, filtered to remove large debris and sand, and then pumped through a circulating water system. The circulating water system feeds the pump house service water system, the cooling system at each pump unit, the fire water system, the irrigation water system, and the domestic water treatment system. The existing filtration system is not designed to strain out fine silts (typically 44 microns in size). Consequently, the fine silt has built up as sediment in the circulating water systems, leading to excessive wear and failure of equipment such as pump packing, cooling water piping, and heat exchangers.

This project will upgrade the filtration system to remove fine silt. Ongoing preliminary design phase activities include field investigations; preparation of preliminary layout drawings; development of final design criteria; and development of preliminary construction cost estimates.

Main Pumping Plant Unit Coolers and Heat Exchangers Refurbishment

Each of the five Colorado River Aqueduct (CRA) pumping plants has nine main pumps. Each main pump has a cooling system to cool various components of the pump system. At each pump house, water is pumped through a circulating water system, which feeds multiple unit coolers and heat exchangers for each individual main pump unit. Over the years, the unit coolers have developed many leaks, which were subsequently repaired. Lack of sufficient cooling water could cause equipment overheating; and the leaks could damage nearby electrical equipment. Reliability of the unit coolers and heat exchangers is required to ensure the CRA maintains full flow readiness.

This project will replace, refurbish, and/or upgrade the cooling system at each pump unit. Ongoing condition assessment phase activities include: detailed visual inspections; materials testing; assessment of new technologies for equipment and performance monitoring; review of compiled operation and maintenance data; preparation of conceptual design reports for improvements; and preparation of conceptual-level construction cost estimates.

Pumping Plants Crane Improvements

Each of the five Colorado River Aqueduct (CRA) pumping plants is equipped with motor room crane, a transformer crane, and a bump bay crane. The fifteen overhead cranes were installed in the pumping plants during the original CRA construction and have been in operation since 1939. The cranes were rehabilitated in the late 1980s. The cranes are used to raise, shift, and lower main pump components, motors, and transformers for maintenance and replacement. The cranes have reached the end of their service life; spare parts for the original crane components are difficult to obtain or no longer available. Parts which were replaced in the 1980s are

outdated and the electronic features are no longer supported by vendors. The fifteen overhead cranes need to be replaced or rehabilitated to enhance reliability and improve plant operations.

This project will replace or rehabilitate the fifteen cranes at the five CRA pumping plants. Ongoing preliminary design phase activities include field investigations; preparation of preliminary layout drawings; development of final design criteria; and development of preliminary construction cost estimates.

Pump Suction Joint Refurbishment

At the Gene, Iron Mountain, Eagle Mountain, and Hinds pumping plants, the nine main pump units at each plant are supplied with water from a common 16-foot-diameter suction manifold. Each pump draws water from this manifold through its own 6-foot-diameter suction pipe. A valve is installed in this suction pipe so that the pump can be isolated from the common manifold to perform inspections and repairs. Each valve has an adjacent pipe suction joint which was used for construction assembly and may be used for future disassembly and removal of the valve. The suction joints for Pumping Units Nos.1 through 5 each consist of a pipe sleeved within another pipe, along with rings of packing and a follower gland that compresses the packing to seal the joint. The suction joints on Pumping Units Nos. 6 through 9 consist of sleeve-type pipe couplings. Both types of joints were designed to be leak-tight. However, after 70 years of continuous service, the suction joints have begun to show signs of deterioration, including leakage. Although the volume of leakage is presently low, it is causing the joints to corrode. This corrosion could eventually result in failure of the suction joints, leading to potential outage of the Colorado River Aqueduct.

This project will refurbish the suction joints at the Gene, Iron Mountain, Eagle Mountain, and Hinds pumping plants. A pilot refurbishment project on an Iron Mountain pump's suction joint was completed by Metropolitan forces during a February 2013 shutdown and confirmed the approach for the remaining work. Planned work for the remaining 35 suction joints includes blasting and removing the coating on the interior of the suction piping and valve disc, welding an internal butt strap to span the joint, and recoating the interior of the suction piping and valve disc, followed by blasting and recoating of the exterior of the suction valve, joint, and exposed piping. Ongoing final design phase activities to rehabilitate the suction joints for the remaining 35 pump units include detailed shutdown planning; preparation of drawings and specifications; advertisement and receipt of bids; development of construction cost estimates; and all other activities in advance of award of the construction contracts.

Dam Rehabilitation & Safety Improvements 15419

Total Program Estimate:	$5,700,000	**Total Projected Through June 30, 2014:**	$3,888,000
Appropriated Amount:	$4,130,000	**Estimated Percent Complete:**	90%
Biennial Estimate:	$188,000	**Estimated Completion Date:**	2017

Scope

This appropriation was established to review the adequacy of Metropolitan's dams, evaluate risks, and identify alternative solutions to minimize risks. Under this appropriation, the seismic adequacy of dams and their appurtenant structures are being assessed, and the hydraulic adequacy of dams' spillway and hydraulic structures under up-to-date hydrologic conditions are being evaluated.

Purpose

To implement multiple projects that will facilitate monitoring, and assess stability, risks, and capacities of Metropolitan's dams and reservoirs.

Accomplishments Through FY 2013/14

Through FY 2013/14, three projects have been completed.

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Dam Seismic Upgrades Phase 3	$3,035,800	2017	Complete assessments
Diamond Valley Lake Dam Monitoring System Upgrade	$1,335,200	2016	Complete final design

Dam Seismic Retrofit - Phase 3

Metropolitan's conveyance and distribution system includes 27 dams and reservoirs that store treated water, untreated water, or storm water. The dams range in height from 6 feet to 285 feet, have storage capacities from 18 to 810,000 acre-feet, and range from one year to 86 years in age. Most of Metropolitan's dams are between 30 and 60 years old and are located near densely populated areas in a region of high seismic activity. Twenty-two of the dams are under the jurisdiction of the California Division of Safety of Dams (DSOD). The DSOD requires periodic reassessment of the stability of permitted dams. In 2004, Metropolitan initiated a comprehensive assessment program to review the safety of all of its dams and reservoirs. To date, 23 of Metropolitan's 27 dams and appurtenant structures have been assessed and determined to be seismically stable or have already been upgraded, and thus require no further investigations at this time.

This project will review the safety of Metropolitan's dams and reservoirs based on current knowledge of earthquake risks and site-specific geotechnical information. Phase 3 investigations are currently underway or will be initiated within the next several months at the four remaining reservoirs: Palos Verdes Reservoir, the two Jensen finished water reservoirs, and Garvey Reservoir. Ongoing Phase 3 investigations include limited field and laboratory testing, along with detailed structural and foundation modeling and review of results with DSOD. Phase 4 investigations, if needed, will include more extensive field and laboratory testing, along with detailed three-dimensional finite element modeling. The data gathered will be used to characterize any highly complex geologic structures to a greater degree, and to further refine seismic strength parameters for use in the three-dimensional modeling.

Diamond Valley Lake Dam Monitoring System Upgrade

Diamond Valley Lake (DVL) is Southern California's largest surface water reservoir, with a maximum storage capacity of 810,000 acre-feet. The facility provides emergency storage in the event of a major earthquake, carryover storage as a reserve for drought conditions, and seasonal storage to meet annual member agency demands. DVL was completed in 2000 and is located south of the city of Hemet in Riverside County. The three rock-fill dams which form DVL are monitored continuously by the dam monitoring system, which transmits the performance data through Metropolitan's Wide Area Network (WAN) to the Headquarters Building at Union Station and to the Operations Control Center at Eagle Rock. This data is collected to prepare mandatory reports on the dams' performance for submission to the California Division of Safety of Dams (DSOD), and to provide early indication of a potential problem within the dam embankments or foundations. The dam monitoring system uses a wireless communication network to store and transmit real-time data from approximately 300 monitoring instruments, including 189 piezometers, 74 settlement sensors, 16 weirs, 15 strong motion accelerographs, eight deformation monitors, four fixed embankment extensometers, and three inclinometers. The dam monitoring system uses 86 remote terminal units (RTUs) to collect and transmit data via a wireless network to host computers located at each of the three dams and to a base station located at the San Diego Canal. After 12 years of continuous operation, the current monitoring equipment has reached the end of its service life. In recent years, the RTUs have begun to deteriorate and require increasing levels of maintenance. The wireless network does not operate reliably at the high ambient temperatures which occur frequently at the site, while the East Dam host computer frequently loses connectivity with the base station located five miles away at the San Diego Canal.

This project will upgrade the dam monitoring system in order to reliably monitor performance of the three dams and to comply with the operating permit issued by DSOD. Ongoing preliminary design activities include: conducting a condition assessment of the dam monitoring instruments and cabling; detailed evaluation of options for wireless technology upgrades, including new RTUs, new host computers, and upgraded WAN base stations; development of final design criteria; preparation of environmental documentation and a preliminary design report; and development of a preliminary construction cost estimate.

Diemer Plant Improvements 15380

Total Appropriation Estimate:	$255,800,000	**Total Projected Through June 30, 2014:**	$112,503,200
Appropriated Amount:	$132,597,000	**Estimated Percent Complete:**	47%
Biennial Estimate:	$32,172,000	**Estimated Completion Date:**	2021

Scope

This appropriation was established to plan and implement multiple projects within the Diemer Plant. The common driver for many of the projects in this appropriation is infrastructure reliability.

Purpose

To maintain reliability and ensure regulatory compliance of the Diemer plant.

Accomplishments Through FY 2013/14

Through FY 2013/14, sixteen projects have been completed.

Major project milestones in FY 2013/14:

Diemer Basin Rehabilitation – Completed final design

Diemer Electrical Improvements Stage 2 – Began construction

Diemer Filter Outlet Conduit Seismic Upgrade – Began final design

Diemer Finished Water Reservoir South Slope and East Washwater Tank Seismic Upgrades – Completed construction

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Diemer Basin Rehabilitation	$66,845,300	2019	Begin construction
Diemer Electrical Improvements Stage 2	$21,296,100	2017	Begin construction
Diemer Filter Outlet Conduit Seismic Upgrade	$8,378,400	2017	Begin construction
Diemer Washwater Reclamation Plant No. 2 Improvements	$44,053,300	2021	Begin final design
Diemer Finished Water Reservoir South Slope and East Washwater Tank Seismic Upgrades	$7,772,300	2015	Complete record drawings and permitting requirements

The Diemer plant was placed into service in 1963 with an initial capacity of 200 million gallons per day (mgd), and was expanded in 1969 to its current capacity of 520 mgd. The Diemer plant delivers a blend of waters from the Colorado River and the State Water Project to Metropolitan's Central Pool portion of the distribution system and to exclusive service areas within Orange County. The Diemer plant is located in the city of Yorba Linda. Its treatment processes presently consist of flocculation, sedimentation, filtration, and final disinfection using chlorine and chloramines. Pre-ozonation facilities have been constructed and are currently undergoing testing.

Basin Rehabilitation

Flocculation and sedimentation are two important unit processes within a conventional water treatment plant. Flocculation follows immediately after the initial chemical addition, and is designed to gently mix small particles and colloids in the water so that they agglomerate to form settleable or filterable particles that can be subsequently removed by sedimentation and filtration. The four flocculation/sedimentation basins on the east side of the Diemer plant were constructed in 1963, while the four west basins were completed in 1969. Each of these basins is 500 feet long by 100 feet wide, and is further divided into a 100-foot-long flocculation section and a 400-foot-long sedimentation section. Despite receiving regular maintenance, the equipment has deteriorated after 45-50 years of continuous operation.

This project will address needed upgrades to the basin equipment and structural components, along with required remediation of polychlorinated biphenyls (PCBs) in the sealant of concrete joints in Basin No. 4 and for the other basins should more PCBs be discovered. Key components of the basins to be upgraded include: basin inlet gates; basin perimeter water lines; flocculator drive trains, shafting, and bearing housing; baffle boards and supports; clarifier turntable assemblies, drives, rakes, catwalks, and corner fillets; and launders. Ongoing final design activities to rehabilitate the Diemer plant's east and west treatment basins include preparation of drawings and specifications; PCB remediation permitting; environmental documentation; advertisement and receipt of bids; third-party value engineering review; development of a construction cost estimate; and all other activities in advance of award of a construction contract.

Washwater Reclamation Plant No. 2 Improvements

The Diemer plant's Washwater Reclamation Plant (WWRP) No. 2 was built in 1992 with a capacity of 25 million gallons per day. The reclamation plant primarily treats used filter backwash water. WWRP No. 2 has two identical treatment trains with a common inlet structure. Each treatment train is equipped with four flocculator drives and 20 pillow blocks, which are used to enclose and support the flocculator drive shafts. Sand and coal from the used backwash water frequently enter the space between the flocculator bearing and its shaft, causing premature wear or damage. Replacing the shaft or bearing requires shutting down half of the reclamation plant, which significantly reduces the reclamation plant capacity and, ultimately, overall treatment plant capacity. In addition, the northwestern section of the WWRP passes through a zone of fill material. Seismic analyses have concluded that a major earthquake could induce a slide of the fill material which supports the reclamation plant and potentially damage the reclamation plant.

This project will provide a new grit removal facility and a new inlet structure to allow isolation of each treatment train; modify the chemical feed system, residual solids line, and utilities at the west slope; and construct a concrete caisson retaining wall to restrain the soil along the northwestern slope. Ongoing preliminary design activities include field surveys, preparation of environmental documentation, and development of preliminary layout drawings and a preliminary construction cost estimate.

Electrical Upgrades

Principal components of the Diemer electrical system date to the plant's original construction in 1963. Since that time, whenever portions of the plant were upgraded or additional facilities were constructed, the electrical system was expanded or adapted to accommodate the increased electrical loads. However, the architecture of the electrical system and its principal components were not updated. Some protective equipment is now considered underrated and does not have adequate short-circuit interrupting capability, which may increase the risk of unplanned outages, equipment damage, and fire hazard. Many critical electrical components at the plant are over 50 years old, and their performance has begun to deteriorate. As the equipment continues to age, its ability to operate safely and reliably will diminish. To address these issues, the Diemer Electrical Upgrades Program was initiated in 2005.

Stage 1: Under Stage 1 of the two-stage program, the electrical improvements needed to accommodate the Diemer Oxidation Retrofit Program (ORP) and to replace outdated and worn-out equipment were incorporated into the Diemer ORP's construction contract due to their overlapping construction schedules and common locations of some facilities. This project constructed the Stage 1 upgrades, which were completed in 2011 and included the Southern California Edison 66 kV electrical substation; the switchgear and emergency generator buildings; and various electrical duct banks throughout the Diemer plant. Record drawings are currently being prepared to document the upgraded system.

Stage 2: Under Stage 2, the project will upgrade the electrical system through installation of new conduits, duct banks, unit power centers, motor control centers, and circuit breakers; relocation of electrical loads; upgrade of the existing grounding system; and replacement of existing liquid-propane standby generators with diesel-powered generators. Construction of the electrical upgrades commenced in August 2013.

Finished Water Reservoir South Slope and East Washwater Tank Seismic Upgrades

The finished water reservoir and the east washwater tank at the Diemer plant are susceptible to damage from a strong earthquake. The plant's single finished water reservoir is designed to provide 75.6 acre-feet of treated water storage. The reservoir is constructed of reinforced concrete and is classified as a dam by the California Division of Safety of Dams (DSOD). Portions of the reservoir's south wall straddle two soil-filled ravines and are supported by cast-in-place caissons which extend below the concrete floor slab, through the fill material, and into bedrock. Recent assessments of the fill material have determined that it could slide down-slope during strong earthquake shaking, causing the two deepest caissons to fail. The Diemer plant relies on two washwater tanks to store water for filter backwashing. Each tank is 60 feet in diameter, 80 feet in height, and holds 1.5 million gallons of filtered water. The two tanks are constructed of steel and are located at both sides of the plant. The east washwater tank sits on a 5-foot-thick pile cap which is supported by 97 thirty-inch-diameter caissons. During strong shaking from an earthquake, some of the caissons could rotate down-slope, while some caissons could shear. This differential lateral movement could cause the pile cap foundation and tank sitting on top of it to rupture. Consequently, the Diemer plant's ability to backwash filters would be impacted, resulting in reduced treatment capacity.

The project installed reinforced concrete piles; strengthened sections of the finished water reservoir floor slab; added anchor bolts and excavated trenches; installed shear walls at the East Washwater Tank; modified the tank's roof vent structure, and sandblasted and painted the interior and exterior of the East Washwater Tank. The work also included demolition of an existing truck scale and building, utility relocations, minor paving, tree removal, replacement of the cathodic protection system on the washwater tank, modification of a weir plate in the filter outlet conduit, substructure relocations, shutdown activities, and final disinfection. Record drawings will be prepared to document the upgraded facilities. Ongoing permitting activities include preparation of reports and emergency preparedness mapping for submission to DSOD and the California Emergency Management Agency (Cal EMA), as required by the reservoir's operating permit.

Filter Outlet Conduit Seismic Upgrade

The Diemer plant's filter outlet conduit conveys water from the plant's treatment basins to the finished water reservoir. A section of the filter outlet conduit traverses below the plant's east-west access road along the north side of Basin No. 4, where it passes through a zone of fill material. Seismic analyses have concluded that in a major earthquake, the soil which supports this 10-foot-diameter pipeline could slide down the plant's north slope, potentially rupturing the line.

This project will construct a 450-foot-long concrete caisson retaining wall to restrain the soil which supports the pipeline. Construction of the retaining wall will involve the installation of approximately sixty 6-foot-diameter caissons, each with a depth of up to 100 feet below grade. Ongoing final design phase activities include conducting detailed field investigations, which includes potholing and utility identification; preparation of drawings and specifications; third-party value engineering review; advertisement and receipt of bids; development of a construction cost estimate; and all other activities in advance of award of a construction contract. Since the plant's north slope is adjacent to Chino Hills State Park, preparation of environmental documentation is also underway to address the required mitigation for the retaining wall installation.

Diemer Plant Improvements for FY 2006/07 through FY 2011/12 **15436**

Total Appropriation Estimate:	$67,900,000	**Total Projected Through June 30, 2014:**	$25,834,000
Appropriated Amount:	$33,219,000	**Estimated Percent Complete:**	42%
Biennial Estimate:	$25,389,000	**Estimated Completion Date:**	2019

Scope

This appropriation was established to plan and implement multiple projects at the Diemer plant. The common driver for many projects in the appropriation is infrastructure reliability.

Purpose

To maintain reliability and ensure regulatory compliance of the Diemer plant.

Accomplishments Through FY 2013/14

Through FY 2013/14, ten projects have been completed.

Major project milestones in FY 2013/14:

Diemer Administration Building Seismic Upgrades – Began final design

Diemer Chemical Feed Equipment Improvements – Began final design

Diemer Environmental Documentation – Began evaluations

Diemer Filter Building Seismic East Upgrades – Completed final design

Diemer Filter Building Seismic West Upgrades – Began final design

Diemer Filter Valve Replacement East – Completed final design

Diemer Filter Valve Replacement West – Began final design

Diemer Sample Line and Analyzer Improvements – Began final design

Diemer Supernatant Pump Station Improvements – Began construction

Diemer Washwater Reclamation Plant No. 2 Flocculator Improvement – Completed construction

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Diemer Administration Building Seismic Upgrades	$1,822,000	2016	Begin construction
Diemer Chemical Feed Equipment Improvements	$6,798,300	2019	Begin construction
Diemer Environmental Documentation	$648,300	2015	Complete environmental documentation
Diemer Supernatant Pump Station Improvement	$396,800	2015	Complete construction

Project	Total Project Estimate	Estimated Completion	Planned Activity
Diemer Filter Building Seismic Upgrades	$11,279,900	2018	Complete construction
Diemer Filter Valve Replacement	$18,854,500	2016	Complete construction
Diemer Sample Line and Analyzer Improvements	$1,836,900	2016	Begin construction

Filter Valve Replacement

In a typical filtration cycle, filters are operated by opening and closing a series of valves which allow water to flow in and out of the filter beds during filtration and backwashing. The Diemer plant has 48 filters in two modules. Each filter contains five filter valves, and each module is operated in conjunction with two large-diameter isolation valves in the backwash system, and six isolation valves in the surface wash system. The existing 256 filter valves were installed during the original plant construction in 1963 and during the plant expansion in 1969. These valves are designed to close tightly to prevent mixing of filtered and unfiltered water and to prevent leakage into the washwater reclamation system. The filter valves, ranging in diameter from 16 to 48 inches, have been in continuous service for over 50 years. Despite receiving regular maintenance, these valves have gradually deteriorated over time.

This project will replace the filter valves. Due to the long lead-time needed to procure valves, two valve procurement contracts were executed in 2013 and the 267 valves (including spares) are now being fabricated. Ongoing final design phase activities for installation of the valves include field investigations using 3-dimensional survey technology to efficiently detail the existing valve locations, adjacent equipment, and electrical conduits in order to resolve dimensional conflicts prior to construction; design of piping and electrical modifications; design of extension shafts, support stands and adapter spools to connect the new valves to existing piping; hazardous materials investigation; preparation of drawings and specifications; development of a construction cost estimate; advertisement and receipt of bids; and all other activities in advance of award of a construction contract.

Sample Line and Analyzer Improvements

Real-time water quality monitoring data are used to control chemical feed rates and treatment processes. Currently, water samples are pumped from 14 process locations within the plant to nearby monitoring stations or to the central laboratory located in the Administration Building. These samples are analyzed by either the local on-line instruments, or by laboratory instruments used by plant staff. The 14 sample pumps are currently operated manually; their operational status is not monitored by the plant's Supervisory Control and Data Acquisition (SCADA) system. Additionally, several of the sample points are located more than 1,000 feet from the central laboratory. This distance leads to sample transport times of more than one hour under some conditions. This condition can result in inconsistent data between local on-line analyzers and grab samples tested in the laboratory and creates difficulty in making appropriate operational adjustments. Timely and accurate water quality monitoring results are required to properly control treatment processes, such as the chemical feed rates. Improvements are needed for sample lines, sample pumps, and on-line analyzers to enable reliable and rapid response to changing water quality conditions.

This project will upgrade the sample pumps to allow operation at higher pressure and flow rates to reduce transport time in the sample lines. At most of the remote sites, transport times will be reduced to less than 10 minutes. In addition, the sample lines will be upgraded from polypropylene tubing to PVC piping to enable higher operating pressures. Sample pumps will be configured to show their operating status in SCADA, with automatic restart after power outages to enable continuous sample flows for regulatory compliance monitoring. In addition, remote on-line analyzers will be installed at five sampling locations to improve the accuracy and timeliness of collected data. Since three of these locations do not have structures to house the on-line instruments, weather-proof cabinetry will be installed with new power feeds, communication lines, and SCADA data lines. Ongoing final design phase activities include field surveys, preparation of drawings and specifications, development of a construction cost estimate, advertisement and receipt of bids, and all other activities in advance of award of a construction contract.

Administration Building Seismic Upgrade

The Diemer plant's 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. The plant's inlet conduit runs below the full length of the building. The Administration Building 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. A recent seismic analysis identified that some of the building's interior and exterior walls, the clerestory roof, the south side entry floor, and the plant's inlet conduit could be damaged in a major earthquake. Seismic upgrades to the facility will reduce the risk of structural failure in the event of a major earthquake.

This project will add a new 12-inch-thick concrete wall extending from the basement to the roof; strengthen perimeter walls with concrete infills at some of the exterior windows; reinforce the clerestory roof system in the area of the main entry; and reinforce structural elements such as floors, piers, and beams. The recommended upgrades will result in relocation of some existing mechanical and electrical equipment, and minor architectural modifications near the areas of seismic strengthening. In addition, to take advantage of cost-saving opportunities while this work proceeds, the plant's control room will be provided with an independent high-efficiency heating, ventilating, and air conditioning (HVAC) system, to improve reliability of water treatment operation and enhance smoke control in the event of a local fire occurrence. Ongoing final design activities include detailed structural analyses and engineering design of the seismic upgrades, equipment relocation, architectural modifications, and the HVAC system; preparation of drawings and specifications; development of a construction cost estimate; advertisement and receipt of bids; and all other activities in advance of award of a construction contract.

Filter Buildings Seismic Upgrade

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 which are 177 feet wide by 424 feet long and 18 feet deep. The filter basins contain pipe galleries, box conduits, and 24 multimedia filters. 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 filter buildings were designed to meet the then-current building codes of the 1960s. Since that time, knowledge of earthquakes and seismic design has greatly improved, which has resulted in more stringent building codes. A recent seismic evaluation identified 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 could 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.

This project will install steel frames in each filter control building; reinforce each clerestory at the roof line; and strengthen the perforated concrete shear walls. To perform these upgrades, some existing mechanical and electrical equipment in the filter control buildings needs to be relocated. Retrofit work will be staged to avoid limiting the Diemer plant's water production capability. Ongoing final design phase activities include detailed structural analyses and engineering design of seismic upgrades and equipment relocation; preparation of drawings and specifications; development of a construction cost estimate; advertisement and receipt of bids; and all other activities in advance of award of a construction contract.

Environmental Documentation for Planned Diemer Projects

The Diemer plant is located on the top of a hill in Yorba Linda, with surrounding land uses that include residential developments, a golf course, and the Chino Hills State Park. There are environmentally sensitive areas located within the plant boundary, as well as off-site. Due to the Diemer plant's unique setting, and its tight working space which restricts opportunities for simultaneous construction projects, staff endeavors to identify potential capital projects well in advance of their anticipated need, so that adequate time is available for planning and environmental

review. Several upcoming Diemer plant projects, including seismic upgrades of the Administration Building and Filter Buildings, along with seismic upgrade of the Filter Outlet Conduit, are planned in order to enhance the Diemer plant's treatment and operational reliability. These projects may have the potential to affect the quality of the environment due to potential impacts to air quality and other environmental factors such as visual, traffic, noise, and biological resources. The potential environmental impacts of these projects and other upcoming rehabilitation work will be analyzed in a programmatic environmental document, which will consider cumulative impacts, and allow Metropolitan to consider broad policy alternatives and program-wide mitigation measures earlier with greater flexibility.

This project will prepare environmental documentation for planned seismic upgrade and rehabilitation projects at the Diemer plant. Ongoing activities include preparation of the environmental documentation, permitting, and consultations with regulatory agencies.

Chemical Feed System Improvements

At the Diemer plant, conventional treatment processes are employed including disinfection, coagulation, flocculation, sedimentation, and filtration. Water treatment chemicals are added throughout the treatment process. Following filtration, chlorine and ammonia are added to the water to maintain a disinfectant residual within the distribution system. Caustic soda is also added to adjust the pH of the treated water to minimize corrosion, while dry polymer is used as filter aid and coagulant for the washwater reclamation and solids handling processes. The chemical feed pumps and flow meters which handle alum/ferric chloride, caustic soda, liquid polymer, dry polymer and ammonia are over 20 years old and have reached the end of their service life. These chemical feed systems have become unreliable, and spare parts are no longer available from their manufacturers. Repeated age-related failures have occurred recently, resulting in unscheduled switchovers to backup systems and costly maintenance. Failure of the feed equipment for water treatment chemicals could potentially disrupt plant operations and impair regulatory compliance. Upgrades to these feed systems are needed to improve system reliability and for compliance with water quality regulations.

This project will replace the worn-out feed equipment to improve chemical feed system reliability. The new chemical feed equipment will be sized and configured to meet up-to-date water treatment criteria. A total of 26 pumps, 29 flow meters, 14 control valves, and other piping appurtenances will be installed for these chemical feed systems. All new equipment will be located within the existing chemical tank farms. The existing motor drives for the pumps will be upgraded to improve the accuracy of flow control and to expand the controllable range of operation. The layout of the ammonia feed piping and strainer will be modified to provide improved access for maintenance. Ongoing final design phase activities includes code review, preparation of drawings and specifications for the final system configuration as well as temporary systems so that the chemical feeds may remain in service during construction, shutdown planning, development of a construction cost estimate, advertisement and receipt of bids, and all other activities in advance of construction.

Supernatant Pump Station Improvements

Decant from the solids thickeners and filtrate from the belt presses are conveyed to the supernatant pump station, which pumps these flows to the inlet of the washwater reclamation plant for further treatment. The supernatant pump station was originally constructed in the early 1980s, and was equipped with three vertical turbine pumps. These three pumps have become unreliable and need to be refurbished. The coatings of the existing carbon steel pump columns have failed due to age and occasional entrainment of abrasive solids, which has caused severe corrosion of the columns. The addition of two solids thickeners and belt presses to the plant's solids handling facilities in 2008 have increased the amount of flow which needs to be pumped to the washwater reclamation plant. If operation of the pump station were interrupted due to either pump failure or insufficient pump capacity, the decant/filtrate generated from the solids handling processes would overflow the pump station and potentially spill into the on-site storm drain system.

This project will install one additional pump and refurbish the existing three pumps at the supernatant pump station. The highly corroded carbon steel pump columns will be replaced with stainless steel columns. The procurement contract for the new supernatant pump was awarded under the General Manager's Administrative Code authority. Metropolitan forces will install the new pump and refurbish the three existing pumps.

Diemer Plant Improvements for FY 2012/13 through FY 2017/18 **15478**

Total Appropriation Estimate:	$7,400,000	**Total Projected Through June 30, 2014:**	$305,500
Appropriated Amount:	$375,000	**Estimated Percent Complete:**	6%
Biennial Estimate:	$1,814,000	**Estimated Completion Date:**	2017

Scope

This appropriation was established to plan and implement multiple projects at the Diemer plant. The common driver for many projects is infrastructure reliability.

Purpose

To maintain reliability and ensure regulatory compliance of the Diemer plant.

Accomplishments Through FY 2013/14

Through FY 2013/14, no projects have been completed.

Major project milestones in FY 2013/14:

Diemer Chemical Tank Farm Improvements – Began preliminary design

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Diemer Administration Building Improvement	$1,152,000	2015	Complete final design
Diemer Chemical Tank Farm Improvements	$3,436,900	2017	Begin final design
Diemer Filter Chlorine Injection at Filter Outlet Conduit	$369,900	2017	Begin final design
Hatch Cover Replacement at Basins and Filter Areas	$1,461,601	2016	Complete construction

Administration Building Improvements

The Diemer plant's 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. There is a significant amount of unused areas within the building that were previously used for process systems, obsolete equipment, and storage that should be converted to useful operating areas. Additional office space is needed for plant personnel such as the water quality liaison, security specialist, plant engineer, and safety monitor. Also, at the time the Diemer plant was constructed, the building was designed to meet the then-current building codes of the early 1960s. Fire sprinklers, smoke detectors, or other means of fire detection and suppression are not provided within the building. Four fire hydrants are spaced around the building to meet current fire flow requirements. If a fire is visually observed, the local fire department will be contacted to combat the fire using the fire hydrant water. Existing windows throughout the building have not been upgraded since the original construction 50 years ago; energy efficient replacement windows will substantially reduce building heating and cooling costs.

This project will renovate the Administration Building and provide an early fire warning system to allow timely evacuation of building occupants and to enable quick response to address small fires within the building using portable fire extinguishers to contain and squelch them before they spread. Due to the potential hazard from high voltage equipment in the basement of the Administration Building, complexity, and potential cost, the installation of fire sprinklers in the Administration Building is not recommended. Instead, this project will add fire alarms, smoke detectors and temperature sensors, fire dampers, HVAC system interlocks, and other methods to reduce the risk of loss, such as addition of clean-agent fire suppression systems in electrical rooms. Ongoing condition assessment activities include field investigations, meetings with the Orange County Fire Authority, development of conceptual layouts, and development of a conceptual-level construction cost estimate.

