

City of Riverside

**WASTEWATER COLLECTION AND TREATMENT  
FACILITIES INTEGRATED MASTER PLAN**

**VOLUME 10: CAPITAL IMPROVEMENT PLAN AND  
OVERALL IMPLEMENTATION SCHEDULE  
CHAPTER 1: CAPITAL COSTS AND  
IMPLEMENTATION SCHEDULE**

**FINAL**

February 2008



**WASTEWATER COLLECTION AND TREATMENT  
FACILITIES INTEGRATED MASTER PLAN**

**VOLUME 10: CIP AND OVERALL IMPLEMENTATION SCHEDULE  
CHAPTER 1: CAPITAL COSTS AND IMPLEMENTATION SCHEDULE**

**TABLE OF CONTENTS**

	<b><u>Page</u></b>
1.1	PURPOSE..... 1-1
1.2	BACKGROUND..... 1-1
1.3	SUMMARY OF TREATMENT SYSTEM AND COLLECTION SYSTEM PROJECTS ..... 1-1
	1.3.1 Treatment System ..... 1-1
	1.3.2 Collection System..... 1-4
1.4	COSTS AND SCHEDULE CRITERIA ..... 1-5
	1.4.1 Development Basis..... 1-5
1.5	IMPLEMENTATION SCHEDULE ..... 1-7
1.6	CAPITAL IMPROVEMENT PLAN ..... 1-8
1.7	ALTERNATIVE TREATMENT SCENARIOS..... 1-12

APPENDIX A – COLLECTION SYSTEM COSTS

APPENDIX B – OVERALL CIP COSTS

**LIST OF TABLES**

Table 1.1	Standard S-Curves for Project Costs..... 1-6
Table 1.2	Implementation Schedule for Treatment System Projects - Low-Growth Scenario ..... 1-7
Table 1.3	CIP - Capital Expenditures by Year (\$ Million)..... 1-8
Table 1.4	Alternative Treatment Scenarios..... 1-12

**LIST OF FIGURES**

Figure 1.1	Annual Capital Expenditures..... 1-10
Figure 1.2	Cumulative Capital Expenditures..... 1-11

---

## CAPITAL COSTS AND IMPLEMENTATION SCHEDULE

### 1.1 PURPOSE

The purpose of this chapter is to present the Capital Improvement Plan (CIP) for the City of Riverside (City) Regional Water Quality Control Plant (RWQCP), based on the proposed treatment plant upgrades and collection systems projects that will occur between now and 2025. The CIP will be used as input into the Master Plan Manager™ (MPM™) and Financial Planning Tool™ (FPT™).

### 1.2 BACKGROUND

The RWQCP is a tertiary wastewater treatment plant that currently treats approximately 33 mgd on an average flow basis. The RWQCP has a rated capacity of approximately 40 mgd. The City seeks to develop an Integrated Master Plan for the Wastewater Systems Facilities to identify and plan for expansion and replacement needs up to the year 2025.

The expansion projects were identified based on the flow projections made in Volume 2, Chapter 3 – Population and Flow Projections, and the findings and recommendations of previous and ongoing plans and studies.

Volumes 2 through 9 and 12 of this Master Plan present details of all the proposed projects and reviews of the existing plans and studies. Estimated project costs of the proposed projects are presented in the respective chapters in these volumes. These costs are used to develop the CIP, which is presented in this chapter.

### 1.3 SUMMARY OF TREATMENT SYSTEM AND COLLECTION SYSTEM PROJECTS

The following summary of treatment and collection system projects is based on the high-growth scenario (2025 flow of 52.2-mgd average annual flow). As described in Volume 2, Chapter 3 – Population and Flow Projections, this flow rate is based on the City's decision (August 2006) to set the Master Plan design criteria based on the high-growth scenario. Subsequently (August 2007), after all process alternative analyses were completed, the City noticed a slowdown in the population/housing growth and decided the low-growth scenario (2025 flow of 47.3-mgd average annual flow) would be more appropriate for establishing the schedule of projects to develop the Operations and Maintenance (O&M) costs and CIP, and the user rates and connection fees.

#### 1.3.1 Treatment System

Alternatives were evaluated and life-cycle cost analyses were performed for each of the treatment areas. Based on these analyses and the City's input, the following sections

summarize the selected projects for the liquid and solid stream treatment. Please refer to Volumes 2 through 9 and 12 for detailed analyses.

### **1.3.1.1 2025 Expansion Projects**

#### **1.3.1.1.1 *Preliminary Treatment***

As described in Volume 4, Chapter 5 – Preliminary Treatment, the existing headworks facility is re-rated at a capacity of 37 mgd on an average daily flow basis. A new 15-mgd (annual average flow (AA)) headworks facility is planned for the Integrated Master Plan period.

#### **1.3.1.1.2 *Primary Treatment***

As part of the Plant 1 Primary Expansion project, Plant 1 primary clarifiers will be replaced with four new circular primary clarifiers with a combined capacity of 32-mgd AA. The expansion project will also include two primary effluent Equalization (EQ) basins with a total volume of 12.1 MG, a biofilter for odor scrubbing, a primary EQ pump station, a primary sludge pump station, and primary sludge thickening facilities.

#### **1.3.1.1.3 *Primary Equalization***

The City has chosen to use primary effluent EQ to provide better control for downstream processes and to reduce project costs for the Membrane Bioreactors (MBRs). The 12.1-MG primary EQ basins will be uncovered and lined with Hypalon®.

Alternative treatment scenarios for the MPM™ include EQ basins lined with concrete and a Hypalon® floating cover, should the City change their decision in the future.

#### **1.3.1.1.4 *Secondary Treatment***

Four options for expanding the RWQCP secondary treatment plant were evaluated: Conventional Activated Sludge (CAS), High Solids Retention Time (SRT) Activated Sludge, MBR, and Integrated Fixed Film Activated Sludge (IFAS). Based on the ability to achieve better effluent quality, the City chose to build a 32-mgd MBR for the future expansion. This is being separated into two phases:

1. First Phase: To convert Plant 1 from a 20-mgd CAS facility to a 26-mgd MBR facility.
2. Second Phase: To add the remaining 6-mgd capacity for a Plant 1 secondary capacity of 32.2 mgd and a total RWQCP capacity of 52.2-mgd AA.

#### **1.3.1.1.5 *Tertiary Treatment***

There is no tertiary facility expansion required since an MBR is selected as the secondary treatment method.

#### **1.3.1.1.6 Disinfection**

For the Integrated Master Plan, the City decided to continue the usage of NaOCl as the disinfection method. In order to meet the 2025-projected flow, the Integrated Master Plan includes a new 8-mgd AA Chlorine Contact Basin (CCB).

In addition, ozone plus Ultraviolet (UV) is being developed as an alternate treatment scenario for the MPM™, should removal of Endocrine Disrupting Compounds (EDCs) be required by future regulations.

#### **1.3.1.1.7 Biosolids Handling and Treatment**

The City has selected Gravity Belt Thickeners (GBTs) for the primary solids and Waste Activated Sludge (WAS) thickening facilities. It is estimated that 14 GBT units will be required for the expansion, 9 units for primary solids thickening, and 5 units for WAS thickening.

Besides the thickening facilities, the City has also decided to install a new multi-compartment acid-phase digester for their digestion facilities. The City will continue the addition of fat-oil-grease to the digester.

#### **1.3.1.1.8 Energy Management**

The following summarizes the projects for the RWQCP energy management system:

- A low-pressure digester gasholder to assist with digester gas control.
- A new digester gas-fueled 1.2-MW fuel cell cogeneration system to supplement the one currently being installed.
- Conversion of existing cogeneration engines to standby to meet future Air Quality Management District requirements.
- A redundant 12-kV ductbank system.
- Upgrade the electrical control/monitoring system (i.e., Computerized Load Management System (CLMS)).
- Modifications to existing electrical equipment (e.g., breakers).
- Replace eddy-current drives with variable frequency drives.

#### **1.3.1.1.9 Air Quality and Emissions Control**

Two new 4.2-million British thermal units per hour (MMBtu/hr) natural gas-fired boilers will be installed to address the potential Best Available Control Technology (BACT) adjustment for Nitrogen Oxide (NO<sub>x</sub>) emissions from boilers. In addition, the fuel cells, as described in the Energy Management section above, and the biofilters, as described in the Primary Treatment section above, will address compliance with other air quality regulatory requirements.

