Public Utilities Capital Improvement Program

Steps Have Been Taken to Implement Asset Management and Planning, but Improvements Are Needed to More Effectively Manage Projects

SEPTEMBER 2011

Audit Report

Office of the City Auditor

City of San Diego

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THE CITY OF SAN DIEGO

September 27, 2011

Honorable Mayor, City Council, Audit Committee Members, and Independent Rates Oversight Committee Members

City of San Diego, California

Transmitted herewith is an audit report on the Public Utilities Department's Capital Improvement Program (CIP). This audit found that steps have been taken to implement asset management and capital planning, but improvements are needed to effectively manage capital projects. This report is in accordance with City Charter Section 39.2. The Results in Brief is presented on page 1. The Administration's response to our audit recommendations can be found in Appendix VII on page 84 of the report.

If you need any further information please let me know. We would like to thank staff from the following departments for their cooperation and assistance during this audit: Public Utilities, Public Works/Engineering, and Comptroller's Office. We greatly appreciate their valuable time and efforts spent on providing us with information. OCA staff that contributed to this audit report are Erin Noel, DeAndre McCall, Sonja Howe, Toufic Tabshouri, Kyle Elser, and Chris Constantin.

Respectfully submitted,

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Abbreviations

BCE	Business Case Evaluation
CIP	Capital Improvement Program
CIPRAC	CIP Review and Advisory Committee
EAM	Enterprise Asset Management
EMPAC	Enterprise Maintenance Planning & Control
EPA	Environmental Protection Agency
GFOA	Government Finance Officers Association
IROC	Independent Rates Oversight Committee
OCA	Office of the City Auditor
PSTools	Planner/Scheduler Tools
SPLASH	System Planning Locator Application
SWIM	Sewer Water Infrastructure Management

Results in Brief

Finding 1 Comprehensive asset management is a recommended best practice for identifying needed maintenance and planning capital investments for asset renewal and replacement because it will provide key data on the inventory and condition of assets and an evaluation of alternatives to help officials make sound decisions.[1] We assessed Public Utilities' efforts against best practices and found that the Department has taken various steps toward implementing asset management, but these efforts are not comprehensive and improvement is needed.

- Public Utilities has only established initial goals and objectives for comprehensive, Department-wide asset management in its Strategic Plan. However, the Department intends to complete an asset management plan that includes goals and objectives for the program by the end of fiscal year 2012. We also found that the Department lacks targets for acceptable asset condition levels. Officials said that developing targets would be challenging given the large variety of water and wastewater assets and all assets must always be fully operational in order to avoid interruptions in service. We believe that the Department should assess the potential benefits of establishing a target level of condition for certain assets to (1) provide transparency over the condition of the water and wastewater systems, (2) establish a baseline against which progress can be measured, and (3) effectively support the need for capital improvements to ratepayers and other stakeholders.

[1] U.S. Government Accountability Office, *Water Infrastructure: Comprehensive Asset Management Has Potential to Help Utilities Better Identify Needs and Plan Future Investments*, GAO-04-461 (Washington, D.C.: March 19, 2004), 4; National Asset Management Steering Committee, *International Infrastructure Management Manual, Version 3.0* (Wellington, New Zealand: 2006), 1.2-1.5; U.S. Government Accountability Office, *Executive Guide: Leading Practices in Capital Decision-Making*, GAO/AIMD-99-32 (Washington, D.C.: Dec. 1998), 46; U.S. Environmental Protection Agency, *Asset Management: A Best Practices Guide* (Washington, D.C.: April 2008), 1; U.S. Department of Transportation, *Asset Management Primer* (Washington, D.C.: Dec. 1999), 9.

- The Department has assessed the physical condition of many above-ground assets, but has only assessed 5.5 of 505 miles or about one percent of its water transmission pipes. This is largely due to the challenges of accessibility of underground water mains, service disruption, and high associated costs. In addition, the Department does not physically assess the condition of its water distribution mains. Because of the high costs associated with physical assessment of smaller pipes and the difficulty in predicting specific failures on hundreds of miles of individual small lines, it is generally considered to be more cost-effective to simply fix lines when they break. By not fully assessing the conditions of its assets, the Department will not have information on pipes that are at high risk for failure and cannot make informed decisions regarding capital needs for these assets. Unplanned failures usually incur additional costs and can lead to reactive and unplanned replacement, which is often the most expensive option.
- Public Utilities uses abstracts and full Business Case Evaluations (BCE) to evaluate alternatives. We found that BCE abstracts lacked details, especially relating to financial costs. Officials told us that cost estimate details are maintained in the project proponent's file for future reference. We also found that full evaluations are only performed for about 31 percent of projects. Officials told us that complex and expensive projects require full BCEs, but routine and recurring projects, such as pipeline replacement, do not warrant the time and resources needed to complete a full BCE. While full BCEs may require a significant amount of time and effort, the ultimate purpose is to support a solid business decision on a proposed project. Without consistently and thoroughly conducting business evaluations for all appropriate projects, the Department cannot support rational decisions that minimize risks and provide benefits to the ratepayer.

We are recommending that Public Utilities (1) determine the frequency of which the condition of appropriate assets should be assessed and establish a schedule for these assessments, particularly for water transmission mains, (2) assess whether the current criteria and process for determining whether to

develop a full BCE for a project is sufficient to ensure that all appropriate capital projects are justified, and (3) complete a consolidated asset management plan, including measurable goals and objectives for the program and clear, numeric goals for the target level of condition the Department wants to achieve for appropriate assets.

Finding 2 Master planning and capital improvement planning provide an overall perspective of developments in the City to enable decision-makers and other stakeholders, including citizens, to take a long-range view of future needs, projects, and priorities. Public Utilities has developed three master plans to address capital needs—the Water Facilities Master Plan, *Draft* Metropolitan Wastewater Plan, and Municipal Wastewater Collection System Master Plan.[2] The Water Facilities Master Plan is comprehensive and generally in line with best practices; however, neither the *Draft* Metropolitan Wastewater Master Plan nor the Municipal Wastewater Collection System Master Plan is as comprehensive, and both lack several elements of best practices. For example, the *Draft* Metropolitan Wastewater Master Plan has limited project information and does not prioritize projects. Department officials told us that this is because many elements missing from the wastewater plan are included in separate documents, such as the wastewater five-year CIP plan, 10-year CIP, and project prioritization documents. Including all information in one document helps to show that various aspects of planning are being assessed together and provides transparency to stakeholders.

Developing a strategy for financing capital infrastructure needs is important since these projects are typically costly, are generally implemented over long time horizons, and must be financed through rate increases to cover costs.[3] In addition, the Department must balance other primary drivers of rate increases, such as the rising cost of purchased water in the City,

[2] Public Utilities' Wastewater Branch has two separate master plans because it is responsible for two wastewater systems. The Metropolitan Wastewater System treats the wastewater from the City of San Diego and 15 other cities and districts, and the Municipal Wastewater Collection System is responsible for the collection and conveyance of wastewater from residences and businesses within the City of San Diego.

[3] The Department also finances capital projects through federal grants and state loans which are free monies or carry more favorable interest rates than bonds.

with infrastructure needs.[4] Best practices recommend that organizations develop a financing and ratesetting strategy to determine how to pay for capital needs in a fiscally-prudent manner and effectively communicate this information to stakeholders, including City Council Members, oversight boards, and customers.[5] The Department uses its Cost of Service Study and Rate Case to assist in determining the amount of funds needed for operations and capital improvements. However, they do not provide information to stakeholders regarding the Department's determination of the funding mix—the proportion of CIP funds raised through rate increases and the proportion raised through borrowing or other sources. The choice of funding mix is ultimately a policy decision that affects current and future ratepayers, and the rationale behind it should be transparent.

The Department has conducted extensive outreach efforts to educate stakeholders regarding needed rate increases but has had limited success in improving understanding of the conditions driving rate increases and implications for failing to fund needed infrastructure projects. The public's concern is likely related to repeated water and wastewater rate increases in the past. The affordability of water and wastewater rates is a primary concern to the City and constrains the amount of funds that can be raised for CIP projects. Given the deteriorating and aged infrastructure, capital needs are generally greater than available funds. While the Department's master plans include an extensive planned infrastructure replacement program over the next 20 years, it is not reporting a backlog of projects that it is unable to implement due to funding constraints. We understand that the Department must prioritize needs and assess which projects to implement based on available funds. But, by not reporting the backlog of unfunded projects, stakeholders cannot see the big picture and fully understand the implications of deferring projects. Deferring projects prevents the City from maintaining infrastructure in a good

[4] The City of San Diego imports about 85 to 90 percent of its water from the State Water Project in Northern California and the Colorado River. The costs to purchase and deliver imported water and major investments in infrastructure are the two factors driving the bulk of the rate increases for fiscal year 2011.
[5] Association of Municipal Sewerage Agencies, *Managing Public Infrastructure Assets to Minimize Cost and Maximize Performance* (Washington, D.C.: 2002), 125-126.

state of repair and makes those same repairs more expensive as construction costs increase and small preventative projects become larger and more expensive replacements. Without improved communication of the consequences of not financing projects to ratepayers and other stakeholders, the Department risks not being able to secure the needed funds.

We are recommending that Public Utilities (1) develop a comprehensive Wastewater Master Plan based on a full assessment of the wastewater system's needs and best practices; (2) include the basis for determining the funding mix in future Master Plans, CIP plans, or a financing plan, and make these available to the public; and (3) improve the Department's strategy for communicating capital needs to stakeholders, including providing estimated deferred maintenance and unfunded needs if needed rate increases are not secured and implications of deferring projects.

Finding 3 Best practices recommend that organizations collect and analyze baseline versus actual data to understand and communicate the project progress and performance and forecast results.[6] The California Multi-Agency Benchmarking Study provides statewide averages for project delivery costs, and the City of San Diego participates in this study.[7] Based on our sample of 44 projects, we found that the City of San Diego's average project delivery cost (as a ratio of total construction cost) is just one percent higher than the statewide average of 25 percent. However, for smaller projects valued between $100,000 and $2 million, the City's average delivery costs are 14 percent higher than the statewide average of 33 percent. Officials attribute higher project delivery costs for small projects to several uncontrollable factors, including the City's limited access to public bond markets from 2004 to 2008 and below market bids due to the nation's economic recession. We believe that the City's project delivery costs are higher for

[6] Project Management Institute, *A Guide to the Project Management Body of Knowledge 4th Edition* (Newton Square, PA: 2008), p. 266.

[7] The Study is a collaborative research effort including seven of the eight largest municipalities in California to share and develop approaches in order to provide high value implementation of capital programs in the most efficient manner. Study participants include the City of San Diego, San Jose, Los Angeles, Long Beach, Sacramento, Oakland, and the City and County of San Francisco. *California Multi-Agency CIP Benchmarking Study: Annual Report* (2010), 1.

smaller projects because Public Works/Engineering officials are not reviewing and reporting project delivery costs for each project or generating summary reports at project completion. As a result, the high delivery cost for smaller projects is not observable because likely savings from larger projects overshadow inefficiencies in smaller projects. Without effectively tracking and monitoring project delivery costs, the City risks not delivering and implementing projects in the most efficient and cost-effective manner. In addition, a lack of reporting requirements reduces accountability to meet performance measures, reduces transparency over the true cost to deliver projects, and inhibits the ability to identify areas of inefficiency.

Because of their scale and cost, capital projects can represent a significant risk for local governments. Consequently, governmental entities should establish policies and procedures to support effective capital project monitoring and reporting to mitigate such risks as well as improve financial accountability and enhance operational effectiveness. We found many projects with inaccurate project charges. In addition, the layout and functionality of the City's financial system poses much inefficiency with managing project budgets. This is because there is a lack of documented policies and procedures, and there was a lack of training when the City switched from its prior financial system to SAP in fiscal year 2010. Without additional documented policies and procedures, project managers and City staff will continue to have a limited understanding of the City's financial system, projects will continue to incur incorrect charges which must be backed out by budget analysts, project expenditure data will be inaccurate, and internal controls will be ineffective.

We are recommending that Public Works/Engineering (1) revise its service level agreement with Public Utilities Department to describe specific requirements to monitor and report project delivery costs; (2) develop project-level delivery costs progress reports from the Project Portfolio Management Integrator or other sources to track, monitor, and report planned versus actual costs on a monthly basis for all active projects; and (3) annually, compile, consolidate, and analyze performance data

of completed projects to identify inefficiencies and enhance performance and value. We are also recommending that the City Comptroller develop a regulation process narrative that outlines charges that are appropriate direct expenses and establish a policy and guidelines to streamline the process to identify costs related to construction management and the construction contract.

Finding 4 Accurately forecasting the cost of future projects is vital to the survival of any organization contemplating future construction, and indirect costs rates or overhead is an important consideration in the analysis of project cost proposals.[8] The Public Works/Engineering Department charges Public Utilities and other client departments project delivery costs for the services that it provides; this includes overhead costs, such as advertising, depreciation, insurance, and rent. The Comptroller's Office develops overhead rates for City departments based on an annual review of each department's direct and indirect costs.[9] We found that the City has not charged overhead since the beginning of fiscal year 2012, because it lacks an effective methodology for doing so. In previous years, the Comptroller's Office's methodology was based on reports from the City's former financial system. The Comptroller's Office's cannot use this same methodology for fiscal year 2012 because the City's new financial system—SAP—does not require specific job orders for billing direct and indirect costs, which has been a key driver to determining overhead rates for each department.[10] Comptroller's officials told us they are working to develop a new methodology and expect it to be in place by the end of October 2011.

Without an appropriate indirect cost or overhead rate structure, Public Works/Engineering, Public Utilities, and other departments will not be able to accurately forecast the costs of future projects, make informed decisions regarding the

[8] National Institute of Building Sciences, *Whole Building Design Guide: Cost Estimating* (Washington, D.C.: May 28, 2010).
[9] Although the *California Multi-City Benchmarking Study* includes overhead rates for each of the eight participating cities, we did not include a comparison here because each City uses different methodologies to calculate overhead rates.
[10] SAP replaced AMRIS in fiscal year 2009, and SAP's Human Capital Management application—which includes human resources/personnel, benefits and payroll functions—was implemented on January 1, 2010.

feasibility of projects, or effectively monitor project costs. Further, charging appropriate overhead rates for the Public Works/Engineering Department is important to maintain the accuracy of the General Fund and enterprise funds. We are recommending that the City Comptroller develop an effective methodology for developing overhead rates and make retroactive adjustments if needed to ensure that departments correctly receive overhead funds as budgeted and billed in fiscal year 2012.