Chemical Tank Farm Improvements

The Diemer plant has two tank farms to support the chemical feed requirements of the water treatment process. The plant's central tank farm was originally constructed in 1963 as a chlorine unloading facility, and, in 2003, was converted to a temporary chemical feed facility with two 9,000-gallon, cross-linked polyethylene tanks. The two existing tanks currently store fluorosilicic acid. They have reached the end of their service life, and need to be replaced. In addition, the central tank farm's existing 28-foot by 48-foot roof and siding panels need to be modified to accommodate installation of the two new storage tanks, and to provide better clearance to facilitate periodic inspection and maintenance of the tanks. The material of the existing panels is transite, an asbestos-containing material, which will need to be abated. The existing east tank farm was constructed in the 1980s and consists of two 50,000-gallon tanks and associated chemical feed equipment. The two tanks currently store caustic soda. Chemical containment is provided to capture potential spills within the 32-foot by 48-foot uncovered tank farm area. If any chemical spills were to occur, the material would be removed and disposed of appropriately. Similarly, any rainfall captured in the containment area is considered to be contaminated under new environmental regulations. Captured rainfall greatly contributes to the total volume which must be handled as hazardous waste. Charges have exceeded $100,000 per year for the disposal of mostly captured rainwater.

This project will install new roof and support structures at the central and east tank farms, and two new storage tanks at the central tank farm. Ongoing preliminary design activities include field surveys to create baseline record drawings, preparation of environmental documentation, review of applicable codes, development of a preliminary construction cost estimate, and development of preliminary design layout drawings.

Hatch Cover Replacement at Basins and Filter Areas

The Diemer plant's treatment basins include 20 surface mounted, steel hatch covers for personnel and equipment access to perform maintenance activities. The filter areas also contain access hatches. These hatches were installed during the original plant construction in the 1960s. All of the steel hatch covers have become severely corroded, creating a misalignment which prevents complete closure and creates tripping hazards. Some of these hatches have rusted openings, resulting in a potential cross connection, while some of the concrete edges supporting the hatch covers have spalled.

This project will replace corroded hatch covers over the treatment basins and filter areas, remove and dispose of any PCB-containing sealant in the concrete joints, and repair spalled concrete. Ongoing preliminary design activities include field investigations, preparation of environmental documentation, development of a preliminary

construction cost estimate, and development of preliminary design layout drawings.

Filter Chlorine Injection at Filter Outlet Conduit

When ozone disinfection commences at the Diemer plant, the chlorine dosage supplied at the filter outlet channel will be increased because chlorination at upstream locations will be eliminated or significantly reduced in order to meet the U.S. Environmental Protection Agency's Disinfectants/Disinfection By-Products Rule (D/DBP Rule) requirements. The filter outlet chlorine increase will have minimal impact on the formation of chlorinated byproducts such as trihalomethanes, as ammonia is added to form chloramines, which produce significantly fewer chlorinated by-products. This increase, however, will be adequate to control bacteriological growth in the distribution system. This single chlorine feed location becomes a critical last step to complete the treatment process in order to comply with the drinking water regulations.

This project will install one additional chlorine injection point in the filter outlet conduit immediately downstream of the west filters to increase reliability. The existing combined filter outlet injection point will then provide the opportunity to fine-tune the final residual chlorine dosage. This project will also install a flow meter to establish the chlorine dosage requirement of the west filter outlet, and an additional chlorine evaporator at the chlorine containment facility to provide the needed redundancy to support the overall chlorine disinfection operation. Ongoing preliminary design activities include field surveys to create baseline record drawings, preparation of environmental documentation, review of applicable codes, development of a preliminary construction cost estimate, and development of preliminary design layout drawings.

Diemer Plant Oxidation Retrofit 15389

Total Appropriation Estimate:	$366,232,000	**Total Projected Through June 30, 2014:**	$342,823,000
Appropriated Amount:	$366,232,000	**Estimated Percent Complete:**	99%
Biennial Estimate:	$2,924,000	**Estimated Completion Date:**	2016

Scope

This appropriation was established to design and construct oxidation retrofit facilities at the Diemer plant. The appropriation consists of the following projects: 1) Chemical Tank Farm Improvements, 2) Plant Maintenance Facility and Vehicle Maintenance Center, 3) Site Preparation (South Slope Stabilization), 4) Ozonation Facilities, and 5) Purchase and Installation of Ozone Equipment.

Purpose

To reduce the level of disinfection by-products in the treated water supplied by the Diemer plant in order to meet state and federal standards and provide consistent and equitable high quality treated water to all of Metropolitan's member agencies.

Accomplishments Through FY 2013/14

Through FY 2013/14, all projects have been completed with the exception of:

1. Preparation of as-built drawings of the new ozonation facilitities.
2. Design and construction of south slope revegetation and mitigation improvements.
3. Diemer ORP Completion project.

Major project milestones in FY 2013/14:

Construction of Ozonation Facilities – Completed testing and start up

Diemer Ozone System Equipment – Completed testing and start up

Diemer South Slope Revegetation and Mitigation Improvements – Continued final design

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Diemer Ozonation Facilities	234,711,000	2015	Complete project
Diemer ORP Completion Activities	$2,659,600	2015	Complete record drawings
Diemer South Slope Revegetation and Mitigation Improvements	$2,106,700	2016	Begin construction

Ozonation Facilities

The addition of ozone as the primary disinfectant at each of Metropolitan's treatment plants substantially reduces the formation of disinfection by-products for compliance with the U.S. Environmental Protection Agency's Disinfectants/Disinfection By-Products Rule. The use of ozone also enhances Metropolitan's ability to treat water with varying source-water quality, and provides critical operational flexibility to meet treatment challenges resulting from periodic water supply events such as drought or other source-water limitations. Further, ozonation is effective in controlling taste-and-odor causing compounds which may be present from time to time, as well as some pharmaceuticals/personal care products, endocrine disruptors, and algal toxins. In addition to these overall water quality benefits, the use of ozone provides important operational advantages, allowing Metropolitan to eliminate blend restrictions of State Water Project and Colorado River Aqueduct source waters.

This project constructed the ozone generation building, ozone contactors, contactor inlet and outlet conduits, contactor rejection tunnel, liquid oxygen storage and feed system, chemical feed facilities, the plant electrical switchgear and emergency generator buildings, large-diameter yard piping and conduits; added and modified plant utilities and controls; performed demolition, grading, and paving; completed tie-ins to existing facilities; placed the initial landscaping; and installed and commissioned the ozone equipment furnished by Metropolitan. Construction of the Diemer ozonation facilities was completed in June 2013. Record drawings will be prepared to document the upgraded facilities.

Completion Activities

To enable the ozonation facilities to commence operation, a series of key integration activities between the new and existing facilities at the Diemer plant must be completed, such as modification of life safety systems and integration of plant control, communication, and chemical systems. These activities are being performed by Metropolitan forces, which are more cost-effective than use of a construction contract due to the greater flexibility in scheduling of construction activities around plant operations, and to the reduced risk of contractor impacts or delays.

This project will enable the new ozonation facilities to commence operation after the completion of the main construction contract and to comply with the Disinfectants/Disinfection Byproduct Rule. These activities include modification of life safety systems; integration of plant control, communication, and chemical systems; calibration and testing of ozone process instruments; preparation of operational schematics for use by plant staff; and follow up work identified during the performance testing of the ozonation system.

South Slope Revegetation and Mitigation Improvements

The Orange County Fire Authority (OCFA) has designated an area that includes the Diemer plant as a Very High Fire Hazard Severity Zone. Accordingly, the OCFA requires that combustible material be reduced through vegetation clearing and maintenance to help mitigate the potential for fire. The OCFA recently issued revised vegetation management guidelines that require combustible vegetation material immediately surrounding the Diemer plant's infrastructure to be reduced, and also require regularly scheduled vegetation clearing and maintenance. Based on the OCFA guidelines, an assessment of the vegetation around the plant was conducted by staff to understand the risk of wild fires to the Diemer plant and to identify potential vegetation fire hazards. An updated revegetation plan was prepared to allow Metropolitan to control the type of flammable vegetation planted on the plant site to address commitments contained in the Diemer plant's environmental documents, preserve the stability of plant slopes, address local agency viewshed concerns, and minimize the cost and amount of required landscaping maintenance.

This project will revegetate the Diemer plant's south slope and install related mitigation improvements to meet the OCFA requirements and to satisfy other commitments. Ongoing final design activities include permitting and consultations with regulatory agencies; preparation of drawings and specifications for the south slope vegetation and irrigation systems; advertisement and receipt of bids; and all other activities in advance of award of a construction contract.

DVL Transformation 15334

Total Appropriation Estimate:	$92,800,000	**Total Projected Through June 30, 2014:**	$67,280,800
Appropriated Amount:	$92,800,000	**Estimated Percent Complete:**	75%
Biennial Estimate:	$100,000	**Estimated Completion Date:**	2015

Scope

This appropriation was established to begin transformation of the Diamond Valley Lake Property to incorporate revenue enhancement to extract value from the property while ensuring that Metropolitan's core business is protected. Current spending is aimed at completing current commitments required by the ground leases and at encouraging future development opportunities within the DVL properties, in a cost-effective manner, consistent with board-approved objectives.

Purpose

To fully implement the Metropolitan's Board directives on recreation and associated development at DVL.

Accomplishments Through FY 2013/14

Through FY 2013/14, nine projects have been completed.

Major project milestones in FY 2013/14:

Initiated entitlement process, including amending the Diamond Valley Lake Specific Plan and the existing specific plan covering the North Property as well as preparation of accompanying environmental assessments.

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
CEQA and Entitlement for Solar Power Facilities	$1,500,000	2018	Complete entitlement process and CEQA documentation

CEQA and Entitlement for Solar Power Facilities

The goal of the Diamond Valley Lake (DVL) land use plan is to protect Metropolitan's water resource facilities from incompatible land uses, while enhancing the value of the land and generating revenue. Much of this property is designated as reserve land and is permanently protected as mitigation for environmental impacts associated with Metropolitan projects. Almost 4,000 acres, mostly located adjacent to the east and west dams, are available for mixed use development, including renewable energy, commercial, and recreational uses. The DVL land use plan emphasizes renewable energy, commercial and light industrial uses, and does not contemplate Metropolitan funding the development. Metropolitan intends to develop solar energy farms on the north and west parcels at DVL through long-term leases with solar farm developer(s). These leases for renewable energy projects will generate revenue and potentially allow Metropolitan to purchase power for Metropolitan use at some future date. To implement these land use changes, compliance with the California Environmental Quality Act (CEQA) and completion of entitlements for all affected properties are required.

This project will carry out CEQA compliance and entitlement activities for DVL solar projects. Ongoing activities includes preparing and releasing a Request for Qualifications to pre-qualify developers with the capacity and competency to finance, plan, design, permit, own, operate, and maintain a solar farm. Request for Proposals will be issued to select the best qualified developers.

Enhanced Bromate Control 15472

Total Appropriation Estimate:	$9,600,000	**Total Projected Through June 30, 2014:**	$1,103,000
Appropriated Amount:	$1,970,000	**Estimated Percent Complete:**	13%
Biennial Estimate:	$1,381,000	**Estimated Completion Date:**	2019

Scope

This appropriation was established to determine the feasibility, study, preliminary design, and construct necessary facilities for the ammonia-chlorine bromate control process at the Diemer, Jensen, Mills, Skinner, and Weymouth plants.

Purpose

To control the formation of bromate, which is a regulated disinfection by-product, during the ozonation process, and reduce chemical costs.

Accomplishments Through FY 2013/14

Through FY 2013/14, no projects have been completed.

Major project milestones in FY 2013/14:

Enhanced Bromate Control Mills – Completed preliminary design

Enhanced Bromate Control Weymouth – Completed final design

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Enhanced Bromate Control Mills	$1,441,400	2018	Complete final design
Enhanced Bromate Control Weymouth	$6,642,500	2019	Begin construction

Weymouth Enhanced Bromate Control Facilities

Metropolitan initiated the Oxidation Retrofit Programs during the 1990s to change the primary disinfectant at its five water treatment plants from chlorine to ozone. The Weymouth ozonation facilities are planned to be operational by 2016. The addition of ozone as the primary disinfectant substantially lowers chlorinated disinfection by-product (DBP) levels for compliance with the U.S. Environmental Protection Agency's (USEPA's) Disinfectants/DBPs Rule. While ozone forms fewer DBPs than chlorine with Metropolitan's source waters, bromate is formed as a DBP when waters containing bromide (such as flows from the State Water Project) are ozonated. Bromate is regulated by the USEPA at a maximum contaminant level (MCL) of 10 micrograms per liter (µg/L), which is equivalent to 0.01 milligrams per liter (mg/L), based on a running annual average. Low levels of chloramines introduced upstream of ozone treatment are effective for bromate control.

This project will provide bromate control upgrades, including construction of a new aqueous ammonia tank farm with roof structure, unloading facilities, chemical feed system, and secondary containment and ammonia absorber facilities. In addition, two aqueous ammonia feed lines will be extended from the new tank farm to the injection point at the inlet of the ozone contactors. Two four-inch-diameter chlorine gas lines will be added from the chlorinators to the new chlorine injection point. The work will also include modifications to the plant's utility piping, control systems, instrumentation, chemical trenches, and chemical leak detection systems. Ongoing final design phase activities include detailed engineering analyses; preparation of drawings and specifications; development of a construction cost estimate; advertisement and receipt of bids; and all other activities in advance of award of a construction contract.

Mills Enhanced Bromate Control Systems

At the present time, control of bromate formation at the Mills plant can be achieved by two methods: sulfuric acid addition or chloramine addition. Both methods reduce the conversion of bromide to bromate. When sulfuric acid is added, the pH of the water is lowered upstream of the ozonation process. Following sulfuric acid addition and ozonation, the pH of the water is raised with caustic soda to provide a stable, noncorrosive finished water. With the goal of developing a lower-cost alternative to control bromate formation, a full-scale evaluation of chloramination to control bromate formation was conducted at the Mills plant beginning in July 2010 utilizing spare and short-term testing equipment. Low levels of chloramines introduced upstream of ozone treatment were as effective for bromate control as pH reduction using sulfuric acid, and performed better under certain conditions. From January 2012 to June 2012, chemical savings of approximately $400,000 were realized at the Mills plant by implementing this new process on a full-time basis.

This project will provide permanent, full-scale chemical feed systems for enhanced bromate control including modification of the existing aqueous ammonia tank farm and ammonia injection system at the plant inlet. A second aqueous ammonia solution pipe will be extended to the inlet structure and both feed lines will be equipped with isolation valves and magnetic flow meters. In addition, two new four-inch-diameter chlorine gas lines and diaphragm valves will be added, the chlorine ejectors will be modified, and the chlorine diffuser at the plant inlet will be relocated. The work will also include modifications to the plant's control systems, instrumentation, chemical trenches, and chemical leak detection systems. Ongoing final design phase activities include detailed engineering analyses; preparation of drawings and specifications; development of a construction cost estimate; advertisement and receipt of bids; and all other activities in advance of award of a construction contract.

Hydroelectric Power Plant Improvements 15458

Total Appropriation Estimate:	$26,500,000	**Total Projected Through June 30, 2014:**	$3,995,000
Appropriated Amount:	$4,517,000	**Estimated Percent Complete:**	28%
Biennial Estimate:	$3,270,000	**Estimated Completion Date:**	2021

Scope

This appropriation was established to implement a comprehensive rehabilitation plan that will identify deficiencies, ensure compliance with regulatory requirements, improve plant efficiency, and reduce maintenance on all hydroelectric power (HEP) plants. Inspection teams will identify physical conditions, needed repairs, upgrades, changes to maintenance procedures, and any unusual conditions. Several projects have been incorporated into this appropriation and completed, including the San Dimas Hydroelectric Plant Needle Valve Rehabilitation and the Scrollcase and Tailrace Refurbishment.

Purpose

To ensure reliability of Metropolitan's hydroelectric power plants.

Accomplishments Through FY 2013/14

Through FY 2013/14, two projects have been completed.

Major project milestones in FY 2013/14:

Carbon Creek Pressure Control Structure Seismic Upgrade – Began study

Foothill HEP Seismic Upgrade – Began study

Greg Avenue HEP Seismic Upgrade – Began study

Sepulveda Canyon Control Facility Seismic Upgrade – Began study

Sepulveda Canyon HEP Rehabilitation – Began study

Foothill HEP Rehabilitation – Began final design

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Carbon Creek Pressure Control Structure Seismic Upgrade	$1,165,900	2018	Begin preliminary design
Etiwanda HEP Rehabilitation	$2,925,000	2016	Complete construction
Foothill HEP Rehabilitation	$3,315,700	2018	Complete final design
Foothill HEP Seismic Upgrade	$1,917,400	2018	Begin preliminary design
Sepulveda Canyon Control Facility Seismic Upgrade	$3,097,700	2018	Begin preliminary design
Sepulveda Canyon HEP Rehabilitation	$2,269,100	2016	Complete final design

Project	Total Project Estimate	Estimated Completion	Planned Activity
San Dimas Hydroelectric Plant Rehabilitation	2,668,000	2017	Complete final design
Venice Hydroelectric Plant Rehabilitation	2,651,000	2017	Complete final design
Greg Avenue Seismic Assessment	1,157,000	2021	Begin preliminary design

Foothill Hydroelectric Plant Rehabilitation

The Foothill Hydroelectric Plant (HEP) was constructed in 1981 and is located adjacent to the Department of Water Resources' Castaic Lake facility, where it receives untreated State Water Project flows from that lake. After water passes through the single turbine, it is conveyed to the Jensen plant through the Foothill Feeder. When the hydroelectric plant is shut down, flows are diverted through a separate pressure control structure in order to maintain continuous water deliveries to the Jensen plant. The Foothill HEP can produce up to 9.1 megawatts of electricity. Depending on pipeline flow rates, daily revenues can range from $3,000 to $7,500. While the facility has received routine preventive maintenance, the electrical and mechanical systems are exhibiting signs of normal wear and tear after 30 years of service. Equipment requiring rehabilitation includes electrical protection relays, control relays, and mechanical piping for the generator cooling water systems. The failure of any of these components could cause the plants to unexpectedly shut down. Replacement of deteriorated electrical and mechanical components will help minimize repair costs and unplanned shutdowns.

This project will rehabilitate electrical and mechanical components at Foothill HEP. The project will upgrade the electrical protection relays and control relays, as they do not always function properly. The electrical upgrade will require documenting and modifying the turbine manufacturer's original proprietary design to accommodate the electrical and control equipment. The copper piping system which supplies cooling water to the generator enclosure will also be replaced, as it has begun to corrode. This project will also upgrade the cooling water system to eliminate discharge of lubrication water flows into the adjacent storm drain. Ongoing final design phase activities include equipment selection, preparation of drawings and specifications, development of a construction cost estimate, permitting, advertisement and receipt of bids, and all other activities in advance of award of a construction contract.

Sepulveda Canyon Hydroelectric Plant Rehabilitation

The Sepulveda Canyon Hydroelectric Plant (HEP) was constructed in 1982. It receives treated water from the Jensen plant via the Sepulveda Feeder, and can produce up to 8.6 megawatts of electricity with its single turbine. When the hydroelectric plant is shut down, flows are diverted through a separate pressure control structure in order to maintain continuous treated water deliveries into the Central Pool. Depending on pipeline flow rates, daily revenues can range from $2,000 to $4,500. While the facility has received routine preventive maintenance, the electrical and mechanical systems are exhibiting signs of normal wear and tear after 30 years of service. Replacement of deteriorated electrical and mechanical components will help minimize repair costs and unplanned shutdowns.

This project will rehabilitate the Sepulveda Canyon HEP including recoating the internal components of the turbine, including the scroll case and tailrace, which have deteriorated over time. The coatings in the tailrace area have large areas with severe corrosion, including blistering, delamination, and rusting of the metal surfaces. This project will upgrade the electrical protection relays and control relays. The electrical upgrade will require documenting and modifying the turbine manufacturer's original design to accommodate the new electrical and control equipment. In addition, the transformer ventilation system will be replaced, as it runs hotter than the manufacturer's recommendations due to poor air ventilation in the transformer yard. The bearing cooler will also be upgraded to comply with current cross-connection prevention regulations. This will require a custom double-walled bearing cooler to meet space and thermal characteristics of the existing bearings and bearing housings without compromising the efficiency of the system. Ongoing final design activities include equipment selection, preparation of drawings and specifications, development of a construction cost estimate, advertisement and receipt of bids, and all other activities in advance of award of a construction contract.

San Dimas Hydroelectric Plant Rehabilitation

The San Dimas Hydroelectric Plant (HEP) was constructed in 1981. It receives untreated State Water Project flows from the Department of Water Resources' Devil Canyon facility via the Rialto Pipeline. After water passes through the single turbine, it is conveyed to the Weymouth plant through the La Verne Pipeline. When the hydroelectric plant is shut down, flows are diverted through a separate pressure control structure in order to maintain water deliveries to the Weymouth plant. The San Dimas HEP can produce up to 9.9 megawatts of electricity. Depending on pipeline flow rates, daily revenues can range from $2,000 to $11,000. While the facility has received routine preventive maintenance, the electrical and mechanical systems are exhibiting signs of normal wear and tear after 30 years of service. The condition assessment identified that the copper piping system which supplies cooling water to the generator enclosure has also begun to corrode. Due to the close proximity to high voltage equipment, any leakage or spray of water occurring as a result of pipe corrosion could damage the generator and electrical system.

This project will rehabilitate electrical and mechanical components of San Dimas HEP. Ongoing preliminary design phase activities include: detailed physical inspection which includes partial tear-down of electrical panels; selection of design criteria based on recent technological advances and compatibility with existing equipment; assessment of upgrades needed to comply with current building and safety codes; permitting; preparation of as-is drawings; and development of a preliminary construction cost estimate.

Venice Hydroelectric Plant Rehabilitation

The Venice Hydroelectric Plant (HEP) was constructed in 1982. It receives treated State Water Project flows from the Jensen plant via the Sepulveda Feeder, and can produce up to 10 megawatts of electricity with its single turbine. When the hydroelectric plant is shut down, flows are diverted through a separate pressure control structure in order to maintain continuous treated water deliveries into the Central Pool. Depending on pipeline flow rates, daily revenues can range from $3,000 to $15,000. While the facility has received routine preventive maintenance, the electrical and mechanical systems are exhibiting signs of normal wear and tear after 30 years of service. The condition assessment identified that the power transformer is approaching the end of its service life and is experiencing high internal oil temperatures, which could lead to failure of the equipment. Electrical components such as protection relays and control relays do not always function properly. In addition, spare parts for some of the electrical equipment are difficult to obtain or are no longer available.

This project will rehabilitate electrical and mechanical components of the Venice HEP, which will reduce future repair costs and minimize unplanned shutdowns. Ongoing preliminary design phase activities include: detailed physical inspection which includes partial tear-down of electrical panels; selection of design criteria based on recent technological advances and compatibility with existing equipment; assessment of upgrades needed to comply with current building and safety codes; permitting; preparation of as-is drawings; and development of a preliminary construction cost estimate.

Sepulveda Canyon Control Facility Seismic Assessment

The Sepulveda Canyon Control Facility consists of a pressure control structure, hydroelectric plant, and two water storage tanks. The facility is located near the top of the Sepulveda Pass, immediately west of the San Diego Freeway (I-405) near the J. Paul Getty Museum. The pressure control structure was constructed in the early 1970s to reduce pressure in the 9-foot-diameter Sepulveda Feeder as it conveys treated water from the Jensen plant. The two water tanks have a combined capacity of 18 million gallons of water and are used to regulate flows through the pipeline. The hydroelectric plant, which was constructed in 1982, takes advantage of excess pressure in the Sepulveda Feeder to generate up to 8.6 megawatts of electricity with its single turbine. When the hydroelectric plant is not operating, flow is diverted through the pressure control structure to maintain continuous treated water deliveries into the Central Pool, and to service connections for the city of Los Angeles and West Basin Municipal Water District. The pressure control facility is a reinforced concrete structure located on top of a large pad that was constructed by filling a steeply sloped V-shaped ravine. The pad is approximately 120 feet above the toe of the slope. The site is located within one mile of the Santa Monica Fault, which is capable of generating a 6.8 magnitude earthquake. Preliminary slope analyses indicate that the fill could slide down the slope during a major earthquake, causing significant damage to the pressure control structure, the water tanks, and the hydroelectric plant. A seismic-induced failure of the pressure control structure could result in interruption of water deliveries to the Central Pool and loss of daily revenues of up to $4,500.

This project will consolidate all seismic upgrade efforts for the entire Sepulveda Canyon Control Facility and seismically upgrade the facility. Ongoing activities for the seismic assessment include comprehensive structural modeling of the pressure control structures, hydroelectric power plant, and tanks; evaluation of retrofit options to address identified deficiencies; geotechnical site investigation; and slope stability analyses including an integrated finite element model to assess options for slope strengthening in order to minimize vertical settlement and lateral displacement.

Foothill Hydroelectric Plant Seismic Assessment

The Foothill Pressure Control Structure was constructed in 1975 and the hydroelectric plant was added in 1981. The facility is located on the Foothill Feeder, immediately downstream of the Department of Water Resources' Castaic Lake. The Foothill Feeder conveys untreated State Water Project flows from Castaic Lake to the Jensen plant in Granada Hills. The Foothill Hydroelectric Plant (HEP) is constructed of a precast concrete roof which is supported by exterior columns. The structure features a main level and a basement level. The structure is 192 feet long by 56 feet wide and 14 feet high. The basement level extends 45 feet below ground and contains a single turbine/generator which can produce up to 9.1 megawatts of electricity. When the hydroelectric plant is not operating, flow is diverted through the pressure control structure to maintain continuous water deliveries to the Jensen plant. The Foothill HEP is located within 13 miles of the San Andreas Fault, which is capable of generating a magnitude 8 earthquake. A seismic-induced failure of the control structure could result in interruption of water deliveries to the Jensen plant and loss of daily revenues of up to $7,500.

This project will seismically upgrade the Foothill HEP. Ongoing activities for the seismic assessment include comprehensive structural analyses of the building and evaluation of retrofit options to address identified deficiencies**.**

Carbon Creek Pressure Control Structure Seismic Assessment

The Carbon Creek Pressure Control Structure was constructed in 1972. The structure is located south of the intersection of East Orangethorpe Avenue and North Community Drive in the city of Placentia. This control structure maintains operating pressure and controls flows on the Second Lower Feeder, while maintaining water deliveries from the Diemer plant into the Central Pool. The Carbon Creek Pressure Control Structure is constructed of a reinforced concrete roof which is supported by reinforced concrete exterior walls. The 111-foot-long by 55-foot-wide structure contains a main level and a basement. The basement extends 28 feet below the structure to connect the Second Lower Feeder to the pressure control valves. The Carbon Creek Pressure Control Structure is located four miles from the Whittier Fault, which is capable of generating a 6.8 magnitude earthquake. A seismic-induced failure of the structure could result in interruption of water deliveries into the Central Pool.

This project will seismically upgrade the Carbon Creek Pressure Control Structure. Ongoing activities for the seismic assessment include comprehensive structural analyses of the building and evaluation of retrofit options to address identified deficiencies**.**

Etiwanda Hydroelectric Plant Rehabilitation

The Etiwanda Hydroelectric Plant (HEP) was constructed in 1994 and is located in the city of Rancho Cucamonga. It receives State Water Project (SWP) flows from the Department of Water Resources' Devil Canyon facility via the Rialto Pipeline and the Etiwanda Pipeline, and can produce up to 23.9 megawatts of electricity with its single turbine. Under peak flow conditions, annual revenues from the Etiwanda HEP have reached $8.3 million. The Etiwanda HEP may be kept out of service when SWP allocations are low and will be out of service when lining repairs are made to the Etiwanda Pipeline in 2014-2019. The plant's impulse turbine is driven by six water jets directed tangentially into "buckets" or "paddles" of a wheel-shaped runner turning in air. The runner translates the linear motion of the water into rotational motion by the use of blades or buckets. Each of six needle valves is used to regulate the flow of water to the runner and is regulated by the governor via the hydraulic fluid power system and the control system. The plant is exhibiting signs of wear and tear and replacement parts have become difficult to obtain, have long lead times for delivery, or require modifications in order to use a commercially available part. The needle valves are no longer functioning properly under the hydraulic power system pressure. Two needle valves recently drifted from the closed position (0 percent) to 8 percent and 4 percent open, respectively, even though the hydraulic power supply and control system were off. In addition, the needle valves are full of debris and solids transported by the raw water into the turbine.

This project will rebuild the needle valves, rehabilitate the hydraulic control units, install on-line data acquisition and monitoring instrumentation, and refurbish and/or replace other deficient equipment. Ongoing condition assessment phase activities include: detailed visual inspections; materials testing; assessment of new technologies for equipment and performance monitoring; review of compiled operation and maintenance data; preparation of conceptual design reports for improvements; and preparation of conceptual-level construction cost estimates.

Greg Avenue Hydroelectric Plant Seismic Assessment

The Greg Avenue Hydroelectric Plant (HEP) was constructed in 1979. The plant is located on the corner of Greg Avenue and San Fernando Road within the San Fernando Valley. Treated water from the Jensen plant reaches the facility through the East Valley Feeder, and is then delivered to the cities of Los Angeles, Beverly Hills, Glendale and Burbank. The Greg Avenue HEP is constructed of a pitched wood roof which is supported by reinforced masonry exterior walls. The structure is 68 feet long by 33 feet wide and 14 feet high. This facility has three major features: a hydroelectric plant which can produce up to 1 megawatt of electricity with its single turbine; a control structure which can regulate flow through its three 24-inch motor-operated sleeve valves; and a pumping station which can pump up to 60 cfs into the Sepulveda Feeder or, if required, can pump west to Calleguas and Las Virgenes Municipal Water Districts. When the hydroelectric plant is not operating, flow is diverted through the pressure control structure in order to maintain continuous water deliveries from the Jensen plant. The Greg Avenue HEP is located approximately five miles from the Sierra Madre Fault, which is capable of generating a 7.1 magnitude earthquake. A seismic-induced failure of the Greg Avenue HEP could result in interruption of water deliveries to the Santa Monica Feeder, and loss of daily revenues of up to $1,500.

This project will seismically upgrade the Greg Avenue HEP. Ongoing activities for the seismic assessment include comprehensive structural analyses of the building and evaluation of retrofit options to address identified deficiencies.

Information Technology System - Infrastructure 15376

Total Appropriation Estimate:	$46,800,000	**Total Projected Through June 30, 2014:**	$30,170,000
Appropriated Amount:	$36,401,000	**Estimated Percent Complete:**	66%
Biennial Estimate:	$15,203,000	**Estimated Completion Date:**	2016

Scope

This appropriation was established to impliment multiple projects to ensure the reliability and efficiency of the Information Technology Infrastructure in support of Metropolitan's operational and business applications. This appropriation contains fifteen completed projects including IT Telecommunications Upgrade, IT Business System Data Recovery, Exchange Replacement, and Phonemail Replacement.

Purpose

To ensure reliability of IT infrastructure for critical business applications.

Accomplishments Through FY 2013/14

Through FY 2013/14, fifteen projects have been completed.