#### **1.3.1.1.10 Supervisory Control and Data Acquisition System**

The Supervisory Control and Data Acquisition (SCADA) Master Plan, which was done by WaterHammer Inc., provided a list of recommended updates for non-project related portions of the SCADA system. However, the Master Plan did not provide any costs associated with these recommendations and the information provided in the Master Plan is not sufficient to estimate these costs. As a result, a \$1 million allowance was put into the CIP for the SCADA system upgrades. The \$1 million will be spread over the Master Plan planning period equally, and an escalation rate will be applied to each respective year.

#### **1.3.1.1.11 Other Facilities and Projects**

Other projects that were proposed in the Master Plan include:

- A new maintenance building.
- Recycle Water Pump Station.
- A new 24-inch metering control valve and vault at the headworks.
- Replacement of the 42-inch pipe that connects the aeration basin with the Plant 2 splitter box with a 54-inch pipe.
- Potential raising of the existing flood control levee.

#### **1.3.1.2 Rehabilitation and Renovation Projects**

Based on the condition assessment results that Carollo Engineers performed in October 2006, a preliminary list of Rehabilitation and Replacement (R&R) projects has been compiled from the Watershed Analysis and Management Water/Wastewater Asset Manager™ (WAM™) program, using the criteria as discussed in Section 2.4.1.11 of Volume 12, Chapter 2 – Condition Assessment. Most of the 26 recommended projects would be part of either the primary expansion project or the recycle water pump station project. Only three other projects are being added to the CIP list and they are listed as the following:

- Rehabilitation of the waste gas burner.
- Replacement of the media for Biofilter Nos. 1 and 2 at the current headworks.
- A seismic upgrade to the headquarters for sewer line maintenance.

### **1.3.2 Collection System**

The Collection System CIP includes 50 capital projects identified in the Collection System Master Plans (CSMPs) that were completed between 2002 and 2006, and the City identified separately 24 replacement projects.

The capital projects from the CSMPs cover deficiencies from all five basins: Spruce Basin, Tequesquite Basin, Arlanza Basin, Phoenix Basin, and Northside Basin. The 50 projects were classified into three priority groups, as follows:

- Priority A:  
Priority A pipes were “deficient” at the time of the study: 2002 for Spruce, 2003 for Tequesquite, and 2005 for the remaining basins.
- Priority B:  
Priority B pipes were projected to be “deficient” by 2015.
- Priority C:  
Priority C pipes were projected to be “marginally deficient” by 2020.

Of the 50 expansion projects identified in the CSMPs, 12 of the projects have either been started or the City has allocated budget for them. Consequently, they are not included in the CIP for the Integrated Master Plan.

The 24 replacement projects identified by the City include replacement of pipes in the collection system that are older than 50 years. These pipes are categorized as either being constructed before 1943, or between 1944 and 1956, as documented in the City’s geographic information system (GIS).

## **1.4 COSTS AND SCHEDULE CRITERIA**

### **1.4.1 Development Basis**

#### **1.4.1.1 Treatment System**

As mentioned in Volume 2, Chapter 4 – Basis of Cost Estimates, the expected level of accuracy for the cost estimates for the Integrated Master Plan is Class 4, with an expected accuracy range of within 30 percent over the estimate to 15 percent under the estimate. In order to reduce the risk of under estimation, a contingency is applied to the developed estimates. The estimated project costs represent August 2006 dollars.

The implementation schedule for each project consists of a planning/design period and a construction/start-up period. A 2-year duration for the planning and design period is used for each project to include a conservative schedule at the Master Plan level. The construction and start-up period ranges from 1.5 to 4 years based on a general guideline of a contractor being able to perform approximately \$2 million/month worth of construction. When final implementation projects are established, adjustments should be made to this schedule guideline based on experience, looking at factors such as project sequencing, and equipment procurement times. For some of the projects, it may be possible to shorten the planning/design and construction/start-up schedules. However, for the Master Plan, the schedules will be presented based on the criteria described above.

The costs for the selected projects are based on the information presented in the respective chapters. As stated above, they are based on costs in August 2006 dollars. These costs have been adjusted to their midpoint of construction before placement in the CIP. An escalation rate of 6 percent for the first 5 years and 4 percent for 5 years and more are applied to calculate the midpoint construction costs. They are then spread over the project duration according to Standard S-Curves for Project Costs.

Table 1.1 is a tabular representation of an S-curve for the projects in this Master Plan. This method allocates a certain percentage of the project cost for each project based on the duration of the project. It takes into account the lower percentage spending at the beginning and end of projects, and the increased spending in the middle. For projects that have partial project durations, the durations are rounded up to the next whole year for calculation of the annual capital expenditures.

<b>Table 1.1 Standard S-Curves for Project Costs Wastewater Collection and Treatment Facilities Integrated Master Plan City of Riverside</b>						
<b>Project Duration (Years)</b>	<b>Proportion of Project Costs Spent in Year</b>					<b>Total</b>
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	
1	100%	0%	0%	0%	0%	100%
2	30%	70%	0%	0%	0%	100%
3	10%	45%	45%	0%	0%	100%
4	4%	6%	40%	50%	0%	100%
5	4%	6%	35%	35%	20%	100%

**1.4.1.2 Collection System**

The costs for the Collection System CIP are based on the estimates from the CSMPs. The cost estimation methods used for the CSMPs differed from the methods applied to the wastewater treatment plant upgrades. On the direction of the City, these costs were adjusted using the Integrated Master Plan method as described in Volume 2, Chapter 4 – Basis of Cost Estimates, and then distributed evenly over a 10-year period from FY 2007/2008 through FY 2016/2017. These costs were escalated at a rate of 6 percent through 2011 and then 4 percent for the remaining years.

For the R&R projects, the costs were provided by the City. These costs were distributed evenly over 50 years (FY 2007/2008 to FY 2056/2057) and were escalated at 6 percent through 2011 and 4 percent thereafter. Because the Integrated Master Plan only covers up to year 2025, the costs for the City’s replacement projects up to 2025 only will be included. Please refer to Volume 3, Chapter 1 – Wastewater Collection System, for details of the costs.

## 1.5 IMPLEMENTATION SCHEDULE

The implementation schedule for the projects is based on the criteria listed above. With the exception of the SCADA system and the collection system projects, the projects have a required completion date based on the RWQCP projected flow compared to the existing facility capacity. Project start dates are then determined based on the implementation criteria described in Section 1.4 above.

Table 1.2 lists the implementation schedule recommended for this Master Plan. It also lists the total project costs in August 2006 dollars. As was discussed in previous volumes, some projects are grouped into combined projects. Combined projects would be easier and less expensive for the City to design, coordinate, and manage. The construction cost is potentially lower, depending on the schedule, because the contractor can apply economies of scale to the work. However, at the Master Plan level, the reduction in cost is difficult to determine and is subject to several factors, including schedule, which will be refined during detailed planning and design. If the City chooses, other projects with similar start/completion dates can be combined later.

<b>Table 1.2 Implementation Schedule for Treatment System Projects - Low-Growth Scenario Wastewater Collection and Treatment Facilities Integrated Master Plan City of Riverside</b>				
<b>Project</b>	<b>Total Project Cost<sup>(1)</sup> (\$ Million)</b>	<b>Project Duration</b>	<b>Date</b>	
			<b>Start</b>	<b>Completion</b>
Primary, EQ, MBR, APAD	\$185.0	5.5	Jan 2008	Jul 2013
1.2-MW Fuel Cell	\$13.2	4	Jan 2008	Dec 2011
Low-Pressure Digester Gas Holder	\$1.2	3	Jan 2008	Dec 2010
42-inch Pipe Upgrade (54-inch dia.) from Connecting Plant 2 Splitter Box to Aeration Basins	\$0.1	1.5	Jul 2008	Dec 2009
Waste Gas Burner	\$0.5	1.5	Jul 2008	Dec 2009
24-inch Meter Control Valve	\$0.5	1.5	Jul 2008	Dec 2009
New Boilers	\$3.0	1	Jan 2014	Dec 2014
Biofilter Nos. 1 and 2 Media	\$2.1	1.5	Jul 2014	Dec 2015
O&M Building	\$2.1	1.5	Jul 2014	Dec 2015
Influent Metering Project	\$5.9	1.5	Jul 2014	Dec 2015
Building Headquarters for Sewer Line Maintenance	\$0.3	1.5	Jul 2014	Dec 2015
Power System Projects	\$5.1	2	Jan 2016	Dec 2017
New Chlorine Contact Basin	\$4.0	3.5	Jul 2016	Dec 2020
New Headworks	\$10.0	3.5	Jan 2019	Jul 2022

<b>Table 1.2 Implementation Schedule for Treatment System Projects - Low-Growth Scenario</b>				
<b>Wastewater Collection and Treatment Facilities Integrated Master Plan</b>				
<b>City of Riverside</b>				
<b>Project</b>	<b>Total Project Cost<sup>(1)</sup> (\$ Million)</b>	<b>Project Duration</b>	<b>Date</b>	
			<b>Start</b>	<b>Completion</b>
Additional MBR Equipment	\$12.0	4	Aug 2019	Jul 2023
WAS Thickening Facility	\$17.0	3.5	Jul 2023	Dec 2026
SCADA System Upgrades	\$1.0	No specific projects have been assigned at this time		
<b>Total</b>	<b>\$263.0</b>			
<b>Notes:</b>				
(1) Costs are in August 2006 dollars.				