Introduction

In accordance with the City Auditor's Fiscal Year 2011 Audit Work Plan and in response to a request from the Independent Rates Oversight Commission (IROC), we conducted a performance audit of the Public Utilities Department's Capital Improvement Program (CIP).[11] CIP projects are planned and initiated by Public Utilities and primarily implemented by the City's Public Works/Engineering Department. Our objectives for this audit were to determine the extent to which (1) Public Utilities is effectively managing assets and identifying capital renewal and replacement needs; (2) Public Utilities is effectively planning for capital infrastructure; (3) Public Utilities and Public Works/Engineering are effectively and efficiently managing CIP projects and charging appropriate accounts; and (4) Comptroller's Office is charging appropriate overhead rates. The four major findings in this report correspond to each of these objectives.

We conducted our review from April 2011 through July 2011 and limited our work to those areas specified in the Objectives, Scope, and Methodology section of this report. We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. We limited our work to those areas specified in the "Objective, Scope, and Methodology" section of this report.

The Office of the City Auditor thanks Department staff for their assistance and cooperation during this audit. Their valuable time and efforts spent on providing us information are greatly appreciated.

[11] During the April 12, 2010 Audit Committee meeting, the Committee proposed using $100,000 of Public Utilities' funds, which have been allocated on behalf of IROC, for OCA's budget. After conducting a survey and risk assessment of Public Utilities, OCA identified five key issues for potential audit. IROC selected the Capital Improvement Options relating to long term planning and efficiency and oversight of capital projects.

Background

Effective water and wastewater systems are critical to public health, the environment, and the economy. Water systems provide drinking water free of contaminants and wastewater treatment systems prevent pollutants from reaching our rivers, lakes, and coastlines, preventing water-borne diseases, and preserving our environment. Cities depend upon clean rivers, lakes and coastlines for water-based recreation and tourism. The primary assets of water utilities are infrastructure—water and wastewater treatment plants, pumps, distribution and collection lines, and related facilities. Much of this infrastructure in the United States is aging with some components over 100 years old, and for the first time much of this infrastructure, including underground pipes, are nearing the end of its expected life span.[12] The American Society of Civil Engineers reports that the physical condition of water and wastewater treatment plants as poor due to lack of investment in plants, equipment, and other capital improvements over the years. The Society also reports that the nation's water and wastewater infrastructure faces staggering investment needs over the next 20 years with an annual shortfall of at least $11 billion to replace aging assets that are near the end of their useful life and to comply with existing and future federal regulations.[13] The U.S. Environmental Protection Agency (EPA) estimates that pipeline rehabilitation and replacement represents a significant portion of the projected infrastructure needs. According to the U.S. Government Accountability Office, pipeline rehabilitation and replacement represents a significant portion of the projected infrastructure needs.[14]

[12] American Water Works Association, *Dawn of the Replacement Era: Reinvesting in Drinking Water Infrastructure* (Denver, CO: May 2001), 5.
[13] American Society of Civil Engineers, *2009 Infrastructure Fact Sheet*.
[14] U.S. Government Accountability Office, *Water Infrastructure: Comprehensive Asset Management Has Potential to Help Utilities Better Identify Needs and Plan Future Investments*, GAO-04-461 (Washington, D.C.: March 19, 2004), 14.

As a result of aging and deteriorating U.S. infrastructure, EPA reported 240,000 water main breaks nationwide annually.[15] Disruptions in water service can hinder disaster response and recovery efforts, expose the public to contaminants, and cause damage to roadways and other infrastructure, endangering lives and resulting in billions of dollars in losses. Sanitary sewer overflows, caused by blocked or broken sewer pipes result in the release of as much as 10 billion gallons of raw sewage annually. EPA reported 75,000 sanitary sewer overflows per year. Water and wastewater utilities are facing pressure to upgrade the nation's aging and deteriorating infrastructure to serve growing demands, meet new and existing regulatory requirements, and improve security.[16]

Capital Infrastructure Investment

Local governments are the primary investors in water and sewer systems and are responsible for 99 percent and 95 percent of total spending on these systems, respectively.[17] In San Diego, long-term financial challenges, including several years of limited market access and minimal debt issuance, have resulted in about $840 million of deferred maintenance and capital needs for streets, facilities, and storm water assets. While the City has not calculated deferred maintenance for water and sewer infrastructure nor reported unfunded needs for these assets, they are aged and deteriorating and have resulted in violations of the Clean Water Act and California Health and Safety Code. For example, EPA issued a finding of violation of the Clean Water Act in 2002, requiring reduction and elimination of sewage spills. On the water side, the California Department of Health Services' Drinking Water Field Operations Branch conducted a sanitary survey of the City's water system in 1993 and found numerous operational deficiencies, including an inadequate cross connection control program. As a result of these violations, the City is currently (1) operating under a Consent Decree that provides requirements and a schedule for replacing, rehabilitating, and cleaning sewer

[15] EPA, *Aging Water Infrastructure Research Program: Addressing the Challenge through Innovation* (Washington, D.C.: March 14, 2007).
[16] U.S. Government Accountability Office, *Physical Infrastructure: Challenges and Investment Options for the Nation's Infrastructure*, GAO-08-763T (Washington, D.C.: May 8, 2008), 3.
[17] Investments in infrastructure include the reinvestment and replacement of existing assets and investment in new assets.

pipes, among other things, and (2) completing capital improvements to water treatment plants and related assets based on a State of California Department of Health Services Compliance Order.[18] Other regulatory requirements for wastewater include compliance with the National Pollution Discharge Elimination System Permit for the Point Loma Wastewater Treatment Plant and the Ocean Pollution Reduction Act.[19]

Public Utilities Department

The City of San Diego's water and wastewater infrastructure assets are managed, operated, and maintained by the Public Utilities Department.[20] The Department is comprised of four branches that are funded by the Water Enterprise Fund and Sewer Enterprise Fund. See Exhibit 1. The Water Branch is responsible for the storage, treatment, and delivery of water, including nine reservoirs, three treatment plants, 49 water pump stations, and 3,190 miles of water transmission and distribution pipeline. The collection, treatment, and disposal of wastewater for the City is conducted by the Wastewater Branch, which operates four treatment plants, eight major pump stations, 75 smaller pump stations, and 3,146 miles of Municipal and Metropolitan sewer pipelines.

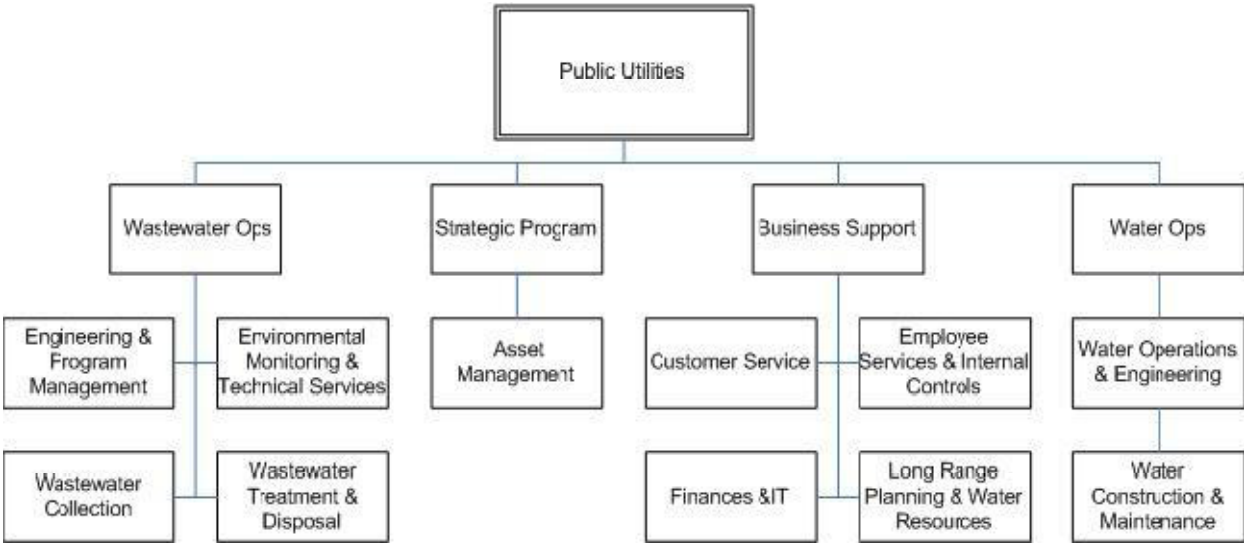
[18] Final Consent Decree in the matter of United States, et. al v. City of San Diego (San Diego, CA: July 28, 2007) and California Department of Health Services Compliance Order, Number 04-14-96CO-022, (Sacramento, CA: Jan. 17, 1997).

[19] In June 2010, the City's most recent request for a five-year NPDES permit to allow secondary treatment of discharges from the Point Loma Wastewater Treatment Plant was approved through July 31, 2015. Currently, San Diego is the only California city that has this exception—other cities have made changes to their systems to provide for advanced primary treatment discharges. The NPDES permit specifies a set of wastewater discharge requirements to ensure compliance with the terms of the Ocean Pollution Reduction Act. In particular, the mass emission rate of total suspended solids cannot exceed 15,000 metric tons per year.

[20] Water and wastewater functions, which were formerly operated by two different departments, were merged into the Public Utilities Department in fiscal year 2009.

Exhibit 1

Public Utilities Organizational Structure



Source: Public Utilities Department

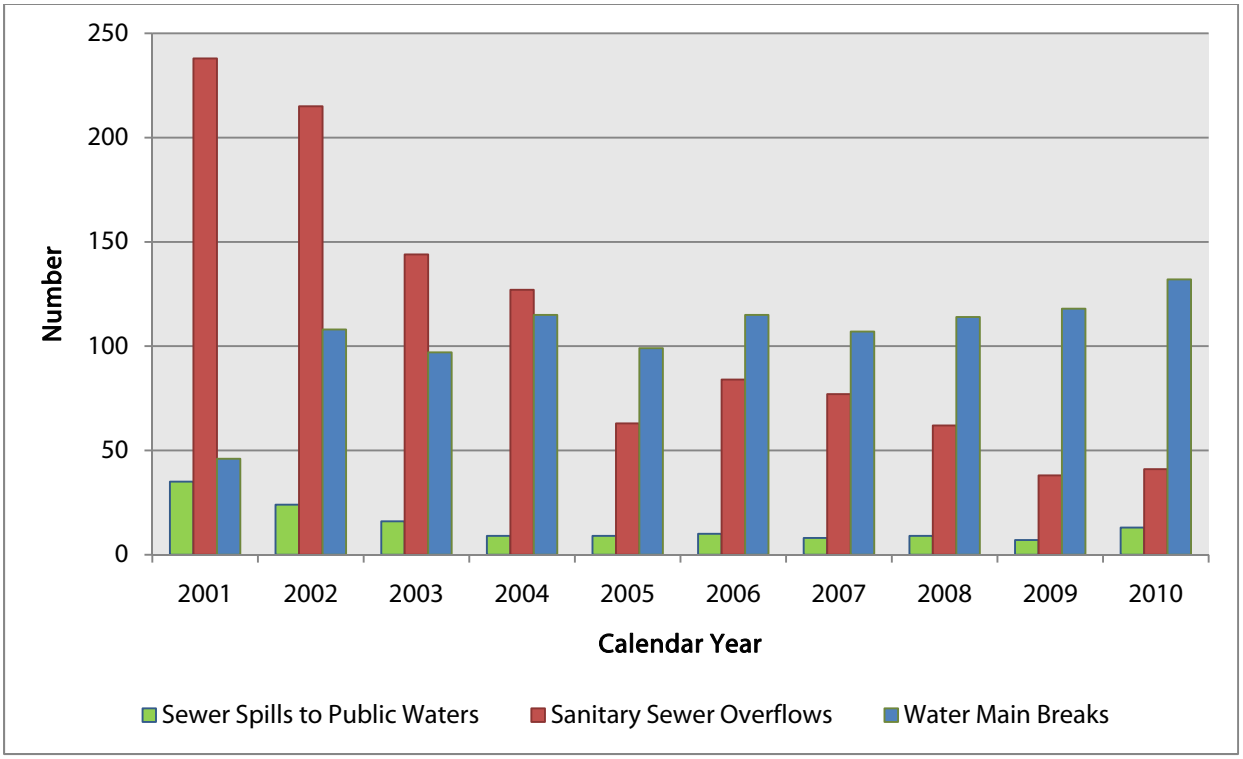
As is the case for many U.S. cities, San Diego's water and wastewater infrastructure is aging. For example, about 23 percent of water pipes are 50 years old or more. In addition, the wastewater treatment system was first installed at Point Loma in 1963. The rehabilitation, renewal and replacement of both water and wastewater pipelines is an ongoing process for the City.

Public Utilities has an aggressive program for cleaning sewer pipes and has reduced the number of sanitary sewer overflows from 238 in 2001 to 41 in 2010. See Exhibit 2. However, water main breaks have averaged about 105 per year since 2001 and increased to 132 in 2010 with about half of the breaks occurring in cast iron mains and the remaining half occurring in asbestos cement mains.[21]

[21] The City water system consists of 3,190 miles of pipelines; 3 percent or about 90 miles are cast iron and 68 percent or 2,100 miles are asbestos cement mains.

Exhibit 2

Number of Sewer Spills to Public Waters, Sanitary Sewer Overflows, and Water Main Breaks, Calendar Years 2001-2010



Source: OCA analysis of Public Utilities data.

San Diego's CIP

Like many cities, San Diego has a CIP for replacing deteriorating capital infrastructure. The City's CIP is implemented through an interrelationship of City departments, including seven service and nine client departments.[22] Service departments have various responsibilities for implementing the CIP, for example Public Works/Engineering is primarily responsible for managing CIP projects.[23] Client departments—such as Public Utilities—are generally those departments that will manage, operate, or maintain the future asset. Client departments are also responsible for identifying and prioritizing capital needs and

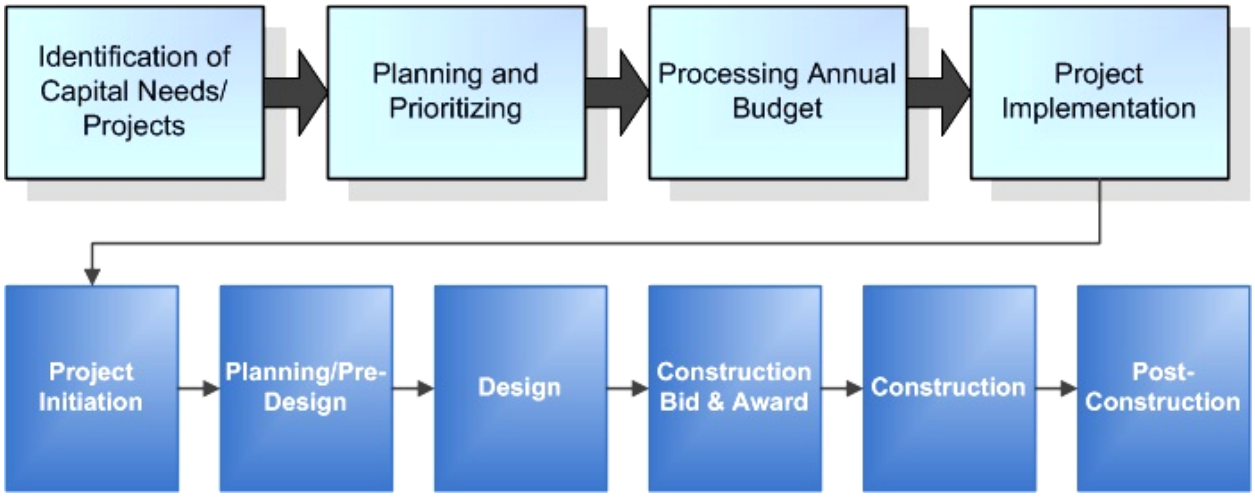
[22] For more information on the City's CIP, see OCA, *Capital Improvement Program: Better Planning and Oversight Are Needed to Effectively Identify Capital Infrastructure Needs and Manage Projects*, OCA-11-027 (San Diego, CA: June 29, 2011).