Major project milestones in FY 2013/14:

Communication Infrastructure Reliability Upgrade – Continued design

Emergency Radio Communications Project – Continued design

Lake Mathews IT Disaster Recovery Facility Upgrade – Continued deployment

Union Station Data Center UPS Upgrade – Completed construction

Objectives for 2014/15– 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Communication Infrastructure Reliability Upgrade	$7,771,900	2016	Complete design
Emergency Radio Communications Upgrade	$11,780,900	2016	Complete design
Lake Mathews IT Disaster Recovery Facility Upgrade	$913,000	2015	Complete deployment
Union Station Data Center UPS Upgrade	$1,069,300	2015	Complete record drawings

Communication Infrastructure Reliability Upgrade

Metropolitan's communication network was constructed in the late 1990s and consists of two primary networks: a voice network that carries voice and voicemail traffic, and a data communication network that is conveyed over Metropolitan's Wide Area Network (WAN). The WAN supports data traffic such as transmission of Automated Meter Reading (AMR) system information, Supervisory Control & Data Acquisition (SCADA) data (system operational control data), system alarms for Metropolitan's hydraulic control facilities, security camera feeds, Oracle financial information, staff timekeeping information, business emails, PeopleSoft applications, geographical information system (GIS) data, and teleconferencing data. Metropolitan's existing voice and data communication infrastructure is nearing the end of its reliability life cycle and needs to be replaced. The equipment is no longer supported by its manufacturer and many of the parts are no longer available from third-party vendors. Recent advances in technology have created an opportunity to use a single network to efficiently support both voice and data communications. At Metropolitan, a single data communication network can be created most cost effectively by upgrading the equipment that supports the existing WAN. The upgraded WAN will be able to transmit both voice and data, and will accommodate advanced phone and communication capabilities such as instant messaging, E-FAXs, and web-based video conferencing.

This project will create a single data communication network, consistent with previous procurement practices for WAN equipment. In addition, mechanical and electrical upgrades to telecommunication rooms at the Union Station Headquarters Building will be performed. A procurement contract for the parts required to upgrade Metropolitan's data communication equipment was awarded and those parts have been installed by Metropolitan forces. Ongoing activities include software and hardware procurement to replace the phone system with a Voice Over Internet Protocol system, which will support the future implementation of other advanced communication technologies that can assist in lowering costs, facilitating collaboration of dispersed employees, connecting mobile and remote employees, minimizing delays in locating key staff, and improving efficiency.

Lake Mathews IT Disaster Recovery Facility Upgrades

Metropolitan's Information Technology (IT) Disaster Recovery Facility (DRF), located adjacent to Lake Mathews, houses IT equipment which provides recovery of critical business functions following a disruption in service, whether the disruption is minor, such as a power outage, or major, such as an earthquake. Adequate, reliable recovery capability for critical business systems is essential to reduce the consequences of an interruption of service. In light of lessons learned as a result of Hurricane Katrina, improvements are recommended to enhance the reliability of the DRF.

This project will upgrade the DRF, including: addition of an Uninterruptible Power Supply (UPS) to prevent power surges; addition of a permanent emergency generator to ensure back-up power is available; expansion of the existing fire suppression system to protect the entire DRF building; addition of security and remote monitoring systems; seismic upgrades; and upgrade of the HVAC equipment to replace the current portable system. Ongoing activities include preliminary design of the fire suppression system and seismic upgrades; final design, procurement, and installation of the security and remote monitoring systems, UPS, and emergency generator; and final design and construction of the HVAC upgrades.

Emergency Radio Communications Upgrade

The two-way radio system is an important element of Metropolitan's communication strategy and emergency response plan. The system is primarily used for daily operational communications by field staff at the treatment plants, Colorado River Aqueduct pumping plants, conveyance and distribution system facilities, and at Headquarters. Metropolitan has more than 250 employees using two-way radios during routine operational activities, and may have over 500 users during emergencies. Radio communication is particularly vital during disasters such as earthquakes, when staff must be able to respond quickly and effectively to assess, repair, and operate damaged water conveyance, treatment, and distribution facilities. Cellular phone services become overloaded and are not a reliable means of communication during major regional events. Satellite phones have proven to be impractical for communication among large numbers of employees and are hindered by poor weather and the need to be outdoors to receive a signal. Therefore, it is particularly important that Metropolitan have a reliable two-way radio system with sufficient capacity for mission-critical communication during emergencies. Metropolitan's existing two-way radio communication system was initially designed and installed 18 years ago to support communications internal to individual facilities. Licensed radio frequencies were acquired with the local needs in mind. As the distribution system evolved, and its operations became centralized, communications

between the treatment plants became more crucial in order to coordinate efforts, especially in the event of a major disaster impacting more than one region of Metropolitan's service area. While the radio system has been expanded to partially address this need for expanded coverage, the current system design has significant limitations including its inability to provide complete geographic coverage of Metropolitan's service area. Additionally, Metropolitan does not enjoy exclusive use of two-way radio frequencies, which can result in interference from other entities.

This project will upgrade the two-way radio system. Ongoing activities include completing the preliminary system design, conducting radio site surveys to assess equipment and infrastructure needs, defining specific technical requirements, generating detailed frequency coverage maps, and evaluating proposals from prospective vendors to complete the design and installation of the upgrade.

Union Station Data Center - Uninterruptible Power Supply (UPS) Upgrade

Metropolitan's data center, which was constructed in 1998, is housed in a 4,000-square-foot area within the Union Station Headquarters Building in Los Angeles. The data center acts as Metropolitan's centralized repository for data processing, storage, and network communications for the following key systems: (1) Financial - Water billing, which calculates customer water usage and generates bills; (2) Emergency Response - Two-way radio system; (3) Water Operations - Supervisory Control and Data Acquisition and Automated Meter Reading systems, which are used to control and meter water deliveries throughout Metropolitan's service area; (4) Water Quality - Laboratory Information Management System, which manages and tracks water sampling and testing results; and (5) Engineering - Programs that monitor and measure seepage and displacement of dams. The existing 14-year-old uninterruptible power supply (UPS) at Metropolitan's Headquarters Building has reached the end of its service life and is becoming less reliable. The UPS system's main function is to prevent fluctuations in electric power that could cause equipment failures, and to serve as a backup power supply in case of loss of utility power. A UPS system differs from an emergency standby generator in that it provides near-instantaneous power during the interim period prior to the standby generator coming on-line, or until its connected equipment is properly shut down. Replacement of the UPS is needed to reduce the potential for service disruption, loss of critical data, or damage to Metropolitan's data systems, which support financial operations, emergency response, communications, water operations, and engineering functions.

This project removed the existing UPS and installed a new UPS system within the existing UPS room, installed new electrical equipment such as bypass switches and terminal boxes, modified existing power distribution equipment including rerouting of electrical conduits and cables, modified the Headquarters Building's automation system, and modified the UPS room's existing sub-floor steel frames to accommodate the new UPS layout. In addition, the UPS room's air conditioning ductwork was modified to improve air circulation and provide cooling system redundancy. Construction was completed in February 2014. Record drawings will be prepared to document the upgraded system.

Information Technology System Security 15378

Total Appropriation Estimate:	$5,906,000	**Total Projected Through June 30, 2014:**	$5,217,000
Appropriated Amount:	$5,906,000	**Estimated Percent Complete:**	92%
Biennial Estimate:	$451,300	**Estimated Completion Date:**	2015

Scope

This appropriation was established to enhance and upgrade the functionality, reliability, security and to protect against cyber threats of Metropolitan's business and SCADA systems. This appropriation contains several completed projects including the Information Security Monitoring Improvement, SCADA Security Improvement, SCADA Operator Authentication, and PeopleSoft Upgrade.

Purpose

To implement technologies that provide most cost-effective and threat-reducing benefits to Metropolitan with public safety and security represented at all levels.

Accomplishments Through FY 2013/14

Through FY 2013/14 seven projects have been completed.

Major project milestones in FY 2013/14:

SCADA Cyber Security Upgrades – Completed development

Objectives for 2014/15– 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
SCADA Cyber Security Upgrades	$1,454,600	2015	Complete deployment

SCADA Cyber Security Upgrades

Cyber security is high priority and is a key part of the Information Technology Strategic Plan (ITSP). Maintaining a secure computing environment requires regular enhancements and upgrades to Metropolitan's IT information security infrastructure to ensure protection against continually evolving cyber threats. New vulnerabilities are identified on a regular basis and require ongoing efforts to analyze risks and to implement countermeasures to protect against them to maintain the security and reliability of our systems. Metropolitan utilizes a Supervisory Control and Data Acquisition (SCADA) system to control the flow and treatment of water. It is comprised of instrumentation, hardware, software, and data networks that run 24 hours per day, seven days per week throughout the distribution system, Colorado River Aqueduct, and treatment plants. The SCADA system also supplies information for more than 80 core business functions at Metropolitan. Upgrades to reduce cyber security risks for Metropolitan's SCADA system by implementing additional countermeasures are needed to help protect against unauthorized access and to help ensure that Metropolitan's SCADA system used to control the flow and treatment of water is adequately protected from cyber threats.

This project will strengthen SCADA cyber software security countermeasures by implementing best practices upgrades and by validating previous efforts. Ongoing efforts include continuing assessment to identify potential vulnerabilities and make recommendations for strengthening cyber security; design and implementation of cyber security enhancements; purchase of security-related software and hardware tools; and validation of the implementation of best practice cyber security measures.

Infrastructure Reliability Information System 14502

Total Program Estimate:	$2,400,000	**Total Projected Through June 30, 2014:**	$0
Appropriated Amount:	$0	**Estimated Percent Complete:**	0%
Biennial Estimate:	$1,789,000	**Estimated Completion Date:**	2017

Scope

This appropriation is established to update and integrate equipment maintenance reporting tools to enhance management and tracking of assets, improve maintenance and engineering work planning, and track equipment performance data by integrating data from several information systems to support condition-based equipment maintenance and improved selection of replacement equipment.

Purpose

To improve data and information flow and processing, and provide decision making tools related to Metropolitan's major Infrastructure Reliability and Asset Maintenance initiatives.

Accomplishments Through FY 2013/14

This is a new appropriation; no projects have been completed.

Objectives for 2014/15– 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Asset Information Services	$2,000,000	2017	Complete planning, update applications, begin data integration and information reporting.

Asset Information Services

Metropolitan owns, maintains, and operates a large inventory of physical assets. Over 130,000 of these assets are tracked using a maintenance management software package called Maximo to manage maintenance activities on its water conveyance, treatment, and distribution systems. Maximo facilitates the planning and scheduling of maintenance activities (i.e., preventive and corrective maintenance work orders) and acts as a repository for maintenance-related data. The locations of many assets are also tracked in Metropolitan's ESRI-based Geographic Information System (GIS) mapping software. The GIS currently contains over seven terabytes of asset, property, demographic, and geospatial mapping information for asset and real property management, hydraulic modeling, water quality tracking, and many other uses. Metropolitan also utilizes a Supervisory Control and Data Acquisition (SCADA) system, primarily to control the flow and treatment of water, but also to collect equipment information such as equipment runtime, cycle counts, and condition alarms which often trigger repairs. While these software systems individually provide basic information for a variety of business needs, they do not provide an integrated picture of information necessary to support condition-based equipment maintenance and infrastructure reliability. Because the current version of the Maximo software is no longer supported by the vendor, upgrade is needed. The current GIS software was last updated in 2009 and is not able to leverage modern data interfaces. Upgrades to the Metropolitan-wide SCADA system are now being planned under another project.

This project will update the Maximo and GIS software, provide basic integration of the Maximo, GIS, and SCADA information systems, and provide tools to enhance management and tracking of assets, improve maintenance and engineering work planning, and track equipment performance. Ongoing efforts include definition of project needs by assessing planning, engineering, and operation and maintenance requirements and data inventories, in order to update asset-centric software.

IT Infrastructure Reliability 15487

Total Appropriation Estimate:	$10,500,000	**Total Projected Through June 30, 2014:**	$406,000
Appropriated Amount:	$1,800,000	**Estimated Percent Complete:**	9%
Biennial Estimate:	$4,030,000	**Estimated Completion Date:**	2018

Scope

This appropriation is established to implement multiple projects to ensure the reliability and efficiency of the Information Technology Infrastructure in support of Metropolitan's operational and business applications.

Purpose

To ensure reliability of IT infrastructure for critical business applications.

Accomplishments Through FY 2013/14

Through FY 2013/14, seven projects have been completed.

Major project milestones in FY 2013/14:

Enterprise UNIX Server Upgrades – Completed design

IT Network Reliability Upgrades – Defined scope

Business System Cyber Security Upgrades – Defined scope

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Business Systems Data Recovery Upgrade	$502,000	2016	Begin design
Enterprise UNIX Server Upgrades	$1,548,400	2015	Begin development
IT Network Reliability Upgrades	$6,106,900	2018	Begin design
Business Systems Cyber Security Upgrades	$1,128,100	2016	Begin design

Enterprise UNIX Server Upgrade

Metropolitan's business and financial systems run on enterprise-class servers and are used to prepare water invoices, manage water laboratory information, perform maintenance management, collect employee timesheets, pay employees and vendors, track human resource information, and handle the general ledger and financial reporting. Enterprise-class servers are advanced servers in terms of processing performance and transaction volumes and are designed to handle multiple databases and high-end processing requirements. Metropolitan's enterprise-class servers primarily use the Oracle database system to support approximately 53 applications in various Oracle environments including the Oracle E-Business Suite, PeopleSoft Human Resources and Payroll, Water Invoicing, Timekeeping, Enterprise Geographic Information System (GIS), and numerous in-house applications. The existing servers were procured between 2000 through 2006 and are reaching the end of their normal expected life. Average enterprise-class server replacement cycles are in the range of seven to ten years. The existing servers cannot run newer versions of the operating systems needed for upcoming planned upgrades to PeopleSoft, GIS, and other applications. Replacement with the next generation of Itanium servers will enable continued, reliable support to Metropolitan's core business functions.

This project will provide replacement Itanium servers and associated operating system and system management software to replace end-of-life enterprise-class servers. Ongoing activities include procurement, installation, configuration, testing, and validation of the new servers and migration and testing of 53 applications on the new platform to ensure that they are functioning properly.

Business Systems Data Recovery Upgrade

Metropolitan's critical business functions are dependent on Information Technology (IT) applications, data, and the supporting IT infrastructure. Loss of any of these components could result in disruption to critical IT systems. In accordance with Metropolitan's Business Continuity Plan, key IT systems need to be quickly available following a disruption in service, whether the disruption is minor, such as a power outage, or major, such as an earthquake. Adequate, reliable recovery capability for critical business systems and supporting infrastructure is essential to reduce the consequences of an interruption of service. In 2006, servers and other IT components were installed at Metropolitan's Disaster Recovery Facility, located adjacent to Lake Mathews, to increase the capability to recover critical systems identified through a business impact analysis process. This data recovery system is fully functional and its effectiveness has been verified in numerous emergency exercises. The existing servers and other components are reaching the end of their normal expected life.

This project will upgrade the capabilities of the data recovery infrastructure to replace end-of-life hardware servers and other components at the Disaster Recovery Facility. Ongoing efforts include definition of project needs.

Business Systems Cyber Security Upgrades

Cyber security is a high priority and is a key part of the Information Technology Strategic Plan (ITSP). Maintaining a secure computing environment requires regular enhancements and upgrades to Metropolitan's IT information security infrastructure to ensure protection against continually evolving cyber threats. New vulnerabilities are identified on a regular basis and require ongoing efforts to analyze risks and to implement countermeasures to protect against them to maintain the security and reliability of our systems. Recent review of Metropolitan's Supervisory Control and Data Acquisition (SCADA) system and network resulted in SCADA cyber security enhancements. Similar review of business systems and the business network are now prudent.

This project will strengthen cyber software security countermeasures for the business systems and business network by implementing best practices upgrades and by validating previous efforts. Ongoing efforts include definition of project needs by assessing different aspects of the IT infrastructure to identify potential vulnerabilities and making recommendations for strengthening cyber security; design and implementation of cyber security enhancements; purchase of security-related software and hardware tools; and validation of the implementation of best practice cyber security measures.

IT Network Reliability Upgrades

Metropolitan's wide area network (WAN) network was constructed in the late 1990s. It transmits telephone, voice, data, and video communication between all Metropolitan facilities, utilizing point-to-point microwave transmission. Microwave radio relays transmit signals between two locations on a line-of-sight radio path. The network points are located at remote hilltops to provide point-to-point communication links. Metropolitan's WAN

presently comprises a network of 31 microwave transmission towers located throughout Southern California, including 12 which support the Colorado River Aqueduct. Each transmission site consists of a tower, directional antennas which form the connection between the incoming and outgoing signals, microwave radio equipment which is housed in small masonry structures, and fiber optic cable. The WAN transmits real-time data from the Supervisory Control and Data Acquisition (SCADA) system, Automated Meter Reading (AMR) system, security cameras, and system alarms to Metropolitan's control facilities, and provides access at remote sites to the email, Geographical Information System (GIS), Oracle financials, timekeeping, and PeopleSoft applications. Many of these systems run 24 hours per day, 7 days per week, as system operators rely on real-time communications to monitor and control Metropolitan's water delivery system. The current microwave radios and SCADA routers and switches are over 10 years old and near the end of their service life. Failure rates on electronic components in the radios have accelerated.

This project will replace microwave radios throughout the WAN, replace SCADA network routers and switches, and replace network core switches at Union Station and Lake Mathews. Battery backup systems at ten critical communication facilities will also be installed. Electrical grounding issues identified at fifteen communication facilities will be remediated. Ongoing efforts include definition of project needs.

Jensen Plant Improvements 15371

Total Appropriation Estimate:	$58,100,000	**Total Projected Through June 30, 2014:**	$34,833,000
Appropriated Amount:	$37,322,000	**Estimated Percent Complete:**	65%
Biennial Estimate:	$16,743,000	**Estimated Completion Date:**	2018

Scope

This appropriation was established to plan and implement multiple projects within the Jensen Water Treatment Plant. The common driver for many of the projects in this program is infrastructure reliability.

Purpose

To maintain reliability and ensure regulatory compliance of the Jensen plant.

Accomplishments Through FY 2013/14

Through FY 2013/14, eleven projects have been completed.

Major project milestones in FY 2013/14:

Jensen Bulk Chemical Tank Facility Upgrade – Continued final design

Jensen Chemical Tank Conversion – Completed construction

Jensen Module 1 Filter Valve Refurbishment – Completed final design

Jensen Solids Transfer System – Completed final design

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Jensen Bulk Chemical Tank Facility Upgrade	$7,497,600	2016	Begin construction
Jensen Module 1 Filter Valve Refurbishment	$12,111,900	2016	Complete construction
Jensen Module 1 Traveling Bridge Rehabilitation	$1,177,100	2016	Continue final design
Jensen Modules Nos. 2 and 3 Traveling Bridge Rehabilitation	$3,500,000	2016	Begin Preliminary design
Jensen Solids Transfer System	$3,616,900	2015	Complete construction
Jensen Entrance Security Improvements	$1,824,400	2017	Continue final design
Jensen Washwater Return Pump Modifications	$975,100	2018	Begin construction

The Jensen plant was placed into service in 1972 with an initial capacity of 350 million gallons per day (mgd), and was expanded in the early 1990s to its current capacity of 750 mgd. A major plant modification was completed in 2005, when the ozonation process commenced operation. The Jensen plant exclusively 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. Its treatment processes presently consist of pre-ozonation, flocculation, sedimentation, biological filtration, and final disinfection using chlorine and chloramines.

Module No. 1 Traveling Bridge Rehabilitation

Jensen Module No. 1 contains four sedimentation basins. Each basin 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 longitudinal basin walls. Each bridge carries a high-torque, slow speed motor-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 four traveling bridges in Module No. 1 have been in operation for over 40 years. The bridges' mechanical drive components have a 30-year expected service life, depending on service time and environment. In recent years, the mechanical drive components have shown significant signs of wear, including journal bearing wear and seizure, chain drive failure, and track misalignments. To date, these problems have been repaired on an as-needed basis. Due to the age and frequency of repair of the equipment, the equipment has reached the end of its useful life and needs to be replaced. If the mechanical drive components are not repaired, eventually the traveling bridges will not operate, and the entire Module No.1 will be unavailable for treating water.

This project will rehabilitate the Module No. 1 traveling bridge equipment. Major components to be replaced or repaired include electrical power rack bars, gear/chain drive components, bridge tracks, and control system upgrades. Each bridge will also be upgraded from the existing 10-pump system to a 3-pump system, which will be similar to the Jensen Modules Nos. 2 and 3 bridges and enable a simpler control system. Ongoing final design phase activities include preparation of drawings and specifications, shutdown planning, development of a construction cost estimate, advertisement and receipt of bids, and all other activities in advance of award of a construction contract.

Modules Nos. 2 and 3 Traveling Bridge Rehabilitation

Each of the eight sedimentation basins 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.

This project will repair the rails, replace the end-wheels, and refurbish the motor-drive system on all traveling bridges of Modules Nos. 2 and 3. Ongoing 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 construction cost estimate.

Washwater Return Pump Modifications

Constructed in 1991, the washwater return pumping station receives used filter backwash water that has been treated in the Washwater Reclamation Plants (WWRPs) Nos. 1 and 2. It discharges the reclaimed water back to the inlet of the Jensen plant. The station has five fixed-speed pumps with a combined capacity of 33 mgd. For certain plant flow conditions, the output from a single fixed-speed pump is too high for the station's small collection sump. Consequently, the pump repeatedly turns on/off over short periods of time, which can lead to motor failure and unstable return flow rates to the main plant. Due to frequent return pump starts and stops, the reclaimed water return flow can quickly fluctuate more than five percent of the raw source water flow entering the main plant. This causes the ozone generators to ramp up and down more frequently to maintain disinfection and impacts regulatory compliance monitoring. The ozonation process at the main plant operates best when incoming flows are stable.

This project will replace the existing fixed-speed motor drives with variable frequency motor drives (VFDs), allowing the existing pumps to operate over a larger range of fluctuating flow conditions within the confines of the existing small sump. VFDs on the existing pumps will reduce the number of times that the motors are started, prolonging motor life and ensuring efficient and continued operation of the station. This, in turn, will dampen spikes of reclaimed water flows into the main plant's inlet conduit and increase the efficiency of the ozonation process. Ongoing final design phase activities include preparation of drawings and specifications, shutdown planning, development of a construction cost estimate, advertisement and receipt of bids, and all other activities in advance of award of a construction contract.

Bulk Chemical Tank Facility Upgrades

Caustic soda is added to the filtered water to raise its pH in order to minimize deterioration of downstream concrete structures and corrosion within the distribution system. The 30,000-square-foot caustic soda tank farm at the Jensen plant was placed into service in 1972, during the plant's original construction. The tank farm includes four 50,000-gallon mixing tanks, four 127,000-gallon bulk storage tanks, piping, chemical feed pumps, and a chemical containment system for the tank farm and its adjacent rail car unloading area. The chemical containment system consists of perimeter containment curbing, a sump, and an underground spill containment tank. Since its original construction 40 years ago, the perimeter masonry block walls and the asphalt pavement within the tank farm have deteriorated as a result of weathering and seismic activity. The tank farm pavement and walls are in need of upgrade to reduce the risk of unintentional on-site discharge of hazardous materials, and to comply with current safety and environmental regulations. Although staff routinely patches the cracks, the containment area is in need of upgrade to contain potential leakage in the event of a chemical spill.

This project will include replacement of existing asphalt pavement with cast-in-place concrete pavement sloped to a new sump; replacement of unreinforced block walls with taller reinforced concrete walls and an improved foundation; application of chemical-resistant seal coating within the tank farm; disposal of contaminated soil, as required; removal of the existing industrial waste neutralizing tank and installation of two containment tanks, one for potential caustic soda spillage and one for potential acid spillage from the nearby sulfuric acid and alum tank farms; and replacement of the liner of the existing spill containment tank. Ongoing final design phase activities include the design of temporary and permanent pump and chemical piping systems; pumps, piping and instrumentation for the two new containment tanks; temporary relocation of electrical and control conduits and leak detection monitoring system; and update of plant control system programming for the temporary configuration; as well as preparation of drawings and specifications, development of a construction cost estimate, advertisement and receipt of bids, and all other activities in advance of award of a construction contract.

Module No. 1 Filter Valve Refurbishment

Module No. 1 contains 20 filters which have been in continuous service since 1972. In a typical filtration cycle, filters are operated by opening and closing a series of valves which allow water to flow in and out of the filter beds during filtration and backwashing. Each filter has four filter valves which range in diameter from 30 to 48 inches. These valves are operated in conjunction with two 42-inch-diameter isolation valves in the Module No. 1 backwash system, for a total of 82 valves. These valves are designed to close tightly to prevent mixing of filtered and unfiltered water and to prevent leakage into the washwater reclamation system. The Jensen plant's Module No. 1 filters have been in continuous service for over 40 years. Despite receiving regular maintenance, the filter valves have gradually deteriorated over time, including corrosion of the valve body and degradation of embedded seals.

This project will replace the filter valves. Due to the long lead-time needed to procure valves, a valve procurement contract was executed in 2012 and most of the 82 valves (including spares) have been fabricated and delivered to Metropolitan. Ongoing final design phase activities for installation of the valves include field investigations using 3-dimensional survey technology to efficiently detail the existing valve locations, adjacent equipment, and electrical conduits, in order to resolve dimensional conflicts prior to construction; design of piping and electrical modifications; design of extension shafts, support stands and adapter spools to connect the new valves to existing piping; hazardous materials investigation; preparation of drawings and specifications; development of a construction cost estimate; advertisement and receipt of bids; and all other activities in advance of award of a construction contract.

Entrance Security Improvements

The Jensen plant's existing perimeter security gates and guard stations were installed in the early 1990s during Jensen Expansion No. 1. The primary gate for visitor access is located off Balboa Boulevard at the southwestern boundary of the plant property. The secondary gate is located off San Fernando Boulevard and is used mainly for chemical delivery trucks, Metropolitan staff vehicles, and construction traffic. The guard station enclosures are located inside the perimeter fencing, requiring the guard to open the security gate to communicate with visitors. Improvements are needed to allow guards to better regulate vehicle and pedestrian access into the plant site and for security and access control.

This project will realign the entry roads, provide automated entrance gates, provide enhanced security features (camera connections and lighting) and signage at both entrances, and improve the landscaping with fire-resistant plants and a new irrigation water system along the west side of the plant. For the San Fernando Boulevard entrance, coordination will be required with several utility companies, due to the proximity of their facilities at the street/entrance junction. Ongoing final design phase activities include detailed field investigations, development of utility easements, preparation of drawings and specifications, development of a construction cost estimate, advertisement and receipt of bids, and all other activities in advance of award of a construction contract.

Solids Transfer System

Residual chemicals and settled solids collected from the Jensen plant's sedimentation basins are currently thickened on-site and then air-dried at two nearby LADWP lagoons on the grounds of its Los Angeles Aqueduct Filtration Plant (LAAFP). This cooperative arrangement, which was initiated in February 2005, provides sufficient solids handling capacity to process only 15 percent of the solids generated at the Jensen plant's maximum flow rate under design conditions. Solids produced at the Jensen plant may also be discharged to a city of Los Angeles sanitary sewer. However, sewer disposal is expensive and is limited by the discharge permit. A recently executed agreement with LADWP permits Metropolitan to use four solids lagoons at the LAAFP for a period of 50 years. The use of these lagoons, supplemented by a planned mechanical dewatering facility, will provide sufficient capacity to meet the anticipated solids handling needs of the Jensen plant. Under this agreement, four existing lagoons will be used by Metropolitan initially, while two of the four lagoons will be returned to LADWP for its use after 10 years. Metropolitan may then construct two new lagoons on LADWP property so that four lagoons remain available for Metropolitan use through the full duration of the agreement.

This project will provide a solids transfer system to transport thickened residual solids from the Jensen plant to newly refurbished LADWP lagoons at the LAAFP. The improvements will include 8,000 feet of pipeline; security fencing; utility conduits for transmission of Supervisory Control and Data Acquisition (SCADA) system information; a utility crossing of Bull Creek; four lagoon inlet structures; and various valves, flow meters, cleanouts, and appurtenances. Ongoing final design phase activities include detailed field investigations, development of utility easements, preparation of drawings and specifications, development of a construction cost estimate, advertisement and receipt of bids, and all other activities in advance of award of a construction contract.

Jensen Plant Improvements for FY 2006/07 through FY 2011/12 **15442**

Total Appropriation Estimate:	$84,700,000	**Total Projected Through June 30, 2014:**	$15,280,400
Appropriated Amount:	$24,146,000	**Estimated Percent Complete:**	20%
Biennial Estimate:	$27,676,000	**Estimated Completion Date:**	2019

Scope

This appropriation was established to plan and implement multiple projects at the Jensen plant. The common driver for many of the projects in this program is infrastructure reliability.

Purpose

To maintain reliability and ensure regulatory compliance of the Jensen plant.

Accomplishments Through FY 2013/14

Through FY 2013/14, three project have been completed.

Major project milestones in FY 2013/14:

Jensen Chemical Trench Extension – Completed construction

Jensen Basin Launder Gate Improvement – Completed construction

Jensen Electrical System Reliability – Continued final design

Jensen Filters Nos. 1-20 Surface Wash System Upgrades – Continued construction

Jensen Modules Nos. 2 & 3 Flocculator Refurbishment – Began final design

Jensen Washwater Tanks Seismic Upgrades – Began construction

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Jensen Electrical System Reliability	$45,559,700	2019	Begin construction
Jensen Filters Nos. 1-20 Surface Wash System Upgrades	$16,925,700	2015	Complete construction
Jensen Modules Nos. 2 & 3 Flocculator Refurbishment	$5,966,100	2016	Begin construction
Jensen Site Stabilization Geotechnical Investigations	$465,100	2015	Complete study
Jensen Washwater Tanks Seismic Upgrades	$4,677,700	2015	Complete construction

Filters Nos. 1-20 Surface Wash System Upgrade

Jensen Module No. 1 has a total of 20 granular tri-media filters which commenced operation in 1972. In order to clean and break up the solids that accumulate during filtration, the filter surface wash system sprays the top of each filter bed with high-pressure water through nozzles mounted on rotary arms. Following 40 years of operation, the 16-inch-diameter steel header pipes and appurtenances have corroded and deteriorated. The rotary wash arms occasionally fail to rotate, and some of the discharge nozzles have plugged with rust. These conditions have diminished the overall performance of the filters, as evidenced by mud ball formation and uneven filter cleansing, which can lead to removal of filters from service due to high outlet turbidity levels. The frequency of required repairs to components of the surface wash system has increased as the system continues to corrode.

This project will construct a new fixed nozzle surface wash system including new steel pipe headers, service water pumps, handrails, and light standards. Construction commenced in February 2013.

Washwater Tanks Seismic Upgrades

The Jensen plant utilizes two aboveground welded steel tanks to store filtered water for use in backwashing the plant filters. Backwashing cleanses the filters after they have been on-line for 20 to 80 hours in active filtration service. A small portion of the filtered water is pumped into and stored in the plant's washwater tanks, from which it is released by gravity to backwash dirty filters when needed. Each of the Jensen plant washwater tanks is a 100-foot diameter by 32-foot tall steel tank with a storage capacity of 1.5 million gallons. The south tank was erected in the late 1960s as a part of the original plant construction. It was damaged during the 1971 San Fernando Earthquake and was repaired thereafter. The north tank was constructed in 1991 when the plant was expanded to meet the increased demand for washwater. Both tanks were designed and constructed in accordance with applicable building codes of their time. The results of a seismic analyses indicated that during a seismic event, rupture could occur at the bottom plate of the tanks, with an uncontrolled release of water.

This project will provide structural upgrades to improve the tanks' capability to withstand a seismic event. Upgrades will include: installing a new anchorage system; adding a ring footing and micro-piles around each tank; adding a flexible coupling on the 42-inch-diameter interconnection pipe to prevent shell rupture at the pipe's inlet to each tank; roof repairs; and recoating as required. Construction of the seismic upgrades commenced in March 2014.