As discussed above, there are no set schedules for the 62 collection system projects. The project costs are distributed evenly, either over a 10-year period from FY 2007/2008 through FY 2016/2017 for the expansion projects identified in the CSMPs (total of \$37.7 million, August 2006 dollars), and over a 50-year period from FY 2008/2009 through FY 2056/2057 for the projects identified by the City (total of \$418 million, August 2006 dollars). For the 24 projects identified by the City, only costs for up to FY 2024/2025 are included in the CIP. Details on the 62 projects can be found in Appendix A.

## 1.6 CAPITAL IMPROVEMENT PLAN

The CIP over the planning period identified for the RWQCP, including all the treatment facilities and collection system projects, are summarized in Table 1.3. The costs presented are in midpoint of construction dollars, according to the criteria described above. Appendix B has the detailed costs of the individual projects.

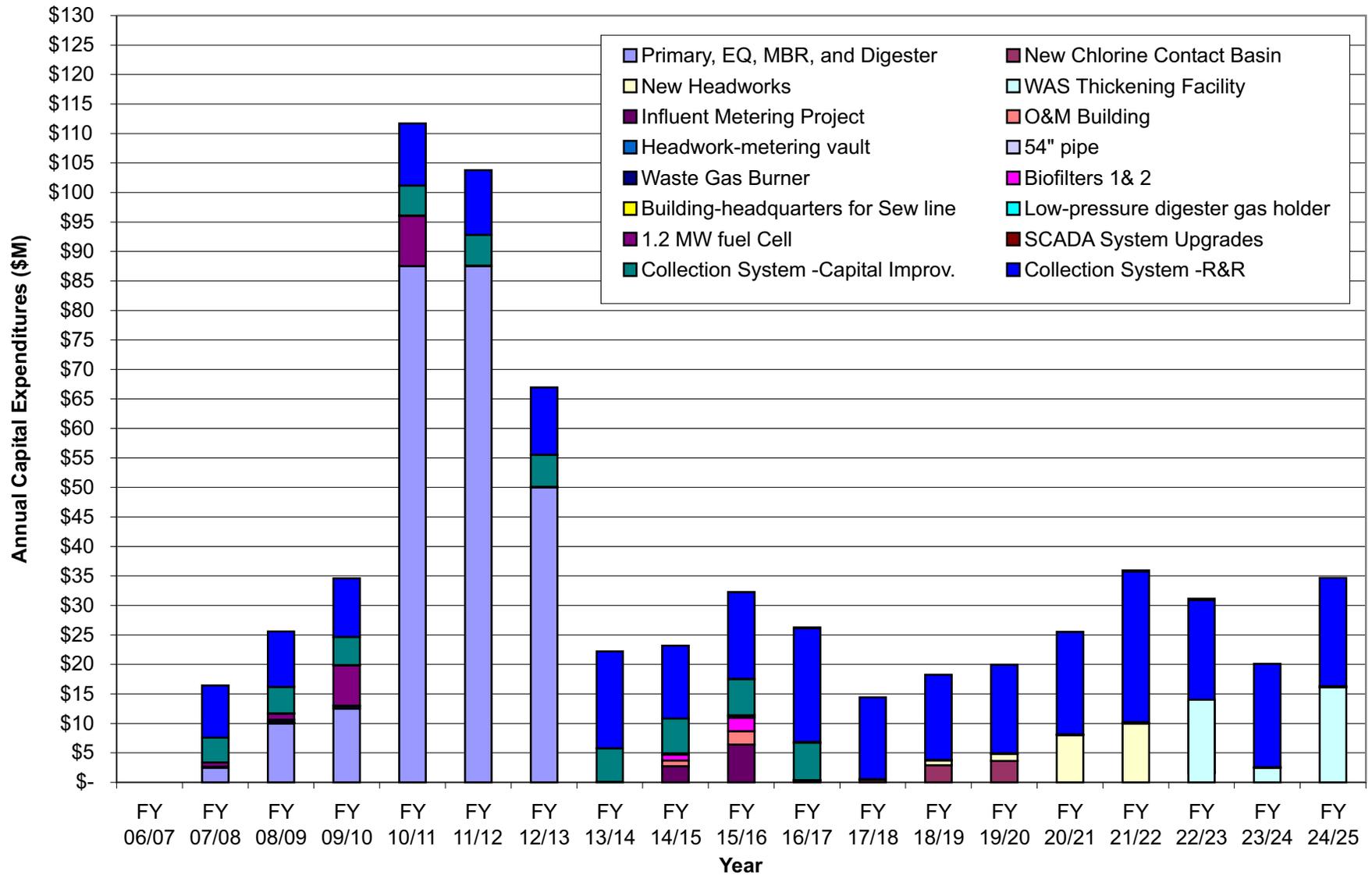
<b>Table 1.3 CIP - Capital Expenditures by Year (\$ Million)<sup>(1)</sup></b>				
<b>Wastewater Collection and Treatment Facilities Integrated Master Plan</b>				
<b>City of Riverside</b>				
<b>Fiscal Year</b>	<b>Treatment Facilities</b>	<b>Collection System</b>		<b>Total Costs</b>
		<b>Projects Identified in CSMP</b>	<b>Projects Identified by the City</b>	
2007/2008	\$3.50	\$4.24	\$8.85	\$16.6
2008/2009	\$12.38	\$4.49	\$9.39	\$26.3
2009/2010	\$20.58	\$4.76	\$9.95	\$35.3
2010/2011	\$96.13	\$5.05	\$10.54	\$111.7
2011/2012	\$87.59	\$5.25	\$10.97	\$103.8

<b>Table 1.3 CIP - Capital Expenditures by Year (\$ Million)<sup>(1)</sup> Wastewater Collection and Treatment Facilities Integrated Master Plan City of Riverside</b>				
<b>Fiscal Year</b>	<b>Treatment Facilities</b>	<b>Collection System</b>		<b>Total Costs</b>
		<b>Projects Identified in CSMP</b>	<b>Projects Identified by the City</b>	
2012/2013	\$50.09	\$5.46	\$11.41	\$67.0
2013/2014	\$4.60	\$5.68	\$11.86	\$22.1
2014/2015	\$4.93	\$5.90	\$12.34	\$23.2
2015/2016	\$13.98	\$6.14	\$12.83	\$32.9
2016/2017	\$6.41	\$6.39	\$13.34	\$26.1
2017/2018	\$0.53	-	\$13.88	\$14.4
2018/2019	\$3.80	-	\$14.43	\$18.2
2019/2020	\$5.94	-	\$15.01	\$20.9
2020/2021	\$9.64	-	\$15.61	\$25.2
2021/2022	\$20.26	-	\$16.23	\$36.5
2022/2023	\$14.41	-	\$16.88	\$31.3
2023/2024	\$2.55	-	\$17.56	\$20.1
2024/2025	\$16.32	-	\$18.26	\$34.6
<b>Total</b>	<b>\$373.6</b>	<b>\$53.4</b>	<b>\$239.3</b>	<b>\$666.3</b>