[23] Engineering and project management functions were centralized and standardized into Public Works/Engineering in fiscal year 2008 based on recommendations from the City's Business Process Reengineering Study for Engineering Services, and the City's engineering services went through organizational and procedural changes. City of San Diego, *Final Report on Engineering Services Business Process Reengineering* (San Diego, CA: April 26, 2007), 2.

identifying funding sources for their proposed CIP projects during the annual budget development process. For ease of understanding, we summarized the process from a client department perspective into four primary phases: Identification of Capital Needs, Planning and Prioritizing; Processing Annual CIP Budget; and Project Implementation for a Design-Bid-Build Contract. See Exhibit 3.

Exhibit 3

CIP Process



Source: OCA analysis of City documents and information obtained from City officials.

Public Utilities CIP

Public Utilities finances capital projects using the water and sewer enterprise funds, which are based on revenues generated by rates, fees, and charges; through federal and state grants and loans; and by issuing bonds. The Department develops a cost of service study every four to five years prior to seeking City Council approval for rate increases to finance its capital program. Although the City had limited access to public markets and minimal debt issuance between 2004 and 2008, the Department issued about $439 million in private notes for water and wastewater capital needs during this time period.[24] The Department's CIP budget has increased by $147 million or about 157 percent since fiscal year 2006, primarily due to federal and state requirements. See Exhibit 4. The Department's

[24] The City was unable to issue bonds in public markets from 2004 through 2008. Standard and Poor suspended its rating because it could not evaluate the City's credit due to delays in the release of audits and missing financial statements. Standard & Poor's, *RatingsDirect: San Diego, California Appropriations and General Obligation* (New York: NY: May 15, 2008), 8.

CIP budget for fiscal year 2011 is about $241 million or about 24 percent of its total budget, an increase of 12 percent since fiscal year 2006. See Appendix I for more information on Public Utilities' CIP budget.

Exhibit 4

Public Utilities CIP and Total Budgets, Fiscal Years 2006 and 2011
Millions of Dollars

	2006	2011	Dollar Change	Percent Change
Water CIP	57.3	105.7	48.4	84
Wastewater CIP	36.6	135.2	98.6	269
Total Public Utilities CIP Budget	93.9	240.9	147.0	157
Public Utilities Operating Budget	697.9	771	73.1	10
Total Public Utilities Budget	791.8	1,011.9	220.1	28
CIP as Percentage of Total Budget	12	24		

Source: OCA analysis of updated Public Utilities budget figures provided by Public Utilities officials.

Asset Management and Planning

Faced with the challenges of aging infrastructure, the lack of federal funding, and the desire to maintain affordable rates while meeting customer expectations, utility managers are looking for more effective ways to make decisions about capital improvements and infrastructure maintenance.[25] Given the magnitude of estimates for future capital needs, it is important for water and wastewater utilities to adopt a strategy for repairing and replacing key assets as cost-effectively as possible.[26] Comprehensive asset management is a best practice recommended by international and federal agencies and industry groups for the effective management of water and wastewater infrastructure.[27] These organizations advocate that it is essential to make state-of-the-practice asset management

[25] National Association of Clean Water Agencies, Association of Metropolitan Water Agencies, and the Water Environment Federation, *Implementing Asset Management: A Practical Guide* (Washington, D.C.: April 2007), 1.
[26] U.S. Government Accountability Office, *Water Infrastructure: Information on Financing, Capital Planning, and Privatization*, GAO-02-764 (Washington, D.C.: Aug. 16, 2002), 16.
[27] National Asset Management Steering Committee, *International Infrastructure Management Manual, Version 3.0* (Wellington, New Zealand: 2006), 1.2-1.5; U.S. Government Accountability Office, *Water Infrastructure: Comprehensive Asset management Has Potential to Help Utilities Better Identify Needs and Plan Future Investments*, GAO-04-461 (Washington, D.C.: March 19, 2004), 4; EPA, *Asset Management: A Best Practices Guide* (Washington, D.C.: April 2008), 1;Association of Metropolitan Sewerage Agencies, *Managing Public Infrastructure Assets to Minimize Cost and Maximize Performance* (Washington, D.C.: 2002), i.

concepts, tools, techniques, and technologies the norm for managing for cost effective performance.[28]

Asset management seeks to optimize a utility's expenditures by determining the most appropriate time to intervene in an asset's deterioration process and the most appropriate action—increased maintenance, rehabilitation, or replacement. In order to make sound decisions, officials need key data, including:

- desired levels of service;
- inventory of assets and their characteristics;
- physical condition of assets;
- performance level of assets; and
- total cost of ownership.[29]

The goal is to manage infrastructure assets so that the total cost of owning and operating them is minimized while service levels are maintained. Asset management is particularly relevant to the water utility industry, because water and wastewater systems are capital-intensive and have a sizeable investment in pipes and other assets with a relatively long service life. The renewal and replacement of the assets that make up our nation's water infrastructure is a constant and ongoing task. Water and wastewater utilities increasingly understand that preserving the life and function of infrastructure assets will help optimize operations and maintenance and more effectively identify capital needs. In the past, many utilities have limited their approach to the acquisition of software applications, such as computerized maintenance management systems and geographic information systems. However, the benefits can be greatly

[28] Under a Memorandum of Understanding between EPA and the Federal Highway Administration, the two agencies are working together to promote cross-sector asset management. U.S. Department of Transportation Federal Highway Administration and U.S. EPA, *Memorandum of Understanding: Infrastructure Asset Management Exchange* (Washington, D.C.: July 11, 2006), 3.

[29] National Association of Clean Water Agencies, Association of Metropolitan Water Agencies, and the Water Environment Federation, *Implementing Asset Management: A Practical Guide* (Washington, D.C.: April 2007), 11, and U.S. Government Accountability Office, *Water Infrastructure: Comprehensive Asset Management Has Potential to Help Utilities Better Identify Needs and Plan Future Investments*, GAO-04-461 (Washington, D.C.: March 19, 2004), 4.

enhanced if they are incorporated into a system-wide, integrated approach to asset management that includes considerations for risk, levels of service, life-cycle costing, and other important concepts.[30]

Various levels and types of planning are important for water and wastewater utilities to determine whether to rehabilitate, replace, install or construct new assets and to guide future capital infrastructure investments. For example:

- An asset management plan is a tactical plan, usually three to five years, for managing an organization's infrastructure and other assets to deliver an agreed standard of service. An asset management plan seeks to maximize efficient use of assets and help prioritize capital investment based on detailed knowledge of existing assets and current or forecasted needs.
- A capital improvement plan is a mid-range plan, usually four to ten years, which identifies capital projects and equipment purchases, provides a planning schedule, and identifies options for financing the plan. Essentially, the plan provides a link between a utility's long-range plan and annual CIP budget.
- A master plan is a comprehensive long-range plan, usually more than 10 years, which identifies and prioritizes needed capital projects over the long-term and serves as the source of projects for the shorter-term plan or budget.

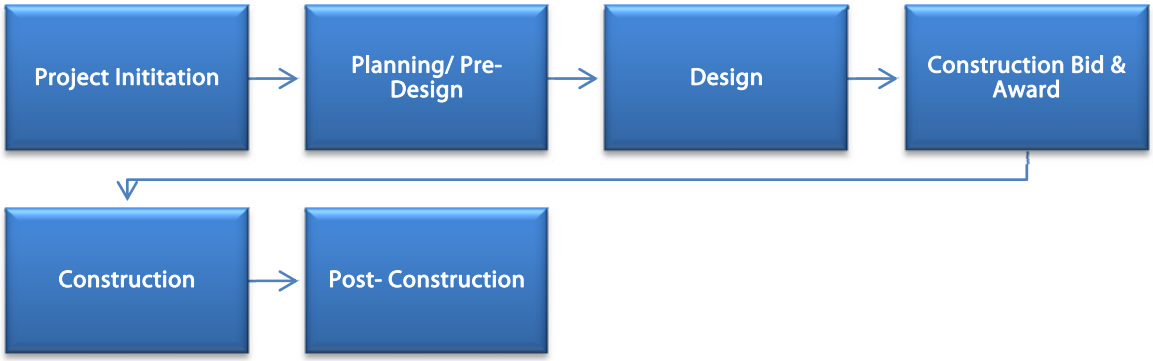
Project Management

Project management is the overall planning, coordination and control of a project from inception to completion aimed at meeting a client's requirements in order to produce a functionally and financially viable project that will be completed on time, within authorized cost, and to the required quality standards. The project manager or managers are responsible for every aspect of a project throughout its lifecycle from project intake to post-construction. See Exhibit 5.

[30] National Association of Clean Water Agencies, Association of Metropolitan Water Agencies, and the Water Environment Federation, *Implementing Asset Management: A Practical Guide* (Washington, D.C.: April 2007), 1.

Exhibit 5

Project Management Phases



Source: OCA analysis of Engineering/Public Works Standard Operating Procedures.

Within the City of San Diego, Public Works/Engineering is primarily responsible for managing CIP projects.[31] Based on recommendations from the City's Business Process Reengineering Study for Engineering Services, engineering and project management functions were restructured and consolidated into Public Works/Engineering in fiscal year 2008.[32] The City centralization of engineering and project management functions into Public Works/Engineering was intended to develop more streamlined and enhanced processes and structure.[33] In prior fiscal years, Public Works/Engineering managed group jobs, but other engineering functions were spread across multiple departments.[34] While most city departments' engineering staff were transferred to Public Works/Engineering, Public Utilities retained about 11 engineering staff in its Engineering and Program Management division. Officials from this division work with Public Works/Engineering to oversee the implementation of capital projects for water, wastewater, and reclaimed water infrastructure. In addition, the division provides engineering services, long-range master planning, development review,

[31] Public Works/Engineering was formerly called the Engineering & Capital Projects Department.
[32] City of San Diego, *Report to the City Council – Engineering Services Business Process Reengineering* (San Diego, CA: April 2007).
[33] The City's Business Office reports that the Business Process Reengineering resulted in 89.5 fewer positions, savings of about $6.9 million in fiscal year 2008, and anticipated annual savings of about $7.4 million starting in fiscal year 2009.
[34] Group jobs consist of the replacement of small diameter water and wastewater mains and are generally grouped geographically to minimize the impact on communities due to construction.

condition assessment, water and sewer modeling, planning and pre-design for infrastructure, energy management, environmental support, and facility information management for water and wastewater and the City's reclaimed water system.[35]

Public Works/Engineering charges client departments, like Public Utilities, project delivery costs for the project implementation services that it provides. Project delivery costs are defined as all Department and consultant costs associated with project planning, design, bid, award, construction management, and closeout activities, including overhead. The Comptroller's Office is responsible for calculating overhead rates for the City based on information from its financial system.

The City's Financial System

The City changed its financial system from AMRIS to SAP in fiscal year 2010 and implemented a new Human Capital Management system for labor charges in January 2010. These major changes have impacted the City's operations, including how to charge expenditures to CIP projects.

[35] Reclaimed or recycled non-potable water is wastewater that has been partially treated and is generally used for agricultural irrigation, landscaping, industrial, and other related uses.

Objectives, Scope, and Methodology

In accordance with the City Auditor's Fiscal Year 2011 Audit Work Plan and in response to a request from the Independent Rates Oversight Commission (IROC), we conducted a performance audit of the Public Utilities Department's Capital Improvement Program (CIP).[36] CIP projects are planned and initiated by Public Utilities and primarily implemented by the City's Public Works/Engineering Department. Our objectives for this audit were to determine the extent to which (1) Public Utilities is effectively managing assets and identifying capital renewal and replacement needs; (2) Public Utilities is effectively planning for capital infrastructure; (3) Public Utilities and Public Works/Engineering are effectively and efficiently managing CIP projects and charging appropriate accounts; and (4) Comptroller's Office is charging appropriate overhead rates. The four major findings in this report correspond to each of these objectives.

In conducting this review, we focused our scope on the Public Utilities Department's process for identifying and prioritizing capital needs and conducting planning for water and wastewater capital infrastructure. Our scope also included the City's processes for implementing CIP projects for the Public Utilities Department, including the roles and responsibilities of service departments, such as Public Works/Engineering. To determine the extent to which Public Utilities is effectively planning for capital improvement needs, we reviewed best practices for the management of infrastructure assets and long-term capital planning. We also reviewed Public Utilities' CIP and long-term plans for water and wastewater infrastructure capital

[36] During the April 12, 2010 Audit Committee meeting, the Committee proposed using $100,000 of Public Utilities' funds, which have been allocated on behalf of IROC, for OCA's budget. After conducting a survey and risk assessment of Public Utilities, OCA identified five key issues for potential audit. IROC selected the Capital Improvement Options relating to long term planning and efficiency and oversight of capital projects.

improvement and other departmental documents and conducted extensive interviews with Department officials to identify the process for managing assets and planning for capital projects.

To determine the extent to which Public Utilities is effectively managing assets and identifying capital needs, we reviewed the Department's goals and objectives for its Asset Management Program; state and federal regulatory requirements for water and wastewater systems; information systems supporting asset inventory, maintenance, and planning efforts; processes for conducting condition assessments of existing assets, identifying needs, developing and evaluating alternatives for capital improvement projects, and prioritizing these projects. We also reviewed best practices advocated by EPA, the National Asset Management Steering Committee, and others as referenced throughout the report for water and wastewater capital programming, decision making, and infrastructure management. In some cases, we used asset management principles recommended by transportation agencies, and we believe these to be appropriate because (1) the U.S. Department of Transportation and EPA are advocating cross sector asset management; (2) at a high level, many of these concepts are the same across sectors; and (3) many of the concepts recommended for transportation asset management are easier for the lay person to understand. We also interviewed the Public Utilities Asset Management Program Coordinator and engineering staff involved in asset management.