Electrical System Reliability – Stage 1

Principal components of the Jensen electrical system date to the plant's original construction in 1972. With each major upgrade that has occurred at the plant, the on-site electrical system was expanded or adapted to accommodate the increased electrical loads, without changing the architecture of the electrical system or its principal components. Many critical electrical components at the plant are over 40 years old, and their performance has begun to deteriorate. As the equipment continues to age, its ability to operate safely and reliably will diminish. The electrical system was initially designed as a radial system, with power running through a single path to each local unit power center (UPC) for distribution to powered equipment. This practice of powering all the components of a critical system from a single electrical source does not provide backup or reliability, and leaves the plant vulnerable to an unplanned outage caused by a single failure in the power system. These unplanned outages are disruptive to plant operations and can impact reliability of the treatment process.

This project will upgrade the Jensen plant's electrical system. Stage 1 will address the upgrade of critical electrical equipment located on the western portion of the site. The Stage 1 work includes upgrade of the plant's 4-kilovolt switchgear to provide a dual power feed to each UPC; expansion of the switchgear building; improvement of the standby generator control system; installation of electrical conduits and duct banks on the west side of the plant; upgrade of four UPCs and related motor control centers (MCCs) that power critical process equipment; and redistribution of the power feed to process equipment to improve reliability. Ongoing final design phase activities include field surveys, preparation of drawings and specifications, shutdown planning, development of a construction cost estimate, advertisement and receipt of bids, and all other activities in advance of award of a construction contract.

Electrical System Reliability – Stage 2 (and Jensen Site Stabilization - Geotechnical Investigation)

Under the future Stage 2 electrical system improvements, the remaining components of the electrical system in the eastern portion of the plant will be upgraded. The Stage 2 work will include installation of new duct banks to the

upgraded electrical equipment, and provision of a dual power feed. Much of this eastern area is located within a potential liquefaction zone. As a result, geotechnical issues regarding liquefaction of areas containing electrical facilities will be addressed. Ongoing study phase activities include compiling past subsurface data; collecting new subsurface data for geotechnical seismic analyses; performing plant-wide liquefaction and ground deformation analyses to determine areas of seismic vulnerability on the eastern side of the plant; and making recommendations to reduce the potential for plant outages during design seismic events.

Modules Nos. 2 and 3 Flocculator Refurbishment

Modules Nos. 2 and 3 each contain eight flocculation/sedimentation basins, which were constructed when the Jensen plant was expanded in the early 1990s. The flocculation section of each basin contains six 104-foot-long 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. 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. These mechanical components have deteriorated due to corrosion and need to be refurbished.

This project will clean the existing bearing housing assemblies; repair support columns, which have shifted due to past seismic activity; replace stub shafts; recoat interlocking shafts and paddle arms; and refurbish shaft seals to prevent leakage. Ongoing preliminary design phase activities include: 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.

Jensen Plant Improvements for FY 2012/13 through FY 2017/18 **15486**

Total Appropriation Estimate:	$6,800,000	**Total Projected Through June 30, 2014:**	$316,000
Appropriated Amount:	$255,000	**Estimated Percent Complete:**	9%
Biennial Estimate:	$1,739,000	**Estimated Completion Date:**	2017

Scope

This appropriation was established to plan and implement multiple projects at the Jensen plant. The common driver for many of the projects in this program is infrastructure reliability.

Purpose

To maintain reliability and ensure regulatory compliance of the Jensen plant.

Accomplishments Through FY 2013/14

Through FY 2013/14, no project has been completed.

Major project milestones in FY 2013/14:

Jensen Chemical Containment Upgrades – Began final design

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Jensen Chemical Containment Upgrades	$1,746,600	2016	Begin construction
Jensen Filter Backwash Biological Control System Rehabilitation	$195,600	2016	Complete construction
Jensen Finished Water Reservoir No. 1 Cover Rehabilitation	$2,102,900	2017	Begin final design
Jensen Influent Water Quality and Metering Structure	$359,700	2016	Begin construction
Jensen Tank Farm Caustic Metering and Control Facilities	$1,221,700	2017	Begin construction
Jensen Washwater Reclamation Plant Hand Rails and Grating Improvements	$244,600	2017	Complete construction

Chemical Containment Upgrades

Liquid cationic polymer is a primary coagulant used to improve the removal of turbidity in the water treatment process. The liquid polymer storage facility at the Jensen plant is over 40 years old and has begun to deteriorate. The existing polymer storage facility has four 2,800-gallon storage tanks. Two nearby 25,000-gallon storage tanks were recently converted to polymer storage. The adjacent unloading facility for liquid polymer does not have a permanent spill containment system. Temporary containment methods are used at the Jensen plant for unloading liquid polymer deliveries, with plastic trays placed under the tanker during unloading operations to capture minor drips or splashes. Larger spills of liquid polymer could potentially enter the on-site stormwater drainage system. The liquid polymer storage facilities are located adjacent to both the caustic soda and chlorine containment facilities. Since diluted caustic soda is used in the chlorine containment scrubber, the chlorine containment facility includes a caustic soda unloading containment pad. The location of this pad significantly restricts routine access for chemical truck-trailers and emergency access for fire department vehicles. Installation of a combined caustic soda and liquid polymer chemical unloading facility would provide unrestricted access and would reduce the risk of chemicals discharging into the stormwater system.

This project will provide a permanent single concrete unloading facility for both chlorine-neutralizing caustic soda and liquid polymer chemicals, equipped with a new sump and discharge piping to provide complete secondary containment. In addition, the abandoned ferric chloride handling facility and the seismically-deficient liquid polymer structure containing the 2,800-gallon tanks will be removed. These improvements will enhance access for response to unplanned releases of caustic soda and liquid polymer. Ongoing final design phase activities to upgrade the containment systems for the liquid polymer and caustic soda unloading facilities include conducting field surveys, identification of utilities, hazardous materials investigations, development of final design criteria, preparation of environmental documentation, preparation of drawings and specifications, development of a construction cost estimate, local agency permitting, advertisement and receipt of bids, and all other activities in advance of award of a construction contract.

Washwater Reclamation Plant No. 1 Handrail & Grating Improvement

The 5.5-mgd Washwater Reclamation Plant No. 1 (WWRP) commenced operation in 1972. It handles waste flows generated by the plant's treatment processes including used filter backwash water and supernatant from the gravity thickeners. The WWRP has two treatment trains, each with a flocculation basin equipped with vertical flocculators, followed by a sedimentation basin equipped with a traveling bridge for settled solids removal. The clarified water is then returned to the Jensen plant's inlet. A recent safety inspection recommended that grating and hand rails be installed around the vertical flocculators to enhance safety during maintenance.

This project will provide platform grating and handrails around the vertical flocculators. Ongoing preliminary design phase activities include field investigation, development of final design criteria, and development of a preliminary construction cost estimate.

Finished Water Reservoir No. 1 Cover Rehabilitation

The California Department of Public Health requires that all finished water reservoirs be covered to protect the finished water from potential contamination. The Jensen Finished Water Reservoir No. 1 was placed into operation in 1972 and has a capacity of 50 million gallons. It is a 260,000-square-foot concrete structure with a concrete roof overlain by an insulating roofing system. The roofing system acts as a barrier to prevent the percolation of stormwater into the reservoir through any cracks that develop in the concrete roof. The roofing system was repaired in May 2002 and consists of built-up coal-tar roofing topped by lightweight insulating concrete, which is designed to protect the coal-tar from sun damage. Due to weathering, the lightweight insulating concrete has cracked and broken into small pieces. This has allowed stormwater and normal weather to compromise the integrity of the built-up roofing below. In addition, wind-blown pieces of the lightweight concrete have damaged the polypropylene floating cover of the adjacent 50-million-gallon Reservoir No. 2.

This project will rehabilitate the Reservoir No. 1 roof to repair and seal the existing lightweight insulating concrete. Ongoing preliminary design phase activities include field investigation, development of final design criteria, and development of a preliminary construction cost estimate.

Sodium Hypochlorite Rehabilitation for Filter Backwash Biological Control

Sodium hypochlorite is used to control microorganism growth in the biological filtration process, which reduces

the levels of disinfection by-product precursors and ozone-related by-products. The sodium hypochlorite system consists of two chemical storage tanks, three pumps, metering valves, and flow control. The sodium hypochlorite is injected into the backwash water that is used to cleanse the filters. The hypochlorite delivery system has failed on several occasions resulting in chemical spills. In addition, several areas of the pressurized sodium hypochlorite PVC piping have cracked due to pressure surges, causing leaks.

This project will replace the damaged piping, providing flexibility to allow for contraction-expansion, and will modify the system to avoid pressure surges. Ongoing preliminary design phase activities include field investigation, development of final design criteria, and development of a preliminary construction cost estimate.

Caustic Soda Metering and Control Facility

The existing 960-square-foot caustic soda metering and control building at the Jensen plant houses caustic soda feed pumps, flow control modules, instrumentation, HVAC equipment, SCADA remote terminal units, electrical supply equipment, and variable frequency drives. The building is a 42-year-old uninsulated, sheet metal structure surrounded by a perimeter step-over curb. The building is located within the containment area of the 30,000-square-foot caustic soda tank farm. The caustic soda tank farm includes four 50,000-gallon mixing tanks and four 127,000-gallon bulk storage tanks. The planned upgrade of the tank farm's chemical containment system will include taller, reinforced concrete perimeter walls. After completion of the upgrades, a large chemical spill would be captured within the large tank farm but spillage would overtop the short perimeter curbing of the caustic soda metering and control building and submerge the equipment inside the building.

This project will replace the existing building with a raised facility whose floor is higher than the maximum 3-foot chemical spillage level. The new facility will be designed to comply with current seismic codes and be energy efficient. Ongoing preliminary design phase activities include field investigation, development of final design criteria, and development of a preliminary construction cost estimate.

Inlet Water Quality and Metering Structure

At the inlet to the Jensen plant, water quality parameters, the plant inlet flow, and raw water flow to service connection LA-35 are measured. The on-line water quality monitoring instrumentation system includes sample pumps, piping, data collection and transmission equipment, and electrical systems. The system measures turbidity, dissolved oxygen, and particle counts. Timely and accurate water quality monitoring results and inlet flow data are required to properly control treatment processes and to set the feed rates of treatment chemicals. The LA-35 flow data is used for billing the Los Angeles Department of Water and Power for raw water fed to the Los Angeles Aqueduct Filtration Plant. The equipment was installed in 2005 on the exterior of the Jensen plant's Influent and Rejection Structure. The equipment has degraded due to exposure to sun, wind, and rain, resulting in instrument failures and inaccurate readings.

This project will provide a new water quality and metering building, consisting of a 12-foot by 12-foot structure mounted on a concrete slab and equipped with an HVAC system, to provide a stable temperature environment for the relocated instruments. Ongoing preliminary design phase activities include field investigation, development of final design criteria, and development of a preliminary construction cost estimate.

LaVerne Shop Facilities Upgrade 15395

Total Appropriation Estimate:	$45,100,000	**Total Projected Through June 30, 2014:**	$32,327,400
Appropriated Amount:	$38,520,000	**Estimated Percent Complete:**	75%
Biennial Estimate:	$6,176,000	**Estimated Completion Date:**	2017

Scope

This appropriation was established to modernize the Maintenance Support Unit facilities at LaVerne and will evaluate, recommend, design and build new or remodel shop building facilities, and upgrade through refurbishment or replacement aging shop equipment. The program includes three projects, 1) Existing Machine and Fabrication Shop Equipment Upgrades, 2) Shop Building Expansions of the Coating, Machine, and Fabrication Shops, and 3) Quality Management System – ISO certification and compliance.

Purpose

To modernize the machine, coatings, and fabrication shops so that they can continue to provide emergency response service, support routine maintenance throughout Metropolitan, and perform fee-for-service work for member agencies and the California Department of Water Resources.

Accomplishments Through FY 2013/14

Through FY 2013/14, one project has been completed.

Major project milestones in FY 2013/14:

New Coating Shop Building Construction – Completed construction

Fabrication and Machine Shop Building Construction – Began construction

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Fabrication and Machine Shop Equipment Design and Procurement	$9,630,700	2017	Complete design and procurement
Fabrication and Machine Shop Building Construction	$17,210,900	2015	Continue construction

La Verne Shops Upgrades - New Machine and Fabrication Shop Buildings Construction

Specialized shops have been a feature of the Weymouth plant, which is located in the city of La Verne, since the plant was originally placed into service in 1941. The La Verne Shops provide full-time support for Metropolitan's rehabilitation work, maintenance activities, and capital projects; provide equipment rehabilitation services for the California Department of Water Resources; and provide routine and emergency fabrication support to Metropolitan and its member agencies. The La Verne Shops have the capability to perform critical rehabilitation of pumps, valves and pipelines within the expedited time frame needed to respond to emergencies and shutdowns. The shops were expanded in the 1960s when larger facilities were constructed, and were expanded again in the 1980s to support a major rehabilitation of the Colorado River Aqueduct pumps. The La Verne Shops are housed in four buildings: the fabrication shop, machine shop, and two coatings shops. Refurbishment and replacement of 19 pieces of equipment in the existing machine and fabrication shops was completed in 2006. In 2011, the existing machine shop roof was replaced, the existing fabrication shop building was retrofitted to meet current seismic codes, and the bridge cranes in the fabrication and machine shops were upgraded to improve safety and handling of materials and equipment. In 2013, one of the existing coating shop buildings was expanded.

This project will expand the footprint of the existing machine and fabrication shop buildings by attaching an adjacent 22,000-square-foot structure. The existing shops will be updated with a new fire protection system; the existing restroom will be made Americans with Disabilities Act (ADA) compliant; and equipment within the existing buildings will be relocated for increased efficiency, improved productivity, and enhanced safety. Construction commenced in June 2012.

La Verne Machine and Fabrication Shop Equipment Design and Procurement

The Machine Shop at La Verne consists of a large area for machining operations and a small area for sheet-metal fabrication. The machining area contains approximately 30 machines, ranging in size from the huge lathes and milling machines used to machine 16-foot-diameter impellers and 20-ton shafts to smaller machines that are used to fabricate special clamps and fasteners, refurbish valve bodies, and polish bearings and seal rings. The sheet metal area is used to fabricate cabinets, covers, and containers which are used for a variety of equipment, including field instrumentation and general electrical and mechanical equipment. Both areas are heavily involved in maintenance projects throughout the service area, and the machining area in particular has been instrumental in supporting several planned and unplanned shutdowns of the Colorado River Aqueduct pumps. Many of the machines are very old and worn out, and the combination of age and excessive wear makes routine maintenance difficult and costly and increases the likelihood of delays.

This project will procure equipment such as a new hydraulic press brake, band saw, shear, mechanical saw, water jet, plasma cutter, three small lathes, small and large machining centers, medium horizontal mill, and medium and large floor lathes. In addition, two large milling machines will be upgraded and refurbished. Ongoing procurement activities include preparation of specifications for advertisement and competitive bid, evaluations, and awards of procurement contracts.

Mills Plant Improvements 15381

Total Appropriation Estimate:	$12,600,000	**Total Projected Through June 30, 2014:**	$5,279,000
Appropriated Amount:	$5,695,000	**Estimated Percent Complete:**	45%
Biennial Estimate:	$175,000	**Estimated Completion Date:**	2020

Scope

This appropriation was established to plan and implement multiple projects within the Mills plant. The common driver for many of the projects in this program is infrastructure reliability.

Purpose

To maintain reliability and ensure regulatory compliance of the Mills plant.

Accomplishments Through FY 2013/14

Through FY 2013/14 eight projects has been completed.

Major project milestones in FY 2013/14:

Mills Hazardous Waste Storage Facility – Completed project

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Mills Solids Removal Automation	$6,374,100	2019	Complete final design

The Mills plant was placed into service in 1978 with an initial capacity of 75 million gallons per day (mgd). The plant was expanded twice to provide a total treatment capacity of 326 mgd using four conventional treatment modules. Due to low treated water demands within the Mills service area, Modules Nos. 1 and 2 were removed from service in 1997. The plant is currently rated to treat 220 mgd, which is the design capacity of the two treatment modules (Modules Nos. 3 and 4) that remain in operation. The Mills plant exclusively treats water from the East Branch of the State Water Project and is located within the city of Riverside. Its treatment processes presently consist of pre-ozonation, flocculation, sedimentation, biological filtration, and final disinfection using chlorine and chloramines.

Solids Removal Automation

At the Mills plant, Modules Nos. 3 and 4 have four traveling bridges for solids collection and removal from the sedimentation basins. The solids collection and removal equipment consists of the traveling bridges, which are equipped with vacuum pumps and siphon piping. The equipment is operated manually and requires the close attention of operators. There is no on-line monitoring of bridge position, motor torque, sludge (solids mixed with water) level, flow and cleaning effectiveness. The addition of monitoring and control equipment will improve the efficiency of the solids removal process, limit excessive solids build-up in the sedimentation basins, and minimize excessive use of the plant's water reclamation facilities.

This project will upgrade the controls and equipment for traveling bridge solids collection and removal at the Mills plant. Solids discharge piping will be modified to allow the installation of sludge density meters. Various equipment items will be required to fully automate the traveling bridges and solids collection and removal systems, including programmable logic controllers, local controls and variable frequency drive on the bridges, level indicators in sludge trough, sludge blanket meters, flow switches, flow meters and sludge density meters. In addition, telemetry will be provided for control and monitoring of the bridge. Supervisory Control and Data Acquisition (SCADA) programming will be modified to automate basin solids collection and removal monitoring and controls. Ongoing preliminary design phase activities include field investigations; preparation of schematic drawings; development of final design criteria; and development of a preliminary construction cost estimate.

Mills Plant Improvements for FY 2006/07 through FY 2011/12 **15452**

Total Appropriation Estimate:	$26,000,000	**Total Projected Through June 30, 2014:**	$7,984,000
Appropriated Amount:	$8,969,000	**Estimated Percent Complete:**	35%
Biennial Estimate:	$3,345,000	**Estimated Completion Date:**	2019

Scope

This appropriation was established to plan and implement multiple projects at the Mills plant. The common driver for many of the projects in this appropriation is infrastructure reliability.

Purpose

To maintain reliability and ensure regulatory compliance of the Mills plant.

Accomplishments Through FY 2013/14

Through FY 2013/14, three projects have been completed.

Major project milestones in FY 2013/14:

Mills Electrical Improvements – Began final design

Mills Modules 3 and 4 Potable Water Safety Station and Water Line Extensions – Completed project

Mills Modules 3 and 4 Turbidity Meters and Gas Detectors Replacements – Completed project

Mills Sodium Hydroxide Tank Replacement – Completed construction

Mills Weir Gate and Filter Valve Rehabilitation – Completed project

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Mills Electrical Improvements	$13,524,100	2018	Complete construction
Mills Modules Nos. 3&4 Influent Flash Mix Chemical Containment	$536,000	2014	Begin construction
Mills Industrial Wastewater Handling Facilities Improvements	$2,991,100	2014	Complete project

Electrical Upgrades Stage 1

Principal components of the Mills electrical system were installed during the plant's original construction in 1978. The performance of some critical electrical components has begun to deteriorate due to over 35 years of continuous service. As the equipment continues to age, its ability to operate reliably will continue to diminish. Failure of a single electrical device could impact the treatment process. Unit Power Center No. 9 (UPC-9) is the only unit remaining at the plant with a single power feed. It serves key process equipment including service water pumps, reservoir control gates, and water quality instrumentation. A failure of UPC-9 would impact the treatment capability of the plant. Similarly, there are many critical processes such as chemical feed systems which are configured such that all equipment is powered by a single motor control center (MCC). The Mills plant currently receives power from a single 12-kilovolt power line from Riverside Public Utilities, which is shared with other local customers. The existing 12-kilovolt service has experienced numerous outages and low-voltage events over the past several years, which have triggered the plant's standby generators to operate. Failure of the 12-kilovolt service or the associated switchgear would impact plant operation and could lead to unplanned outages. Providing backup power sources to key electrical equipment would enhance plant reliability and reduce the risk of outages. Over the past several years, treated water demands within the Mills service area have been substantially less than the plant's capacity. As a result, staff has considered the plant's current low flow rate during the prioritization process for rehabilitation work. The planned Stage 1 electrical upgrades are needed to improve reliability and enhance worker safety, and are independent of the plant's treated water demands.

This project will replace aging electrical equipment, provide backup for potential component failures, and provide a secondary12-kilovolt electrical service to the plant from the local power utility. The Stage 1 work includes: replacement of obsolete circuit breakers; expansion of the electrical building for UPC-9 and installation of a new air conditioning system, along with provision of a backup UPC; installation of a secondary incoming 12-kilovolt service from Riverside Public Utilities, upgrade of the main switchgear and standby generator switchgear, and improvement of the main switchgear electrical building; and installation of MCCs and redistribution of the power feed to chemical feed systems and washwater return pumps so that each critical equipment item will be powered from two different sources. Ongoing final design phase activities include preparation of drawings and specifications, third-party value engineering review, shutdown planning, development of a construction cost estimate, advertisement and receipt of bids, and all other activities in advance of award of a construction contract.

Industrial Wastewater Handling Facilities Improvements

Industrial wastewater generated in the piping galleries and other locations outside of the chemical tank farms is captured and directed into the plant industrial drainage system. This wastewater may contain chemicals in the event of chemical piping leaks or chemical spills. The wastewater from the drainage system is collected and stored in two 6,000-gallon fiberglass-reinforced plastic (FRP) containment tanks and two 20,000-gallon unlined steel storage tanks for pH verification prior to proper disposal. The two 20,000-gallon steel storage tanks were installed in 2005 as a temporary measure to enlarge the industrial wastewater storage capacity and to provide more time for staff to verify the wastewater's pH and to arrange for proper disposal. The tanks should not be exposed to waters with widely varying pH, as this contributes to corrosion and potential leakage. Also, each large steel tank is temporarily supported from below by wooden beams lying on top of sand. During a seismic event, the system may move and the tanks and piping may sustain damage. The secondary containment system for the steel tanks consists of heavy plastic sheeting over sand. Although the secondary containment system nominally meets code requirements, removal and disposal of any captured leakage is very difficult. The wooden support beams and the plastic sheeting are subject to weathering and are deteriorating.

This project will provide three new 20,000-gallon epoxy-lined steel storage tanks; a chemical-resistant wastewater collection system; secondary containment; a tank mixing and discharge system; a pH adjustment feed system; emergency eyewash and deluge shower stations; instrumentation; and connection to the city of Riverside municipal sewer system near the northwest corner of the Mills plant. These improvements will allow safer and more efficient handling of industrial wastewater and chemicals, and will reduce the risk of accidental release of these materials. Construction of the improvements is planned to commence in mid-2014.

Modules Nos. 3 and 4 Flash Mix Chemical Containment

Flocculation and sedimentation are two important processes within a conventional water treatment plant. Flocculation follows immediately after the initial chemical addition at the flash mix unit, and is designed to gently mix small particles and colloids in the water so that they agglomerate to form settleable or filterable particles that can be subsequently removed by sedimentation and filtration. Each module has a flash mix system located at the

inlet of the flocculation basins. The flash mix system injects polymer and coagulant (i.e., aluminum sulfate or ferric chloride) into the inlet chamber. In addition, sodium hypochlorite can be injected through the flash mix systems of each module for emergency disinfection. The use of pump-injection flash-mix systems provides the necessary mixing energy to achieve proper dispersal of chemicals within the inlet chambers. Currently, the flash mix areas at Modules Nos. 3 and 4 each have a low concrete curb around the flash mix pump, flash mix valves, instrumentation, and chemical pipes. The curb was designed to catch spillage when the flash mix system is shut down and depressurized for maintenance, but not from a full accidental release. The inlet flash mix systems at Modules Nos. 3 and 4 are the only areas at the plant with hazardous chemicals under pressure which do not have secondary containment to prevent an accidental release.

This project will upgrade chemical containment at the two flash mix areas to: (1) modify each flash mix unit's chemical piping; (2) construct secondary containment walls; and (3) relocate the control panels to allow safe operation and system shutdown from outside of the containment areas in the event of a spill. These improvements will mitigate the risk of chemical releases outside of the flash mix areas and will enhance employee safety. Ongoing preliminary design phase activities include field surveys, preparation of conceptual layout drawings, preparation of environmental documentation, permitting, and development of a preliminary construction cost estimate.

Mills Plant Improvements for FY 2012/13 through FY 2017/18 **15479**

Total Appropriation Estimate:	$46,700,000	**Total Projected Through June 30, 2014:**	$0
Appropriated Amount:	$2,580,000	**Estimated Percent Complete:**	5%
Biennial Estimate:	$500,000	**Estimated Completion Date:**	2026

Scope

This appropriation was established to plan and implement multiple projects at the Mills plant. The common driver for many of the projects in this program is infrastructure reliability.

Purpose

To maintain reliability and ensure regulatory compliance of the Mills plant.

Accomplishments Through FY 2013/14

Through FY 2013/14, no project have been completed.

Major project milestones in FY 2013/14:

Mills Solids Handling Facilities Stage 1 – Completed final design

Mills Modules 3 and 4 Backwash Chlorination System – Completed study

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Mills Solids Handling Facilities Stage 1	$25,218,300	2017	Complete construction
Mills Chemical System Upgrade	$15,605,200	2016	Begin construction
Plant Perimeter Fencing Upgrade	$60,000	2015	Complete construction

Solids Handling Facilities Stage 1

The Mills plant currently relies on six concrete-lined lagoons for both washwater reclamation and dewatering of residual solids. Over the past ten years, the Mills plant has needed to significantly increase the level of coagulant added during the water treatment process due to increased levels of total organic carbon and decreased levels of alkalinity in the East Branch of the State Water Project. This higher coagulant dosage has created an increase in residual solids and has escalated the occurrence of turbidity spikes and elevated soluble manganese levels in the water returned from the lagoons to the plant's inlet control structure, which in turn disrupts the ozonation process. These conditions occur independently from the flow rate being treated by the plant. The addition of a solids handling system at the Mills plant is needed to improve the quality of water returned to the plant inlet, and to reliably dewater solids for off-site disposal. Due to the current need for solids handling improvements to address the variable incoming water quality, staff recommends that the solids handling improvements move forward in two stages. Under Stage 1, the solids transfer system will be upgraded and two solids thickeners will be constructed to improve the quality of water returned to the inlet of the plant and to increase solids density in the lagoons. These improvements will support near-term plant water production and solids disposal needs. The Stage 2 improvements will support the plant's solids handling needs when its capacity is restored to 326 million gallons per day (mgd) in the future.

This project will improve the solids transfer system and add two new thickeners, a solids pumping station, a motor control center, and a staging area for a temporary belt press. The thickeners will improve the reclaimed water quality and allow utilization of contract-operated belt presses to increase solids handling capacity during high-turbidity and high-plant-flow events. The staging area will be equipped with a containment area to collect solids that fall during the belt press operation or during routine belt press cleaning and maintenance; utility and power outlets for the belt presses and support equipment; lighting; and an access road. Ongoing final design phase activities include detailed field investigations, preparation of drawings and specifications, development of a construction cost estimate, value engineering, advertisement and receipt of bids, and all other activities in advance of award of a construction contract.

Chemical Systems Upgrade

Mills Chemical Tank Farm 2A includes four 20,000-gallon alum storage tanks, two 9,000-gallon liquid polymer storage tanks, and associated chemical feed pumps, piping, and instrumentation. Chemical Tank Farm 2B includes three 20,000-gallon caustic soda storage tanks, two 7,000-gallon ammonia tanks, and associated chemical feed pumps, piping, and instrumentation. Both tank farms were built in 1996 during the second expansion of the Mills plant and do not meet current California Fire Code requirements.

This project will upgrade these two tank farms to meet current fire code and Cal-OSHA requirements. The upgrades will include installation of automatic isolation and shutoff valves, level sensors, safety signs, segregation of incompatible chemicals, and improved chemical containment. Ongoing preliminary design phase activities include field investigations, feasibility study, development of final design criteria, and development of a preliminary construction cost estimate

Plant Perimeter Fencing Upgrade

The existing Mills plant perimeter fencing consists of 8,600 feet of wrought iron and 6,800 feet of chain link fences. Most of the existing wrought iron fence was also installed over 20 years ago and has not been repainted. The paint has deteriorated significantly, allowing corrosion to occur.

This project will repair the corrosion-damaged portions of the wrought iron fence and the entire length of the wrought iron fencing repainted. Ongoing preliminary design activities include field investigations; development of final design criteria; and development of a preliminary construction cost estimate.

Mills Plant - Ozone System Reliability 15434

Total Program Estimate:	$6,200,000	**Total Projected Through June 30, 2014:**	$5,160,000
Appropriated Amount:	$5,000,000	**Estimated Percent Complete:**	86%
Biennial Estimate:	$871,000	**Estimated Completion Date:**	2015

Scope

This program was established to enhance plant reliability at the Mills plant when the plant expands from 220 mgd to 326 mgd. This appropriation contains three projects, Equipment Procurement, Design and Installation. Equipment includes an additional ozone generator, an additional power supply unit, an additional liquid oxygen storage tank, a new nitrogen injection system, additional ambient ozone and oxygen gas analyzers, piping extensions, power feeds, control system programming, and related accessories.

Purpose

To meet the increasing ozone production and treatment demands while maintaining a standby ozone generation system when the capacity at Mills plant is expanded from 220 mgd to 326 mgd.

Accomplishments Through FY 2013/14

Through FY 2013/14, no projects have been completed.

Major project milestones in FY 2013/14:

Ozone System Reliability Upgrade Construction – Completed final design

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Ozone System Reliability Upgrade Construction	$591,200	2015	Complete construction
Ozone System Reliability Upgrade Equipment Procurement	$4,247,100	2015	Complete construction

Ozone Equipment Procurement

Ozonia North America (ONA) delivered the ozone generation equipment to Metropolitan in 2009 for later installation at the Mills plant. This equipment package includes one ozone generator which matches the three existing units at the Mills plant, one power supply unit, one 34,000-gallon liquid oxygen (LOX) storage tank, one nitrogen generation and injection system, three ambient ozone analyzers, two ambient oxygen analyzers, two ozone contactor control panels, and support equipment. With the exception of the LOX tank, the equipment is being stored in a secure, climate-controlled warehouse located near the Mills plant. The LOX tank is being stored in Minnesota at the tank fabricator's yard.

Ozone System Reliability Upgrade Equipment Installation

Construction of the Mills Oxidation Retrofit Program was completed in 2003 in order to comply with the U.S. Environmental Protection Agency's Disinfectant/Disinfection By-products (D/DBP) Rule. The initial Mills installation was based on an ozonation hydraulic capacity of 160 million gallons per day (mgd). The existing Mills plant ozone generation system includes three ozone generators, two liquid oxygen (LOX) storage tanks, and related equipment to provide a design ozone dose of 2.0 mg/L at a 326-mgd plant flow. In August 2006, procurement of a fourth ozone generator with ancillary equipment was authorized to allow one of the three duty generators to be removed from service for scheduled preventive or emergency corrective maintenance, without impacting plant capacity or compliance with the D/DBP Rule. The fourth ozone generator and ancillary equipment package was procured and delivered in 2009 for later installation at the Mills plant. Due to reduced treated water demands in recent years within the Mills' service area, the standby capacity of the fourth ozone generator and most of the ancillary equipment are no longer needed. However, the existing nitrogen generation system, which is a single compressor type, is not reliable and needs frequent repairs. When the nitrogen system is out of service, the efficiency of ozone generation decreases. Nitrogen bottles can be used during repair or maintenance of the existing nitrogen system. However, use of bottled nitrogen requires more operator attention and is more costly. The recently procured nitrogen generation and injection system has a fully redundant compressor and is more reliable than the existing nitrogen system.

This project will replace the existing nitrogen generation system with the recently procured nitrogen generation and injection system. The other equipment will be relocated to the Mills plant and installed for long-term storage. Ongoing final design phase activities include preparation of drawings and specifications for installation of the procured equipment; advertisement and receipt of bids; development of a construction cost estimate; and all other activities in advance of award of a construction contract.