**Notes:**  
(1) Costs are escalated from August 2006 to 2011 by 6 percent, and 4 percent thereafter.

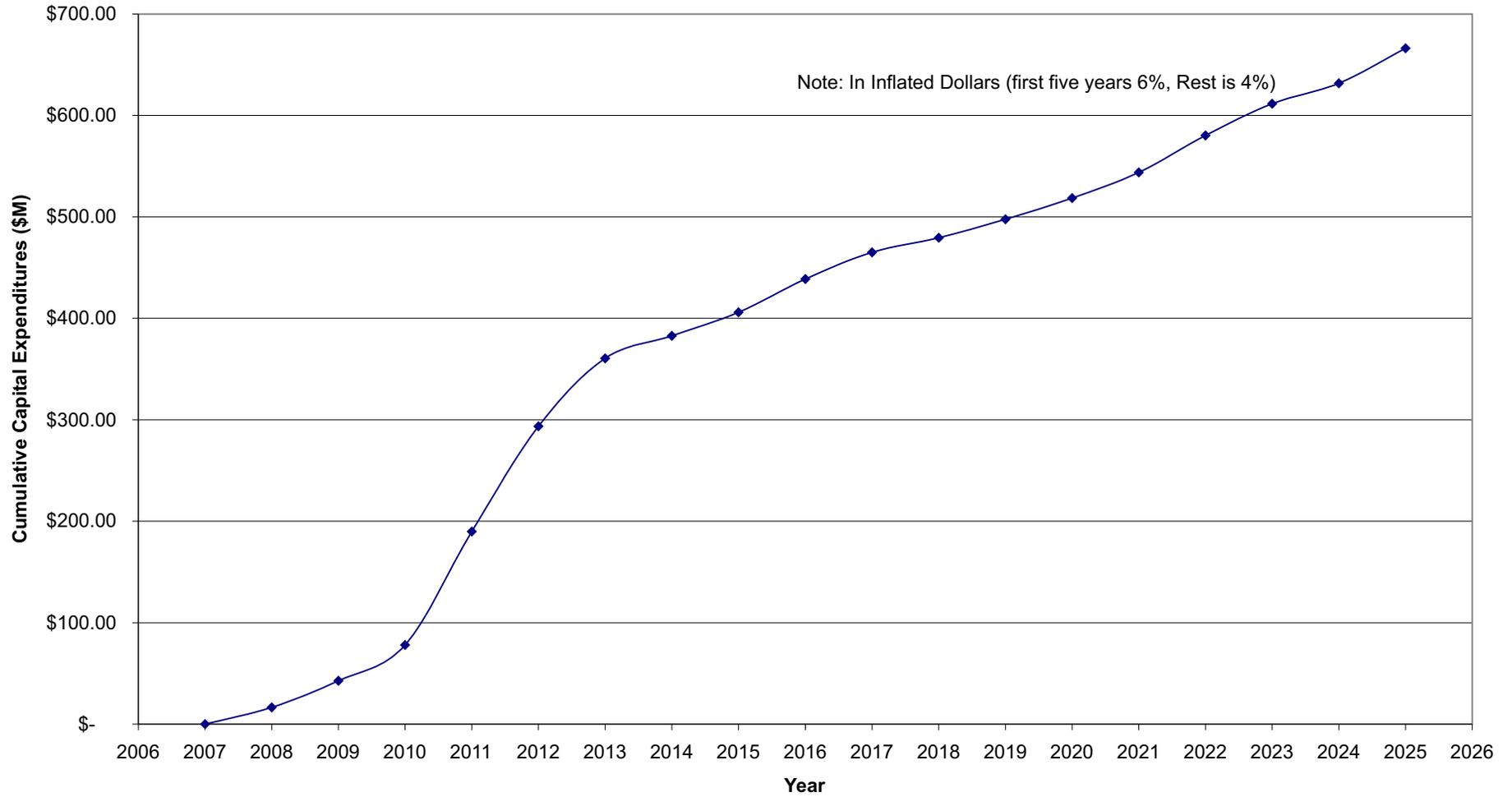
For the treatment systems, the total estimated capital costs through the year 2025 are approximately \$370 million. For the collection system, the total estimated capital costs over the 10-year period are approximately \$53 million, and the estimated R&R costs through the year 2025 are approximately \$240 million. The total estimated CIP project costs for the Integrated Master Plan is approximately \$666 million.

Figure 1.1 presents the capital expenditures by year in escalated dollars for the 19-year planning period. Figure 1.2 presents the cumulative capital expenditures for the planning period in escalated dollars. As shown in Table 1.3 and Figure 1.1, the fourth and fifth years are the highest spending years with \$112 million and \$104 million in capital expenditures, respectively.



### ANNUAL CAPITAL EXPENDITURES

FIGURE 1.1



### CUMULATIVE CAPITAL EXPENDITURES

FIGURE 1.2

## 1.7 ALTERNATIVE TREATMENT SCENARIOS

The four projects that will be included as alternate treatment scenarios for the MPM™ are UV plus ozone as a disinfection alternative, primary EQ basin with concrete liner, addition of a primary EQ basin Hypalon® cover, and potential raising of the existing levee. Costs and implementation schedules for these projects are shown in Table 1.4.

<b>Table 1.4 Alternative Treatment Scenarios Wastewater Collection and Treatment Facilities Integrated Master Plan City of Riverside</b>					
<b>Project</b>	<b>Project Costs<sup>(1)</sup> (\$ Million)</b>	<b>Duration (Years)</b>	<b>Date</b>		<b>Inflated Project Cost<sup>(2)</sup> (\$ Million)</b>
			<b>Start</b>	<b>Completion</b>	
UV + Ozone	72.5	3.5	July 2012	January 2016	112.10
Primary EQ with Concrete Liner	13.6	5.0	January 2009	July 2013	17.60
Primary EQ Hypalon® Cover	2.1	5.0	January 2009	July 2013	2.70
New Levee	52.0	3.0	July 2012	July 2015	79.58

**Notes:**  
 (1) Costs in August 2006 dollars.  
 (2) Escalated at 6 percent for the first 5 years, then 4 percent thereafter.

---

**COLLECTION SYSTEM COSTS**

<b>Table A.1 Capital Improvement Project Costs Wastewater Collection and Treatment Facilities Integrated Master Plan City of Riverside</b>															
<b>Project Study Area</b>	<b>Priority</b>	<b>Location<sup>(1)</sup></b>	<b>Total Project Cost (Million Dollars)<sup>(2)</sup></b>	<b>Annual CIP Costs (Million Dollars)<sup>(3)(4)</sup></b>											
				<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>		
Arlanza	A	Collett Avenue	\$0.38	\$0.04	\$0.04	\$0.04	\$0.05	\$0.05	\$0.05	\$0.05	\$0.05	\$0.05	\$0.06	\$0.06	
		Fillmore Street	\$0.41	\$0.04	\$0.04	\$0.05	\$0.05	\$0.05	\$0.05	\$0.06	\$0.06	\$0.06	\$0.06	\$0.06	
		Golden Avenue	\$0.26	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04	
			RWQCP Sewer	\$0.33	\$0.03	\$0.03	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04	\$0.05	\$0.05	\$0.05
	B	Monticello Avenue	\$1.59	\$0.16	\$0.17	\$0.18	\$0.19	\$0.20	\$0.21	\$0.22	\$0.22	\$0.23	\$0.24	\$0.24	
	C	Acorn Street	\$1.44	\$0.14	\$0.15	\$0.16	\$0.17	\$0.18	\$0.19	\$0.20	\$0.20	\$0.20	\$0.21	\$0.22	
		Arizona Avenue	\$0.69	\$0.07	\$0.07	\$0.08	\$0.08	\$0.09	\$0.09	\$0.09	\$0.09	\$0.10	\$0.10	\$0.11	
		Collett Avenue	\$0.90	\$0.09	\$0.09	\$0.10	\$0.11	\$0.11	\$0.12	\$0.12	\$0.12	\$0.13	\$0.13	\$0.14	
		Fillmore Street	\$0.62	\$0.06	\$0.07	\$0.07	\$0.07	\$0.08	\$0.08	\$0.08	\$0.08	\$0.09	\$0.09	\$0.10	
		Golden Avenue	\$0.73	\$0.07	\$0.08	\$0.08	\$0.09	\$0.09	\$0.10	\$0.10	\$0.10	\$0.10	\$0.11	\$0.11	
		Harrison Street	\$0.43	\$0.04	\$0.05	\$0.05	\$0.05	\$0.05	\$0.06	\$0.06	\$0.06	\$0.06	\$0.06	\$0.07	
		Jackson Street	\$1.78	\$0.18	\$0.19	\$0.20	\$0.21	\$0.22	\$0.23	\$0.24	\$0.24	\$0.25	\$0.26	\$0.27	
		Jones Avenue	\$1.07	\$0.11	\$0.11	\$0.12	\$0.13	\$0.14	\$0.14	\$0.15	\$0.15	\$0.15	\$0.16	\$0.16	
		La Sierra Channel	\$1.80	\$0.18	\$0.19	\$0.20	\$0.21	\$0.23	\$0.24	\$0.25	\$0.26	\$0.26	\$0.27	\$0.28	
		Magnolia Avenue	\$0.55	\$0.06	\$0.06	\$0.06	\$0.07	\$0.07	\$0.07	\$0.08	\$0.08	\$0.08	\$0.08	\$0.09	
		Monroe Street	\$0.51	\$0.05	\$0.05	\$0.06	\$0.06	\$0.06	\$0.07	\$0.07	\$0.07	\$0.07	\$0.08	\$0.08	
		RWQCP Sewer	\$0.64	\$0.06	\$0.07	\$0.07	\$0.08	\$0.08	\$0.08	\$0.09	\$0.09	\$0.09	\$0.09	\$0.10	
		Van Buren Boulevard	\$6.83	\$0.68	\$0.72	\$0.77	\$0.81	\$0.86	\$0.90	\$0.93	\$0.97	\$0.97	\$1.01	\$1.05	
		Northside	B	Marlborough Avenue	\$0.12	\$0.01	\$0.01	\$0.01	\$0.01	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02
C			Fairmount Boulevard	\$0.57	\$0.06	\$0.06	\$0.06	\$0.07	\$0.07	\$0.08	\$0.08	\$0.08	\$0.08	\$0.08	\$0.09
			Fairmount Trunk	\$2.43	\$0.24	\$0.26	\$0.27	\$0.29	\$0.31	\$0.32	\$0.33	\$0.34	\$0.36	\$0.37	
	Marlborough Avenue		\$0.26	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.04	\$0.04	\$0.04	\$0.04		
	Strong Street		\$0.49	\$0.05	\$0.05	\$0.06	\$0.06	\$0.06	\$0.06	\$0.07	\$0.07	\$0.07	\$0.08		