To determine the extent to which Public Utilities is effectively planning for capital needs, we reviewed the Department's processes for developing the capital improvement budget; determining CIP funding needs; developing financing strategies; and conducting public outreach. We also reviewed the Department's short-, mid-, and long-range planning efforts, and assessed CIP master plans against best practices provided by the Association of Municipal Sewerage Agencies and Government Finance Officers Association (GFOA), and others as referenced throughout the report.

To determine the extent to which the City is effectively and efficiently managing CIP projects, we reviewed engineering, construction, and best practices advocated by the Project Management Institute and others as referenced throughout the report. We also interviewed City departments that provide service-related functions for CIP project implementation and reviewed financial data for projects implemented between fiscal years 2000 and 2010 and completed between fiscal years 2006 and 2010 resulting in an analysis of 58 projects. Data for fiscal years 2010 and 2011 are unaudited numbers because the City had not completed its financial audits during the time the data was collected. In addition, we used the information for these projects to determine the percentage of total construction cost attributed to overhead.

To determine the extent to which projects are efficiently delivered and meeting performance goals, we reviewed a subset of 47 projects. We had to take out 11 Design-Build projects because we were not able to clearly determine what charges are associated with Design and Construction Management and which are associated with Construction. As a result, we used best practices for the Design-Build-Build project delivery method. We developed performance models using regression analysis comparing project delivery costs to total project costs. See Appendix II.

To determine the method used in determining overhead rates being billed to client departments by Public Works/Engineering, we interviewed (1) Comptroller's officials responsible for identifying the annual overhead rates for all City departments and the overhead rate for federal grants and (2) Public Works/Engineering officials responsible for data submitted to the annual California Multi-City Benchmarking Study.

Audit Results

Finding 1: Public Utilities Has Taken Steps to Implement Asset Management, but Efforts are Not Comprehensive

Major asset renewal and replacement is one of the primary drivers of an organization's capital improvement program. Comprehensive asset management is a recommended best practice for identifying needed maintenance and planning capital investments for asset renewal and replacement because it will provide key data on the inventory and condition of assets and an evaluation of alternatives to help officials make sound decisions. [37] Components of asset management include developing an extensive inventory of assets, evaluating a wide range of alternatives before choosing to construct a capital asset, and prioritizing projects based on pre-established criteria. See Exhibit 6. We assessed Public Utilities' efforts against these best practices and found that the Department has taken various steps toward implementing asset management, such as developing an inventory of water and wastewater assets and performing business case evaluations to assess alternatives to projects. However, these efforts are not comprehensive; for example, the Department has limited information on the condition of its water pipes and has not completed an asset management implementation plan. Improvement is needed to move the Department's program forward.

[37] U.S. Government Accountability Office, *Water Infrastructure: Comprehensive Asset Management Has Potential to Help Utilities Better Identify Needs and Plan Future Investments*, GAO-04-461 (Washington, D.C.: March 19, 2004), 4; National Asset Management Steering Committee, *International Infrastructure Management Manual, Version 3.0* (Wellington, New Zealand: 2006), 1.2-1.5; U.S. Government Accountability Office, *Executive Guide: Leading Practices in Capital Decision-Making*, GAO/AIMD-99-32 (Washington, D.C.: Dec. 1998), 46; U.S. Environmental Protection Agency, *Asset Management: A Best Practices Guide* (Washington, D.C.: April 2008), 1; U.S. Department of Transportation, *Asset Management Primer* (Washington, D.C.: Dec. 1999), 9.

Exhibit 6

Components of Asset Management

Component	Key Steps
Strategy, Mission, Goals, and Objectives	• Determine goals and desired customer level of service based on customer input. • Establish clear numeric goals for the target technical level of service or minimum compliance condition for individual assets. • Develop appropriate and measurable asset management goals and integrate them with other departmental goals.
Asset Inventory	• Collect and organize detailed information on assets. o Develop asset hierarchy o Include descriptive information about assets, including age, size, construction materials, location, installation date, condition, and performance in inventory database. o Map assets in Geographic Information System.
Asset Condition and Performance	• Assess the physical condition of assets, including updating the assessment based on best practices frequency recommendations. • Identify key information on operation, maintenance, and repair history and the asset's expected remaining useful life. • Assess information on the asset's value, including historical cost, depreciated value, and replacement cost. • Evaluate performance of assets and determine risk. • Identify existing and predicted problems/needs.
Alternatives Evaluation and Risk Assessment	• Consider and prioritize all management options to address existing or predicted needs. o Analyze life-cycle costs, including installation or construction cost, operating efficiency, and frequency of maintenance and repairs. o Evaluate investment alternatives. o Assess risk to determine criticality of assets to operations considering both the likelihood of asset failure and consequences—in terms of costs and impacts on desired level of service—if asset does fail.
Implementation Plan	• As part of a capital renewal strategy, establish repair, rehabilitation, and replacement schedule. • Prepare and implement an asset management implementation plan. • Develop master plans and capital improvement plans. o Prioritize projects. • Develop annual CIP budget. • Use a combination of short-, mid-, and long range initiatives to ensure that funds and staff availability are not barriers to successful implementation.
Performance Monitoring	• Develop appropriate targets and measures to meet identified objectives and service levels. • Monitor and report outcomes to customers and other stakeholders and solicit feedback.

Source: OCA analysis of asset management best practices and guidance provided by the National Asset Management Steering Committee , U.S. Government Accountability Office, EPA, Association of Metropolitan Sewerage Agencies, National Association of Clean Water Agencies, Association of Metropolitan Water Agencies, Water Environment Federation, and New Mexico Environmental Finance Center.

Public Utilities Has Established Broad Objectives for Asset Management, but it Lacks Targets for Acceptable Asset Condition Levels

Goals and performance indicators are the levers that drive the asset management decision-making framework, establishing investment levels that reflect service levels, and making resource commitments consistent with the perceived needs of the public and their ability to pay. Best practices recommend that organizations establish measurable goals and objectives and the desired level of service based on customer input.[38] In its 2006 Enterprise Asset Management Plan, the former Wastewater Department established potential customer levels of service and various one- and three-year goals for various aspects of asset management, such as implementing asset hierarchies for pipelines and pump stations. The Wastewater Department achieved some of these goals which are currently in place at Public Utilities, such as the use of Business Case Evaluations discussed later in this report.

However, we found that the Public Utilities Department has only established initial goals and objectives for comprehensive, Department-wide asset management in its Strategic Plan. See Exhibit 7. As part of an initiative for fiscal year 2011 to expand and optimize the Asset Management Program, the Department created quarterly milestones and deliverables, including defining a mission and objectives for the Asset Management Program. Public Utilities officials have not developed more comprehensive goals, because the Water and Wastewater Departments were recently consolidated in fiscal year 2010. They plan to complete an asset management plan that includes goals and objectives for the program by the end of fiscal year 2012. Without goals and objectives, the Department cannot establish direction for its asset management program or the ability to measure progress toward achievement.

[38] National Asset Management Steering Committee, *International Infrastructure Management Manual, Version 3.0* (Wellington, New Zealand: 2006), 3.3-3.4; Association of Metropolitan Sewerage Agencies, *Managing Public Infrastructure Assets to Minimize Cost and Maximize Performance* (Washington, D.C.: 2002), 39-43; U.S. Department of Transportation Federal Highway Administration, *Asset Management Primer,* (Washington, D.C.: Dec. 1999), 20 and U.S. Department of Transportation Federal Highway Administration, *Asset Management Overview*, FWHA-IF-08-008 (Washington, D.C.: Dec.2007), 13-14.

Exhibit 7

Public Utilities' Asset Management Goals, Fiscal Year 2012

A. *Quarter 1 – Assess*
   1. Identify and document the current baseline of condition assessment activities within the Department.

B. *Quarter 2 – Formalize*
   1. Complete a formal missions and functions agreement between the Asset Management Program and the Condition Assessment section of the Engineering and Program Management Division.

C. *Quarter 3 – Integrate*
   1. Develop a continual asset condition assessment methodology for use by field maintenance and engineering staff.
   2. Develop integrated information map for business areas impacted by SAP Enterprise Asset Management.

D. *Quarter 4 – Document*
   1. Finalize the Enterprise Asset Management Plan incorporating the Condition Assessment Program and its integration with the Asset Management Program.
   2. Develop preliminary process blueprints for SAP Enterprise Asset Management.

Source: Public Utilities Strategic Plan, Asset Management Program.

Department Has Not Established Target Level of Condition

Best practices recommend that departments develop clear, numeric goals for the level of condition it wants to achieve for its assets.[39] We found that the Department has not developed a target or minimum level of condition. According to officials, after assessing the condition of assets and its criticality—that is, consequences in terms of costs and impacts on the desired level of service if the asset does fail—they determine whether to repair, rehabilitate, or replace the asset. Officials told us that establishing a target or minimum level of condition would be challenging given the large variety of water and wastewater assets. In addition, they believe that all assets, particularly those for water distribution, must always be fully operational in order to avoid interruptions in service.

We agree that establishing a target level of condition is more complicated than, for example, setting targets for street conditions. In the water industry, the purpose of understanding

[39]National Asset Management Steering Committee, *International Infrastructure Management Manual, Version 3.0* (Wellington, New Zealand: 2006), 3.44-3.35; Association of Metropolitan Sewerage Agencies, *Managing Public Infrastructure Assets* (Washington, D.C.: February 2002), 71; and U.S. Department of Transportation Federal Highway Administration, *Beyond the Short Term: Transportation Asset management for Long-Term Sustainability, Accountability, and Performance*, FWHA-IF-10-009 (Washington, D.C.: May 27, 2010), 15-16.

an asset's condition is to identify its remaining life and determine a maintenance or replacement schedule before it reaches failure.[40] Therefore, assessments of criticality and risk of failure must also be considered when establishing targets for acceptable level of condition. Further, we understand that the Department is responsible for numerous water and wastewater assets and establishing a target level of condition for all of these may not be beneficial. Although we have not identified specific guidelines in the water industry for establishing target level of condition, we believe the Department should assess the potential benefits of establishing target level of condition for certain assets to (1) provide transparency over the condition of the water and wastewater systems, (2) establish a baseline against which progress can be measured, and (3) effectively support the need for capital improvements to ratepayers and other stakeholders.

Public Utilities Has Developed and Maintains Asset Inventory in Geographic Information Systems Databases, but Does Not Receive Information on Completed Projects in a Timely Manner

Collecting and organizing basic information about capital assets helps managers identify their infrastructure needs and make informed decisions about the assets. Leading organizations have an extensive inventory of assets that should include descriptive information about the assets including age, size, construction materials, location, and installation date.[41] We found that the Public Utilities Department maintains asset information in several databases, including a comprehensive geographic information system database—Systems Planning Locator Application (SPLASH). See Exhibit 8. SPLASH includes information on the type of asset, age, material, and location. Public Utilities officials manually map updated information after it is provided by two primary sources: (1) Public Works/Engineering provides documents for public projects completed by the City and (2) Development Services Department provides documents for projects completed by residents or private developers.[42] However, Public Utilities

[40] EPA, *Issue Paper: Distribution System Inventory, Integrity, and Water Quality* (Washington, D.C.: Jan. 2007), 17.
[41] U.S. Government Accountability Office, *Executive Guide: Leading Practices in Capital Decision-Making*, GAO/AIMD-99-32 (Washington, D.C.: Dec. 1998), 17 and *Water Infrastructure: Comprehensive Asset Management Has Potential to Help Utilities Better Identify Needs and Plan Future Investments*, GAO-04-461 (Washington, D.C.: March 19, 2004), 19.
[42] Public Works/Engineering also makes CIP project information available to Public Utilities' staff on a SharePoint site. Public Utilities told us that this site is helpful but also has issues with accuracy.

officials told us that Public Works/Engineering and Development Service are not providing the information in a timely manner and, in some cases, are not providing this information at all and Public Utilities must obtain these from other sources, such as operating and maintenance crews. For example, the Department has identified a subdivision with recently completed pipes in the ground, but has not received the project drawings.

Exhibit 8

Public Utilities Inventory Databases

System	User(s)	Purpose
Enterprise Maintenance Planning and Control (EMPAC)	Wastewater Treatment and Disposal; Wastewater Collection Division, Pump Section	Work order and asset management system for sewer treatment plants and pump stations
Planner/Scheduler Tools (PSTools)	Wastewater Collection Division, Main Cleaning Section	Work order tracking and preventive maintenance scheduling
Sewer History Activities Repository and Query (SHARQ)	Wastewater Collection Division, Engineering and Program Management Division	Repository for Closed Circuit Television Camera condition assessment videos
Sewer Water Infrastructure Management (SWIM)	Water Branch; Wastewater Collection Division	Work order and preventive maintenance system
System Planning Locator Application (SPLASH)	City departments and private entities and individuals	Infrastructure mapping application for water, wastewater, and reclaimed water assets

Source: OCA analysis of Public Utilities database information.

The lack of up to date information in SPLASH is problematic for maintenance crews and other Department staff who rely on the information to perform their work. For example, crews that clean sewer pipes use specific equipment depending on the type of material of the pipe and have been unprepared when SPLASH had not been updated to reflect new pipes. Additionally, private entities, such as cable and electric companies, developers, and residents rely on maps generated from SPLASH when excavating and will risk damaging pipes if the information is inaccurate.

Development Services is not providing timely project updates because there is no formal requirement for providing the information within a specified timeframe. A Development Services official told us that the Department has developed an as-built close out process that addresses the concerns we

raised, but first needs to complete its current effort to implement its Project Tracking System for inspections of grading and right of way permits. This will allow Public Utilities to monitor progress electronically, and is expected to be completed later this fiscal year. According to Development Service officials, the Department is also implementing an imaging system to replace the current microfiche archival system for engineering records which provides for the electronic distribution of as-built plans and access to an electronic index of drawings.

While the Service Level Agreement between Public Works/Engineering and Public Utilities requires that project information be provided within six months of completion, the process lacks a control to ensure that Public Works/Engineering is complying with this requirement. In addition, when conducting group jobs that may include many segments of pipes and take several years to complete, Public Works/Engineering does not provide completed information until all segments are completed. By not updating SPLASH in a timely manner, the Department increases the risk that maintenance crews and other users of SPLASH maps will experience unanticipated delays or accidentally damage underground piping during construction.