Operations Support Facilities Improvements 05065

Total Appropriation Estimate:	$14,800,000	**Total Projected Through June 30, 2014:**	$105,000
Appropriated Amount:	$0	**Estimated Percent Complete:**	3%
Biennial Estimate:	$2,264,000	**Estimated Completion Date:**	2026

Scope

This appropriation is established to construct site improvements at Lake Mathews, including upgrade of the facility's sewer system. Improvements will also be constructed to rehabilitate the Oxidation Demonstration Project Plant at the Weymouth plant.

Purpose

To replace and /or expand support facilities to meet current and future operations and maintenance needs.

Accomplishments Through FY 2013/14

This is a new appropriation; no projects have been completed.

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Lake Mathews Wastewater System Improvement	$2,356,900	2016	Begin preliminary design
Oxidation Demonstration Project Plant Rehabilitation	$188,300	2017	Complete construction

Lake Mathews Support Facility Wastewater System Improvements

The Lake Mathews Support Facility, located south of the city of Riverside, was originally constructed in 1940 and expanded in the 1960s. The 90 acres of operational area contain multiple buildings housing approximately 100 Metropolitan staff who provide construction services, conveyance and distribution system operations, health and safety oversight, water compliance monitoring, security, fleet operations, and warehousing. In addition, the facility is often used to train up to an additional 60 staff. The facility is served by five on-site wastewater systems. These on-site systems collect, treat, and dispose of domestic wastewater generated from bathrooms at the maintenance buildings, training/meeting rooms, shops, water quality laboratory, and residences. The wastewater systems consist of three primary components: community septic tanks and leach fields; collector lines which convey wastewater to the septic tanks from throughout the facility; and sewer laterals which convey wastewater from individual buildings to the collector lines. All of the on-site wastewater systems are permitted. The capacities of the existing systems are undersized for the current level of staffing at the Lake Mathews facility. The existing systems have been in operation for over 40 years and have deteriorated significantly. In general, the service life of septic tanks ranges from 40 to 60 years. The existing wastewater systems have deteriorated through continual use and need to be decommissioned. In the early 2000s, a sewer connection for future Metropolitan use was constructed on the main public sewer line on El Sobrante Road, just north of the facility, but the Lake Mathews facility was not connected at that time.

This project will connect the Lake Mathews facility to the public sewer by providing new main-line pipes, building laterals, manholes, and cleanouts. The on-site wastewater systems will then be decommissioned. Ongoing preliminary design phase activities include field investigations; preparation of schematic drawings; development of final design criteria; and development of a preliminary construction cost estimate.

Oxidation Demonstration Project Plant Rehabilitation

The Oxidation Demonstration Project (ODP) plant was originally placed into service to perform demonstration-scale testing of ozone processes in advance of the ozone retrofits at the full-scale treatment plants. The ODP facility is located north of Filter Building No. 2 at the Weymouth plant. The 5.5-million-gallons-per-day, demonstration-scale testing facility is approximately a 1:100 scale version of Metropolitan's treatment plants. Since completing the original ozone and peroxone testing, the facility has been used to evaluate biofiltration, arsenic removal, enhanced coagulation, bromate control technologies, chlorine dioxide as an alternative oxidant, and N-nitrosodimethylamine (NDMA) precursor control. The chemical storage and feed systems at the ODP plant pose an increasing potential for failure and require several equipment upgrades to maintain safety standards. The recent failure of an overflow sensor for the sulfuric acid tank farm contributed to two separate incidents involving acid spills into a containment sump. The ozone generation system also requires safety enhancements in order to meet current fire code requirements. The ozone generators are currently located in a structure with other process equipment and cannot be isolated. While this was an acceptable practice based on standards in place at the time of construction, the structure should be partitioned such that the generators are in an enclosed space and potential ozone leaks can be more readily contained.

This project will address the current safety deficiencies at the ODP plant by rehabilitating chemical equipment and controls, and isolating ozone generators from other process equipment. Ongoing detailed assessments include evaluation of existing process equipment, development of containment concepts for a new ozone generation room, development of conceptual design drawings, and preparation of a conceptual-level construction cost estimate.

PCCP Rehabilitation and Replacement 15471

Total Appropriation Estimate:	$2,600,000,000	**Total Projected Through June 30, 2014:**	$21,668,000
Appropriated Amount:	$29,560,000	**Estimated Percent Complete:**	1%
Biennial Estimate:	$24,018,000	**Estimated Completion Date:**	2034

Scope

This appropriation was established to plan and implement reliability projects throughout the Conveyance and Distribution System which will include structural engineering evaluation of all 163 miles of Prestressed Concrete Cylinder Pipe (PCCP) lines, implement refurbishment and replacement projects for at-risk pipelines, and conduct pilot testing installation of fiber optic acoustic monitoring system up to five miles in either the Sepulveda Feeder and Second Lower Feeder.

Purpose

To identify pipelines whose age, location and condition warrant refurbishment/ replacement to insure long-term reliability of Metropolitan's PCCP lines water delivery.

Accomplishments Through FY 2013/14

Through FY 2013/14, two projects have been completed.

Major project milestones in FY 2013/14:

Acoustic Fiber Optic Monitoring of PCCP Lines – Completed study

Eastern Region PCCP Joint Modification – Completed construction

Electromagnetic Inspection of PCCP Lines – Continued study

Foothill & Sepulveda Feeder PCCP Carbon Fiber Joint Repairs – Completed construction

PCCP Hydraulic Analyses – Began study

Second Lower Feeder Sites 1 & 2 Locations Urgent Repairs – Completed final design

Secon Lower Feeder Site 3 PCCP Rehabilitation – Completed final design

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Acoustic Fiber Optic Monitoring of PCCP Lines	$1,352,900	2015	Continue study
Electromagnetic Inspections of PCCP Lines	$4,153,000	2017	Continue study
PCCP Hydraulic Analyses	$215,300	2015	Continue study
Second Lower Feeder PCCP Rehabilitation	$500,270,600	2023	Complete preliminary design
Second Lower Feeder Sites 1 & 2 PCCP Rehabilitation	$8,110,400	2015	Complete construction

Project	Total Project Estimate	Estimated Completion	Planned Activity
Second Lower Feeder Site 3 PCCP Rehabilitation	$13,743,800	2016	Complete construction
Sepulveda Feeder PCCP Rehabilitation	$688,141,600	2023	Begin preliminary design
Acoustic Fiber Optic Monitoring of PCCP Lines	$1,352,900	2015	Continue monitoring

Over the last several decades, water agencies throughout the United States and several other countries have found that under certain conditions, prestressed concrete cylinder pipe (PCCP) lines have a reduced service life and elevated risk of failure versus other types of pipe. PCCP failures can be catastrophic and can occur without forewarning, compromising system reliability and resulting in significant costs due to interruption of service, unplanned major repairs, and potential third-party damages. In response to this risk, Metropolitan initiated a comprehensive program in September 2011 to inspect, manage, and rehabilitate its 163 miles of PCCP lines. Based on Metropolitan's 11 years of experience with inspection and repair of PCCP lines, these five feeders are the most likely to have a reduced service life and will form the primary focus of Stage 1 of this effort: the Allen McColloch Pipeline, Calabasas Feeder, Rialto Pipeline, Second Lower Feeder, and Sepulveda Feeder.

1. **Allen McColloch Pipeline** (AMP): The AMP delivers treated water from the Diemer plant in Yorba Linda to El Toro Regional Reservoir in Mission Viejo. The AMP line is approximately 25 miles long and was installed in the late 1970s. The northern 16-mile portion of the line consists of 78-inch-diameter welded steel pipe, while the southern 9-mile portion consists of PCCP that varies in diameter from 54 to 84 inches. The AMP delivers treated water to the Municipal Water District of Orange County and its retail agencies via a total of 26 service connections.

2. **Calabasas Feeder**: The Calabasas Feeder is a 54-inch-diameter PCCP line which was constructed in 1975. The pipeline is approximately 9 miles long, and delivers treated water from the Jensen plant to the cities of Agoura Hills, Calabasas, Hidden Hills, Westlake Village, and areas of unincorporated western Los Angeles County.

3. **Rialto Pipeline**: The Rialto Pipeline conveys untreated State Water Project supplies from the California Department of Water Resources' Devil Canyon Power Plant to Metropolitan's San Dimas Flow Control Facility near Live Oak Reservoir. The Rialto Feeder was installed in 1973 and its diameter varies from 98 to 120 inches. The length of the Rialto Feeder is 30 miles, of which approximately 16 miles are PCCP while the remaining 14 miles are welded steel pipe. The Rialto Pipeline is the primary source of water for the Inland Empire Utilities Agency and Three Valleys Municipal Water District service areas.

4. **Second Lower Feeder**: The Second Lower Feeder delivers treated water from the Diemer plant in Yorba Linda to the Palos Verdes Reservoir in Rolling Hills Estates. The feeder was constructed in 1967 and is 39 miles long. Approximately 30 miles of the line are constructed of PCCP, with diameters ranging from 78 to 84 inches. The remainder of the line is constructed of welded steel pipe with a diameter of 84 inches. In addition to supplying water to the Central Pool portion of Metropolitan's distribution system, the Second Lower Feeder has 11 service connections for deliveries to the cities of Long Beach, Los Angeles, and Torrance, the Central Basin Municipal Water District, and the Municipal Water District of Orange County.

5. **Sepulveda Feeder**: The Sepulveda Feeder is a 96-inch-diameter PCCP line that extends south approximately 42 miles from the Jensen plant in Granada Hills to an interconnection with the Second Lower Feeder in Torrance. The Sepulveda Feeder was constructed in 1970 and delivers treated water into Metropolitan's Central Pool, along with direct service connections to the city of Los Angeles and West Basin Municipal Water District.

Electromagnetic Inspection of PCCP Lines

At the present time, electromagnetic inspection is the industry's primary means for identification of PCCP wire breaks. Electromagnetic inspections are an integral component of Metropolitan's long-term strategy for management of PCCP lines. The results of these inspections will expand knowledge of the pipelines' baseline condition, track wire breakage over time, and identify portions of feeders containing distressed PCCP segments. The information provided will be used to evaluate and schedule both short-term repairs of distressed PCCP segments and the long-term comprehensive repair/replacement of pipeline reaches or entire pipelines. Since inspections can only be accomplished during shutdown seasons with the pipelines dewatered, only 35 to 45 miles of PCCP lines are planned to be inspected each year. As a result, these inspections will take place over a five-year period. Upon completion of this cycle of electromagnetic inspections, the results will be used to update the assessments and long-term strategy to manage Metropolitan's PCCP lines.

This project will include scheduling and coordinating shutdowns; conducting the electromagnetic inspections; conducting visual inspections; performing soundings and impact echo tests; analyzing the inspection results; and preparing comprehensive inspection reports.

Allen McColloch Pipeline PCCP Rehabilitation

Engineering activities to initiate the long-term rehabilitation of the Allen McColloch Pipeline include: utilities research for potential repair access locations; assessment of right-of-way needs and temporary construction easements; evaluation of design alternatives; third-party value engineering reviews; hydraulic evaluation of alternate delivery options to service connections while construction is underway; development of a phasing program for construction; initial permitting and outreach with local agencies; and preparation of environmental documentation.

Second Lower Feeder Sites 1 and 2 Urgent Repairs

In February 2013, electromagnetic inspections of the Second Lower Feeder identified that 19 PCCP segments had deteriorated significantly over the last several years.

This project will repair pre-stressed concrete cylinder pipe at two sites which are located near Lakewood Boulevard and Pacific Avenue in the city of Long Beach. The work at each location includes excavation and installation of Metropolitan-furnished welded steel pipe at Site No. 1 and Contractor-furnished welded steel pipe at Site No. 2. The repairs include the installation of 1,400 feet of steel liner designed as a stand-alone pipeline which can accommodate full internal and external pressures on the line. The annular space between the steel liner and the existing PCCP segments will be filled with concrete grout. Construction commenced in January 2014. The repairs are consistent with long-term rehabilitation work planned for the feeder.

Second Lower Feeder Site 3 Urgent Repairs

In February 2013, electromagnetic inspections of the Second Lower Feeder identified that 19 PCCP segments had deteriorated significantly over the last several years.

This project will repair pre-stressed concrete cylinder pipe at a site near Santa Fe Avenue in the city of Carson. This work will include the installation of 4,900 feet of steel liner. The liner will be designed as a stand-alone pipeline which can accommodate full internal and external pressures on the line. The annular space between the steel liner and the existing PCCP segments will be filled with concrete grout. Construction is planned to commence in April 2014.

Second Lower Feeder PCCP Rehabilitation

The Second Lower Feeder operates at pressures up to 340 pounds per square inch and passes through areas with highly corrosive soils. In addition, there are numerous underground utility lines, natural gas lines, and oil lines within the vicinity, which exposes the feeder to significant stray current interference. Its route follows major public streets as it extends through a highly urbanized area. The feeder crosses several freeways, several flood control channels, and an airport. The Second Lower Feeder has been inspected three times since 1999 using the electromagnetic inspection technique. To date, over 500 distressed PCCP segments have been identified, or approximately two miles of the 30-mile PCCP portion of the line. These distressed segments are spread throughout the length of the feeder. Between 1999 and 2002, Metropolitan repaired 231 segments or 4,620 feet of PCCP on the Second Lower Feeder. Urgent repairs to line 6,400 feet of the feeder are currently being addressed via other near-term projects.

This long-term rehabilitation program will address the remaining 28 miles of PCCP in the Second Lower Feeder. The rehabilitation program will be staged to address six reaches of the pipeline in sequence. Construction will take place over an 8- to 10-year period to minimize water delivery impacts to Metropolitan's member agencies. This strategy will improve reliability of the pipeline incrementally with the completion of each reach. Each staged project will include lining the existing PCCP segments with a steel liner designed as a standalone pipeline which can accommodate full internal and external pressures on the line. The annular space between the steel liner and the existing PCCP segments will be filled with concrete grout. Open excavations will be required to access the existing pipeline at approximately 2,000-foot intervals. New 40-foot-long liner segments will be inserted at these locations, moved into position, and welded together. Approximately 80 access sites are planned along the 28 miles of feeder to be rehabilitated. Most of these access sites will be located in urban areas where tight-sheet shoring is necessary, and close coordination will be required with local agencies and the surrounding communities. Installation of line-sized sectionalizing valves and meters is planned to minimize hydraulic impacts to the feeder's flow capacity due to the reduction of the line's internal diameter. In addition, modifications to several interconnections with other feeders are planned to allow deliveries to continue to member agency service connections while the rehabilitation is underway. Ongoing engineering activities to initiate the long-term rehabilitation of the Second Lower Feeder include: utilities research for potential repair access locations; assessment of right-of-way needs and temporary construction easements; evaluation of design alternatives; third-party value engineering reviews; hydraulic evaluation of alternate delivery options to service connections while construction is underway; development of a phasing program for construction; initial permitting and outreach with local agencies; and preparation of environmental documentation.

PCCP System-Wide Hydraulic Analyses

Lining existing PCCP segments with a steel liner will result in a reduced internal diameter for conveying water. In addition, construction will involve isolating and shutting down individual reaches of pipelines for several months at a time. Identification of alternate means of routing flows through the Central Pool to the member agency service connections, both during and after construction, will require a hydraulic model of the distribution system which allows multiple flow scenarios to be evaluated. Metropolitan's current hydraulic modeling tools provide a technically accurate means to evaluate individual pipelines and small sub-systems, but are not capable of running evaluations of the complex interaction of multiple pipelines within the Central Pool under various flow scenarios and operating conditions. The system-wide hydraulic model will be used to simulate flows through the Central Pool and assess alternate pipeline diameters, evaluate potential modifications to structures such as feeder interconnections and pressure control facilities, and consider the potential addition of pump stations. These assessments will enable staff to develop the most cost-effective means to rehabilitate each feeder while minimizing hydraulic impacts to member agencies.

This project will develop the hydraulic model of Metropolitan's distribution system which may be impacted by the PCCP rehabilitation work. This model will provide staff the capability to evaluate alternatives for maintaining deliveries to member agency service connections during and after rehabilitation of the Second Lower Feeder, the Sepulveda Feeder, and other feeders. The model will be tested and verified for accuracy using actual flow measurements recorded under varying operating scenarios. Ongoing activities include development of the model and verification of accuracy, and staff training.

Acoustic Fiber Optic Monitoring of PCCP Lines

Acoustic fiber optic monitoring allows real-time monitoring of wire breaks. With this technology, sensors "listen" for prestressing wire breaks while the pipeline is in service. The location of wire breaks is calculated from sensor locations based on the speed of sound, so once the sensors are installed, information is collected on a continuous real-time basis. There is a significant amount of signal processing required to determine the wire breaks, so the real-time monitoring is delayed by the processing lag time. However, the monitoring results can be used to calculate rates of prestressing wire breakage.

The project monitored approximately five miles of prestressed concrete cylinder pipe (PCCP) lines over a one-year period under a pilot testing project. Ongoing activities include evaluation of the collected data to make recommendations regarding continued use of acoustic fiber optic monitoring.

Perris Valley Pipeline 15425

Total Appropriation Estimate:	$129,100,000	**Total Projected Through June 30, 2014:**	$122,640,000
Appropriated Amount:	$129,100,000	**Estimated Percent Complete:**	95%
Biennial Estimate:	$1,100,000	**Estimated Completion Date:**	2015

Scope

This appropriation was established to design and construct a 6.5-mile, 96-inch diameter pipeline from the Mills plant to Eastern Municipal Water Districts' member agency boundary, southeast of the Mills plant. This pipeline will have four new service connections. The project will be undertaken as a cooperative effort between Metropolitan, Eastern Municipal Water District, and Western Municipal Water District. The majority of the project will be designed and constructed by Metropolitan utilizing a traditional design-bid-build delivery. Construction will be performed utilizing separate construction contracts for the North and South Reaches.

Purpose

Expand service to Eastern Municipal Water District and Western Municipal Water District and optimize operations of the Mills and Skinner plants.

Accomplishments Through FY 2013/14

Through FY 2013/14, four projects have been completed.

Major project milestones in FY 2013/14:

Perris Valley Pipeline South Reach – Completed as-builts

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Perris Valley Pipeline South Reach	$42,540,200	2015	Complete defense of litigation

Perris Valley Pipeline – South Reach

The South Reach of the Perris Valley Pipeline is a 96-inch-diameter pipeline in Riverside County which begins near Eastern Municipal Water District's service connection (EM-23) at Cactus Avenue, south of Alessandro Boulevard, and continues south for approximately three miles. The route parallels Interstate 215 and a railroad line. In June 2008, Metropolitan's Board had awarded a $22.3 million construction contract to Oscar Renda Contracting, Inc. for constructing the South Reach of the Perris Valley Pipeline. Notice to proceed was issued in September 2008. The work originally included the construction of over four miles of tunnels, fabricated steel pipelines, and appurtenant work. Metropolitan staff later deleted tunnel crossing work at Van Buren Avenue and the I-15 freeway, along with connecting piping and a turnout structure. Metropolitan accepted the contract work in November 2011, more than one year after the original due date for contract completion. In September 2012, the contractor filed a complaint against Metropolitan in Superior Court in Riverside County, seeking "an amount in excess of $10,000,000, plus interest" for breach of contract.

This project constructed the Perris Valley Pipeline – South Reach. Ongoing activities will continue Metropolitan's efforts to best defend the construction contract litigation and, if appropriate, obtain the most favorable settlement of the case.

Pipeline Rehabilitation and Replacement 15482

Total Appropriation Estimate:	$9,000,000	**Total Projected Through June 30, 2014:**	$80,000
Appropriated Amount:	$0	**Estimated Percent Complete:**	5%
Biennial Estimate:	$200,000	**Estimated Completion Date:**	2023

Scope

This appropriation is established to plan and implement multiple projects throughout the Conveyance and Distribution System for all non-prestressed concrete cylinder pipe lines. The projects will rehabilitate and replace at risk pipelines, and update the appropriation estimate annually based on rehabilitation and replacement options. The common driver for all projects in this appropriation is infrastructure reliability

Purpose

To identify pipelines whose age, location, and condition warrant rehabilitation/replacement to insure long-term water delivery reliability

Accomplishments Through FY 2013/14

This is a new appropriation; no projects have been completed.

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Non-PCCP Lines Condition Inspection and Assessment	$379,900	2017	Perform baseline condition assessment

Non-PCCP Lines Condition Inspection and Assessment

Construction of Metropolitan's distribution system began in the 1930s. Metropolitan's water delivery system includes 830 miles of pipelines, of which 667 miles are comprised of welded steel, cast iron, and reinforced concrete pipe and 163 miles are prestressed concrete cylinder pipe (PCCP). Most of these lines were installed over 50 years ago and have performed well over time. While the distribution system continues to perform reliably today and most of the non-PCCP feeders are in good condition, some lines are exhibiting signs of wear and tear, as may be expected from decades of continuous service and as evidenced by several recent lining and joint repair projects. Industry experience has shown that degradation from corrosion of metallic and reinforced concrete pipelines is a slow process and the risk of failure of these types of pipe is low. The consequences of failure are generally not catastrophic, especially when compared to PCCP.

This project will develop a comprehensive strategy for the short-term and long-term rehabilitation of Metropolitan's welded steel, cast iron, and reinforced concrete pipelines through inspection, condition assessment, and prioritization for rehabilitation. Ongoing initial stage work is focusing on condition assessments to identify and document the current condition of Metropolitan's feeders. If any immediate repair needs are identified, the work will be recommended to proceed as near-term capital projects. Subsequent stages will utilize the condition assessment data to conduct a risk assessment and identify priorities for future rehabilitation work. Long-term, comprehensive plans for completing the work will be developed. This program is a companion to the PCCP Rehabilitation and Replacement Program, which was initiated in September 2011. Together, these two capital programs will address the rehabilitation needs of all pipelines within Metropolitan's distribution system.

Power Reliability and Energy Conservation 15391

Total Appropriation Estimate:	$34,537,000	**Total Projected Through June 30, 2014:**	$29,092,000
Appropriated Amount:	$34,537,000	**Estimated Percent Complete:**	98%
Biennial Estimate:	$588,000	**Estimated Completion Date:**	2015

Scope

This appropriation was established to implement multiple power and energy related projects throughout Metropolitan's system. Since its inception, several projects have been incorporated into this appropriation and completed, including the OC-88 Energy Savings Modifications Project which modified the pump station to reduce the energy required for pumping and provides significant energy savings, and the one Megawatt (1 MW) Skinner Solar Power Facility project.

Purpose

To reduce purchased electrical energy and costs, provide sufficient and reliable power, and reduce carbon-based emissions.

Accomplishments Through FY 2013/14

Through FY 2013/14, six projects have been completed.

Major project milestones in FY 2013/14:

La Verne Water Quality HVAC Chiller Replacement – Continued final design

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
La Verne Water Quality HVAC Chiller Replacement	$1,336,900	2015	Begin construction

La Verne Water Quality Laboratory HVAC Chiller Replacement

The existing heating, ventilating, and air conditioning (HVAC) system for the 27,000-square-foot southern half of the Water Quality Laboratory building is over 27 years old and has begun to fail. It is comprised of a 175-ton chiller for cooling, two 1.2-million-Btu/hour hot water boilers, and a 175-ton cooling tower, as well as miscellaneous pumps, balancing valves, fan coil units, fume hoods, pneumatic control systems, and other mechanical components. Replacement of the HVAC equipment is required to maintain the capability to conduct water quality analyses and submit regulatory reports without the risk of interruption, and to continue complying with laboratory safety standards. In March 2013, the chiller unit that provides cooling for the HVAC system failed. A temporary unit was installed to keep the laboratory in operation at a cost of approximately $7,500 per month. Moving forward with this project will provide a reliable and energy-efficient HVAC system, and will minimize the risk of future system failures. The HVAC system serving the northern portion of the building is presently in good condition, and does not require major rehabilitation work at this time.

This project will improve the HVAC system by replacing the chiller, boilers, pumps, and supervisory control system. An air-cooled chiller will be procured and installed by Metropolitan forces to replace the rental chiller unit which had been serving the southern portion of the building. Ongoing final design phase activities include detailed engineering design, preparation of plans and specifications for replacement of HVAC equipment, advertisement and receipt of bids, development of a construction cost estimate, and all other activities in advance of award of a construction contract.

Project Controls and Reporting System 03407

Total Appropriation Estimate:	$3,800,000	**Total Projected Through June 30, 2014:**	$299,000
Appropriated Amount:	$0	**Estimated Percent Complete:**	9%
Biennial Estimate:	$1,095,000	**Estimated Completion Date:**	2017

Scope

This appropriation was established to replace outdated project reporting systems. Some of the tools in use today lack key fundamental capabilities, such as earned value and resource utilization reporting, and, due to the upgrades of other applications, have lost the former integration impacting timely reporting. Currently, the primary deliverable of this appropriation is the implementation of an enterprise-wide Project Controls System to provide schedule and resource management and replace the Project Management Information System (PMIS).

Purpose

To ensure the accuracy, efficiency and effectiveness for enterprise-wide proejct controls, scheduling, budgeting, resource management, and management reporting.

Accomplishments Through FY 2013/14

This is a new appropriation; no projects have been completed.

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Project Controls and Reporting System	$3,442,600	2017	Complete replacement of project reporting system

Project Controls and Reporting System

Metropolitan staff uses various systems to maintain project controls and generate reports for the capital investment plan (CIP) projects and programs. The three primary systems used include: (1) the Project Management Information System (PMIS) for cost and labor reporting, (2) Primavera P6 for high-level project scheduling and budgeting, and (3) the Integrated Budget Management System (IBMS) for cash-flow projections. PMIS, the cornerstone of Metropolitan's project reporting system, generates labor and cost reports from data obtained from Oracle EBS, Metropolitan's financial system. These reports provide information on actual costs against budgets, and actual labor expenditures. Primavera schedules are based on information obtained from other sources, primarily input from project managers on the overall status of projects, and on budgets maintained by project managers in Excel spreadsheets. The schedules are used to generate quarterly expenditure forecasts by project by financial expenditure category. IBMS data comes from exports of data from P6, and reports from IBMS are used to estimate overall CIP expenditure forecasts. PMIS, a Metropolitan-developed application, is more than 20 years old and has reached the end of its service life. This application is based on obsolete technology which is difficult to maintain and upgrade. Furthermore, in order to improve resource management and financial forecasting, it is necessary to implement a more collaborative project controls and reporting system which will integrate the scheduling system with the financial system (for earned value calculations) and the scheduling system with the budgeting system (for up-to-date forecasting), and will provide staff with timely resource forecasts to improve project planning.

This project will improve resource management and financial forecasting by implementing a centralized, collaborative project controls and reporting system. Objectives include a Project Controls and Reporting System (PCRS); an enterprise-wide application for routine project management needs including running project reports, updating project status, accessing project schedules, and creating project authorizations; an enterprise reporting environment which will consist of a data warehouse and a front end application for creating project reports; a new project scheduling system to replace existing Primavera P6 Release 6.2; creation of new project schedules which provide the detail needed to support resource management and financial forecasting; and integration of schedules with financial and budgeting systems. Ongoing activities include requirements definition, system design, and infrastructure and security activities; software purchase and hardware purchase; and installation, configuration, testing, and implementation.

Reservoir Cover Replacement 15417

Total Appropriation Estimate:	$32,100,000	**Total Projected Through June 30, 2014:**	$7,937,000
Appropriated Amount:	$8,330,000	**Estimated Percent Complete:**	27%
Biennial Estimate:	$20,974,000	**Estimated Completion Date:**	2017

Scope

This appropriation was established to perform studies, prepare design and construction documents, and coordinate with California Department of Public Health and Division of Safety of Dams for the replacement of floating reservoir covers at multiple locations. The scope includes remove existing covers, repair reservoir gunite lining, modify structures and protective grillages on reservoir bottoms, install underdrain leakage collection systems, install new geocomposite drainage course, install new Hypalon flexible membrane liners and floating covers, and upgrade reservoir electrical systems and surface drainage to accommodate new cover dewatering pumps. The Skinner Finished Water Reservoir cover replacement is completed.

Purpose

To replace reservoir floating covers that have exceeded their useful life and are increasingly difficult to repair.

Accomplishments Through FY 2013/14

Through FY 2013/14, one project has been completed.

Major project milestones in FY 2013/14:

Palos Verdes Reservoir Cover – Completed final design

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Palos Verdes Reservoir Cover Replacement	$23,213,600	2017	Begin construction

Palos Verdes Reservoir Cover Replacement

The Palos Verdes Reservoir, constructed in 1939, is located in the city of Rolling Hills Estates, where it receives treated water from the Second Lower Feeder and the Palos Verdes Feeder. The reservoir has a storage capacity of 1,080 acre-feet, and serves a key role hydraulically within the Central Pool portion of Metropolitan's distribution system. The California Department of Public Health requires that all finished water reservoirs be covered. Metropolitan has installed floating reservoir covers at many of its potable water storage facilities. Floating reservoir covers consist of a thin membrane material that floats on top of the reservoir's water surface. They are considerably more cost-effective than fixed or rigid covers for Metropolitan's and other agencies' reservoirs. While floating reservoir covers are an effective means of maintaining water quality, they are susceptible to contamination of the potable water supply if a tear develops in the cover material. The floating covers are regularly and carefully inspected for damage and signs of deterioration. The 28-acre Hypalon floating cover at Palos Verdes Reservoir was added to the existing open reservoir in 1988. The floating cover had experienced numerous tears in the cover material and repair of these tears had become increasingly difficult due to aging of the material. In 2011, the floating cover was removed and the reservoir was taken out of service.

This project will replace the floating cover. In addition, because the reservoir's existing gunite-concrete floor has several areas of damage, a new membrane liner and subdrain system will be installed to collect and convey drainage flows, and to reduce excess hydrostatic pressure on the floor. The project will also remove the inlet/outlet tower (including all mechanical equipment); modify the spillway, reconfigure the inlet and outlet control mechanism to maintain upstream grade, thereby lowering the maximum operating range of the reservoir; install a new isolation valve; and install a new magnetic meter. Ongoing final design phase activities include detailed field surveys, engineering design, preparation of drawings and specifications, development of a construction cost estimate, advertisement and receipt of bids, and all other activities in advance of award of the construction contract.

Right of Way and Infrastructure Protection 15474

Total Appropriation Estimate:	$50,300,000	**Total Projected Through June 30, 2014:**	$5,840,000
Appropriated Amount:	$7,100,000	**Estimated Percent Complete:**	13%
Biennial Estimate:	$12,522,000	**Estimated Completion Date:**	2023

Scope

This appropriation is established to protect Metropolitan's investment in its rights-of-way by securing and rehabilitate rights of way in a manner that will complement aesthetic qualities of communities and neighborhoods, provide adequate access and buffer area, install security measures (e.g., fencing and signage) to boundaries and restricted areas, and correct or evict encroachments and trespassers.

Purpose

To assess and resolve the known encroachments and rights-of-way gaps, develop best management practices, and install security measures.

Accomplishments Through FY 2013/14

Through FY 2013/14, no projects have been completed.