<b>Table A.1 Capital Improvement Project Costs</b>														
<b>Wastewater Collection and Treatment Facilities Integrated Master Plan</b>														
<b>City of Riverside</b>														
<b>Project Study Area</b>	<b>Priority</b>	<b>Location<sup>(1)</sup></b>	<b>Total Project Cost (Million Dollars)<sup>(2)</sup></b>	<b>Annual CIP Costs (Million Dollars)<sup>(3)(4)</sup></b>										
				<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	
Phoenix	A	Central Avenue	\$0.54	\$0.05	\$0.06	\$0.06	\$0.06	\$0.07	\$0.07	\$0.07	\$0.07	\$0.08	\$0.08	\$0.08
		Hillside Avenue	\$2.57	\$0.26	\$0.27	\$0.29	\$0.31	\$0.32	\$0.34	\$0.35	\$0.36	\$0.38	\$0.39	
		Phoenix Avenue	\$0.13	\$0.01	\$0.01	\$0.01	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	
		Santa Ana River Pipeline	\$1.52	\$0.15	\$0.16	\$0.17	\$0.18	\$0.19	\$0.20	\$0.21	\$0.22	\$0.23	\$0.23	
	B	Madison Street	\$0.56	\$0.06	\$0.06	\$0.06	\$0.07	\$0.07	\$0.07	\$0.08	\$0.08	\$0.08	\$0.09	
	C	Madison Street	\$1.32	\$0.13	\$0.14	\$0.15	\$0.16	\$0.17	\$0.17	\$0.18	\$0.19	\$0.19	\$0.20	
		Phoenix Avenue	\$2.03	\$0.20	\$0.21	\$0.23	\$0.24	\$0.26	\$0.27	\$0.28	\$0.29	\$0.30	\$0.31	
Spruce	B	Chicago Avenue	\$1.02	\$0.10	\$0.11	\$0.11	\$0.12	\$0.13	\$0.13	\$0.14	\$0.14	\$0.15	\$0.16	
	C	Chicago Avenue	\$0.44	\$0.04	\$0.05	\$0.05	\$0.05	\$0.06	\$0.06	\$0.06	\$0.06	\$0.07	\$0.07	
Tequesquite	A	Eastridge Avenue	\$0.21	\$0.02	\$0.02	\$0.02	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	
		Eastridge Avenue	\$0.73	\$0.07	\$0.08	\$0.08	\$0.09	\$0.09	\$0.10	\$0.10	\$0.10	\$0.11	\$0.11	
		Trautwein Road	\$0.65	\$0.06	\$0.07	\$0.07	\$0.08	\$0.08	\$0.09	\$0.09	\$0.09	\$0.10	\$0.10	
	C	Tequesquite Avenue	\$0.31	\$0.03	\$0.03	\$0.03	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04	\$0.05	\$0.05
		Wood Road	\$0.85	\$0.09	\$0.09	\$0.10	\$0.10	\$0.11	\$0.11	\$0.12	\$0.12	\$0.13	\$0.13	
<b>Total (Million Dollars)</b>			<b>\$37.71</b>	<b>\$4.24</b>	<b>\$4.49</b>	<b>\$4.76</b>	<b>\$5.05</b>	<b>\$5.25</b>	<b>\$5.46</b>	<b>\$5.68</b>	<b>\$5.90</b>	<b>\$6.14</b>	<b>\$6.39</b>	

**Notes:**  
(1) Projects categorized as "not required" and "completed" have been removed from the CIP list.  
(2) Costs in 2007 dollars.  
(3) Costs are distributed evenly over the 10-year period.  
(4) Costs are escalated from 2005 at 6 percent through 2011, and 4 percent thereafter.

<b>Table A.2 Pipe Replacement &amp; Rehabilitation Costs (2008 - 2019) Wastewater Collection and Treatment Facilities Integrated Master Plan City of Riverside</b>														
<b>Construction Year</b>	<b>Pipe Diameter (inch)</b>	<b>Total Project Cost<sup>(1)</sup></b>	<b>Annual R&amp;R Costs (Million Dollars)<sup>(2)(3)</sup></b>											
			<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>
Before 1943	Unknown	\$22.14	\$0.47	\$0.50	\$0.53	\$0.56	\$0.58	\$0.60	\$0.63	\$0.65	\$0.68	\$0.71	\$0.74	\$0.77
	4	\$0.02	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	6	\$85.96	\$1.82	\$1.93	\$2.05	\$2.17	\$2.26	\$2.35	\$2.44	\$2.54	\$2.64	\$2.75	\$2.86	\$2.97
	8	\$172.87	\$3.66	\$3.88	\$4.12	\$4.36	\$4.54	\$4.72	\$4.91	\$5.11	\$5.31	\$5.52	\$5.74	\$5.97
	10	\$19.16	\$0.41	\$0.43	\$0.46	\$0.48	\$0.50	\$0.52	\$0.54	\$0.57	\$0.59	\$0.61	\$0.64	\$0.66
	12	\$14.15	\$0.30	\$0.32	\$0.34	\$0.36	\$0.37	\$0.39	\$0.40	\$0.42	\$0.43	\$0.45	\$0.47	\$0.49
	14	\$1.93	\$0.04	\$0.04	\$0.05	\$0.05	\$0.05	\$0.05	\$0.05	\$0.06	\$0.06	\$0.06	\$0.06	\$0.07
	15	\$10.67	\$0.23	\$0.24	\$0.25	\$0.27	\$0.28	\$0.29	\$0.30	\$0.32	\$0.33	\$0.34	\$0.35	\$0.37
	16	\$2.28	\$0.05	\$0.05	\$0.05	\$0.06	\$0.06	\$0.06	\$0.06	\$0.07	\$0.07	\$0.07	\$0.08	\$0.08
	18	\$8.45	\$0.18	\$0.19	\$0.20	\$0.21	\$0.22	\$0.23	\$0.24	\$0.25	\$0.26	\$0.27	\$0.28	\$0.29
	20	\$1.40	\$0.03	\$0.03	\$0.03	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04	\$0.05	\$0.05
	21	\$6.22	\$0.13	\$0.14	\$0.15	\$0.16	\$0.16	\$0.17	\$0.18	\$0.18	\$0.19	\$0.20	\$0.21	\$0.21
	24	\$18.54	\$0.39	\$0.42	\$0.44	\$0.47	\$0.49	\$0.51	\$0.53	\$0.55	\$0.57	\$0.59	\$0.62	\$0.64
	27	\$5.43	\$0.12	\$0.12	\$0.13	\$0.14	\$0.14	\$0.15	\$0.15	\$0.16	\$0.17	\$0.17	\$0.18	\$0.19
	30	\$0.25	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01
	36	\$0.45	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.02
1944 to 1956	9	\$0.49	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.02	\$0.02	\$0.02	\$0.02
	4	\$0.04	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	6	\$1.01	\$0.02	\$0.02	\$0.02	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03
	8	\$39.86	\$0.85	\$0.90	\$0.95	\$1.01	\$1.05	\$1.09	\$1.13	\$1.18	\$1.22	\$1.27	\$1.32	\$1.38
	10	\$2.64	\$0.06	\$0.06	\$0.06	\$0.07	\$0.07	\$0.07	\$0.07	\$0.08	\$0.08	\$0.08	\$0.09	\$0.09
	12	\$2.25	\$0.05	\$0.05	\$0.05	\$0.06	\$0.06	\$0.06	\$0.06	\$0.07	\$0.07	\$0.07	\$0.07	\$0.08