Department Has Developed Asset Hierarchy

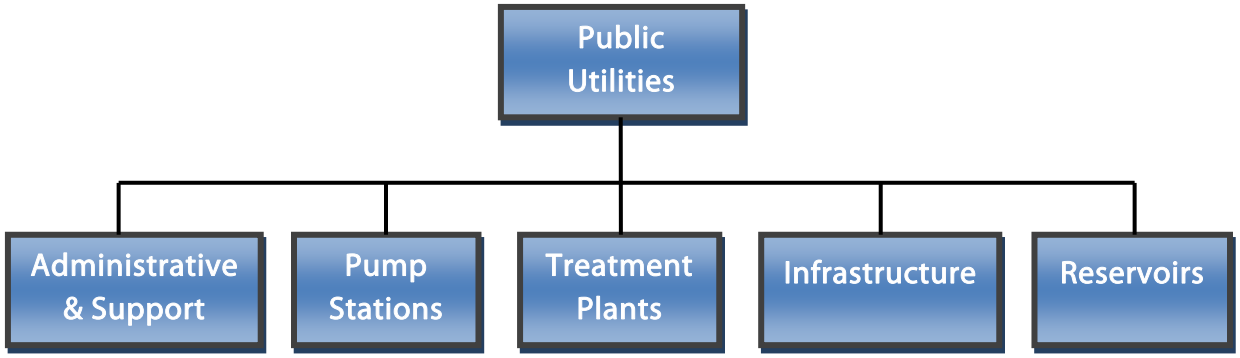
Best practices recommend the establishment of an asset hierarchy as an important step for an asset inventory because it provides a structured approach to organizing assets and a framework to uniformly manage, track and report assets across multiple departments, work groups, and their respective operations and management systems.[43] Development of an accurate asset hierarchy is the first step to organizing data for utilization. A team from the former water and wastewater departments worked together to develop asset hierarchies beginning in 2003 to establish standards in facilities, treatment plants, pump stations, pipelines, and water reservoirs. The broadest level of classification for both water and wastewater assets at Public Utilities is the facility type. See Exhibit 9. In 2005, a new version of the wastewater's operations and

[43] Association of Metropolitan Sewerage Agencies, *Managing Public Infrastructure Assets to Minimize Cost and Maximize Performance* (Washington, D.C.: February 2002), 59-61.

maintenance division's Enterprise Maintenance Planning and Control database was implemented establishing the hierarchy and standards in the system.

Exhibit 9

Asset Hierarchy – Major Public Utilities Facility Types



Source: OCA analysis of Water and Wastewater Asset Hierarchy Program Development, Version 4.0.

Department officials developed asset hierarchies, because previously (1) silos of information were available for various functions but needed the perspective of the life cycle of assets; (2) numbering systems varied from function to function; (3) life cycle cost information was lacking; and (4) consistent naming and numbering was lacking. The asset hierarchy is a key element of the City's asset management program and information management systems that increases the potential to integrate the different information systems and create more efficient information linkages.[44]

[44] The City has an Enterprise Asset Management Steering Committee—comprised of asset managers from 16 City departments—that has recently taken steps toward implementing a Citywide asset management framework. OCA, *Capital Improvement Program: Better Planning and Oversight Are Needed to Effectively Identify Capital Infrastructure Needs and Manage Projects*, OCA-11-027 (San Diego, CA: June 29, 2011), 51.

Public Utilities Lacks Information on the Condition of Water Mains, and Has Not Assessed the Condition of Systems Supporting Asset Management

Public Utilities Has Assessed Physical Condition of Many Above-Ground Assets, but Information on Condition of Water Transmission Lines Is Limited

As soon as an asset is put into place, it begins to deteriorate at a rate dependent on local environmental conditions, operating context, and maintenance strategy. By understanding the condition of assets, utilities can assess asset value and better understand remaining useful life which leads to more accurate forecast for the timing of replacement and proactive budgeting for maintenance, rehabilitation, renewal, and replacement.[45] Optimally, utilities would assess the physical condition of assets, but in cases where underground assets are difficult to access this may be cost prohibitive and officials rely instead on general indicators such as age, size, type of material, and failure history.[46]

Assessing the physical condition of many water and wastewater assets is a recommended industry practice for asset management.[47] In addition, state and federal requirements direct physical condition assessments for specific assets, such as water and wastewater facilities and sewer pipes.[48] We found that since fiscal year 2005, Public Utilities has assessed the condition of many of its above-ground water and wastewater assets, including 100 percent of water treatment plants to satisfy the California Department of Public Health Compliance Order requirements. See Exhibit 10. In conjunction with the

[45] Urquhart, T. "Incorporating Condition Assessment into a Comprehensive Asset Management Program" (Water Environment Foundation: 2006), 4198.
[46] EPA, *Distribution System Inventory, Integrity and Water Quality* (Washington, D.C.: Jan. 2007), 17; and Urquhart, T. "Incorporating Condition Assessment into a Comprehensive Asset Management Program" (Water Environment Foundation: 2006), 4202, 4198, and 4201.
[47] EPA, *Distribution System Inventory, Integrity and Water Quality* (Washington, D.C.: Jan. 2007), 17, and Association of Metropolitan Sewerage National Association of Clean Water Agencies, Association of Metropolitan Water Agencies, and the Water Environment Federation, *Implementing Asset Management: A Practical Guide* (Washington, D.C.: April 2007), 44.
[48] The Consent Decree requires that condition assessments be regularly conducted on wastewater facilities and sewer pipes. Final Consent Decree in the matter of United States, et. al v. City of San Diego (San Diego, CA: July 28, 2007), 18.

Department of Public Health, the Department also conducts annual sanitary surveys of the three water treatment plants, potable pump stations and reservoirs. On the wastewater side, the Department has assessed the condition of 100 percent of both small pump stations and ocean outfalls.

Exhibit 10

Physical Condition Assessments of Major Public Utilities Assets, 2005-2011

Asset Category		Total Asset	Amount Assessed	Percentage Assessed
Wastewater	Large Pump Stations	8	2	25
	Small Pump Stations	75	75	100
	Ocean Outfalls	2	2	100
	Pipeline	3,000 miles	1,610 miles	54
	Treatment Facilities	4	3	75
Water	Dams[a]	11	11	100
	Water Reservoirs[b c]	27	11	41
	Water Pump Stations[c]	46	24	52
	Transmission Pipeline	505 miles	5.5 miles	1
	Distribution Pipeline	2,958 miles	0[d]	0[d]
	Reclaimed Water Pipes	83 miles	0	0
	Treatment Facilities	3	3	100

Source: OCA analysis of Public Utilities' condition assessments.

a The City assesses raw water reservoirs/lakes as part of dams.

b Includes both potable and reclaimed water reservoirs.

c In addition to condition assessments performed by the Department, annual assessments are conducted annually in conjunction with the California Department of Public Health for all facilities as part of the Sanitary Survey.

d Public Utilities does not conduct physical condition assessments of water distribution mains due to the low consequence of failure and high cost of assessing small lines. However, as part of its cast iron replacement program, Public Works/Engineering assesses the condition of cast iron distribution lines by assessing age, diameter, material, and break history, which is included in the SPLASH database, to identify and prioritize pipes to be replaced.

Agencies determine whether to conduct a physical condition assessment for an asset depending on the risk of asset failure, consequence or impact on established levels of service, the likelihood or possibility of asset failures, and the cost. According to EPA, ruptures to large transmission mains can

cause significant damage and disruption and service outage, and this justifies the associated cost of conducting a physical assessment.[49] We found that Public Utilities has only assessed 5.5 of 505 miles or about one percent of its water transmission pipes. The Department has not sufficiently assessed the condition of water transmission lines for two reasons. First, these underground assets require excavation to gain access and are pressurized and cannot be inspected without an interruption of service. Turning off a water main to conduct an inspection requires careful planning, because it can result in degradation of water quality or cause pressure changes in the system and lead to pipe bursts or valve damage. Second, due to the challenges associated with water transmission line inspections, they generally require hiring a contractor with specialized equipment which is very costly, even with newer technologies. For example, the Department contracted for the condition assessment of five pipelines with an average cost of $1.9 million per assessment. In contrast, the Department has assessed about 54 percent of its sewer pipelines since these can be accessed through manholes and inspected visually or by using closed circuit television cameras without any disruptions in service, are generally conducted by staff in-house, and are less costly.

We also found that the Department does not physically assess the condition of water distribution mains. Because of the high costs associated with the physical assessment of smaller pipes and the difficulty in predicting specific failures on hundreds of miles of individual small lines, it is generally considered to be more cost-effective to simply fix lines when they break.[50] Officials told us that physical assessment is cost prohibitive for distribution lines. Further, they noted that cast iron mains, which have been responsible for a disproportionate share of breaks, have reached the end of their service life and are already being replaced.[51] To prioritize cast iron pipes for replacement, Public Works/Engineering is using general

[49] EPA, *State of Technology Review Report: Condition Assessment of Ferrous Water Transmission and Distribution Systems* (Washington, D.C.: June 2009), xii; and EPA, *Distribution System Inventory, Integrity, and Water Quality* (Washington, D.C.: Jan. 2007), 18.
[50] EPA, *Distribution System Inventory, Integrity, and Water Quality* (Washington, D.C.: Jan. 2007), 17.
[51] The City has about 165 miles of cast iron pipes which make up about four percent of the total water mains, but cast irons pipes account for 50 percent of breaks. The remaining breaks are from asbestos concrete mains.

indicators—pipe material, diameter, age, and break or leak history—from Public Utilities' SPLASH system to assess pipe condition.

The Department expects to complete cast iron replacements in the next five years and is looking forward to the next oldest pipes in the system—over 2,000 miles of asbestos concrete mains. While SPLASH contains general indicators on asbestos concrete pipes, this has not been assessed and more information may be needed to help officials effectively prioritize the replacement of such a large number of pipes, especially if only a relatively small number of miles can be replaced each year. An official told us that the Department is developing a priority/ranking tool to identify high priority areas. We believe this provides a good opportunity for officials to reassess the most cost effective method for identifying and prioritizing asbestos concrete pipes. For example, software tools can help to predict the condition of assets, evaluate risk, and assist in prioritization and investment decisions. By not fully assessing the conditions of its assets, the Department will not have information on pipes that are at high risk for failure and cannot make informed decisions regarding capital needs for these assets. Unplanned failures usually incur additional costs and can lead to reactive and unplanned replacement, which is often the most expensive option. Further, the consequences of water main pipe failures are high, as these often involve damage to private property, result in claims, and can cause the loss of thousands of gallons of water.

Public Utilities has not Assessed the Condition of Information Systems Supporting Asset Management, but Plans to Replace these Systems with SAP Enterprise Asset Management

Based on best practices, managers should ensure that information collected within an organization is consistent and organized so that it is accessible to the people who need it. Among other things, the databases should be fully integrated; for example, financial and engineering data should be compatible and ideally each asset should have a unique identifier that is used throughout the organization.[52] In addition, the Wastewater Enterprise Asset Management Plan

[52] U.S. Government Accountability Office, *Water Infrastructure: Comprehensive Asset Management Has Potential to Help Utilities Better Identify Needs and Plan Future Investments*, GAO-04-461 (Washington, D.C.: March 19, 2004), 20; and National Association of Clean Water Agencies, Association of Metropolitan Water Agencies, Water Environment Federation, *Implementing Asset Management: A Practical Guide* (Washington, D.C.: 2007), 53.

indicates the need to link data for acquisition, utilization, financial reporting, and disposal as well as to link with geospatial information systems to ensure that information is updated, such as following condition assessments.[53] However, we found that the Department has not conducted a formal assessment of the 10 systems supporting asset management to determine the feasibility of consolidating, replacing, upgrading, or integrating systems. According to officials, Public Utilities inherited legacy systems used by the former water and wastewater departments which had been developed over the years to meet the needs of specific functional areas. See Exhibit 11.

Exhibit 11

Public Utilities Asset Management Information Systems

	System	User(s)	Purpose
Primary Maintenance Management System	Enterprise Maintenance Planning and Control (EMPAC)	Wastewater Treatment and Disposal; Wastewater Collection Division, Pump Section	Work order and asset management system for sewer treatment plants and pump stations
	Planner/Scheduler Tools (PSTools)	Wastewater Collection Division, Main Cleaning Section	Work order tracking and preventive maintenance scheduling
	Sewer Water Infrastructure Management (SWIM)	Water Branch; Wastewater Collection Division	Work order and preventive maintenance system
Other Asset Management Systems	Capital Asset Reporting Look Ahead (CARLA)	Water Branch	Asset and capital forecasting and planning application
	Construction Scheduling Tools (CSTools)	Wastewater Collection Division, Construction Section	Construction scheduling
	Sewer History Activities Repository and Query (SHARQ)	Wastewater Collection Division	Repository for Closed Circuit Television Camera condition assessment videos
	System Planning Locator Application (SPLASH)	City departments and private entities and individuals	Infrastructure mapping application for all water, wastewater, and recycled water assets
	Totally Integrated Data Enterprise System (TIDES)	Department wide	Repository of data stores for water and wastewater systems.
	Tool Room Inventory Management (TRIM)	Water Branch; Wastewater Collection Division	Tracks and monitors tool usage and maintenance.

Source: OCA analysis of Public Utilities documents.

Department officials told us that they integrated their systems, for example SPLASH and SWIM, where technically and/or financially feasible, but integration of the legacy systems was not always possible or beneficial. Public Utilities did not

[53] Metropolitan Wastewater Department, *Enterprise Asset Management Plan*, Version 1.1 (San Diego, CA: June 2006), 18.

conduct a formal assessment of the systems supporting asset management because they are planning to implement an Enterprise Asset Management (EAM) system to replace them. EAM systems are maintenance management systems which provide foundational information and a framework to manage asset information from age and type of material to remaining expected life and maintenance planning. Although officials believe asset management to be important, they told us they had to first focus on the implementation of SAP Customer Care Solutions module to replace the Department's outdated billing system.[54] This delayed their selection and implementation of an EAM module, because large-scale information technology implementations are costly and must be spread out so as not to impact Department operations.

The Department's Executive Team recently made the formal decision to implement the EAM module for the City's financial system—SAP. SAP EAM will replace the Department's three primary maintenance management systems—SWIM, EMPAC, and PS Tools—as well as provide side applications for the remaining six systems many of which are currently operating in silos. Officials told us that SAP EAM will address the deficiencies of the current systems, especially considering that they are reaching the end of their lifecycles with some systems lacking vendor support. Further, SAP EAM should provide core foundational information on Department-wide assets so officials use these to make sound decisions on cost-effective maintenance, renewal, and replacement.