Major project milestones in FY 2013/14:

Distribution System Assessment/Upgrades of Orange County – Began final design

Distribution System Assessment/Upgrades of Los Angeles County – Began preliminary design

Distribution System Assessment/Upgrades of Riverside and San Diego Counties – Began study

Distribution System Assessment/Upgrades of San Bernardino – Completed preliminary design

Programmatic Environmental Documentation of Orange County – Completed Notice of Preparation

Programmatic Environmental Documentation of San Bernardino County – Began Notice of Preparation

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Distribution System Assessment/Upgrades of Orange County	$21,468,800	2020	Complete final design
Distribution System Assessment/Upgrades of Los Angeles County	$6,612,200	2020	Begin final design
Distribution System Assessment/Upgrades of Riverside and San Diego Counties	$9,301,800	2023	Begin preliminary design
Distribution System Assessment/Upgrades of Western San Bernardino County	$5,886,500	2016	Complete final design
Programmatic Environmental Documentation of Orange County	$566,100	2015	Complete and certify Programmatic Environmental Impact Report
Programmatic Environmental Documentation of Western San Bernardino County	$631,700	2015	Complete Notice of Preparation

Pipeline Protection and Access Improvements in the Orange County Operating Region

Metropolitan's Orange County operating region is comprised of approximately 143 miles of pipelines and a total of 1,270 structures. Detailed site investigations of the Orange County region's nine pipelines have identified more than 600 sites as having erosion, access, or right-of-way issues. Erosion issues caused by concentrated and sheet flows from storm runoff need to be addressed by redirecting storm flows or installing drainage control features. Erosion over successive winter seasons may eventually expose or undermine a pipeline, which could lead to an unplanned shutdown to perform repairs. Several stream crossings along the Lower Feeder, Santiago Lateral, and Allen McColloch Pipeline need to be improved for all-weather access by installing drainage culverts, Arizona crossings, or bridges. Field investigations identified 322 locations that require pipeline protection work or access improvements. Deteriorated access roads hinder the inspection of facilities and make access by maintenance equipment difficult, especially during the rainy season. Right-of-way issues were identified at 615 locations within Orange County. These issues primarily consist of locations where access rights were never obtained or recorded, or locations where pipeline and access roads lie outside of Metropolitan's right-of-way. Encroachments by others have also occurred on Metropolitan property. Clear rights-of-way and easements are necessary to protect Metropolitan's rights and to reduce the risk of damage from third parties. Resolution of these issues may involve acquisition of easements or title to parcels in fee.

This project will protect Metropolitan's facilities located in Orange County, enable patrol and maintenance activities during all weather conditions, secure rights-of-way for Metropolitan's pipelines, and improve access to the pipelines to provide year-round unobstructed access to facilities such as manholes, pump wells, and blow-off structures for planned and unplanned repairs and routine maintenance. One hundred of the 322 locations will be addressed as capital improvements and are included in this project. The remaining 222 locations require less extensive work and will be handled as operations and maintenance (O&M) projects. Ongoing preliminary design phase activities include conducting field surveys and preparing topographic maps; developing layout drawings and final design criteria of needed improvements; initiating consultations with permitting agencies for required permits; conducting right-of-way assessments; conducting a value engineering review; providing engineering support for the programmatic environmental documentation; and developing a preliminary construction cost estimate. Ongoing right-of-way assessments include ordering and reviewing title reports and supporting recorded documents; preparing legal descriptions, exhibit maps, and other exhibits as needed for acquisition planning, permits, and real estate negotiations; completing right-of-way mapping; preparing Record of Survey maps to be filed with the county of Orange; setting monuments and witness posts; preparing necessary correspondence and pre-appraisal documentation; negotiating and obtaining entry permits necessary for engineering, environmental and appraisal purposes; and preparing and reviewing appraisals of needed real property.

Programmatic Environmental Documentation for the Orange County Operating Region

Pipelines and patrol roads within the Orange County operating region cross over many regulated streambeds, as well as various other environmentally restricted areas such as the Chino Hills State Park, designated critical habitat, and the Upper Newport Bay. Metropolitan activities could potentially impact regulated streambeds as well as areas with other environmental issues, such as biological and cultural resources. In recent years, increasingly stringent environmental and regulatory requirements have made system improvements and repairs more challenging, time-consuming, and costly. Staff's practice for obtaining environmental clearances, which is common for public agencies, has been to secure them on a project-by-project basis. A programmatic environmental effort will provide a regional strategy for securing permits for multiple projects having generally similar environmental impacts. The programmatic approach provides more comprehensive consideration of alternatives and their cumulative impacts, and allows the lead agency to consider broad policy alternatives and program-wide mitigation measures early in the process. This approach is also more efficient and economical. Regional environmental approvals are valid for up to 15 years, and may reduce Metropolitan's environmental permitting costs by more than $10 million over a 10-15-year period through consolidation of permit costs and mitigation fees, and through reduced efforts to secure project-by-project environmental clearances.

This project will prepare programmatic California Environmental Quality Act (CEQA) documentation for the Orange County operating region, and will initiate programmatic permitting applications to cover all planned work activities for up to 15 years. Preparation includes: evaluation of environmental impacts as required under State CEQA Guidelines; development of mitigation and monitoring plans; preparation and issuance of the programmatic environmental impact report (EIR) document for public comment; and preparation of responses to comments received during the public review period. Ongoing activities include: identification of impacts and determination

of their significance on the basis of specific evaluation criteria for topography and soils; hydrology; biological resources (threatened, endangered and sensitive species); cultural resources; paleontological resources; traffic; air quality; land use; and aesthetics.

Pipeline Protection and Access Improvements in the Western San Bernardino County Operating Region

The western San Bernardino County region includes over 74 miles of pipelines, including the Etiwanda Pipeline, Inland Feeder, Rialto Feeder, Upper Feeder and Yorba Linda Feeder, and a total of 412 structures. Detailed investigations have identified 200 locations that require pipeline protection work or access improvements. Erosion issues caused by concentrated and sheet flows from storm runoff need to be corrected by redirecting storm flows or installing drainage control features. Continued erosion over successive winter seasons may eventually expose or undermine a pipeline, which could lead to an unplanned shutdown to perform repairs. Right-of-way issues primarily consist of locations where access rights were never obtained or recorded, or locations where pipeline and access roads lie outside of Metropolitan's right-of-way. Clear rights-of-way and easements are necessary to protect Metropolitan's rights and reduce the risk of damage to Metropolitan property and facilities. Resolution of these issues may involve acquisition of easements or title to parcels in fee.

This project will protect Metropolitan's facilities in Western San Bernardino County, enable patrol and maintenance activities during all weather conditions, secure rights-of-way for Metropolitan's pipelines, and improve access to the pipelines. A total of 132 locations, consisting of 40 with erosion issues and 92 with right-of-way issues, will be addressed under this action. The remaining 68 locations (out of the total of 200 within the region) require less extensive work and will be handled as operations and maintenance (O&M) projects. Ongoing preliminary design phase activities include conducting field surveys and preparing topographic maps; developing layout drawings and final design criteria of needed improvements; initiating consultations with permitting agencies for required permits; conducting right-of-way assessments; conducting a value engineering review; providing engineering support for the programmatic environmental documentation; and developing a preliminary construction cost estimate.

Programmatic Environmental Documentation for the Western San Bernardino County Operating Region

Pipelines and patrol roads within the Western San Bernardino County operating region cross over many regulated streambeds, as well as various other environmentally restricted areas and designated critical habitat, such as for the San Bernardino Kangaroo Rat. Metropolitan activities could potentially impact regulated streambeds as well as areas with other environmental issues, such as biological and cultural resources. A programmatic environmental effort will provide a regional strategy for securing permits for multiple projects having generally similar environmental impacts. This approach is also more efficient and economical than the project-by-project approach that is currently employed.

This project will prepare programmatic California Environmental Quality Act (CEQA) documentation for the Western San Bernardino County operating region, and will initiate programmatic permitting applications to cover all planned work activities for up to 15 years. Ongoing activities include: identification of impacts and determination of their significance on the basis of specific evaluation criteria for topography and soils; hydrology; biological resources (threatened, endangered and sensitive species); cultural resources; paleontological resources; traffic; air quality; land use; and aesthetics.

Pipeline Protection and Access Improvements in the Los Angeles County Operating Region

Most of Metropolitan's distribution system was constructed between the 1930s and the 1970s. Over the past 50 years, land development throughout Southern California has gradually surrounded Metropolitan's right-of-way, creating a number of operating challenges. For example, open fields have been developed and converted to paved surfaces in many areas, increasing storm runoff and undermining Metropolitan facilities such as blow-off structures, pump wells, and patrol roads. Land development has landlocked some portions of Metropolitan's right-of-way, which limits access for patrol activities, routine maintenance, and staging of repairs. In addition, increased levels of trespassing and vandalism have occurred as more housing is constructed near Metropolitan properties. These recurring development-related issues have led to increased maintenance and repairs for pipeline structures, access routes, and patrol roads. Within Metropolitan's Los Angeles County operating region there are 28 pipelines totaling approximately 348 miles and a total of 2,446 structures. Field investigations underway will identify

locations that require pipeline protection work or access improvements. In addition, investigations will identify right-of-way issues within Los Angeles County.

This project will protect Metropolitan's facilities located in Los Angeles County, enable patrol and maintenance activities during all weather conditions, secure rights-of-way for Metropolitan's pipelines, and improve access to the pipelines to provide year-round unobstructed access to facilities such as manholes, pump wells, and blow-off structures for planned and unplanned repairs and routine maintenance. Ongoing preliminary design phase activities include conducting field surveys and preparing topographic maps; developing layout drawings and final design criteria of needed improvements; initiating consultations with permitting agencies for required permits; conducting right-of-way assessments; conducting a value engineering review; providing engineering support for the programmatic environmental documentation; and developing a preliminary construction cost estimate. Initiation of programmatic environmental documentation for the Los Angeles Operating Region will occur after system assessments are completed.

Pipeline Protection and Access Improvements in the Riverside County and San Diego County Operating Regions

Most of Metropolitan's distribution system was constructed between the 1930s and the 1970s. Over the past 50 years, land development throughout Southern California has gradually surrounded Metropolitan's right-of-way, creating a number of operating challenges. For example, open fields have been developed and converted to paved surfaces in many areas, increasing storm runoff and undermining Metropolitan facilities such as blow-off structures, pump wells, and patrol roads. Land development has landlocked some portions of Metropolitan's right-of-way, which limits access for patrol activities, routine maintenance, and staging of repairs. In addition, increased levels of trespassing and vandalism have occurred as more housing is constructed near Metropolitan properties. These recurring development-related issues have led to increased maintenance and repairs for pipeline structures, access routes, and patrol roads. Within Metropolitan's Riverside County and San Diego County operating regions there is approximately 403 miles of pipelines and a total of 1,753 structures. Field investigations underway will identify locations that require pipeline protection work or access improvements. In addition, investigations will identify right-of-way issues within Riverside County and San Diego County.

This project will protect Metropolitan's facilities located in Riverside County and San Diego County, enable patrol and maintenance activities during all weather conditions, secure rights-of-way for Metropolitan's pipelines, and improve access to the pipelines to provide year-round unobstructed access to facilities such as manholes, pump wells, and blow-off structures for planned and unplanned repairs and routine maintenance. Ongoing preliminary design phase activities include conducting field surveys and preparing topographic maps; developing layout drawings and final design criteria of needed improvements; initiating consultations with permitting agencies for required permits; conducting right-of-way assessments; conducting a value engineering review; providing engineering support for the programmatic environmental documentation; and developing a preliminary construction cost estimate. Initiation of programmatic environmental documentation for the Riverside County and San Diego County Operating Regions will occur after system assessments are completed.

Skinner Plant Improvements 15365

Total Appropriation Estimate:	$156,136,000	**Total Projected Through June 30, 2014:**	$147,822,000
Appropriated Amount:	$156,136,000	**Estimated Percent Complete:**	99%
Biennial Estimate:	$969,000	**Estimated Completion Date:**	2015

Scope

This appropriation was established to plan and implement multiple projects within the Skinner plant. The common driver for most of the projects in this program is infrastructure reliability.

Purpose

To maintain reliability and ensure regulatory compliance of the Skinner plant.

Accomplishments Through FY 2013/14

Through FY 2013/14, fifteen projects have been completed.

Major project milestones in FY 2013/14:

Electrical Building Upgrades and Ground Fault Protection Upgrade – Continued construction

Skinner Solids Handling Area Improvements – Completed final design

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Electrical Building Upgrades and Ground Fault Protection Upgrade	$5,709,500	2015	Completed construction
Skinner Solids Handling Area Improvements	$928,200	2015	Begin construction

The Skinner plant commenced service in 1976 and has been expanded four times to its present treatment capacity of 630 million gallons per day (mgd). It consists of seven treatment modules that are operated as three distinct facilities (Plants Nos. 1, 2, and 3). The Skinner plant delivers a blend of waters from the Colorado River and State Water Project to Eastern Municipal Water District, Western Municipal Water District of Riverside County, and the San Diego County Water Authority. The plant is located north of Temecula in Riverside County. Its treatment processes presently consist of pre-ozonation, flocculation, sedimentation, biological filtration, and final disinfection using chlorine and chloramines.

Electrical Buildings and Ground Fault Protection Upgrade

At the Skinner plant, Electrical Buildings Nos. 1, 2, and 3 house six unit power centers and nine motor control centers. These buildings supply power to Plants Nos. 1 and 2, and to critical plant-wide equipment, such as flocculators, traveling bridges, belt presses, solids transfer pumps, filter valves, and the chlorine, ferric chloride, polymer, and sodium hypochlorite chemical feed systems. The electrical components within these buildings include circuit breakers, transformers, motor starters, transfer switches, and relays. Many of these electrical components had deteriorated due to age and extreme temperatures and were no longer operating reliably. After more than 30 years of continuous service, the unit power center electrical components reached the end of their service life.

This project will replace the electrical components in a sequential manner through a series of procurement contracts, with staged installation by Metropolitan staff. Construction by Metropolitan forces commenced in February 2011.

Solids Handling Area Improvements

Residual chemicals and settled solids collected from the Skinner plant's sedimentation basins are thickened on-site and then mechanically dewatered in the 2,800-square-foot Solids Dewatering Building, which was built in 1989. This uninsulated building is constructed of painted corrugated sheet metal attached to metal framing. The building houses three belt press units and a polymer feed system used to aid the dewatering process. Dewatered solids are conveyed to an exterior solids storage and truck loading area adjacent to the building. The unroofed solids storage and truck loading area consists of a concrete pad with curbing where the dewatered solids are temporarily stored, and an adjacent 1,600-square-foot asphalt parking area for haul trucks. Front end loaders scoop the dewatered solids off the concrete pad and dump them into an adjacent haul truck. Solids being lifted into the truck bed often spill over the curbing and onto the asphalt pavement, which is cracked and weathered. The Solids Dewatering Building contains a 1-ton overhead bridge crane, which is used to lift and remove belt press parts for cleaning, servicing, or replacement. With no insulation in the building, the bridge crane trolley rails expand and contract due to the variation between extreme summer and winter temperatures, causing misalignment. In recent years, the crane frequently could not move along the misaligned bridge rails. Rehabilitation of that building's bridge crane is needed to enable maintenance of the mechanical belt presses, while improvements to the exterior solids storage and truck loading area are needed to properly contain dewatered solids and contaminated rainwater.

This project will rehabilitate the crane system in the Solids Dewatering Building; replace the asphalt pavement at the truck-loading area with a concrete containment pad with sump pump; and replace existing asphalt pavement and improving drainage next to the Solids Dewatering Building, so that storm water runoff is directed away from the solids storage and truck loading area. Ongoing final design activities include preparation of construction drawings and specifications; development of a construction cost estimate; advertisement and receipt of bids; and all other activities in advance of award of a construction contract.

Skinner Plant Improvements for FY 2012/13 through FY 2017/18 **15485**

Total Appropriation Estimate:	$43,800,000	**Total Projected Through June 30, 2014:**	$295,000
Appropriated Amount:	$550,000	**Estimated Percent Complete:**	1%
Biennial Estimate:	$1,344,000	**Estimated Completion Date:**	2027

Scope

This appropriation was established to plan and implement multiple projects within the Skinner plant. The common driver for most of the projects in this appropriation is infrastructure reliability.

Purpose

To maintain reliability and ensure regulatory compliance of the Skinner plant.

Accomplishments Through FY 2013/14

Through FY 2013/14, fifteen projects have been completed.

Major project milestones in FY 2013/14:

Skinner Replacement of Eighty-four Turbidimeters – Continued construction

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Skinner Reservoir Inlet Conduit Low Flow Mixing System	$507,000	2017	Begin final design
Water Quality Laboratory Relocation	$1,184,000	2017	Begin final design
Facility Maintenance and Vehicle Service Centers Renovation	$25,950,000	2018	Begin final design
Skinner Plant No. 1Weir Rehabilitation	$1,552,000	2017	Complete construction
Administration Building Refurbishment	$8,300,000	2016	Begin preliminary design
Skinner Replacement of Eighty-four Turbidimeters	294,700	2015	Complete construction

Water Quality Laboratory Relocation

The Skinner Water Quality Laboratory was built in 1976 and is located on the first floor of the Skinner Administration Building. The facility is approximately 835 square feet in area and includes a general laboratory, microbiology laboratory, and a small storage/office area. Due to increasingly more stringent water quality regulations, the quantity of water quality samples and required tests has greatly increased. The nearly 40-year-old lab space is showing significant signs of wear and tear and is inadequate for the current water quality operations. The lab lacks space to store delicate laboratory equipment and supplies, and current and archival lab records and documents. In order to resolve the deficiencies identified above, the Water Quality Laboratory and its support spaces should be relocated to the vacant 1270-square-foot southeast corner of the Administration Building. The space had previously housed the chlorination equipment, which was moved to the new Chlorine Containment and Handling Facility in 2008.

This project will relocate the Skinner Water Quality Laboratory within the Skinner Administration Building. Mechanical, electrical and plumbing systems at the southeastern corner area will be upgraded to meet the new specifications of the laboratory space functions. The existing laboratory instruments will be relocated to the relocated laboratory. The new laboratory layout will be designed to be functional, efficient, and safe, and to comply with current Building and Fire Codes and with the Americans with Disabilities Act. A new laboratory HVAC system will be provided to maintain positive pressure in the laboratory and enable 100 percent outside air to provide continuous makeup air to the fume hoods. Ongoing preliminary design phase activities include engineering analyses, layout of the laboratory space, preparation of environmental documentation, code review and permitting, development of a preliminary construction cost estimate, and preparation of a preliminary design report.

Facility Maintenance and Vehicle Service Centers Renovation

Maintenance and vehicle service functions at the Skinner plant are currently housed in two adjacent but separate buildings. Service Buildings Nos. 1 and 2 occupy approximately 17,820 square feet on 2.5 acres. The single-story buildings were built in 1977 and 1981, and are constructed of ribbed sheet metal. Service Building No. 1 on the east houses the mechanical, electrical, and fleet services maintenance crews and their shops (such as welding, fabrication, mechanical/electrical, carpentry, and light-to-medium –weight vehicle service shops). Service Building No. 2 on the west houses conveyance and distribution system staff and painting/coating shop staff and equipment. Each building has shared uses including restrooms, lockers, and break rooms. Typically, the shop spaces consist of a layout area, shop, storage, crew room and manager's office. The surrounding paved areas include outdoor vehicle storage space, employee parking, and a fueling island. Outdoor access needs vary with some shops requiring large access doors for large deliveries. Over time, spaces in both buildings have been modified to suit changing needs. As a result, the work and storage areas are fragmented and inadequate space is available for equipment tear down by each of the crafts. Increased congestion has had a detrimental effect on staff's ability to efficiently respond to plant needs for preventive and corrective activities. The vehicle service center has a limited parts storage area and lacks lifting capacity to maintain heavy-duty vehicles used by Metropolitan staff.

This project will renovate Service Buildings Nos. 1 and 2 at the Skinner plant. Ongoing preliminary design phase activities include field investigations, development of final design criteria, and development of a preliminary construction cost estimate.

Skinner Plant No. 1 Filter Weir Rehabilitation

Skinner Plant No. 1, which was placed into service 37 years ago, has a total of 24 filter units. During the filtration process, water flows downward through the filter media within a filter unit. Filtered water from all of the filter units in service is then collected in the filter outlet channel and conveyed to the finished water reservoir. To clean the filter units, valves are operated to cause a reversal of flow from the filter outlet channel, into the filter unit, and up through the filter media, which expands the media and cleans it. This process is known as backwashing. Backwash water flow rates are targeted to achieve a media bed expansion of 15 to 20 percent, which results in optimal cleansing. The backwash water flow rate is controlled by adjusting the height of the filter control weirs. These weirs are located between the filter outlet channel and the filter weir forebays and are composed of stacked 2-inch-high by 4-inch-wide by 11-foot-long wooden boards, held in place by steel guides embedded in the top-of-concrete weir openings. Weir height adjustments are required as the water temperature changes throughout the year and as the volume of water being treated increases or decreases so as to optimize the cleansing and to not wash out too much media during backwash. Weir height is adjusted by manually by adding or removing weir boards

when a module is out of service. The inability to adjust the weirs while the module is in operation results in a less than optimal backwashing performance.

This project will replace the manually adjusted wooden board weirs with mechanically operated weirs at Plant No. 1. Each existing concrete weir opening will be modified to accept a stainless steel weir gate guide and a double panel weir gate, with one panel stationary and the other panel adjustable to allow adjustment during varying flow rates and water temperatures. Ongoing preliminary design phase activities include field investigations, development of final design criteria, and development of a preliminary construction cost estimate.

Reservoir Inlet Conduit Low Flow Chemical Mixing System

In September 2007, construction of multiple chemical storage tank farms and feed systems was completed to support a total treatment capacity of 630 million gallons per day (mgd) at the Skinner plant. Chlorine, ammonia, caustic soda, and fluorosilicic acid are now sequentially injected at various locations in the 12.5-foot by 12.5-foot conduit leading to the finished water reservoir. For flows between 65 mgd and 630 mgd in the conduit, the turbulence of the treated water provides for adequate mixing of the chemicals. Flows below 65 mgd have resulted in inadequate mixing of chlorine and ammonia. Poor mixing results in inadequate disinfection, increased potential for taste-and-odor problems, and chloramine decay in the distribution system.

This project will install a chemical mixing system to achieve adequate mixing of chlorine and ammonia under low flow conditions. Ongoing preliminary design phase activities include field investigation, development of final design criteria, and development of a preliminary construction cost estimate.

Administration Building Refurbishment

The Skinner plant's Administration Building was part of the original plant construction in 1976. The Administration Building houses administrative and operations staff, the local Incident Command Center (ICC), the water quality compliance lab, the plant's process control computers (including the SCADA and area control center systems), and telecommunication and electrical equipment. Barring a minor modification in 1990, no changes have been made to the Administration Building to more efficiently use the space. The Control Room needs to be reconfigured to accommodate new SCADA equipment and the operating information wall display boards are outdated and in poor condition. Additional office space is needed for additional plant personnel (such as the water quality liaison, security specialist, plant engineer, and safety monitor). Restrooms are not compliant with the Americans with Disabilities Act, lighting and ventilation are insufficient, and plumbing need replacement. The HVAC system is over 30 years old and has exceeded its service life; it needs to be replaced with an energy efficient system.

This project will replace the HVAC system and renovate the Skinner Administration Building. Ongoing preliminary design phase activities include field investigations, development of final design criteria, and development of a preliminary construction cost estimate.

Turbidimeter Replacement

Process control instruments, which include turbidimeters, are essential to provide continuous monitoring of a treatment plant's filters and finished water quality. In compliance with California's surface water filtration and disinfection regulations, each filter outlet is equipped with a turbidimeter, while additional units monitor the combined filtered water quality from each module. Turbidimeters provide early warning of filter turbidity breakthrough and are key instruments used to demonstrate compliance with water quality regulations. If a turbidimeter fails, staff must manually collect and analyze water samples every four hours. Water quality regulations require that the continuous on-line measurements resume within five days. After over 30 years of continuous service, many of the Skinner plant's older turbidimeters have begun to fail. The manufacturer is no longer in business, and spare parts are no longer available. In addition, the performance of many of the Skinner plant's turbidimeters is declining.

This project will procure and install new turbidimeters throughout the Skinner plant. This work will be completed in two stages. Under the initial stage, 84 turbidimeters will be replaced at Plants Nos. 1 and 3 (Modules Nos. 1, 2, 3, and 7) and at the finished water reservoir. The existing turbidimeters will then be salvaged and used to supply spare parts for Plant No. 2 (Modules Nos. 4, 5, and 6). In the future, the remaining units at Plant No. 2 will be

replaced after the spare parts supply has been depleted. Ongoing activities include procurement of the 84 turbidimeters for the four treatment modules and at the finished water reservoir.

Skinner Plant Oxidation Retrofit 15388

Total Appropriation Estimate:	$245,492,000	**Total Projected Through June 30, 2014:**	$223,243,000
Appropriated Amount:	$245,492,000	**Estimated Percent Complete:**	99%
Biennial Estimate:	$1,145,000	**Estimated Completion Date:**	2016

Scope

This appropriation was established to design and construction of oxidation retrofit facilities at the Skinner plant. This appropriation consists of four contracts: 1) Site preparation, 2) Oxygen Equipment Procurement, 3) Oxidation Retrofit Program (ORP) General Construction, and 4) ORP large pipe procurement. This appropriation also includes design and construction of the Skinner Incoming 33 kv Electrical service by Southern Calif. Edison, and design and construction of the ORP Facilities Access Road project.

Purpose

To reduce the level of disinfection by-products in the treated water supplied by the Skinner plant in order to meet state and federal standards and provide consistent and equitable high quality treated water to all of Metropolitan's member agencies.

Accomplishments Through FY 2013/14

Through FY 2013-14 seven projects have been completed.

Major project milestones in FY 2013-14:

Skinner ORP Completion Project – Completed construction

Skinner ORP Facilities Construction – Continued As-Built

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Skinner ORP Facilities Construction	$178,727,700	2016	Complete As-built drawings

ORP Facilities Construction

The addition of ozone as the primary disinfectant at each of Metropolitan's treatment plants substantially reduces the formation of disinfection by-products for compliance with the U.S. Environmental Protection Agency's Disinfectants/Disinfection By-Products Rule. The use of ozone also enhances Metropolitan's ability to treat water with varying source-water quality, and provides critical operational flexibility to meet treatment challenges resulting from periodic water supply events such as drought or other source-water limitations. Further, ozonation is effective in controlling taste-and-odor causing compounds which may be present from time to time, as well as some pharmaceuticals/personal care products, endocrine disruptors, and algal toxins. In addition to these overall water quality benefits, the use of ozone provides important operational advantages, allowing Metropolitan to eliminate blend restrictions of State Water Project and Colorado River Aqueduct source waters.

This project constructed ozone-related facilities including the inlet control structure, plant rejection structure, ozone contactors, ozone generator building, ozone destruct facility, liquid oxygen storage and feed system, chemical storage and feed systems, power substation, power switchgear building, and cooling water pump station, and installed and commissioned the ozone equipment furnished by Metropolitan to the construction contractor. Construction of the Skinner ozonation facilities was completed in June 2011. Deficient open loop cooling water pumps, which supply cooling water to the ozone generation equipment, will be replaced by Metropolitan forces. Procurement of these pumps was funded by a settlement agreement with the contractor. Record drawings are being prepared to document the upgraded facilities.

Termination of Center for Water Education Ground Lease 15449

Total Appropriation Estimate:	$4,673,000	**Total Projected Through June 30, 2014:**	$99,000
Appropriated Amount:	$4,673,000	**Estimated Percent Complete:**	23%
Biennial Estimate:	$331,000	**Estimated Completion Date:**	2015

Scope

This appropriation was established to plan and implement multiple projects at the Diamond Valley Lake (DVL) Visitor's Center, formerly known as "The Center for Water Education."

Purpose

To maintain the DVL campus by developing and constructing projects that enhance revenue for Metropolitan's Real Property Development and Management Group, as well as provide assistance and support for WSO staff stationed at DVL.

Accomplishments Through FY 2013/14

Through FY 2013/14, one project has been completed.

Major project milestones in FY 2013/14:

DVL Visitor's Center Improvements – Continued Final design

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
DVL Visitor's Center Improvements	$430,300	2015	Complete construction

Diamond Valley Lake Visitor's Center Improvements

The Diamond Valley Lake (DVL) Visitor's Center is located near the lake's eastern dam in the city of Hemet and consists of several buildings. The former Café Building contains approximately 2,400 square feet of unfinished architectural components, including flooring, lighting, doors, windows, fire sprinklers, exterior restrooms, and other appurtenant features. The Café Building was planned to be part of the former Center for Water Education but the Café Building was never completed because the property and asset were repurposed by Metropolitan in the mid-2000s. A Charter School currently leases other buildings located on site near the Café Building. Finishing work is now justified to bring the building up to code requirements for occupancy, in order to lease out the space and generate revenue. The interior space will be made suitable for use as classrooms and meeting rooms. In addition, the external restrooms will be finished. Finishing the external restrooms will increase security by allowing the use of the restrooms during business hours and keeping the adjacent Metropolitan operational buildings closed to the public.

This project will finalize architectural improvements to the former Café Building at the DVL Visitor's Center. Ongoing final design phase activities include preparation of architectural design drawings for the building improvements, permitting by the city of Hemet, development of a construction cost estimate, advertisement and receipt of bids, and all other activities in advance of award of a construction contract.

Union Station Headquarters Improvement 15473

Total Program Estimate:	$14,100,000	**Total Projected Through June 30, 2014:**	$1,830,000
Appropriated Amount:	$1,920,000	**Estimated Percent Complete:**	15%
Biennial Estimate:	$1,500,000	**Estimated Completion Date:**	2019

Scope

This program was established to resolve seismic modifications to Metropolitan's Headquarters Building at Union Station in Los Angeles. Planned preliminary design activities include the following: review of code and permit requirements; preparation of a preliminary design scaled testing of structural components; detailed structural analyses and evaluation; preparation of a preliminary design report and environmental documentation; and development of a preliminary construction cost estimtate. Repair plans will be developed for areas which would likely be damaged in a major earthquake.

Purpose

To implement seismic modifications to Metropolitan's Headquarters Building which would likely be damaged in a major earthquake.

Accomplishments Through FY 2013/14

Major project milestones in FY 2013/14:

Headquarters Building Seismic Assessment/Upgrades – Completed preliminary design

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Headquarters Building Seismic Assessment/Upgrades	$12,113,900	2019	Begin final design

Headquarters Building Seismic Assessment

The Headquarters Building at Union Station in Los Angeles is a 520,000-square-foot concrete-frame structure consisting of a 12-story high-rise portion connected to a lower 5-story wing. The building was designed and constructed under a design-build agreement in the late 1990s. Metropolitan's intent at that time was that the building be designed as an essential facility, meaning that the structure would remain fully operational immediately following a major earthquake. The building is essential to Metropolitan's business operations. Metropolitan first occupied the building in 1998. Since 2008, Metropolitan has discovered a series of potential design flaws and construction defects. Following the latest discovery in 2010, staff performed an initial seismic assessment of the building to evaluate its seismic vulnerability. This assessment concluded that the building remains safe for occupancy but does not meet current building code requirements for an essential facility. The Headquarters Building may instead fall in to the lesser category of "regular facility" and may require significant repairs in the event of a major earthquake. Structural analyses were conducted to determine the full extent of potential seismic upgrades for the building. Areas needing seismic strengthening were identified.

This project will seismically strengthen beams, columns, and structural connections to reduce the risk of significant building damage and to minimize the associated business disruption due to a major earthquake. Ongoing preliminary design activities include: review of code and permit requirements; materials testing; scaled testing of structural components; detailed structural analyses and evaluation; preparation of a preliminary design report and environmental documentation; and development of a preliminary construction cost estimate.

Water Delivery System Improvements 14503

Total Appropriation Estimate:	$36,800,000	**Total Projected Through June 30, 2014:**	$5,000,000
Appropriated Amount:	$0	**Estimated Percent Complete:**	20%
Biennial Estimate:	$29,500,000	**Estimated Completion Date:**	2017

Scope

This appropriation is established to provide flexibility to distribute Colorado River water portions of the service area that currently rely exclusively on deliveries from the State Water Project.

Purpose

To improve the reliability and flexibilioty of delivering Colorado River water during drought or other State Water Project delivery constraints.