<b>Table A.2 Pipe Replacement &amp; Rehabilitation Costs (2008 - 2019)</b>		<b>Wastewater Collection and Treatment Facilities Integrated Master Plan</b>													
		<b>City of Riverside</b>													
<b>Construction Year</b>	<b>Pipe Diameter (inch)</b>	<b>Total Project Cost<sup>(1)</sup></b>	<b>Annual R&amp;R Costs (Million Dollars)<sup>(2)(3)</sup></b>												
			<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	
	15	\$0.55	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	
	21	\$0.76	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.03	\$0.03	
<b>Total (Million Dollars)</b>		<b>\$418</b>	<b>\$8.85</b>	<b>\$9.38</b>	<b>\$9.95</b>	<b>\$10.54</b>	<b>\$10.96</b>	<b>\$11.40</b>	<b>\$11.86</b>	<b>\$12.33</b>	<b>\$12.83</b>	<b>\$13.34</b>	<b>\$13.87</b>	<b>\$14.43</b>	

**Notes:**  
 (1) Costs in August 2006 dollars.  
 (2) Costs are distributed evenly over a 50-year period.  
 (3) Costs are escalated from 2006 by 6 percent through 2011, and by 4 percent thereafter.

<b>Table A.2 Pipe Replacement &amp; Rehabilitation Costs (2020 - 2032)</b>		<b>Wastewater Collection and Treatment Facilities Integrated Master Plan</b>													
		<b>City of Riverside</b>													
<b>Construction Year</b>	<b>Pipe Diameter (inch)</b>	<b>Annual R&amp;R Costs (Million Dollars)<sup>(2)(3)</sup></b>													
		<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	<b>2031</b>	<b>2032</b>	
Before 1943	Unknown	\$0.80	\$0.83	\$0.86	\$0.90	\$0.93	\$0.97	\$1.01	\$1.05	\$1.09	\$1.13	\$1.18	\$1.22	\$1.27	
	4	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	
	6	\$3.09	\$3.21	\$3.34	\$3.47	\$3.61	\$3.76	\$3.91	\$4.07	\$4.23	\$4.40	\$4.57	\$4.76	\$4.95	
	8	\$6.21	\$6.46	\$6.72	\$6.99	\$7.27	\$7.56	\$7.86	\$8.18	\$8.50	\$8.84	\$9.20	\$9.56	\$9.95	
	10	\$0.69	\$0.72	\$0.74	\$0.77	\$0.81	\$0.84	\$0.87	\$0.91	\$0.94	\$0.98	\$1.02	\$1.06	\$1.10	
	12	\$0.51	\$0.53	\$0.55	\$0.57	\$0.59	\$0.62	\$0.64	\$0.67	\$0.70	\$0.72	\$0.75	\$0.78	\$0.81	
	14	\$0.07	\$0.07	\$0.08	\$0.08	\$0.08	\$0.08	\$0.09	\$0.09	\$0.09	\$0.10	\$0.10	\$0.11	\$0.11	
	15	\$0.38	\$0.40	\$0.41	\$0.43	\$0.45	\$0.47	\$0.49	\$0.50	\$0.52	\$0.55	\$0.57	\$0.59	\$0.61	
	16	\$0.08	\$0.09	\$0.09	\$0.09	\$0.10	\$0.10	\$0.10	\$0.11	\$0.11	\$0.12	\$0.12	\$0.13	\$0.13	

<b>Table A.2 Pipe Replacement &amp; Rehabilitation Costs (2020 - 2032)</b>														
<b>Wastewater Collection and Treatment Facilities Integrated Master Plan</b>														
<b>City of Riverside</b>														
<b>Construction Year</b>	<b>Pipe Diameter (inch)</b>	<b>Annual R&amp;R Costs (Million Dollars)<sup>(2)(3)</sup></b>												
		<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	<b>2031</b>	<b>2032</b>
1944 to 1956	18	\$0.30	\$0.32	\$0.33	\$0.34	\$0.36	\$0.37	\$0.38	\$0.40	\$0.42	\$0.43	\$0.45	\$0.47	\$0.49
	20	\$0.05	\$0.05	\$0.05	\$0.06	\$0.06	\$0.06	\$0.06	\$0.07	\$0.07	\$0.07	\$0.07	\$0.08	\$0.08
	21	\$0.22	\$0.23	\$0.24	\$0.25	\$0.26	\$0.27	\$0.28	\$0.29	\$0.31	\$0.32	\$0.33	\$0.34	\$0.36
	24	\$0.67	\$0.69	\$0.72	\$0.75	\$0.78	\$0.81	\$0.84	\$0.88	\$0.91	\$0.95	\$0.99	\$1.03	\$1.07
	27	\$0.20	\$0.20	\$0.21	\$0.22	\$0.23	\$0.24	\$0.25	\$0.26	\$0.27	\$0.28	\$0.29	\$0.30	\$0.31
	30	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01
	36	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.03
	9	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.03	\$0.03	\$0.03
	4	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	6	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04	\$0.05	\$0.05	\$0.05	\$0.05	\$0.05	\$0.06
	8	\$1.43	\$1.49	\$1.55	\$1.61	\$1.68	\$1.74	\$1.81	\$1.89	\$1.96	\$2.04	\$2.12	\$2.21	\$2.29
	10	\$0.09	\$0.10	\$0.10	\$0.11	\$0.11	\$0.12	\$0.12	\$0.12	\$0.13	\$0.14	\$0.14	\$0.15	\$0.15
	12	\$0.08	\$0.08	\$0.09	\$0.09	\$0.09	\$0.10	\$0.10	\$0.11	\$0.11	\$0.12	\$0.12	\$0.12	\$0.13
	15	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03
	21	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04
<b>Total (Million Dollars)</b>		<b>\$15.00</b>	<b>\$15.60</b>	<b>\$16.23</b>	<b>\$16.88</b>	<b>\$17.55</b>	<b>\$18.26</b>	<b>\$18.99</b>	<b>\$19.74</b>	<b>\$20.53</b>	<b>\$21.36</b>	<b>\$22.21</b>	<b>\$23.10</b>	<b>\$24.02</b>
<b>Notes:</b>														
(1) Costs in August 2006 dollars.														
(2) Costs are distributed evenly over a 50-year period.														
(3) Costs are escalated from 2006 by 6 percent through 2011, and by 4 percent thereafter.														