According to a Public Utilities official, SAP will integrate with City systems, such as fixed assets for capital valuation and the EAM system currently being used by the Transportation and Storm Water Department. Although SAP EAM has certain functionality out of the box, Public Utilities is more asset intensive than other City departments and will need to expand the module to address its specific needs. The Executive Team is planning to seek approval from the Department's oversight committees and the City Council for a budget of $17.4 million for implementing SAP EAM over the next three years and

[54] SAP Customer Care Solutions provides a Citywide billing system and replaced Public Utilities' legacy system, Customer Information System.

should be fully implemented by the end of fiscal year 2015. According to a Public Utilities official, the first step will be to bring in subject matter experts to help the Department define what module and functionality is needed from SAP so that specific requirements are fully understood up front. Without fully justifying the Department's need for the SAP EAM, the Department will not be able to move forward and will not gain the benefits and efficiencies that will result from implementation.

Once implemented, officials told us that Public Utilities' SAP EAM system will potentially provide benefits to other departments in the City. As the Enterprise Resource Planning Department moved forward to merge with the existing EAM system, which the Transportation and Storm Water Department currently uses, officials should coordinate efforts and fully assess the best configuration for these systems to derive optimal benefits.

Public Utilities Uses Abstracts and Full Business Case Evaluations to Evaluate Alternatives, but Full Evaluations Are Only Performed for About 31 Percent of Projects

Needs assessments should not be based solely on the condition of existing infrastructure but also on the desired outcome and the costs and benefits of alternative approaches.[55] Leading organizations conduct analyses and consider a wide range of alternatives to satisfy their needs, including noncapital alternatives before choosing to purchase or construct a capital asset.[56] Best practices recommend that managers use life-cycle cost analysis to evaluate investment alternatives, not just to compare the initial cost of a project, but also installation costs, operating efficiency, and frequency of repairs. Managers should also use risk assessments to determine how critical assets are for their operations—such as considering the likelihood that the asset will fail and the cost and impact on the organization's desired level of service—to

[55] U.S. Government Accountability Office, *U.S. Infrastructure: Funding Trends and Federal Agencies' Investment Estimates*, GAO-01-986T (Washington, D.C.: July 23, 2001), 16; Center for Strategic & International Studies, *Public Works, Public Wealth: New Directions for America's Infrastructure* (Washington, D.C.: Nov. 2005), 6; and The Brookings Institution, *America's Infrastructure: Ramping Up or Crashing Down* (Washington, D.C.: Oct. 10, 2007), 5.

[56] U.S. Government Accountability Office, *Executive Guide: Leading Practices in Capital Decision-Making*, GAO/AIMD-99-32 (Washington, D.C.: Dec. 1998), 28.

set priorities and target resources.[57]

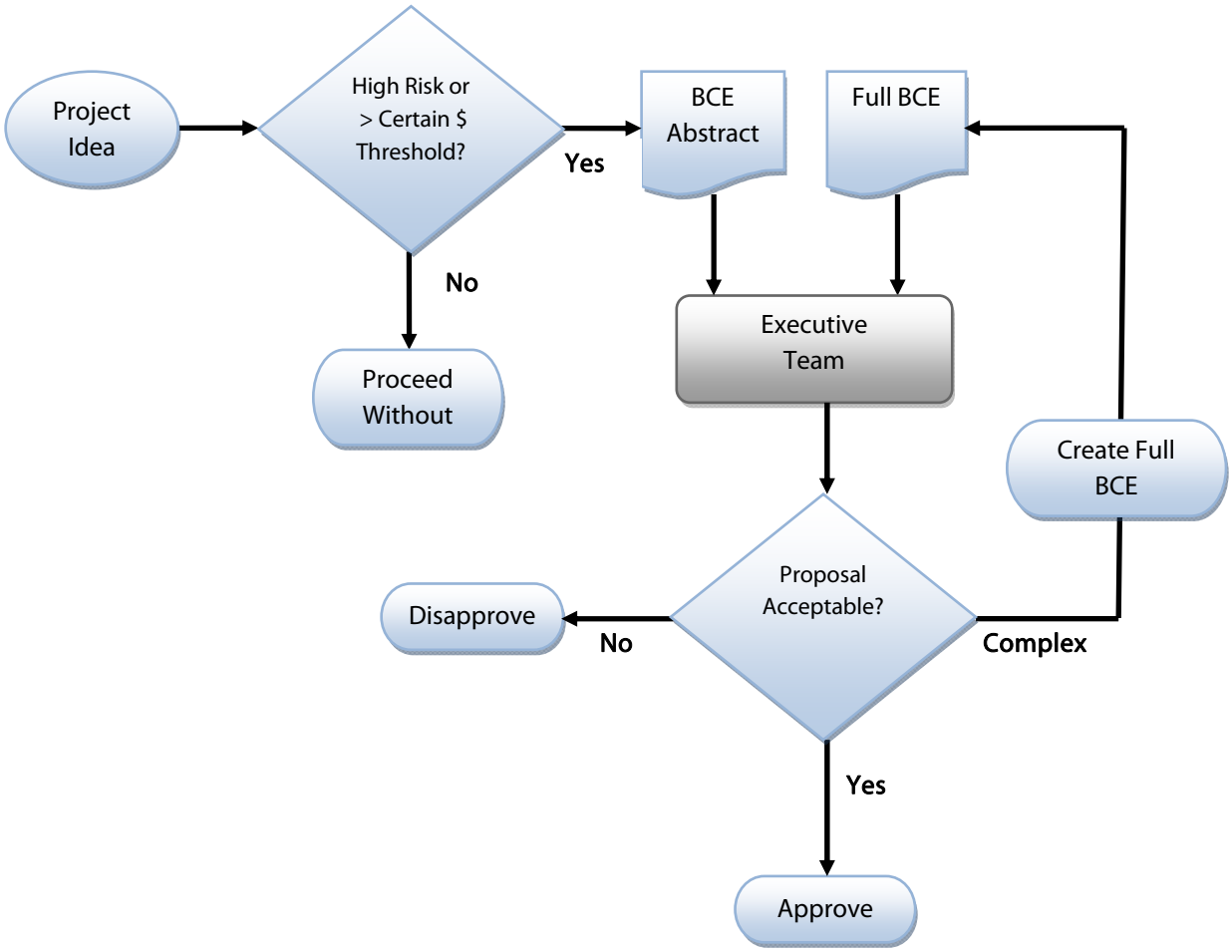
We found that Public Utilities uses Business Case Evaluations (BCE) for capital needs to assess project alternatives and define the most effective project.[58] See Exhibit 12. The Public Utilities Department requires that staff develop BCE abstracts for all projects with an initial cost estimate that exceeds certain threshold—previously $50,000 for all Wastewater projects, $100,000 for Water Operations & Maintenance projects, and $500,000 for Water CIP projects. The Department has drafted a new Department Instruction requiring BCEs for all water and wastewater projects over $50,000. The Department only requires full BCEs when:

- complexities, risks, impacts on the overall system, or other factors indicate the need for detailed analysis; or
- after reviewing a BCE abstract, the Executive Team determines that a proposal requires additional analysis.[59]

[57] U.S. Government Accountability Office, *Water Infrastructure: Comprehensive Asset Management Has Potential to Help Utilities Better Identify Needs and Plan Future Investments*, GAO-04-461 (Washington, D.C.: March 19, 2004), 19-20.
[58] City of San Diego Metropolitan Wastewater and Water Departments, *Business Case Evaluation Handbook* (San Diego, CA: Feb. 2006), 78.
[59] The former Wastewater Department established an Asset Management Executive Committee includes Deputy and Assistant Directors and was established to manage the business case evaluation process for proposed projects. The Asset Management Technical Committee includes experts such as engineers and financial experts who provide recommendations regarding asset management matters.

Exhibit 12

Process for Preparing and Approving BCEs



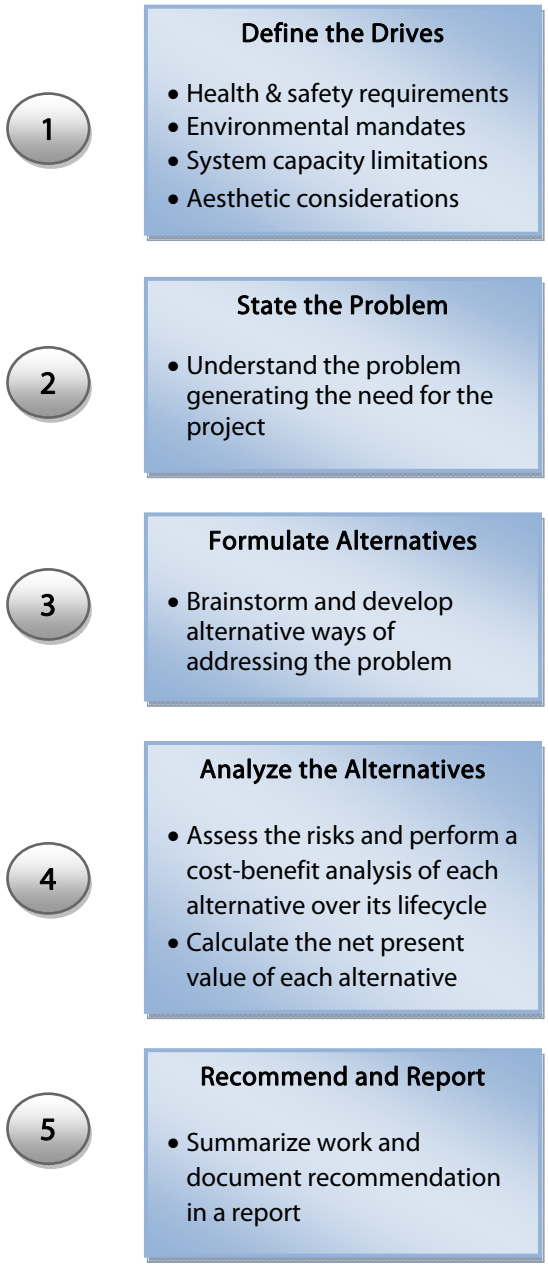
Source: OCA analysis of information included in the Department Instruction for Business Case Evaluations.

Full BCEs Are In Line with Best Practices, but Are Prepared for Only 31 Percent of Projects

Based on our review of full BCEs, we found that these generally include lifecycle cost analysis and a discussion of risks, although the level of depth and number of alternatives assessed varied based on the project. Further, the BCEs assessed alternatives based on cost- and non-cost factors such as operability and reliability issues and compatibility with regulations and requirements. See Exhibit 13. Developing BCEs is highly technical and quantitative and requires an assessment of financial, environmental, and social impacts. We found it commendable that the Department has (1) provided training for staff on BCE preparation and (2) established internal controls over the process, including requiring that the project sponsor and Executive Team review and approve BCEs.

Exhibit 13

Key Steps in Preparing a Business Case Evaluation



Source: OCA analysis of information included in the Department's *Business Case Evaluation Handbook*.

Although the Department's process for conducting full BCEs follows best practices, we found that staff conducted a full BCE for only about 31 percent or 19 of 62 BCE abstracts for projects from fiscal year 2005 through 2011. Officials told us that complex and expensive projects require full BCEs, but routine

and recurring projects, such as pipeline replacement, do not warrant the time and resources needed to complete a full BCE. Further, they stated that abstracts serve as an initial step to determine whether additional resources and time are justified to develop a more complete BCE. Officials also told us that alternatives and life-cycle costs are incorporated in planning studies and 10 percent designs.

Based on our review of BCE abstracts, we found that they lacked details, especially relating to financial costs. For example, an abstract for the replacement of pumps for a sewer pump station identified five project alternatives, but only listed the total initial cost estimate for each alternative. In addition, an abstract addressing problems in the chemical storage and delivery systems at the Metropolitan Biosolids Plant identified three alternatives; two of these included cost estimates of $2.5 million and $3.5 million, respectively. While the abstract lacked support for those amounts, officials told us that cost estimate details are maintained in the project proponent's file for future reference and the recommended alternative in these abstracts was approved without the completion of a full BCE. While full BCEs may require a significant amount of time and effort, the ultimate purpose is to support a solid business decision on a proposed project. Without consistently and thoroughly conducting business evaluations for all appropriate projects, the Department cannot support rational decisions that minimize risks and provide benefits to the ratepayer.

Public Utilities Uses Council Policy 800-14 and Department-Specific Ranking Factors to Prioritize Projects

Public Utilities Faces Difficulties in Prioritizing Projects Using Council Policy 800-14

Because utilities need to schedule rehabilitation and replacement programs over manageable timeframes, establishing priorities is a vital task.[60] Leading organizations establish a framework for reviewing and approving capital decisions based on pre-established criteria and a relative

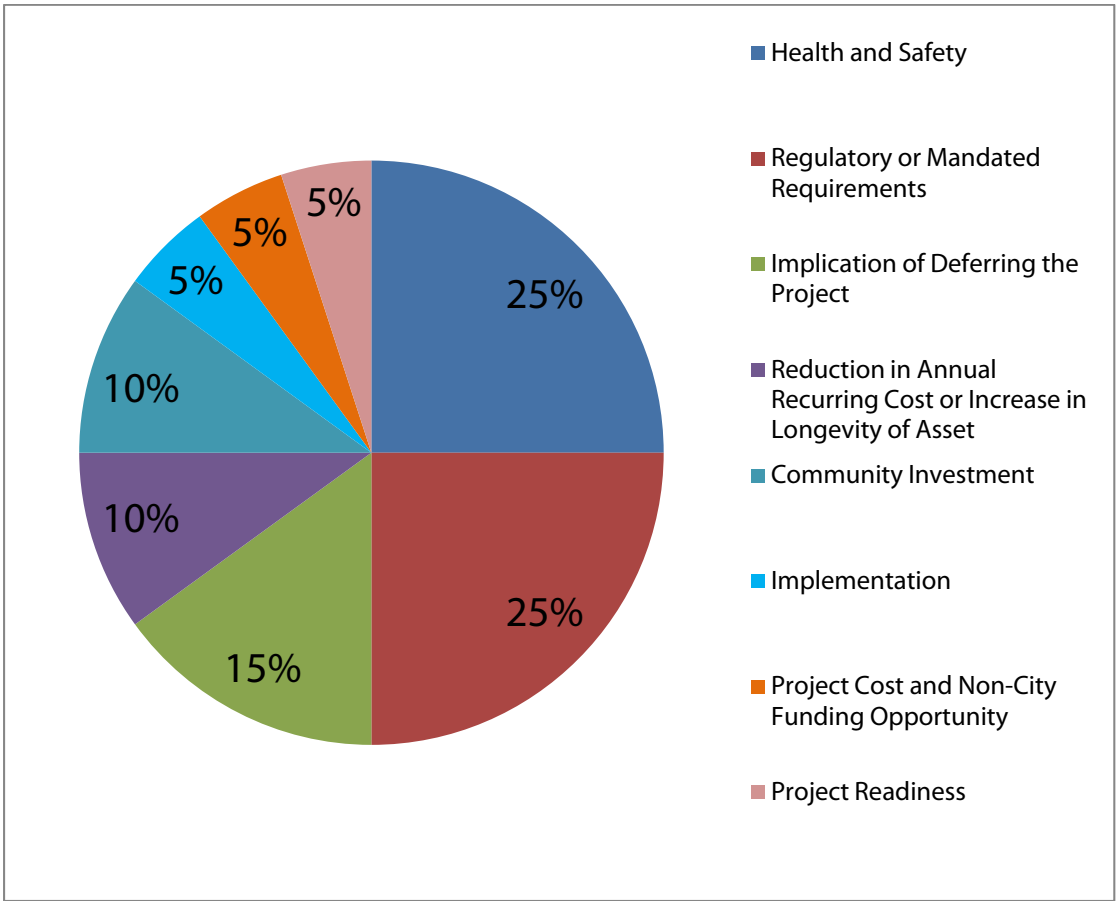
[60] American Water Works Research Foundation, *Advancing the Science of Water: AWWARF and Infrastructure Replacement Needs* (Denver, CO: 2007), 6.

ranking of investment proposals and determine the right mix of projects by reviewing investment proposals and existing capital assets as a portfolio.[61] We found that water and wastewater have been using established prioritization systems for ten years. The remainder of the City lacked effective prioritization until fiscal year 2008 when (1) Council Policy 800-14 was revised to establish guidelines for priority ranking of all CIP projects[62] and (2) the City established the CIP Review and Advisory Committee (CIPRAC) to provide a cross-functional review of the prioritization process to ensure guidelines were followed. The purpose of the prioritization policy is to establish an objective process for ranking projects so that officials have a basis for selection. CIPRAC developed a tool for scoring projects based upon the narrative criteria contained in Council Policy 800-14.[63] See Exhibit 14 and Appendix III for more information on the priority ranking scale.