Accomplishments Through FY 2013/14

This is a new appropriation; no projects have been completed.

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Inland Feeder/Lakeview Pipeline Intertie – I	$14,500,000	2015	Complete construction
Inland Feeder/Lakeview Pipeline Intertie – II	$16,500,000	2016	Complete construction
Greg Avenue Facility Improvements	$3,000,000	2016	Complete construction
San Dimas and Live Oak Pumping Stations	$2,500,000	2017	Begin design

Inland Feeder/Lakeview Pipeline Interconnection

In February 2014, State officials announced that the State Water Project is set to provide zero percent of the contracted water allocations in 2014. Because of significant investments in water storage and other regional projects, Metropolitan will be able to continue to meet delivery demands. However, an Inland Feeder/Lakeview Pipeline interconnection is recommended in order to provide a backup water supply to the Mills plant, which currently relies exclusively on deliveries from the East Branch of the State Water Project. Water stored in Diamond Valley Lake (DVL) could be delivered to the Mills plant by connecting the Inland Feeder to the Lakeview Pipeline. Water would travel from the Inland Feeder to the Lakeview Pipeline through the new interconnection, through the northern portion of the Santa Ana Valley Pipeline, through the Box Springs Feeder, and into the Mills plant. Water would be supplied by gravity at normal lake operating levels. Water surface elevations below normal lake operating conditions would require pumping using the existing Perris Pumpback Facility. This interconnection could supply up to 2 years of supply to the Mills plant, depending on other DVL commitments and treated water demands at the Mills plant.

This project will install the interconnecting piping, including approximately 185 feet of 8-foot-diameter pipe, and 320 feet of 54-inch-diameter pipe. Additionally, three cast-in-place concrete vaults will be constructed to house an 84-inch-diameter tie-in butterfly valve, an 84-inch-diameter isolation butterfly valve, and a 30-inch-diameter bypass line. The project will also line the entire Bernasconi Tunnel with 9.5 -foot-diameter steel liner and install 2,000 cubic feet surge tank at Lake Perris Pumpback facility.

Ongoing final design phase activities include: preparation of drawings and specifications; procurement of valves; development of a construction cost estimate; advertisement and receipt of bids; and all other activities in advance of award of a construction contract. Construction is planned to commence by the end of 2014.

Greg Avenue Facility Improvements

The Greg Avenue Facility is located on the corner of Greg Avenue and San Fernando Road within the San Fernando Valley. The facility houses a pressure control structure and pump station, both built in the early 1960s, and a hydroelectric plant built in 1979. The pressure control structure and hydroelectric plant receive treated water flows from the Jensen plant via the East Valley Feeder and deliver them to the cities of Los Angeles, Beverly Hills, Glendale and Burbank. The pump station can pump up to 60 cfs into the Sepulveda Feeder or, if required, west to Calleguas and Las Virgenes Municipal Water Districts in case of drought. Staff discovered a number of cracks in the C-11 pump support pedestal which made the facility's operation unreliable. A comprehensive design and fabrication of brackets is needed to provide structural support at the C-11 pump support pedestal.

This project will repair the pump support and test the pump and install a diffuser plate at Jensen plant outlet gate to lower the hydraulic grade, and thereby allow additional distribution of treated water from the Weymouth plant to the Calleguas and Las Virgenes districts. In addition, the feasibility of increasing the current Greg Avenue Facility pumping station capacity will be evaluated. Ongoing activities of this fast-tracked project include field investigation, development of final design criteria, design, and Metropolitan forces fabrication and construction.

San Dimas and Live Oak Pumping Stations

The Rialto Pipeline conveys untreated State Water Project (SWP) supplies from the California Department of Water Resources' Devil Canyon Power Plant to Metropolitan's San Dimas Hydroelectric Plant near Live Oak Reservoir. The San Dimas Hydroelectric Plant utilizes the high pressure Rialto Pipeline flows to generate power; if the turbine generator is out of service, the pressure is reduced using pressure-reducing valves. After the water passes through the San Dimas Hydroelectric Plant, it is conveyed to the Weymouth plant through the La Verne Pipeline. The Rialto Pipeline is the primary source of water for the Inland Empire Utilities Agency and Three Valleys Municipal Water District service areas via multiple service connections. At present, the Rialto Pipeline cannot carry Colorado River Aqueduct (CRA) water, and thus all of its service connections are currently dependent on the availability of SWP supplies, either allocated to Metropolitan or from exchanges with other State Water Contractors. Although the Rialto Pipeline is connected to the La Verne Pipeline, which can carry CRA water from the Weymouth Plant, it is not currently possible to send this CRA water back into the Rialto Pipeline because the Rialto Pipeline is at a much higher grade. In order to increase the reliability and operational flexibility of Metropolitan's distribution system and complement SWP water deliveries with available CRA water, two pumping stations are recommended along the Rialto Pipeline.

This project will construct two pumping stations along the Rialto Pipeline: the San Dimas pumping station and the Live Oak pumping station (PS). The San Dimas PS will be located at the existing San Dimas Hydroelectric Plant and pressure control structure facility and will pump water from the La Verne Pipeline into the Rialto Pipeline reach west of Live Oak Reservoir. The Live Oak PS will be located at the existing Live Oak Reservoir site, and will pump water received from San Dimas PS into the Rialto Pipeline reach east of Live Oak Reservoir. Combined, these two pumping stations will supply approximately two thirds of the service connection demands along the Rialto Pipeline, and will complement limited SWP water deliveries from the Devil Canyon Power Plant. The work will consist of installation of several hundred feet of new interconnecting pipeline and suction and discharge manifolds at each site, and installation of multiple pumps at each site. A study is currently underway for this fast-track project and construction is planned to start in summer 2014.

Etiwanda Pumping Station

The Rialto Pipeline conveys untreated State Water Project (SWP) supplies from the California Department of Water Resources' Devil Canyon Power Plant to the Etiwanda Pipeline. The Etiwanda Pipeline, located within the cities of Fontana and Rancho Cucamonga, conveys untreated SWP water from the Rialto Pipeline to the Upper Feeder. The northern portion of the Etiwanda Pipeline, which is 5.4 miles long, conveys water from the Rialto Pipeline to the Etiwanda Hydroelectric Plant, where power is generated from the high pressure flows available from the Rialto Pipeline. From that facility, the southern portion of the Etiwanda Pipeline continues for one mile to an interconnection with the Upper Feeder. The Etiwanda Pipeline provides flexibility in conveying untreated water from the East Branch of the SWP to the Upper Feeder. The Rialto Pipeline is also the primary source of water for the Inland Empire Utilities Agency and Three Valleys Municipal Water District service areas via multiple service connections. At present, the Rialto Pipeline cannot carry Colorado River Aqueduct (CRA) water, and thus all of its service connections are currently dependent on the availability of SWP supplies, either allocated to Metropolitan or from exchanges with other State Water Contractors. Although the Rialto Pipeline is connected via the Etiwanda Pipeline to the Upper Feeder, which can carry CRA water, it is not currently possible to send this CRA water back into the Rialto Pipeline because the Rialto Pipeline is at a much higher grade. In order to increase the reliability and operational flexibility of Metropolitan's distribution system and complement SWP water deliveries with available CRA water, a new pumping station is recommended at the Etiwanda Hydroelectric Plant.

This project will construct a pumping station at the Etiwanda Reservoir/Hydroelectric Plant facility in order to lift water from the Upper Feeder into the Rialto Pipeline by way of the existing Etiwanda Pipeline infrastructure. This pumping station will supply up to the full amount of water typically consumed along the Rialto and Etiwanda pipeline service connections, or may be operated at lower rates to supplement available SWP supplies at the Devil Canyon Power Plant. The work will include installation of approximately 2,500 feet of new interconnecting pipeline, new suction and discharge manifolds, and new pumps and valves, as required. The work also includes construction of electrical power supply facilities for the pumping station. A study is currently underway for this fast-track project and construction is planned to start in late 2015.

Water Operations Control 15467

Total Appropriation Estimate:	$130,600,000	**Total Projected Through June 30, 2014:**	$2,617,000
Appropriated Amount:	$4,540,000	**Estimated Percent Complete:**	2%
Biennial Estimate:	$11,646,000	**Estimated Completion Date:**	2023

Scope

This appropriation is established to further coordinate the capabilities of Metropolitan's control system Supervisory Control and Data Acquisition (SCADA) with operational and business needs. The appropriation will focus on maintaining system reliability, system integration, and improving operational and business capabilities and efficiencies. There are three active projects including, Wadsworth Pumping Plant Control and Protection Upgrade Project, SCADA Remote Terminal Unit CPU (hardware) & OS (software) Replacement, and SCADA Remote Terminal Unit Input/Output (component) System Retrofit.

Purpose

Maintain the reliability and integrity of Metropolitan's control system.

Accomplishments Through FY 2013/14

Through FY 2013/14, one project has been completed.

Major project milestones in FY 2013/14:

Wadsworth Pumping Plant Control and Protection Upgrade – Completed preliminary design

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Wadsworth Pumping Plant Control and Protection Upgrade	$22,175,100	2019	Complete final design and begin pilot
Water System Control Master Plan	$91,237,900	2023	Begin Standards, condition assessment and equipment & software preliminary design

Wadsworth Pumping Plant Control and Protection Upgrade

The Hiram W. Wadsworth Pumping Plant at Diamond Valley Lake (DVL), which was commissioned in 2000, can pump water into DVL or generate power as water flows out of the lake. The pumping plant's control and electrical protection systems operate and protect the pump/generator units, and regulate the pressures and flows between DVL, the Inland Feeder, and the San Diego Canal. The complex and proprietary in-plant Supervisory Control and Data Acquisition (SCADA) system locally controls the pump/generator units and a variety of electrical components which protect against electrical faults or hydraulic surges. The control system is also a component of Metropolitan's distributed SCADA system so that the facility may be remotely operated from the Operations Control Center in Eagle Rock. This equipment has been in operation for 12 years, requires frequent repair, and has reached the end of the typical industry service life. Currently, the equipment failure rates appear to be accelerating. The aging components include: programmable logic controllers that control the pumping/generation equipment; the data and control communications system; the electrical protection relay system; the vibration monitoring system; and pump/generator power control components. Failure of control components may cause single pump/generator units to shut down, or an entire section of the pumping plant, resulting in reduced pump/generation capacity and reliability. Further, the manufacturers no longer support these components and spare parts are increasingly difficult to obtain or are unavailable. Without being upgraded, the operational reliability of the facility will diminish.

This project will rehabilitate and upgrade the control and electrical protection systems for the Wadsworth pumping plant at DVL. The new systems will follow modern industry open standards, be consistent with Metropolitan's current electrical protection and control system practices, be compatible with planned upgrades to the Metropolitan-wide SCADA system, and not be a proprietary system. Ongoing preliminary design activities include development of system and operational requirements for software and hardware, network communications, electrical protection, vibration monitoring, and pump/generator power controls; the preliminary system design and equipment selection; and a project plan.

Water System Control Master Plan

The Water System Control Master Plan was developed to provide a comprehensive, long-term roadmap for upgrading the control system used to operate Metropolitan's water conveyance, treatment, and delivery processes. Metropolitan's Supervisory Control and Data Acquisition (SCADA) system is used to monitor and control water system processes such as water conveyance, treatment, and distribution, as well as provide the source of data for operational business processes such as water quality regulatory compliance, chemical inventories, maintenance management, and other core business processes. Each treatment plant uses the control system for automation of processes such as filtration and disinfection. In the distribution system, the control system is used for functions such as automated reservoir level control, pipeline flow and pressure control, and distribution system water quality monitoring. The control system is comprised of a variety of equipment and software including field instruments, control computers, host servers, and control room operator computers and screens. The SCADA system has been in continuous service for more than 17 years with minimal upgrades. At present, many of the system components are at or have exceeded their design life and many components are technologically obsolete. The Water System Control Master Plan sets forth multiple projects to maintain control system performance and reliability, and identifies opportunities for operational improvement through the application of control system technology and practices. As a short-term measure to address obsolete technology, the District-wide SCADA servers will be replaced with updated technology, as part of an incremental rehabilitation to increase SCADA system reliability, reduce risks, lower maintenance costs, and extend server life for approximately 5 to 8 years.

The four broad categories of upcoming projects to be implemented under the Water System Control Master Plan are:

1. Enterprise SCADA: This category of projects will build a uniform, fully integrated enterprise-wide control system that is sustainable and based on mainstream technologies. Near-term projects include replacement of the central processing units and the input/output components in the Remote Terminal Units.
2. SCADA Information Driven: This category of projects will enable Metropolitan to enhance its information-driven organization by providing self-serve access to quality data required to support regulatory compliance, operational decisions, operations and maintenance efficiency, cost analyses, planning, and asset management.

3. SCADA Asset Management: This category of projects will develop the software tools, practices and procedures to effectively plan, design, implement, govern, and manage the upgraded SCADA system.
4. Operations Improvement: These projects will provide the technology necessary to support the continual improvement of operations by documenting operating procedures and workflow, establishing key performance metrics, and optimizing operations to reduce operating cost and risk, enhance water quality, and maximize power production.

Ongoing activities under the Water System Control Master Plan include implementation of short-term projects and planning and initiation of long-term projects.

Weymouth Plant Improvements 15369

Total Appropriation Estimate:	$241,000,000	**Total Projected Through June 30, 2014:**	$167,475,000
Appropriated Amount:	$169,930,000	**Estimated Percent Complete:**	73%
Biennial Estimate:	$18,123,000	**Estimated Completion Date:**	2021

Scope

This appropriation was established to plan and implement multiple projects at the Weymouth plant. The common driver for many of the projects in this program is infrastructure reliability.

Purpose

To maintain reliability and ensure regulatory compliance of the Weymouth plant.

Accomplishments Through FY 2013/14

Through FY 2013/14, fourteen projects have been completed.

Major project milestones in FY 2013/14:

Weymouth Basin Drop Gate Replacement – Completed construction of first stage. Began final design of second stage

Weymouth Filter Building No. 1 Valve Rehabilitation – Began preliminary design

Weymouth Filter Buildings Seismic Upgrades – Began construction

Weymouth Incoming Electrical Service – Completed construction

Weymouth Power System Upgrade – Completed construction

Weymouth Washwater Tanks Seismic Upgrade – Continued final design

Weymouth Washwater Reclamation Reliability Upgrade – Continued construction

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Weymouth Basin Drop Gate Improvements	$1,847,400	2016	Complete construction
Weymouth Administration and Control Building Seismic Upgrades	$11,347,900	2019	Begin final design
Weymouth Filter Building Valve Replacement	$23,537,000	2018	Begin final design
Weymouth Filter Buildings Seismic Upgrades	$7,029,600	2015	Complete construction
Weymouth Power Systems Upgrade	$39,055,300	2015	Complete project
Weymouth Washwater Reclamation Reliability Upgrade	$3,993,400	2015	Complete construction

Project	Total Project Estimate	Estimated Completion	Planned Activity
Perimeter Security Improvements	$2,871,300	2016	Complete construction
Washwater Tanks Seismic Upgrade	$3,927,500	2016	Complete construction
Basins Nos. 1 and 2 Rehabilitation	$20,800,900	2021	Begin preliminary design

The Weymouth plant was placed into service in 1941 with an initial capacity of 100 million gallons per day (mgd), and was expanded twice to its current capacity of 520 mgd. The plant delivers a blend of waters from the Colorado River Aqueduct (CRA) and State Water Project (SWP) to Metropolitan's Central Pool portion of the distribution system, and to an exclusive service area. The plant is located in the city of La Verne. Its treatment processes presently consist of flocculation, sedimentation, filtration, and final disinfection using chlorine and chloramines. Pre-ozonation facilities are currently under construction.

Basin Drop Gate Replacement

Drop gates are used to isolate hydraulic channels within the Weymouth plant to allow dewatering in order to perform needed maintenance and equipment repairs. Each drop gate consists of a carbon steel plate or gate, approximately 12 feet wide by 10 feet tall, which fits into a steel U-shaped guide located within a hydraulic channel. When a basin needs to be isolated, gates are dropped by crane into their guides and the isolated channels are dewatered. Due to 50 to 70 years of service, many of the carbon steel drop gates at the Weymouth plant are corroded and need to be replaced. Ten gates are recommended to be fabricated at this time to accommodate filter valve replacement work at Filter Buildings Nos. 1 and 2, which is scheduled to commence in early 2016.

This project will rehabilitate ten drop gates at the treatment basins and filter buildings. Ongoing final design and fabrication phase activities includes detailed design; preparation of fabrication drawings; fabrication of ten new carbon steel gates and stainless steel gate guides; preparation of drawings and specifications for installation; development of a construction cost estimate; advertisement and receipt of bids; and all other activities in advance of award of a construction contract.

Basins Nos. 1 and 2 Rehabilitation

Flocculation and sedimentation are two important unit processes within a conventional water treatment plant. Flocculation follows immediately after the initial chemical addition, and is designed to gently mix small particles and colloids in the water so that they agglomerate to form settleable or filterable particles that can be subsequently removed by sedimentation and filtration. Basins Nos. 1 and 2 were built in 1939 as part of the original Weymouth plant construction. Each basin has a treatment capacity of 57.5 million gallons per day (mgd). Each basin is 250 feet long by 200 feet wide, and is further divided into a 50-foot-long flocculation section with horizontal wheel flocculators and a 200-foot-long square sedimentation section with a center feed configuration. From the center, clarified water flows radially to the perimeter overflow weirs and the settled solids on the floor are swept to a sump by a circular sludge rake. Despite receiving regular maintenance, the equipment has deteriorated after 70 years of continuous operation. In addition, short-circuiting occurs through each square sedimentation basin. This results in low settling rates within the basins and floc particles carrying over into the filters. Under unfavorable water quality conditions and average flows, the short circuiting has the potential to lead to a violation of the drinking water regulations. Without major modifications to the design, there is little chance that these basins could meet water quality objectives at their rated flow and high blends of State Water Project water. The plant typically operates these basins at around 30 mgd to maintain adequate filter performance. Redesigning the basins to current standards in order to treat any source water blend is necessary.

This project will redesign the Basins Nos. 1 and 2 flocculator (mixing) and clarifier (settling) sections to convert them from squarish basins to horizontal rectangular basins to reduce the short circuiting and will replace the flocculators, baffle walls, sludge collection equipment, and edge weirs to improve performance. Ongoing final design activities to rehabilitate the Weymouth plant's Basins Nos. 1 and 2 include preparation of drawings and

specifications; hazardous materials remediation permitting, if needed; environmental documentation; third-party value engineering review; development of a construction cost estimate; advertisement and receipt of bids; and all other activities in advance of award of a construction contract.

Power Systems Upgrade

Principal components of the electrical system at the Weymouth plant date to the plant's original construction in the late 1930s. Since that time, the electrical system has been expanded and adapted for subsequent projects without changing the fundamental design of the original system. Many critical electrical components at the Weymouth plant are nearly 70 years old, and utilize an outdated distribution voltage and grounding system. Upon completion of the Weymouth Oxidation Retrofit Program, peak power demand at the Weymouth plant will increase from 1.85 megawatts (MW) to as much as 7.5 MW. Many components of the electrical systems at the Weymouth plant have reached the end of their useful service life. As the equipment continues to age, its capability of operating safely and reliably will diminish. Further, much of the electrical equipment is unable to resist the seismic forces generated by a major earthquake. Upgrades of the Weymouth electrical power system are needed because the aging electrical system relies on long obsolete equipment which is difficult to repair, lacks redundancy, and has inadequate capacity to operate planned ozone facilities. Failure of a single electrical device could lead to an unplanned plant outage. In January 2007, Metropolitan's Board authorized an agreement with Southern California Edison to design and construct a new incoming 66-kilovolt electrical service. Upgrades to the plant's electrical system are needed to connect with this new service.

The project included construction of two buildings containing electrical switchgear equipment, several unit substations, several motor control centers, yard conduits and piping, and modification of plant utilities. Construction commenced in December 2009 and completed in October 2013. Record drawings will be prepared to document the upgraded systems.

Perimeter Security Improvements

The Weymouth plant has two entrances. The main gate located off Moreno Avenue was recently upgraded with improved security features and is used primarily to handle visitor traffic and staff working at the Water Quality Laboratory and the Weymouth plant's administrative buildings. The secondary gate is located off Wheeler Avenue and is used primarily for Metropolitan staff vehicles, construction traffic, and chemical delivery trucks delivering aqua ammonia, polymer, aluminum sulfate, sulfuric acid, and caustic soda solution. The Wheeler Gate entrance is a two-lane roadway, with one entrance lane and one exit lane. Due to the configuration of the intersection with Wheeler Avenue, trucks entering the Wheeler Gate from either direction at Wheeler Avenue might encroach on the exit lane traffic and increase the risk of accidents due to the slower turning speeds for trucks.

This project will add security and entrance improvements along Wheeler Avenue, including a new guard enclosure; improved lighting and communication features for enhanced security; and two new gates and two traffic lanes in each direction for improved access control and better management of chemical deliveries. Ongoing final design phase activities include engineering design and preparation of drawings and specifications; development of a construction cost estimate; advertisement and receipt of bids; and all other activities in advance of award of a construction contract.

Washwater Tanks Seismic Upgrade

The Weymouth plant utilizes two aboveground welded steel tanks to store filtered water for use in backwashing the plant filters. Backwashing cleanses the filters after they have been on-line for 20 to 80 hours in active filtration service. A small portion of the filtered water is pumped into and stored in the plant's washwater tanks, from which it is released by gravity to backwash dirty filters when needed. The Weymouth washwater tanks are located in the northern portion of the plant, with storage capacities of 1 million and 1.3 million gallons. The western tank measures 48 feet in diameter by 71 feet high and was placed into service in 1941. The eastern tank measures 60 feet in diameter by 63 feet high and was erected in the early 1960s. Both tanks were designed and constructed in accordance with applicable codes of their time. Structural analyses have identified that both tanks require upgrades to withstand a significant seismic event.

This project will install a new anchorage system for each tank; extend the existing concrete mat foundation which supports the west tank; install a supplemental foundation system composed of concrete piles and a grade beam around the perimeter of the east tank; relocate electrical equipment to allow extension of tank foundations; install

flexible couplings on the 42-inch-diameter outlet pipes which connect to each tank; repair the tank roofs; and recoat the tanks as needed. Ongoing final design phase activities include engineering design and preparation of drawings and specifications; detailed computer modeling; development of a construction cost estimate; advertisement and receipt of bids; and all other activities in advance of award of a construction contract.

Washwater Reclamation Plant Reliability Upgrades and North Perimeter Wall Construction

The 22-mgd washwater reclamation plant (WWRP), which is located near the plant's northern boundary, commenced operation in 1991 and treats spent filter backwash water before it returns to the plant's inlet line and blends with incoming untreated water. Solids in the used filter backwash water are both corrosive and abrasive to submerged parts in the washwater reclamation system. The reclamation plant equipment has reached the end of its service life, requiring frequent repairs. Equipment replacements and/or modifications are necessary to provide continued reliable operation. Construction of a concrete block wall along the north perimeter of the Weymouth plant will enhance security; reduce noise from plant operation and from planned construction activities, which complies with mitigation requirements contained within environmental documentation for the plant's improvement program; and will screen construction activities at Weymouth from the adjacent neighborhood as requested by the city of La Verne.

This project will replace worn-out equipment in the washwater reclamation facilities to support reliable treatment plant operation, including: extension of decant piping to the Filter Building No. 1 backwash sump to improve reliability by allowing the reclamation facilities to continue to operate when the Filter Building No. 2 backwash sump needs to be shut down for cleaning; replacement of WWRP flocculation basin drive units, flocculation paddle arms, bull gears, drive chains, drive gears, gearboxes, gear shafts and pillow block bearings with corrosion-resistant materials; and replacement of the chain-and-flight equipment; replacement of the coal removal system with two hydro-gritters, which will more effectively separate the coal and sand from the water, thereby reducing abrasive corrosion throughout the washwater reclamation facilities; and replacement of three significantly corroded backwash sump pumps with three new pumps having upgraded materials to reduce erosion and corrosion. Construction of the concrete block wall along the northern perimeter of the plant was completed in 2011. Construction of the remaining project elements by Metropolitan forces commenced in 2011.

Filter Building Seismic Upgrades

The Weymouth plant has two integrated filter buildings. Filter Building No. 1 was completed in 1941 and was expanded in 1962, while Filter Building No. 2 was added in 1969. Each filter building has 24 multimedia filters and a control building which sits on the top deck. The structures have three levels. The lowest level consists of a sump which collects used filter backwash water. The middle level is comprised of the filter basins and galleries that house piping, valves, and equipment that operate and monitor the filters. The top level carries the control building that houses process control equipment for the filtration and backwash processes. A seismic assessment of the Weymouth filter buildings identified that these structures need to be strengthened to reduce the risk of damage following a major earthquake.

This project will include reinforcement of the walls, floors, roof, and columns of the filter control buildings. To accommodate these upgrades, some existing electrical and mechanical equipment will be relocated. At the bottom level, new concrete piers will be added within the sump area below the filters. Construction of the seismic upgrades commenced in September 2013.

Filter Valve Replacement

The Weymouth plant has 48 filters in two modules. In a typical filtration cycle, filters are operated by opening and closing a series of valves which allow water to flow in and out of the filter beds during filtration and backwashing. Each filter contains six filter valves, and each module is operated in conjunction with two large-diameter isolation valves in the backwash system, and six isolation valves in the surface wash system. The existing 240 filter valves are designed to close tightly to prevent mixing of filtered and unfiltered water and to prevent leakage into the washwater reclamation system. The filter valves, ranging in diameter from 8 to 48 inches, have typically been in continuous service for over 50 years. Despite receiving regular maintenance, these valves have gradually deteriorated over time.

This project will replace the filter valves. Due to the long lead-time needed to procure valves, specifications for a valve procurement contract are being prepared with contract award planned for early 2015. Ongoing final design

phase activities for installation of the valves include field investigations using 3-dimensional survey technology to efficiently detail the existing valve locations, adjacent equipment, and electrical conduits, in order to resolve dimensional conflicts prior to construction; design of piping and electrical modifications; design of extension shafts, support stands and adapter spools to connect the new valves to existing piping; hazardous materials investigation; preparation of drawings and specifications; development of a construction cost estimate; advertisement and receipt of bids; and all other activities in advance of award of a construction contract.

Administration and Control Buildings Seismic Upgrades

The Weymouth Administration and Control Buildings were constructed in the late 1930s as part of the original plant construction. The adjacent buildings, with a combined 34,000 square footage, house the plant's control room, Incident Command Center, water quality laboratory, staff meeting rooms, and offices. Current building codes have been substantially upgraded since the building codes of that time. While the structures have withstood minor local earthquakes and remote major ones, they were not designed for and are incapable of withstanding seismic events predicted for the local area from nearby faults. A failure of these structures would shut down the Weymouth plant treatment operations and/or limit the treatment capacity of the facility until the damaged structures could be repaired.

This project will seismically upgrade the Administration Building to: connect wing roofs to western shear walls with shotcrete; connect arcade roof to colonnade with new concrete slab; add supplementary anchors at roof steel to roof slab connection; add a new shear wall to the ground floor below the north discontinuous wall; and strengthen portions of the existing walls with shotcrete. The project will also seismically upgrade the Control Building to: increase all shear wall thicknesses with reinforced shotcrete; place shear walls in inlet/outlet conduit openings below grade; and weld connections at the Control Building tower. Lab and office spaces will be optimized and electrical and mechanical equipment upgraded. Ongoing final design activities include detailed structural analyses and engineering design of the seismic upgrades, equipment relocation, architectural modifications, and the HVAC system; preparation of drawings and specifications; development of a construction cost estimate; advertisement and receipt of bids; and all other activities in advance of award of a construction contract.

Weymouth Plant Improvements for FY 2006/07 through FY 2011/12 — 15440

Total Appropriation Estimate:	$73,100,000	**Total Projected Through June 30, 2014:**	$13,987,000
Appropriated Amount:	$14,215,000	**Estimated Percent Complete:**	21%
Biennial Estimate:	$8,000,000	**Estimated Completion Date:**	2020

Scope

This appropriation was established to implement multiple rehabilitation projects at the Weymouth plant. The common driver for many of these projects is infrastructure reliability. Since its inception in FY 2006/07, numerous projects have been incorporated into this appropriation and completed including, the Resevoir Gate Repair, Combined Filter Outlet Conduit Repairs, and the Emergency Broadcast System Rehabilitation.

Purpose

To maintain reliability and ensure regulatory compliance of the Weymouth plant.

Accomplishments Through FY 2013/14

Through FY 2013/14, two projects have been completed.

Major project milestones in FY 2013/14:

Weymouth Basin 5-8 Refurbishment Project – Began preliminary design

Weymouth Caustic and Ammonia Trench – Completed construction

Weymouth Dry Polymer System – Began final design

Weymouth Emergency Broadcast System Rehabilitation – Completed construction

Weymouth Finished Water Reservoir Gate Replacement – Completed installation of inlet gates and began final design of outlet and bypass gates.

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Weymouth Basin 5-8 Rehabilitation	$44,909,600	2020	Begin final design
Weymouth Dry Polymer System Upgrade	$4,528,700	2017	Complete final design
Weymouth Finished Water Reservoir Gate Replacement	$4,379,100	2017	Complete installation

Reservoir Inlet Gates Replacement

The finished water reservoir at the Weymouth plant has three inlet gates, three bypass gates, and three outlet gates. All nine gates were installed when the reservoir was constructed in 1964. The Weymouth finished water reservoir is classified as a dam by the California Division of Safety of Dams (DSOD). Properly functioning gates are required to comply with DSOD requirements and to isolate the reservoir when it is removed from service for maintenance. Each 8-foot by 8-foot gate is motor operated and fabricated of a carbon steel plate mounted vertically within a gate guide. The gates are routinely exercised to verify proper operation. After nearly 50 years of continuous service, the reservoir gates are exhibiting signs of corrosion and deterioration. As a result, the three inlet gates were replaced in a March 2011 shutdown.

This project will replace the three outlet and three bypass gates during a scheduled Weymouth plant shutdown in early 2016. Ongoing final design phase activities include detailed field surveys, engineering design, preparation of drawings and specifications, development of a construction cost estimate, advertisement and receipt of bids for the construction and gate procurement contracts, and all other activities in advance of award of the two contracts.

Dry Polymer System Upgrade

The Weymouth plant's dry polymer system was constructed in 1991 and consists of a single dry polymer mixing system, which is used to liquefy the dry polymer with water; liquid polymer storage tanks; and liquid polymer feed and injection equipment. Two different types of polymers are used at the plant: a cationic polyacrylamide polymer which is used as a coagulant aid at the washwater reclamation plant (WWRP) and thickeners, and a nonionic polyacrylamide polymer (also called filter aid) which is used to improve filter performance when treating high blends of water from the State Water Project (SWP). The cationic polymer and filter aid polymer are incompatible and must be liquefied separately to avoid mixer clogging. When high blends of SWP water are treated, the two different types of polymer solutions must be prepared in batches, and the mixing system and piping must be thoroughly cleaned before switching between the two polymer types. Upgrades to the dry polymer equipment are needed to allow the simultaneous feed of different polymers to the WWRP and to the filters.

This project will provide two automated trains of new dry polymer mixing equipment to allow simultaneous mixing of both polymer types to improve reliability and efficiency; refurbish the existing feed and injection equipment to restore operational flexibility; and insulate the Dry Polymer Building and install new air conditioning ducts to prevent excessive humidity in the building. Ongoing final design phase activities for upgrades to the existing dry polymer system include detailed design analyses; preparation of drawings and specifications; advertisement and receipt of bids; development of a construction cost estimate; and all other activities in advance of award of a construction contract.