<b>Table A.2 Pipe Replacement &amp; Rehabilitation Costs (2033 - 2045) Wastewater Collection and Treatment Facilities Integrated Master Plan City of Riverside</b>														
<b>Construction Year</b>	<b>Pipe Diameter (inch)</b>	<b>Annual R&amp;R Costs (Million Dollars)<sup>(2)(3)</sup></b>												
		<b>2033</b>	<b>2034</b>	<b>2035</b>	<b>2036</b>	<b>2037</b>	<b>2038</b>	<b>2039</b>	<b>2040</b>	<b>2041</b>	<b>2042</b>	<b>2043</b>	<b>2044</b>	<b>2045</b>
Before 1943	Unknown	\$1.32	\$1.38	\$1.43	\$1.49	\$1.55	\$1.61	\$1.68	\$1.74	\$1.81	\$1.89	\$1.96	\$2.04	\$2.12
	4	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	6	\$5.14	\$5.35	\$5.56	\$5.79	\$6.02	\$6.26	\$6.51	\$6.77	\$7.04	\$7.32	\$7.61	\$7.92	\$8.24
	8	\$10.34	\$10.76	\$11.19	\$11.64	\$12.10	\$12.59	\$13.09	\$13.61	\$14.16	\$14.72	\$15.31	\$15.92	\$16.56
	10	\$1.15	\$1.19	\$1.24	\$1.29	\$1.34	\$1.39	\$1.45	\$1.51	\$1.57	\$1.63	\$1.70	\$1.77	\$1.84
	12	\$0.85	\$0.88	\$0.92	\$0.95	\$0.99	\$1.03	\$1.07	\$1.11	\$1.16	\$1.21	\$1.25	\$1.30	\$1.36
	14	\$0.12	\$0.12	\$0.12	\$0.13	\$0.14	\$0.14	\$0.15	\$0.15	\$0.16	\$0.16	\$0.17	\$0.18	\$0.18
	15	\$0.64	\$0.66	\$0.69	\$0.72	\$0.75	\$0.78	\$0.81	\$0.84	\$0.87	\$0.91	\$0.95	\$0.98	\$1.02
	16	\$0.14	\$0.14	\$0.15	\$0.15	\$0.16	\$0.17	\$0.17	\$0.18	\$0.19	\$0.19	\$0.20	\$0.21	\$0.22
	18	\$0.51	\$0.53	\$0.55	\$0.57	\$0.59	\$0.62	\$0.64	\$0.67	\$0.69	\$0.72	\$0.75	\$0.78	\$0.81
	20	\$0.08	\$0.09	\$0.09	\$0.09	\$0.10	\$0.10	\$0.11	\$0.11	\$0.11	\$0.12	\$0.12	\$0.13	\$0.13
	21	\$0.37	\$0.39	\$0.40	\$0.42	\$0.44	\$0.45	\$0.47	\$0.49	\$0.51	\$0.53	\$0.55	\$0.57	\$0.60
	24	\$1.11	\$1.15	\$1.20	\$1.25	\$1.30	\$1.35	\$1.40	\$1.46	\$1.52	\$1.58	\$1.64	\$1.71	\$1.78
	27	\$0.32	\$0.34	\$0.35	\$0.37	\$0.38	\$0.40	\$0.41	\$0.43	\$0.44	\$0.46	\$0.48	\$0.50	\$0.52
	30	\$0.01	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02
36	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04	
1944 to 1956	9	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04	\$0.05	\$0.05
	4	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	6	\$0.06	\$0.06	\$0.07	\$0.07	\$0.07	\$0.07	\$0.08	\$0.08	\$0.08	\$0.09	\$0.09	\$0.09	\$0.10
	8	\$2.39	\$2.48	\$2.58	\$2.68	\$2.79	\$2.90	\$3.02	\$3.14	\$3.26	\$3.39	\$3.53	\$3.67	\$3.82
	10	\$0.16	\$0.16	\$0.17	\$0.18	\$0.18	\$0.19	\$0.20	\$0.21	\$0.22	\$0.22	\$0.23	\$0.24	\$0.25
	12	\$0.13	\$0.14	\$0.15	\$0.15	\$0.16	\$0.16	\$0.17	\$0.18	\$0.18	\$0.19	\$0.20	\$0.21	\$0.22

<b>Table A.2 Pipe Replacement &amp; Rehabilitation Costs (2033 - 2045)</b>		<b>Wastewater Collection and Treatment Facilities Integrated Master Plan</b>												
<b>City of Riverside</b>		<b>Annual R&amp;R Costs (Million Dollars)<sup>(2)(3)</sup></b>												
<b>Construction Year</b>	<b>Pipe Diameter (inch)</b>	<b>2033</b>	<b>2034</b>	<b>2035</b>	<b>2036</b>	<b>2037</b>	<b>2038</b>	<b>2039</b>	<b>2040</b>	<b>2041</b>	<b>2042</b>	<b>2043</b>	<b>2044</b>	<b>2045</b>
	15	\$0.03	\$0.03	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04	\$0.05	\$0.05	\$0.05	\$0.05	\$0.05
	21	\$0.05	\$0.05	\$0.05	\$0.05	\$0.05	\$0.06	\$0.06	\$0.06	\$0.06	\$0.06	\$0.07	\$0.07	\$0.07
<b>Total (Million Dollars)</b>		<b>\$24.98</b>	<b>\$25.98</b>	<b>\$27.02</b>	<b>\$28.10</b>	<b>\$29.23</b>	<b>\$30.40</b>	<b>\$31.61</b>	<b>\$32.88</b>	<b>\$34.19</b>	<b>\$35.56</b>	<b>\$36.98</b>	<b>\$38.46</b>	<b>\$40.00</b>

**Notes:**  
 (1) Costs in August 2006 dollars.  
 (2) Costs are distributed evenly over a 50-year period.  
 (3) Costs are escalated from 2006 by 6 percent through 2011, and by 4 percent thereafter.

<b>Table A.2 Pipe Replacement &amp; Rehabilitation Costs (2046 - 2057)</b>		<b>Wastewater Collection and Treatment Facilities Integrated Master Plan</b>												
<b>City of Riverside</b>		<b>Annual R&amp;R Costs (Million Dollars)<sup>(2)(3)</sup></b>												
<b>Construction Year</b>	<b>Pipe Diameter (inch)</b>	<b>2046</b>	<b>2047</b>	<b>2048</b>	<b>2049</b>	<b>2050</b>	<b>2051</b>	<b>2052</b>	<b>2053</b>	<b>2054</b>	<b>2055</b>	<b>2056</b>	<b>2057</b>	
Before 1943	Unknown	\$2.21	\$2.29	\$2.39	\$2.48	\$2.58	\$2.68	\$2.79	\$2.90	\$3.02	\$3.14	\$3.27	\$3.40	
	4	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	
	6	\$8.56	\$8.91	\$9.26	\$9.63	\$10.02	\$10.42	\$10.84	\$11.27	\$11.72	\$12.19	\$12.68	\$13.19	
	8	\$17.22	\$17.91	\$18.63	\$19.37	\$20.15	\$20.96	\$21.79	\$22.67	\$23.57	\$24.52	\$25.50	\$26.52	
	10	\$1.91	\$1.99	\$2.06	\$2.15	\$2.23	\$2.32	\$2.42	\$2.51	\$2.61	\$2.72	\$2.83	\$2.94	
	12	\$1.41	\$1.47	\$1.52	\$1.59	\$1.65	\$1.72	\$1.78	\$1.86	\$1.93	\$2.01	\$2.09	\$2.17	
	14	\$0.19	\$0.20	\$0.21	\$0.22	\$0.22	\$0.23	\$0.24	\$0.25	\$0.26	\$0.27	\$0.28	\$0.30	
	15	\$1.06	\$1.11	\$1.15	\$1.20	\$1.24	\$1.29	\$1.35	\$1.40	\$1.45	\$1.51	\$1.57	\$1.64	
	16	\$0.23	\$0.24	\$0.25	\$0.26	\$0.27	\$0.28	\$0.29	\$0.30	\$0.31	\$0.32	\$0.34	\$0.35	