[61] U.S. Government Accountability Office, *Executive Guide: Leading Practices in Capital Decision-Making*, GAO/AIMD-99-32 (Washington, D.C.: Dec. 1998), 32 and 40.
[62] Council Policy 800-14 was adopted for transportation projects in fiscal year 2007 and revised in fiscal year 2008 to incorporate the prioritization of all CIP projects. The scoring system for transportation projects includes additional ranking factors, such as capacity and service and revitalization.
[63] The tool was initially created to prioritize transportation projects and was expanded by CIPRAC in 2011 for application to other types of projects.

Exhibit 14

Priority Ranking Factors for CIP Projects



Source: OCA analysis of Council Policy 800-14, non-Transportation and non-Public Utilities scoring guidelines.

Public Utilities staff are using the Council Policy ranking factors, but we identified two issues. First, the priority ranking factors do not account for the size or impact of a project. For example, the relative savings amount or return per dollar spent is not calculated. A project costing $1 million that reduces annual costs by $5,000 will receive the same 10 percentage points as a project costing $10 million that reduces annual costs by $5,000 or $100,000. Second, officials told us that these priority ranking factors are challenging to effectively apply, because they are more generic and that some asset-specific priority ranking criteria may be needed for certain assets. Public Utilities has developed specific sub-criteria for prioritizing projects, and solicited input from the Independent Rates Oversight Committee (IROC) to assign weights to the sub-criteria. For

example, the additional ranking factors include minimizing service disruptions and reducing the potential for damages to property or current structures. See Exhibit 15. As discussed later in this report, the asset-specific priority ranking factors and weights are included in the Water Facilities Master Plan and Municipal Wastewater Facilities Master Planning documents.

Exhibit 15

Public Utilities Project Prioritization Sub-Criteria

Criteria /Percentage	Sub-Criteria	Weights (percentage)
Health and Safety Effects (25)	Reduce Risk to Public Health and Safety	36
	Provide Adequate Fire Flows	14
	Reduce or Eliminate Potential Supply Shortages to Customers	14
	Minimize the Amount and Duration of Service Interruptions to Customers	19
	Meet Water Quality Standards (Regulated)	13
	Reduce Potential Impacts to Public and Private Property	4
Regulatory or Mandated Requirements (25)	Comply with Regulatory Requirements	39
	Comply with City Council Mandates	18
	Comply with Court-Ordered Mandates	28
	Comply with City's System Performance Criteria	15
Implication of Deferring the Project (15)	Reduce Impacts on Other Projects	19
	Reduce O&M Costs in the Long-Term (Beyond four years) with Project Implementation	32
	Reduce or Eliminate Fines Due to Violations of Permits and Non-Compliance with Regulations	18
	Unplanned Expenses Due to Repairs and Emergencies that Could be Avoided by Implementing Project	31
Annual Recurring Costs or Increased Longevity of Assets (10)	Reduce Unaccounted for Water	40
	Reduce Annual Recurring O&M Costs by Implementing Project	60
Community Investment (10)	Minimize Loss of Economic Activity Due to Facilities Failure	40
	Reduce Environmental Impacts	27
	Improve Water Quality to Meet Secondary Goals (non-regulated)	9
	Make Efficient Use of Natural Resources	13
	Direct Benefits to the Community	11
Implementation (5)	Agreement with General Plan and Community Plans	100
Project Cost and Grant Opportunities (5)	Grant Funding Potential	75
	Capital Costs (2009)	25
Project Readiness (5)	Time Required for Project to Complete its Current Phase	100

Source: OCA Analysis of Water Facilities Master Plan.

A recent OCA report on the City's Capital Improvement Program recommended that the City assess the current priority scoring process, and developing suggested changes, if needed,

to City Council Policy 800-14.[64] An effective prioritization process is important to ensure that the Department is implementing most critical projects and investing resources wisely.

Public Utilities Lacks Consolidated Asset Management Plan

Best practices recommend that organizations develop an asset management plan to provide guidance and a schedule for the implementation of its asset management program.[65] Although the Department has taken steps toward implementing asset management as discussed throughout this section of the report, officials have only recently began to coordinate the various asset management efforts of the former water and wastewater departments.[66] Department officials told us that the leadership and coordination of asset management was put on hold while the water and wastewater departments were merged and consolidated. They also noted that the merger complicated asset management efforts because it increased the breadth and number of assets for which the Department is responsible. The Asset Management Coordinator, who was appointed to the position in fiscal year 2010, is taking the lead on development of an asset management plan that will consolidate all of the Department's efforts. As noted earlier in this report, officials expect to complete this plan by the end of fiscal year 2012. By not having an asset management plan, the Department will not have a road map to ensure that various asset management efforts will be effectively implemented and coordinated across the Department.

[64] OCA, *Capital Improvement Program: Better Planning and Oversight Are Needed to Effectively Identify Capital Infrastructure Needs and Manage Projects*, OCA-11-027 (San Diego, CA: June 29, 2011), 103.
[65] National Asset Management Steering Committee, *International Infrastructure Management Manual, Version 3.0* (Wellington, New Zealand: 2006), Appendix A.
[66] Although Public Utilities lacks an asset management plan, we reviewed the plan developed by the former wastewater department in 2006. Based on our assessment of this plan with best practices, we found that it lacks many of the recommended elements.

Recommendations To improve Public Utilities' Asset Management Program, we are recommending that the Director: *(Priority 3)*

1. Work with Public Works/Engineering and Development Services to develop a documented process that insures all information and documents on completed projects are provided to Public Utilities in a timely manner and include this in service level agreements with these departments.

   - The process should include a control for Public Utilities to ascertain that Public Works/Engineering and Development Services are providing all information within the agreed upon timeframe.

2. Determine the frequency of which the condition of appropriate assets should be assessed and establish a schedule for these assessments, particularly for water transmission mains.

   - Reassess the most cost effective approach for assessing the condition of and prioritizing water distribution pipes as the Department develops its replacement program for asbestos cement pipes, such as the use of predictive software to forecast asset condition.

3. Develop a schedule for implementation of SAP Enterprise Asset management (EAM) and provide updates on progress to the Independent Rate Oversight Committee (IROC) and other stakeholders.

   - To ensure that all City departments, including Public Utilities, derive benefits from the Departments SAP EAM implementation, coordinate with the Enterprise Resource Planning Department's efforts to merge with the existing EAM system, which the Transportation and Storm Water Department currently uses.

4. Assess whether the current criteria and process for determining whether to develop a full BCE for a project is sufficient to ensure that all appropriate capital projects are justified.

   - Ensure that BCE abstracts consistently include the necessary financial and other data to support business decisions.

5. Provide input to the Capital Improvement Program Review and Advisory Committee (CIPRAC) regarding the prioritization

ranking tool, so that appropriate changes can be made to Council Policy 800-14.

6. Complete a consolidated asset management plan and ensure it is in line with best practices and includes a schedule for implementation with a combination of short-, mid-, and long range initiatives to ensure that funds and staff availability are not barriers to successful implementation.

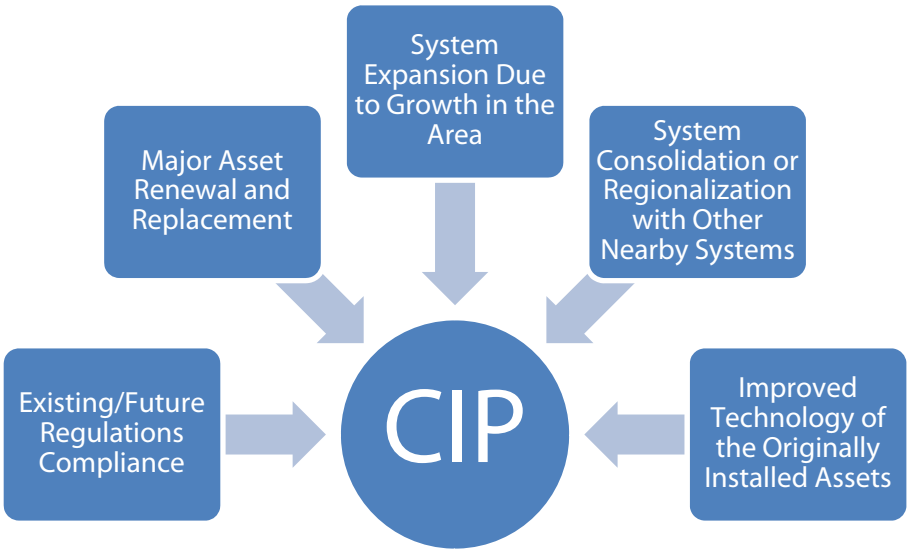
- Ensure that the plan includes:
    - measurable goals and objectives;
    - clear, numeric goals for the target level of condition the Department wants to achieve for appropriate assets; and
    - performance measures that are linked with these goals.
- Monitor and report out performance measures to IROC, City Council, customers, and other stakeholders.

Finding 2: Improvement is Needed for Wastewater Master Plan and Communicating Capital Needs to Stakeholders

Master planning and capital improvement planning provide an overall perspective of developments in the City to enable decision-makers and other stakeholders, including citizens, to take a long-range view of future needs, projects, and priorities. The plans should provide a blueprint for local governments to fund their capital improvements in the most efficient and cost-effective manner.[67] When developing plans, there are several categories of needs that must be considered, such as capital needs related to current and future regulations and major asset replacement based on asset management strategy. See Exhibit 16. In addition, various levels and types of planning are needed to effectively address capital needs and guide future capital infrastructure investments, including long-range master plans, mid-range capital improvement and financing plans, and the annual CIP budget.

Exhibit 16

Drivers of Capital Improvement Planning



Source: OCA analyses of best practices for planning and Public Utilities Plans.

[67] GFOA, *Recommended Practice: Multi-Year Capital Planning* (2009), 1; and Association of Metropolitan Sewerage Agencies, *Managing Public Infrastructure Assets to Minimize Cost and Maximize Performance* (Washington, D.C.: 2002), 116.

Public Utilities Has Developed Master Plans for Water and Wastewater Infrastructure, but Wastewater Plan Is Not Comprehensive

Best practices for master planning recommend that plans have long horizons and account for drivers of capital planning, such as regulatory compliance and replacement and renewal identified through asset management. In addition, plans should prioritize projects and include financing and rate setting strategies, among other things.[68] The Department has developed three master plans to address capital needs:

- **Water Facilities Master Plan** – Identifies system-wide capital improvements for water assets.
- ***Draft* Metropolitan[69] Wastewater Plan** – Describes Metropolitan's capital facilities program for wastewater assets.
- **Municipal Wastewater Collection System Master Plan** – Outlines capital improvements associated with the municipal wastewater collection system.

We found that the Water Facilities Master Plan comprehensively addresses the key drivers of CIP planning, including expansion due to water demand projections, identification of potential capacity deficiencies, and accounts for renewal and replacement needs identified in water facilities condition assessments. In addition, the plan is generally in line with master planning best practices, for example, it includes service area analysis, a list of prioritized CIP projects and estimated costs through 2030, and forecasted CIP expenditures by asset type. See Exhibit 17. However, neither the *Draft* Metropolitan Wastewater Master Plan nor the Municipal Wastewater Collection System Master Plan is as comprehensive as the Water Facilities Master Plan and both lack several elements of best practices. For example, the *Draft* Metropolitan Wastewater Master Plan includes proposed facilities but has limited project information and does not prioritize projects.

[68] University of North Carolina Environmental Finance Center, *What to Include in Your Capital Plan: A Reference Guide for North Carolina Water and Wastewater Utilities* (Chapel Hill, NC: 2011).

[69] Public Utilities' Wastewater Branch has two separate master plans because it is responsible for two wastewater systems. The Metropolitan Wastewater System treats the wastewater from the City of San Diego and 15 other cities and districts, such as Chula Vista, Coronado, and Del Mar, and includes the treatment plants, ocean outfalls, pump stations, and large sewer pipelines. The Municipal Wastewater Collection System is responsible for the collection and conveyance of wastewater from residences and businesses within the City of San Diego and largely includes sewer lines and pump stations used to convey water. Although the Municipal System connects with and ultimately discharges into the Metropolitan System, separate tracking of the assets of each system is important because of cost sharing agreements between the City and the other customers of the Metropolitan system.