Basins Nos. 5-8 Rehabilitation

Flocculation and sedimentation are two important unit processes within a conventional water treatment plant. Flocculation follows immediately after the initial chemical addition, and is designed to gently mix small particles and colloids in the water so that they agglomerate to form settleable or filterable particles that can be subsequently removed by sedimentation and filtration. The four flocculation/sedimentation basins on the east side of the Weymouth plant were constructed in 1962. Each of these basins is 500 feet long by 100 feet wide, and is further divided into a 100-foot-long flocculation section and a 400-foot-long sedimentation section. Despite receiving regular maintenance, the equipment has deteriorated after 50 years of continuous operation.

This project will address needed upgrades to the Basins Nos. 5-8 equipment and structural components. Key components of the basins to be upgraded include: basin inlet gates; basin perimeter water lines; flocculator drive trains, shafting, and bearing housing; baffle boards and supports; clarifier turntable assemblies, drives, rakes, catwalks, and corner fillets; and launders. Ongoing preliminary design activities include: investigating the life cycle and maintenance cost of alternate materials for the equipment, consistent with current industry practice; evaluating sandblasting and recoating alternatives for corrosion protection; developing final design criteria; conducting a third-party value engineering review; and developing a preliminary construction cost estimate for the rehabilitation work.

Weymouth Plant Improvements for FY 2012/13 through FY 2017/18 — 15477

Total Appropriation Estimate:	$81,800,000	**Total Projected Through June 30, 2014:**	$3,965,600
Appropriated Amount:	$4,625,000	**Estimated Percent Complete:**	7%
Biennial Estimate:	$15,031,000	**Estimated Completion Date:**	2021

Scope

This appropriation was established to plan and implement multiple projects at the Weymouth plant. The common driver for many of the projects in the appropriation is infrastructure reliability.

Purpose

To maintain reliability and ensure regulatory compliance of the Weymouth plant.

Accomplishments Through FY 2013/14

Through FY 2013/14, one project has been completed.

Major project milestones in FY 2013/14:

Weymouth Domestic Water Pipeline Replacement – Began construction

Weymouth Basin Inlet Channel Seismic Upgrades – Began preliminary design

Weymouth Filter Rehabilitation – Completed preliminary design

Weymouth Basin Inlet Gates – Began preliminary design

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Weymouth Domestic Water Pipeline Replacement	$822,400	2014	Complete construction
Weymouth Basin Inlet Channel Seismic Upgrades	$1,085,300	2017	Begin final design
Weymouth Basin Inlet Gates Improvement	$7,237,700	2015	Begin final design
Weymouth Chlorine System Upgrade	$3,110,000	2018	Begin final design
Weymouth Combined Filter Outlet Mixing Improvements	$426,200	2017	Begin preliminary design
Weymouth Filter Rehabilitation	$46,000,000	2019	Begin construction
Weymouth Washwater Pumpback Improvement	$689,300	2018	Begin final design

Project	Total Project Estimate	Estimated Completion	Planned Activity
Storm Water Pollution Prevention	$1,425,000	2020	Begin preliminary design
Weymouth Filter Building Sump Sparger Rehabilitation	$380,500	2017	Begin preliminary design
Weymouth Water Quality Instrumentation Relocation	$861,000	2016	Begin final design
Weymouth Chlorine Transloading	$4,000,000	2018	Complete preliminary design
Weymouth Asphalt Refurbishment	$2,236,000	2018	Begin preliminary design
Weymouth Hazardous Waste Staging and Containment	$365,500	2018	Begin preliminary design
Weymouth Solids Handling Lift and Platform	273,800	2015	Begin final design

Combined Filter Outlet Mixing Improvements

At the Weymouth plant, filtered water is conveyed from the filters to the finished water reservoir through the filter outlet conduit. Chlorine, caustic soda, and then ammonia are injected into the filter outlet conduit as part of the treatment process. Near the Weymouth Administration Building, the buried conduit splits into two parallel conduits: the main 140-inch by 140-inch conduit, which is equipped with a dividing weir and flow meter, and a smaller 120-inch by 120-inch conduit, which is equipped with a modulating valve and a flow meter. This flow split is a remnant from when softening was used to treat a partial side-stream of the flow. The two outlet conduits recombine at the reservoir inlet structure. Each conduit requires a minimum flow of 110 cubic feet per second (cfs) to operate its Venturi flow meter. The maximum flow through the 140-inch conduit is 465 cfs, as limited by the weir height. When plant flow exceeds 465 cfs, the flow is split between the 140-inch conduit and the 120-inch conduit. Under these conditions, the chlorine residuals and ammonia residuals within each conduit have varied due to poor mixing. This has made it difficult to determine the appropriate chemical doses needed to meet water quality regulations.

This project will improve the mixing of chemicals downstream of their injection points in the filter outlet conduits. Improvements will include modifying the dividing weir, addressing deficiencies in the conduit level controls, and rehabilitating or replacing control valves and gates. Ongoing preliminary design phase activities include field investigations, detailed hydraulic and engineering analyses, development of conceptual layouts, and preparation of final design criteria and a preliminary construction cost estimate.

Filter Building Sump Sparger Rehabilitation

The Weymouth plant has two integrated filter buildings. Filter Building No. 1 was completed in 1941 and was expanded in 1962, while Filter Building No. 2 was added in 1969. Each filter building has three levels. The top level houses the process control equipment for the filtration and backwash processes. The middle level is comprised of the filter basins and galleries which house piping, valves, and equipment that operate and monitor the filters. The lowest level consists of a sump which collects used filter backwash water, and the sand and coal that are washed out of the filters during the backwash process. The sand and coal that is washed out of the filters settles on the floor and along the walls of the sump. The mounds are manually removed when a filter building is taken out of service during the winter. When the washwater return pumps operate to pump the backwash water out the sump and into the washwater reclamation plant, the sparger piping, located inside each sump, is operated to suspend the settled sand and coal. The underwater sparger piping clogs repeatedly.

This project will rehabilitate the sparger system and fill the interior corners of each sump with sloping concrete fillets to direct settled materials into the path of the spargers and the suction of the dirty washwater return pumps. Ongoing preliminary design phase activities include field investigations, detailed engineering analyses, development of conceptual layouts, and preparation of final design criteria and a preliminary construction cost estimate.

Basin Inlet Gates Improvements

Reliable performance of the flocculation and sedimentation processes within the Weymouth plant's treatment basins is essential for successful plant operation. Treatment Basins Nos. 1 through 4 have been in service for 60-70 years, while Basins Nos. 5 through 8 have been in service for over 50 years. Each of the four oldest basins has two 8-foot by 10-foot inlet gates. Basins Nos. 5 through 8 each have six 3-foot by 4-foot inlet gates. All 32 of the gates are fabricated of carbon steel with a coal tar coating for corrosion protection. The inlet gates are normally open when a basin is operating, but are closed when a basin is taken out of service due to low-treated water demands, or is dewatered in order to perform needed maintenance and equipment repairs. After these extended years of service, many of the treatment basin inlet gates have deteriorated and therefore leak excessively. In order to provide the isolation capability needed to take a basin out of service, these gates need to be replaced or refurbished.

This project will replace the basin inlet gates, gate guides, and actuators, and will automate their control. Ongoing preliminary design phase activities include: evaluation of alternatives for either refurbishment or replacement of the basin gates, guides, and actuators; assessment of alternative materials of construction; development of final design criteria; and development of a preliminary construction cost estimate. Preliminary design will also assess the feasibility of upgrading the actuators and instrumentation so that the gates can be connected to the SCADA network, which will allow remote actuation and position monitoring.

Basin Inlet Channel Seismic Upgrades

The inlet channel adjacent to Basins Nos. 5 through 8 and the inlet channel serving Basins Nos. 1 through 4 are structurally inadequate to resist a strong earthquake. The east-west basin inlet channel, which was constructed in 1962, is a concrete box culvert with a width that varies from 10 feet to 4 feet, and a height of approximately 13 feet. The east-west inlet channel wall is approximately 670 feet long. The north-south inlet channel, which was constructed in 1940, is 20 feet wide by 13 feet tall, and is approximately 506 feet long. A failure of these inlet channels would cause the Weymouth plant to shut down or limit its treatment capacity until the damage could be repaired.

This project will seismically upgrade the channels and also longitudinally separate the inlet channel of Basins Nos. 1 and 2 from Basins Nos. 3 and 4 in order to seismically upgrade the inlet channel and to provide independent rapid mix trains to each of the basin pairs. Ongoing preliminary design phase activities include: detailed structural analyses; development of rehabilitation concepts to strengthen the walls of the inlet channels by adding reinforcement to the existing walls; and preparation of final design criteria and a preliminary construction cost estimate.

Domestic Water Pipeline Replacement

The existing Weymouth domestic and fire water system combines potable water, service water, and fire protection in a single water distribution system. The system was installed in 1939 as part of the original Weymouth plant construction, and has been expanded over the years as new facilities were added on-site. The existing system includes pipelines ranging from 2 to 16 inches in diameter in varying pipe materials. The domestic and fire water system forms a general loop around the plant with inner loops that provide water to individual buildings and facilities. However, on the north side of the plant, domestic water is supplied by a single line from the east. A second line to this area was removed from service due to the presence of lead joints on the cast iron pipe, which was constructed in 1939. During a shutdown in 2011, a pressure surge occurred which resulted in the failure of a polyvinyl chlorine (PVC) pipeline in the tunnel to Filter Building No. 1, which supplies water to the plant's chlorine ejectors. Following that event, a system-wide evaluation identified the need for a surge chamber and several air release and vacuum valves alongside the finished water reservoir where the domestic water pumps are located, and the replacement of critical PVC lines with metallic pipes. Adequate water pressure must be maintained at all times for both reliable chlorine delivery and for fire protection.

This project will replace the abandoned section of pipeline in the north-west portion of the plant with mortar-lined steel pipe to enhance chlorine injection reliability and provide a reliable fire water loop; add hydrants at the caustic soda and ammonia tank farm; and provide surge protection equipment. Ongoing preliminary design phase activities include field investigations, detailed engineering analyses, and development of conceptual layouts and a conceptual-level construction cost estimate. In addition, this project has already replaced the aging PVC backup water connection to the city of La Verne's municipal system; this work consisted of installing approximately 700 feet of 8-inch-diameter mortar-lined carbon steel pipe from the plant entrance to the finished water reservoir,

replacing a backflow preventer, and making connections to existing domestic water lines. Record drawings will be prepared to document the upgraded system.

Chlorine System Upgrade

The Chlorine Containment Building at the Weymouth plant was constructed in 2005 and is used to supply chlorine throughout the Weymouth plant. Although ozone will be used as the primary disinfectant at the Weymouth plant, use of chlorine will remain vital to the water treatment process. Chlorine will still be required as a post-disinfectant and as a backup for the ozonation process. The Weymouth plant receives liquid chlorine deliveries directly by rail. The liquid chlorine is then evaporated, metered, and injected at various plant locations. In a chlorine evaporator, the liquid chlorine travels through a tube that is submerged in a hot water bath kept between 140° F and 175° F to convert the liquid chlorine to its gaseous form. The Weymouth plant has three chlorine evaporators, each rated at 10,000 pounds per day (ppd). When the ozonation facilities commence operation in 2016-2017, the maximum chlorine demand will be 33,351 ppd during normal operation at the plant design flow of 520 million gallons per day (mgd). In the event of an unplanned ozone system outage, activation of the emergency backup chlorination system will immediately inject chlorine just upstream of the treatment modules. The maximum emergency chlorine demand will be 49,000 ppd at 520 mgd, which exceeds the existing evaporator system capacity.

This project will enlarge the chlorine evaporator system to achieve the recommended increase in chlorine dose when the ozonation facilities commence operation in 2016-2017. Ongoing preliminary design phase activities include: evaluation of options to provide system redundancy for maintenance of evaporators and vacuum regulating valves and to provide needed system capacity, field investigations, detailed engineering analyses, development of conceptual layouts, and preparation of final design criteria and a preliminary construction cost estimate.

Filter Rehabilitation

The 48 filters at the Weymouth plant vary in age from 40 to over 70 years old. While they were considered state-of-the-art at the time of their construction, the filters were designed to meet much less stringent performance and water quality standards than exist today. The filters were originally designed to operate at lower filtration rates, using a fine sand mono-media and low backwash rates. Since that time, the filters have been retrofitted with a dual media composed of anthracite coal and silica sand to enhance performance. The performance of the filters is highly constrained by the shallow filter bed depth, which is susceptible to air-binding and media loss, leading to short filter runs. While it is not feasible to deepen the existing filter beds due to hydraulic limitations, the other filter components (e.g., troughs, underdrains, media, etc.) may be modified to compensate for the shallow filter depth and support the higher level of performance expected of the filters. After decades of operation, the filters' performance is declining. The internal components of the filters need to be replaced and updated to reliably meet current water quality standards. Under a pilot testing program initiated in 2009, four filters were rebuilt with different configurations to enable full-scale evaluation and optimization of the rehabilitation design. This full-scale pilot study has been completed and a preferred filter rehabilitation option has been developed.

This project will replace the filter media with optimized size and depth specifications; replace the surface wash system with larger piping and improved flow configuration; replace the underdrains at the west-side filters; modify flow distribution flumes; raise and replace the existing troughs to accommodate a higher depth of filter media; and reinforce the filter gullet walls to improve seismic stability. Ongoing final design phase activities include detailed field investigations, development of a phasing strategy and temporary systems to maintain operation during the construction period, preparation of drawings and specifications, third-party value engineering review, advertisement and receipt of bids, development of a construction cost estimate, and all other activities in advance of award of a construction contract.

Water Quality Monitoring Instrumentation Relocation

At the Weymouth plant, the water quality monitoring instrumentation station for the filter outlet and finished water reservoir inlet are located in the Weymouth Administration Building. The station, which was constructed 15 years ago, is used to analyze chlorine residual, ammonia residual, pH, fluoride, conductivity, and other water quality parameters. The station is located more than 500 feet from the sampling points. Timely and accurate water quality monitoring results are required to properly control treatment processes and monitor Title 22 regulated constituents. The long piping runs from the sampling locations to the analyzers, in addition to biological growth in the sample lines, can lead to erroneous readings due to excessive sample transport times.

This project will replace the sample piping and relocate water quality monitoring instrumentation to locations adjacent to the sampling points to enable reliable and rapid response to changing water quality conditions. The new facilities will include an instrumentation cabinet near the combined filter outlet channel and a new 25-foot by 25-foot concrete-masonry block building near the inlet to the finished water reservoir. Ongoing final design phase activities include identification of utilities, planning to provide continuous water quality monitoring during the relocation and switchover, preparation of drawings and specifications, development of a construction cost estimate, advertisement and receipt of bids, and all other activities in advance of award of construction contract.

Washwater Pumpback Improvements

The washwater pumpback pumping station receives water that has been treated in the Washwater Reclamation Plant (WWRP) and in the Oxidation Demonstration Project (ODP) plant and discharges the reclaimed water back to the inlet of the Weymouth plant. The 22-million-gallon-per-day (mgd) capacity WWRP commenced operation in 1991, and processes waste flows generated by the plant's treatment processes including used filter backwash water, filtrate from the filter belt presses, and supernatant from the gravity thickeners. The 5.5-mgd, demonstration-scale ODP testing facility has recently been used to evaluate biofiltration, arsenic removal, enhanced coagulation, bromate control technologies, chlorine dioxide as an alternative oxidant, and N-nitrosodimethylamine precursor control. In the future, it will continue to be utilized to evaluate treatment processes to cost-effectively improve water quality processes at Metropolitan's full-scale plants. The ODP has three fixed-speed pumps which discharge treated water into the washwater pumpback. For certain ODP flow conditions, the ODP pumps repeatedly turn on and off over short periods of time, which can lead to motor failure and unstable flow rates to the washwater pumpback. Due to frequent ODP pump starts and stops, the reclaimed water return flow from the pumpback can quickly fluctuate, which negatively impacts the treatment processes at the main plant.

This project will replace the existing ODP pump fixed-speed motor drives with variable frequency motor drives (VFDs), allowing the existing pumps to operate over a larger range of fluctuating flow conditions. VFDs on the existing pumps will reduce the number of times that the motors are started, prolonging motor life and ensuring efficient and continued operation of the pumpback pumping station. This, in turn, will dampen spikes of reclaimed water flows into the main plant's inlet conduit and increase the efficiency of the treatment processes. Ongoing preliminary design phase activities include field investigations, detailed engineering analyses, development of conceptual layouts, and preparation of final design criteria and a preliminary construction cost estimate.

Chlorine Transloading

Chlorine is an essential disinfection chemical needed to treat water at each of Metropolitan's treatment plants. The Chemical Unloading Facility (CUF) was constructed in 1975 and is used to transfer liquefied chlorine gas from vendor-supplied rail cars to Metropolitan-owned cargo trailers. These cargo trailers are then delivered by truck to the Diemer, Mills, and Skinner plants. The Jensen and Weymouth plants receive chlorine deliveries directly by rail. Although ozone is used as the primary disinfectant at the Mills, Jensen, and Skinner plants, chlorine is still required as a post-disinfectant and as a backup for the ozonation process. At the Weymouth and Diemer plants, ozone will supplant chlorine as the primary disinfectant, but the use of chlorine will remain vital to the water treatment process at both plants. CUF is one of only two liquid chlorine transfer facilities in Southern California. The other Southern California facility, which is located in Santa Fe Springs, is owned by Metropolitan's current chlorine supplier. When CUF is out of commission due to operational or maintenance issues, chlorine must be purchased in truck loads supplied by the Santa Fe Springs vendor or by another vendor located in Henderson, Nevada and delivered directly to the individual water treatment plants. Full reliance on a vendor's ability to transload chlorine would increase the risk of interruption to Metropolitan treatment processes if the vendor's transfer operations were delayed or interrupted.

This project will provide chlorine transloading capability at the Weymouth plant. The existing Chlorine Containment Building will be expanded to include a chlorine chemical unloading station to transload 90-ton railcars to 19-ton cargo trailers for delivery to the water treatment plants. A new truck scale and chlorine evaporators, additional piping and instrumentation, and connections to the existing scrubber system will be provided. Ongoing preliminary design phase activities include field investigations, detailed engineering analyses, development of conceptual layouts, and preparation of final design criteria and a preliminary construction cost estimate.

Asphalt Refurbishment

Over the past 20 to 50 years, the service roads and paved areas throughout the Weymouth plant have experienced heavy use by Metropolitan forces and construction contractors. As a result, portions of these paved areas are showing extensive surface and sub-base deterioration including raveling caused by wear and tear under traffic loads, and fatigue and edge cracking caused by saturated subgrades from poor drainage and standing water. This project will refurbish the asphalt paving by removing existing deteriorated paving, performing grading to improve drainage, and installing asphalt paving to provide all-weather paved surfaces for several Weymouth plant areas, such as the area south of the Weymouth Control Building, around the La Verne Shops, around the finished water reservoir, and the road to the east of Basin No. 8. The improvements will include resurfacing approximately 538,000 square feet of paving. Ongoing preliminary design activities include conducting site surveys; mapping; preparation of layout drawings; development of final design criteria; preparation of environmental documentation; and development of a preliminary construction cost estimate.

Weymouth Solids Handling Lift and Platform

The Solids Handling Facility, constructed in 2007, is used to dewater residual solids from the treatment process for eventual disposal off-site. The facility houses three belt filter presses, an electrical room, polymer storage and mixing equipment, three cake pumps, a truck loading facility, and four elevated solids storage hoppers. Four slide gate motor-operated gear boxes for each of the four storage hoppers are located approximately 16 feet above the ground. To perform maintenance on the gear boxes, staff must use a manlift to provide access. However, even with the manlift, access is restricted by the structure itself and interfering beams. The cake distribution gates are located on the roof of the building. To perform maintenance on the gates, staff must carry five-gallon drums of oil and heavy tools up a 25-foot-long staircase, which presents a potential safety hazard. An existing 9-foot by 5-foot roof opening is located adjacent to the staircase and could be used to lift and lower drums, heavy tools, and heavy equipment.

This project will construct a platform to access the 16 gear boxes that control the motor-operated slide gates at the four solids storage hoppers. Also, a 500-pound jib hoist with moveable arm will be provided at the existing roof opening. Ongoing preliminary design phase activities include field investigations, detailed engineering analyses, development of conceptual layouts, and preparation of final design criteria and a preliminary construction cost estimate.

Hazardous Waste Staging and Containment

Hazardous wastes, such as oil, paint, paint thinner, and anti-freeze, are generated through routine operations and maintenance at the Weymouth plant, Water Quality Laboratory, and La Verne maintenance shops. Hazardous wastes are collected and placed into drums, separated by chemical type. The drums are temporarily stored on secondary pallets within a fenced area and are transported off-site within 90 days for appropriate disposal. This existing staging area does not have secondary containment to minimize stormwater capture, a defined loading area, spill/leak detection, or an emergency eye wash station.

This project will relocate the hazardous waste staging area approximately 100 feet north of the existing area to an existing chemical storage area that will be decommissioned once the new ozonation facilities are on-line. The new hazardous waste staging area will utilize the existing canopy, containment area, and eyewash station. This project will provide a leak detection system and other modifications to provide a hazardous staging and containment area that meets Title 22 and fire code requirements. Ongoing preliminary design phase activities include field investigations; development of final design criteria; and development of a preliminary construction cost estimate.

Storm Water Pollution Prevention

The Weymouth plant and several key facilities that support Metropolitan's distribution system are co-located on a 150-acre site in the city of La Verne. The site is permitted under the California General National Pollution Discharge Elimination System (NPDES) Permit for Storm Water Discharges Associated with Industrial Activities (General Permit). The collective La Verne site is the only Metropolitan location regulated under the industrial category of the statewide NPDES general permit, which addresses storm water pollutant discharges from industrial facilities. Under the permit requirements, the plant must submit a written report to the Los Angeles Regional Water Quality Control Board (LARWQCB) every year that includes storm water monitoring results and identifies specific improvements made at the facility to demonstrate full compliance with the general permit. Recently, the sampled storm water runoff from the plant outfalls exceeded the U.S Environmental Protection Agency's

Benchmark Values for metals, total suspended solids (TSS), and nitrogen. As a result of the sampling data and a subsequent inspection, LARWQCB enforcement staff has indicated that the plant may be facing Notices of Violation. Long-term storm water management improvements at the La Verne site are needed to reliably meet the requirements of the current NPDES permit.

This project will implement long-term engineered improvements at the Weymouth plant in order to comply with the NPDES general permit and address current and future mandated requirements for storm water pollution prevention. Ongoing detailed analyses and preliminary design efforts include identification of potential sources of pollutants; preparation of a hydrology study to identify pathways and volume of storm water runoff; development of implementation schemes for erosion control, and protection of storage areas from rainfall and runoff; and preparation of a preliminary construction cost estimate.

Weymouth Plant Oxidation Retrofit 15392

Total Appropriation Estimate:	$250,000,000	**Total Projected Through June 30, 2014:**	$116,660,000
Appropriated Amount:	$238,012,000	**Estimated Percent Complete:**	50%
Biennial Estimate:	$76,318,000	**Estimated Completion Date:**	2019

Scope

This appropriation was established to design and construct all systems and facilities that are required to provide ozone disinfection capability and to integrate those systems and facilities into the existing plant operations. This appropriation consists of the following projects: 1) Weymouth Filtration Plant Oxidation - Design, 2) Ozone Equipment Procurement, 3) Inlet Conduit Relocation, 4) Oxidation Facilities - Final Design, and 5) ORP Switchgear Construction.

Purpose

To reduce the level of disinfection by-products in the treated water supplied by the Weymouth plant in order to meet state and federal standards and provide consistent and equitable high quality treated water to all of Metropolitan's member agencies.

Accomplishments Through FY 2013/14

Through FY 2013-14, one project has been completed.

Major project milestones in FY 2013-14:

Weymouth ORP Switchgear – Completed construction

Weymouth Oxidation Retrofit Facilities Construction – Began construction

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Weymouth Oxidation Retrofit Facilities Construction	$170,447,800	2019	Continue construction
Weymouth Sodium Hypochlorite Tank Facility	$9,611,304	2018	Complete final design
Ozone Equipment Procurement	$2,621,000	2018	Continue procurement

Ozone Equipment Procurement

Ozonia North America (ONA) delivered the ozone generation equipment to Metropolitan in April 2008. The ozone generation equipment consists of liquid oxygen storage tanks, vaporizers, a nitrogen generation system, ozone generators, power supply units, ozone off-gas destruct equipment, and a complete ozone control system and software.

Custody of the equipment was transferred to the Weymouth ozonation facilities construction contractor in 2013 for installation at the Weymouth plant. All equipment is scheduled to be installed by 2016. ONA will provide training, startup, and testing services for the Oxidation Retrofit Program (ORP).

Ozonation Facilities

The Weymouth plant is Metropolitan's final facility to receive the ozone disinfection process. The addition of ozone as the primary disinfectant at each of Metropolitan's treatment plants substantially reduces the formation of disinfection by-products for compliance with the U.S. Environmental Protection Agency's Disinfectants/Disinfection By-Products Rule. The use of ozone also enhances Metropolitan's ability to treat water with varying source-water quality, and provides critical operational flexibility to meet treatment challenges resulting from periodic water supply events such as drought or other source-water limitations. Further, ozonation is effective in controlling taste-and-odor causing compounds which may be present from time to time, as well as some pharmaceuticals/personal care products, endocrine disruptors, and algal toxins. In addition to these overall water quality benefits, the use of ozone provides important operational advantages, allowing Metropolitan to eliminate blend restrictions of State Water Project and Colorado River Aqueduct source waters.

This project will construct an ozone generation building, ozone contactors, contactor inlet and outlet conduits, liquid oxygen storage and feed system, chemical feed and electrical facilities, sulfuric acid storage and feed facilities, large diameter yard conduits and piping, grading, paving, demolition, adding and modifying plant utilities and controls, connections to existing facilities, landscaping, commissioning, training, installation of Metropolitan-furnished ozonation equipment such as liquid oxygen tank and vaporizers, ozone generators and related systems, and other accessories. Construction of the Weymouth ozonation facilities commenced in July 2012.

Sodium Hypochlorite Facilities

At the Weymouth plant, chlorine is currently added upstream of the filters to provide disinfection. Once the ozonation system is in operation, chlorine will instead be added downstream of the filters, allowing the filters to become biologically active. Chlorination of the filter backwash water will then be needed to control filter biomass build-up and to prevent excessive pressure drop through the filters. To accomplish this, a new sodium hypochlorite facility located near the washwater storage tanks is needed.

This project will provide a new sodium hypochlorite storage and feed facility consisting of two storage tanks, a containment area with roof, an unloading facility, chemical feed pumps, instrumentation and controls, and electrical components. Ongoing final design phase activities include detailed engineering design, preparation of drawings and specifications, advertisement and receipt of bids, development of a construction cost estimate, and all other activities in advance of award of a construction contract.

Whitewater Siphon Protection 15341

Total Appropriation Estimate:	$19,600,000	**Total Projected Through June 30, 2014:**	$761,000
Appropriated Amount:	$2,835,000	**Estimated Percent Complete:**	5%
Biennial Estimate:	$6,222,000	**Estimated Completion Date:**	2018

Scope

This appropriation was established to design and construct a protective barrier for the Whitewater siphons to prevent further erosion of streambed from undermining the siphons, and remediate the Whitewater Mining Pit in accordance with State regulations and prevent head-cutting of the mining pit from undermining the siphons in the event of a major flood.

Purpose

To prevent damage to the Whitewater Siphon due to storm flows on the Whitewater River and to ensure deliveries of CRA water.

Accomplishments Through FY 2013/14

Through FY 2013/14, completed a draft of the reclamation plan for the Whitewater Mining Pit.

Major project milestones in FY 2013/14:

Whitewater Siphon Protection Improvements – Completed final design

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Whitewater Siphon Protection Improvements	$14,733,600	2018	Begin construction

Whitewater Siphon Protection Improvements

The Colorado River Aqueduct (CRA) passes beneath the Whitewater River north of the city of Palm Springs and west of the city of Desert Hot Springs via double-barreled reinforced concrete siphons, which are approximately 2,200 feet long, with diameters of 133 inches and 156 inches. The Whitewater Siphons are buried from 4 feet to 15 feet beneath the river bed. They are protected from future flood flows by an above-ground 25-foot-wide by 250-foot-long concrete slab approximately 12 feet above the nearest siphon. As an added protection, a 6-foot-wide by 760-foot-long earthen diversion berm was constructed to redirect flows over the protective slab. The existing slab has deteriorated from 20 years of stream flow erosion and requires improvements for continued protection in the future. Over time, the stream flows have eroded the soils supporting the slab, resulting in a 40-foot-wide, 30-foot-long, and 15-foot-deep depression directly downstream of the concrete slab. Flows over successive winter seasons will eventually undermine the foundation of the siphons, which could lead to an unplanned shutdown of the CRA to perform emergency repairs.

This project will improve the erosion control structures that protect the Whitewater Siphons from flood damage. Planned erosion protection measures for the Whitewater Siphons include grading of the eroded area downstream of the concrete slab to prevent undermining, repairing damaged concrete sections, increasing the depth of the slab at specific locations for improved scour protection, and replacing the earthen diversion berm with a larger gabion structure. The gabion structure will consist of rock-filled cages approximately 760-feet-long, 12-feet-wide, and 12-feet high, with a scour toe extending three feet below grade. Ongoing final design phase activities include preparation of drawings and specifications, detailed hydraulic modeling, acquisition of permits for erosion control structure improvements, advertisement and receipt of bids, development of a construction cost estimate, and all other activities in advance of award of a construction contract.

Yorba Linda Power Plant Modifications 15446

Total Appropriation Estimate:	$18,400,000	**Total Projected Through June 30, 2014:**	$10,016,100
Appropriated Amount:	$17,125,000	**Estimated Percent Complete:**	58%
Biennial Estimate:	$7,250,000	**Estimated Completion Date:**	2016

Scope

This appropriation was established to retrofit the Yorba Linda Power Plant to operate under the Diemer Oxidation Retrofit new hydraulic conditions and to connect electrical power output into the Diemer plant's new Southern California Edison electrical service.

Purpose

To increase power reliability and generate clean hydro power to offset retail power purchases at the Diemer plant.

Accomplishments Through FY 2013/14

Through FY 2013/14, no projects have been completed.

Major project milestones in FY 2013/14:

Yorba Linda Power Plant Modifications – Begin construction

Objectives for 2014/15 – 2015/16

Project	Total Project Estimate	Estimated Completion	Planned Activity
Yorba Linda Power Plant Modifications	$17,266,100	2016	Complete construction

Yorba Linda Power Plant Modfiications

The Yorba Linda Feeder conveys a blend of untreated waters from the State Water Project and the Colorado River Aqueduct to the Diemer plant. Due to its high delivery pressure, flows from the Yorba Linda Feeder are controlled through the Yorba Linda Pressure Control Structure and the Yorba Linda Power Plant, both of which are located on-site at the Diemer plant. The Yorba Linda Power Plant has a generation capacity of 5 megawatts, and has been a reliable source of revenue for Metropolitan. Since its completion in 1981, the power plant's annual revenue has reached $2.5 million, depending on distribution system operations. As planned under the Diemer Oxidation Retrofit Program, the addition of new ozone contactors changed the hydraulic profile by raising the water level at the inlet to the plant by several feet. This change rendered the existing turbine-generator at the Yorba Linda Power Plant inoperable, thus suspending power generation.

This project will replace the existing turbine-generator with a new one which will accommodate the updated hydraulic conditions. Construction commenced in January 2014. Ongoing construction work consists of removal of the existing turbine, generator and controls; structural modifications to the existing turbine housing and control building; replacement of related equipment in the power plant switchyard; and installation of the new Metropolitan-furnished turbine-generator with its instrumentation and controls.