<b>Table A.2 Pipe Replacement &amp; Rehabilitation Costs (2046 - 2057)</b>														
<b>Wastewater Collection and Treatment Facilities Integrated Master Plan</b>														
<b>City of Riverside</b>														
<b>Construction Year</b>	<b>Pipe Diameter (inch)</b>	<b>Annual R&amp;R Costs (Million Dollars)<sup>(2)(3)</sup></b>												
		<b>2046</b>	<b>2047</b>	<b>2048</b>	<b>2049</b>	<b>2050</b>	<b>2051</b>	<b>2052</b>	<b>2053</b>	<b>2054</b>	<b>2055</b>	<b>2056</b>	<b>2057</b>	
1944 to 1956	18	\$0.84	\$0.88	\$0.91	\$0.95	\$0.98	\$1.02	\$1.07	\$1.11	\$1.15	\$1.20	\$1.25	\$1.30	
	20	\$0.14	\$0.15	\$0.15	\$0.16	\$0.16	\$0.17	\$0.18	\$0.18	\$0.19	\$0.20	\$0.21	\$0.21	
	21	\$0.62	\$0.64	\$0.67	\$0.70	\$0.73	\$0.75	\$0.78	\$0.82	\$0.85	\$0.88	\$0.92	\$0.95	
	24	\$1.85	\$1.92	\$2.00	\$2.08	\$2.16	\$2.25	\$2.34	\$2.43	\$2.53	\$2.63	\$2.73	\$2.84	
	27	\$0.54	\$0.56	\$0.59	\$0.61	\$0.63	\$0.66	\$0.68	\$0.71	\$0.74	\$0.77	\$0.80	\$0.83	
	30	\$0.02	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.04	\$0.04	\$0.04
	36	\$0.04	\$0.05	\$0.05	\$0.05	\$0.05	\$0.05	\$0.05	\$0.06	\$0.06	\$0.06	\$0.06	\$0.07	\$0.07
	9	\$0.05	\$0.05	\$0.05	\$0.05	\$0.06	\$0.06	\$0.06	\$0.06	\$0.07	\$0.07	\$0.07	\$0.07	\$0.08
	4	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01
	6	\$0.10	\$0.10	\$0.11	\$0.11	\$0.12	\$0.12	\$0.13	\$0.13	\$0.14	\$0.14	\$0.15	\$0.15	\$0.15
	8	\$3.97	\$4.13	\$4.30	\$4.47	\$4.65	\$4.83	\$5.03	\$5.23	\$5.44	\$5.65	\$5.88	\$6.11	\$6.11
	10	\$0.26	\$0.27	\$0.28	\$0.30	\$0.31	\$0.32	\$0.33	\$0.35	\$0.36	\$0.37	\$0.39	\$0.40	\$0.40
	12	\$0.22	\$0.23	\$0.24	\$0.25	\$0.26	\$0.27	\$0.28	\$0.30	\$0.31	\$0.32	\$0.33	\$0.35	\$0.35
	15	\$0.05	\$0.06	\$0.06	\$0.06	\$0.06	\$0.07	\$0.07	\$0.07	\$0.07	\$0.08	\$0.08	\$0.08	\$0.08
21	\$0.08	\$0.08	\$0.08	\$0.09	\$0.09	\$0.09	\$0.10	\$0.10	\$0.10	\$0.11	\$0.11	\$0.12	\$0.12	
<b>Total (Million Dollars)</b>		<b>\$41.60</b>	<b>\$43.26</b>	<b>\$44.99</b>	<b>\$46.79</b>	<b>\$48.66</b>	<b>\$50.61</b>	<b>\$52.64</b>	<b>\$54.74</b>	<b>\$56.93</b>	<b>\$59.21</b>	<b>\$61.58</b>	<b>\$64.04</b>	
<b>Notes:</b>														
(1) Costs in August 2006 dollars.														
(2) Costs are distributed evenly over a 50-year period.														
(3) Costs are escalated from 2006 by 6 percent through 2011, and by 4 percent thereafter.														

**OVERALL CIP COSTS**

<b>Table B.1 Capital Improvement Project Costs Wastewater Collection and Treatment Facilities Integrated Master Plan City of Riverside</b>																					
<b>Proposed Projects</b>	<b>Total Project Cost<sup>(1)</sup> (\$ Million)</b>	<b>Annual CIP Costs (\$ Million)<sup>(2)</sup></b>																			
		<b>FY 06/07</b>	<b>FY 07/08</b>	<b>FY 08/09</b>	<b>FY 09/10</b>	<b>FY 10/11</b>	<b>FY 11/12</b>	<b>FY 12/13</b>	<b>FY 13/14</b>	<b>FY 14/15</b>	<b>FY 15/16</b>	<b>FY 16/17</b>	<b>FY 17/18</b>	<b>FY 18/19</b>	<b>FY 19/20</b>	<b>FY 20/21</b>	<b>FY 21/22</b>	<b>FY 22/23</b>	<b>FY 23/24</b>	<b>FY 24/25</b>	<b>Total</b>
Plant 1 Primary Expansion, MBR, and Digester	185		2.50	10.00	12.50	87.51	87.51	50.01													250.04
MBR Equipment Upgrade	12													1.01	1.52	10.14	12.67	-	-		25.35
New Boilers	3								4.52												4.52
New Chlorine Contact Basin	4.0											0.29	0.43	2.89	3.62						7.23
New Headworks	10.0													0.80	1.20	8.00	10.01				20.01
WAS Thickening Facility <sup>(2)</sup>	17.0																1.62	2.43	16.19		20.23
Influent Metering Project	5.9									2.74	6.39										9.13
O&M Building	2.1									0.98	2.28										3.25
Headwork-Metering Vault	0.5			0.17	0.40																0.58
54-inch Pipe	0.1			0.04	0.10																0.14
Low-Pressure Digester Gas Holder	1.2		0.15	0.68	0.68																1.51
1.2-MW Fuel Cell	13.20		0.68	1.02	6.83	8.54															17.08
Power System Projects	5.10										2.58	6.03									8.61
SCADA System Upgrades	1.0			0.066	0.070	0.074	0.079	0.082	0.085	0.089	0.092	0.096	0.100	0.104	0.108	0.112	0.117	0.121	0.126	0.131	1.65
Waste Gas Burner	0.5		0.17	0.39																	0.56
Biofilters 1 and 2	2.1									0.98	2.28										3.26
Building-Headquarters for Sewer Line	0.3									0.15	0.35										0.50
<b>Total Treatment Expenditures</b>	<b>315</b>	<b>-</b>	<b>3.50</b>	<b>12.37</b>	<b>20.58</b>	<b>96.13</b>	<b>87.59</b>	<b>50.09</b>	<b>4.60</b>	<b>4.93</b>	<b>13.98</b>	<b>6.41</b>	<b>0.53</b>	<b>3.80</b>	<b>5.94</b>	<b>9.64</b>	<b>20.26</b>	<b>14.41</b>	<b>2.55</b>	<b>16.32</b>	<b>373.65</b>
Collection System - Capital projects identified in the 2005 CSMP <sup>(3)</sup>	37.7		4.24	4.49	4.76	5.05	5.25	5.46	5.68	5.90	6.14	6.39									53.35
Collection System - R&R projects identified by the City <sup>(4)</sup>	159		8.85	9.39	9.95	10.54	10.97	11.41	11.86	12.34	12.83	13.34	13.88	14.43	15.01	15.61	16.23	16.88	17.56	18.26	239.29
<b>Total Collection System Expenditures</b>	<b>196.7</b>		<b>13.09</b>	<b>13.88</b>	<b>14.71</b>	<b>15.59</b>	<b>16.21</b>	<b>16.86</b>	<b>17.54</b>	<b>18.24</b>	<b>18.96</b>	<b>19.73</b>	<b>13.88</b>	<b>14.43</b>	<b>15.01</b>	<b>15.61</b>	<b>16.23</b>	<b>16.88</b>	<b>17.56</b>	<b>18.26</b>	<b>292.64</b>
<b>Total for the Year</b>		<b>-</b>	<b>16.6</b>	<b>26.3</b>	<b>35.3</b>	<b>111.7</b>	<b>103.8</b>	<b>67.0</b>	<b>22.1</b>	<b>23.2</b>	<b>32.9</b>	<b>26.1</b>	<b>14.4</b>	<b>18.2</b>	<b>20.9</b>	<b>25.2</b>	<b>36.5</b>	<b>31.3</b>	<b>20.1</b>	<b>34.6</b>	<b>666.3</b>
<b>Cumulative Expenditure</b>		<b>-</b>	<b>16.59</b>	<b>42.84</b>	<b>78.13</b>	<b>189.84</b>	<b>293.65</b>	<b>360.60</b>	<b>382.74</b>	<b>405.91</b>	<b>438.85</b>	<b>464.99</b>	<b>479.40</b>	<b>497.63</b>	<b>518.57</b>	<b>543.81</b>	<b>580.30</b>	<b>611.60</b>	<b>631.71</b>	<b>666.28</b>	

**Notes:**  
(1) Project Costs in August 2006 Dollars.  
(2) Costs are midpoint construction dollars spread evenly over the 19-year period.  
(3) Collection system capital improvement project costs are distributed evenly over 10-year period, then escalated at 6 percent for the first 5 years, then 4 percent for the remaining years.  
(4) Collection system R&R projects are distributed over a 25-year period and then escalated at 6 percent for the first 5 years, then 4 percent for the remaining years. However, for the Integrated Master Plan, only costs through year 2025 are included.