Exhibit 17

Comparing Public Utilities' Master Plans with Best Practices

Best Practices for CIP Master Planning	Water Facilities Master Plan *January 2011*		*Draft* Metropolitan Wastewater Plan *March 2011*		Municipal Wastewater Plan *December 2005*	
Are Aligned with Strategic Goals and Objectives	√	Aligned with the Department's first strategic goal and first business objective to manage assets optimally through repair, rehabilitation, and replacement.	X	Driven by regulatory requirements.	X	References Wastewater's *Strategic Business Plan*, but is driven primarily by a regulatory requirement to reduce sanitary sewer overflows.
Have a long horizon (20 + years)	√	Planning through 2030.	√	Planning through 2050.	√	Based on regional transportation agency planning horizon.
Are regularly updated (every 3-5 years)	N/A	This is the first comprehensive Water Facilities Master Plan.	X	Last published in November 2003.	X	Updated December 2002 plan, but has not been updated since 2005.
Account for:						
• Regulatory Compliance	√	Considered as part of the BCE process and the project prioritization scheme.	√	Wastewater CIP is driven by regulatory mandates.	√	The Muni master plan is driven by a regulatory requirement.
• Stakeholder Service Needs	√	Master plan based on three recent service area master plans.	√	Incorporates flow and load estimates based on San Diego Association of Government's demographic projections.	√	Includes hydraulic modeling of capacity and flows based on San Diego Association of Government's demographic projections.
• Renewal and Replacement	√	Identified by facilities assessments.	√	Lists major projects and proposed facilities.	√	Addressed by the Concrete Main Replacement Program and Inspection and Condition Assessments Program.
• Growth and Expansion	√	Discusses ongoing efforts to expand water system capacity.	√	Incorporates demographic forecasts, and flow and load projections.	√	Addressed by the Trunk Sewer Capacity Assurance Program.
Are supported by adequate data management systems	X	Information and data systems have not been evaluated in recent years.	X	Information and data systems have not been evaluated in recent years.	X	Does not address information and data systems.
Incorporate asset management practices	√	Recognizes the importance of asset management.	X	Asset management is at an early stage.	X	Predates wastewater's asset management efforts.
Identify and screen projects	√	Projects emanate from three main sources.	X	Plan does not identify the project population. Included in 10-Year CIP.	√	Projects identified from five sources.
Prioritize projects	√	Prioritization is based on CIPRAC tool and input from IROC.	X	Plan does not rank or prioritize projects. Included in 10-Year CIP.	√	Prioritization schemes vary by project source and are influenced by EPA mandates.
Include financing and rate-setting strategies	X	Included in Rate Case.	X	Included in Rate Case.	X	Included in Rate Case.
Incorporate long-term financial planning	√	Includes a ten-year projection of CIP costs.	X	Includes project cost estimates and delivery dates.	X	Includes project cost estimates and delivery dates.

Source: OCA analysis of Water and Wastewater Master Plans based on State of North Carolina, *Infrastructure Master Plan Guidance*.

Department officials agreed that the Water Facilities Master Plan is more comprehensive than the Metropolitan Wastewater Plan, but they told us that this is because many elements missing from the wastewater plan are included in separate documents, such as the wastewater five-year CIP plan, 10-year CIP, and project prioritization documents. We recognize that the Department conducts planning for various aspects of its operations and does not want to duplicate efforts. However, including all information in one document helps to show that various aspects of planning are being assessed together and provides transparency to stakeholders. Department officials told us that they plan to include this information more comprehensively when the wastewater master plan is revised.

We also observed that while both water and wastewater capital improvements are primarily driven by regulatory requirements, the Water Branch has only four projects remaining to be completed out of 100 items specified in the California Department of Public Health Compliance Order.[70] As a result, the Water Branch conducted a major effort to identify and plan for future infrastructure needs based on other drivers, including future regulations.[71] On the other hand, the Wastewater Branch still has to complete projects specified in the Consent Decree, which is expected to remain in effect until the end of fiscal year 2013. See Appendix IV.

Department Has Mid-Range Capital Plans to Link Master Planning with Annual CIP Budget

Developing a five- to ten-year CIP plan helps an organization to identify a funding strategy to meet capital infrastructure needs that have been identified in long-range master plans and ultimately to approve projects for implementation through the annual budgeting process. We found that the Department has developed a CIP plan—essentially a proposed appropriations schedule listing water and wastewater CIP projects for fiscal years 2008 through 2022. The plan includes projects that have been prioritized in the water and wastewater master plans and provides a link between capital infrastructure needs identified

[70] Of the 100 items specified in the Compliance Order, 96 have either been completed or removed. The remaining four items are ongoing projects and include the (1) replacement of cast iron mains and (2) the other three are related to recycled water.

[71] The Compliance Order included a list of specific projects and completion dates for improving and/or constructing reservoirs, water treatment plans, pump plants, and water main pipelines.

in the Department's master plans and its annual CIP budget.

Department Has Developed a Financing and Ratesetting Strategy and Reached Out to Stakeholders, but Improvement Is Needed to Better Communicate Infrastructure Needs

Developing a strategy for financing capital infrastructure needs is important since these projects are typically costly, are generally implemented over long time horizons, and must be financed through rate increases to cover costs.[72] In addition, the Department must balance other primary drivers of rate increases, such as the rising cost of purchased water in the City, with infrastructure needs.[73] Best practices recommend that organizations develop a financing and ratesetting strategy to determine how to pay for capital needs in a fiscally prudent manner and effectively communicate this information to stakeholders, including City Council Members, oversight boards, and customers.[74] The Department uses its Cost of Service Study and Rate Case to establish a financing and ratesetting strategy to fund infrastructure needs.

- *Cost of Service Study* – The last Cost of Service Study was conducted in 2006 to identify and apportion annual revenue requirements to different client classes proportionate to their demands on the water and wastewater systems. The Department plans to hire a consultant to conduct its next Cost of Service Study this year. The Cost of Service Study is used as the basis for the Rate Case.
- *Rate Case* – Most recently conducted in 2007 for both water and wastewater, the Rate Case determines future water and sewer rates increases and financing options in the rate models and includes projections of operating and capital costs, as well as debt financing assumptions.[75]

The Department recently presented a financing plan to IROC that included schedules showing the proposed funding sources

[72] The Department also finances capital projects through federal grants and state loans which are free monies or carry more favorable interest rates than bonds. In fiscal year 2011, officials secured $3.6 million in grants and $12 million in loans and expect to receive $88.8 million in grant and loan revenues by January 1, 2012.
[73] The City of San Diego imports about 85 to 90 percent of its water from the State Water Project in Northern California and the Colorado River. The costs to purchase and deliver imported water and major investments in infrastructure are the two factors driving the bulk of the rate increases for fiscal year 2011.
[74] Association of Municipal Sewerage Agencies, *Managing Public Infrastructure Assets to Minimize Cost and Maximize Performance* (Washington, D.C.: 2002), 125-126.
[75] To develop its financing strategy, the Department used financial modeling, performed both in-house and by a financial consulting firm, to identify and evaluate several strategies for addressing the Department's needs. Public Utilities officials noted that dollar amounts may change after the City's *Comprehensive Annual Financial Report* is completed for fiscal year 2010.

and forecasted expenditures for water and sewer projects for fiscal years 2012 through 2016. However, officials told us that the financing plan was just a tool to educate IROC members regarding rate drivers and that the Rate Case and Cost of Service Study show the Department's basis for the funding mix and amounts and rationale for selecting the specific projects included under forecasted expenditures. While the Cost of Service Study and the Rate Case help the Department determine the amount of funds it requires to operate and to run its CIP, they do not provide information to stakeholders regarding the Department's determination of the funding mix—the proportion of CIP funds raised through rate increases and the proportion raised through borrowing or other sources. The choice of funding mix is ultimately a policy decision that affects current and future ratepayers, and the rationale behind it should be transparent.

Improved Communication Is Needed to Educate Stakeholders about Capital Needs and Consequences of Deferring Projects

According to officials, the Department has conducted extensive outreach efforts to educate stakeholders regarding needed rate increases, especially during the last rate case in 2007. For example, officials have made presentations during town hall meetings and to the Natural Resource and Culture Committee and City Council and conducted ratesetting workshops. However, as evidenced by the public reaction to rate increases, the Department has had limited success in improving understanding of the conditions driving rate increases and implications for failing to fund needed infrastructure projects. The public's concern is likely related to repeated water and wastewater rate increases in the past that have resulted in ratepayer fatigue and particularly affected customers with low or fixed incomes. See Exhibit 18. In addition, officials told us that the cost function of a utility is counterintuitive to most consumers and conflicts with their usual economic experiences. For example, while a person can reduce vehicle fuel expenses by driving less, the person cannot similarly lower their household water bill by reducing water consumption, since much of a utility's costs are fixed and related to the operation and maintenance of the system. The utility needs to recover these costs regardless of any decrease or increase in customer demand for water.

Exhibit 18

Summary of Percentage Increases in Water and Wastewater Rates, Calendar Years 2002-2011

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Wastewater	7.5	7.5	7.5	7.5	0	8.75	8.75	7	7	0
Water	6	6	6	6	6	6.5	6.5	12[a]	16.4[b]	7.9[c]

Source: OCA analysis of water and wastewater rate information provided by Public Utilities.

a Calculated as an increase of 6.5 percent on July 1 over an increase of 8.5 percent on January 1.
b Calculated as an increase of 5.92 percent on September 1 over an increase of 6.5 percent on July 1 over an increase of 10.6 percent on January 1.
c Increase effective on March 1.

Notes: The purpose of this table is to summarize annual rate increases. Because of the variability in the types and timing of water rate increases, we excluded some increases from this table, including those related to meter size and water use.

Wastewater rate increases were effective on March 1 for 2002 through 2005, and on May 1 for 2007 through 2010. Water rate increases were effective on July 1 unless otherwise indicated.

The affordability of water and wastewater rates is a primary concern to the City and constrains the amount of funds that can be raised for CIP projects. Given the deteriorating and aged infrastructure, capital needs are generally greater than available funds. While the Department's master plans include an extensive planned infrastructure replacement program over the next 20 years, it is not reporting a backlog of projects that it is unable to implement due to funding constraints. We understand that the Department must prioritize needs and assess which projects to implement based on available funds. But, by not reporting the backlog of unfunded projects, stakeholders cannot see the big picture and fully understand the implications of deferring projects. Deferring projects prevents the City from maintaining infrastructure in a good state of repair and makes those same repairs more expensive as construction costs increase and small preventative projects become larger and more expensive replacements. Without improved communication of the consequences of not financing projects to ratepayers and other stakeholders, the Department risks not being able to secure the needed funds.

Recommendations To improve capital planning and increase transparency and public awareness of capital needs, we recommend that the Director of Public Utilities: *(Priority 3)*

7. Develop a comprehensive Wastewater Master Plan based on a full assessment of the wastewater system's needs and best practices when it updates this plan in three to five years.

- Provide links to other plans or documents when best practice elements are excluded from master plans.

8. Conduct regular updates to master, CIP, and financing plans.

- Update water and wastewater master plans every three to five years.

9. Include the basis for determining the funding mix in future Master Plans, CIP plans, or a financing plan and make these available to the public.

10. Improve the Department's strategy for communicating capital needs to stakeholders, including providing estimated deferred maintenance and unfunded needs if needed rate increases are not secured and implications of deferring projects.

Finding 3: Project Delivery Costs Are Higher Than Statewide Average for Smaller Projects, and Project Managers Are Not Consistently Charging Appropriate Line Item Elements of Projects

City's Project Delivery Costs Are In Line with Statewide Average for All Projects, but Significantly Higher for Project Less Than $2 Million

Best practices recommend that organizations collect and analyze baseline versus actual data to understand and communicate the project progress and performance and forecast results.[76] The California Multi-Agency Benchmarking Study provides statewide averages for project delivery costs and the City of San Diego participates in this study.[77] Based on our statistical analysis of 47 projects, we found that the average cost for the City of San Diego to deliver all projects is 26 percent of total construction costs which is just above the study's benchmark of 25 percent. See Exhibit 19. Public Works/Engineering Department officials told us that this is noteworthy considering that the City of San Diego, unlike other California cities, does not require prevailing wages on all construction contracts.[78] San Diego only requires prevailing wages on construction contracts when (1) a project is funded by grants or state loans, (2) the project construction cost is over $10 million, and (3) work is not strictly a municipal affair. Paying prevailing wages increases the construction contract cost and thus project delivery represents a smaller portion of the total project cost.

[76] Project Management Institute, *A Guide to the Project Management Body of Knowledge 4th Edition* (Newton Square, PA: 2008), p. 266.

[77] The Study is a collaborative research effort including seven of the eight largest municipalities in California to share and develop approaches in order to provide high value implementation of capital programs in the most efficient manner. Study participants include the City of San Diego, San Jose, Los Angeles, Long Beach, Sacramento, Oakland, and the City and County of San Francisco. *California Multi-Agency CIP Benchmarking Study: Annual Report* (2010), 1.

[78] Prevailing wages are specific, minimum hourly wage rates determined by state or federal government for trade workers on public works projects and include fringe benefit amounts for health insurance, vacation and pension.

Exhibit 19

Project Delivery Cost as a Percentage of Total Construction Cost, Fiscal Year 2010

	All Projects	Smaller Projects[a]
Statewide Average[b]	25	33
City of San Diego	26	47

Source: OCA statistical analysis of Public Works/Engineering projects.

[a] This includes projects with a total construction cost between $100,000 and $2 Million.

[b] The statewide averages were 19 percent for all projects in fiscal years 2008 and 2009 and 35 percent for smaller projects in fiscal year 2009. The Study did not track the average delivery cost for smaller projects prior to that time. The higher delivery costs are likely because of the decline in construction cost due to declining economic conditions, causing project delivery to represent a great portion of projects' total cost.

Note: The combined project delivery and construction costs for the smaller projects subset exceed $41.2 million.

For smaller projects valued between $100,000 and $2 million, we found that the City's average delivery costs are 14 percent higher than the statewide average of 33 percent.[79] Public Works/Engineering officials told us that their costs are higher for many of the projects for three reasons. First, the City faced uncontrollable circumstances for projects, including large scope changes and design challenges. For example, City departments placed many CIP projects on hold from 2004 to 2008 when the City had limited access to public bond markets and could not issue debt to finance them—these are known as "bubble" projects.[80] Of the projects in our small subset, 21 of 28 projects or about 75 percent had longer than normal design periods lasting from three to 12 years. See Appendix V. Delays to projects frequently required revised design plans based on the latest code and design standards. Additionally, during the consolidation of project management into Public Works/Engineering following Business Process Reengineering, many projects were assigned a new project manager which caused delays. Although lengthy design phases may have contributed to higher project delivery costs, projects in our data set with design periods of less than three years have an

[79] The project delivery percentages represent the average slope of the least squares fit using regression analysis and do not represent simple, arithmetic averages. See Appendix II.

[80] The City was unable to issue bonds in public markets from 2004 through 2008. Standard and Poor suspended its credit rating because it could not evaluate the City's credit due to delays in the release of audits and missing financial statements. Standard & Poor's, *RatingsDirect: San Diego, California Appropriations and General Obligation* (New York: NY: May 15, 2008), 8.

average project delivery cost of about 50 percent, 12 percent higher than the statewide average.[81] Also, as noted earlier in this report, although the City had limited access to public markets between 2004 and 2008, the Department issued about $439 million in private notes for water and wastewater capital needs during this time period.

Second, Department officials told us that the economic recession resulted in bids that were below market rate beginning in 2007, and this caused project delivery to represent a higher percentage of the total cost of projects bid after this time. Because projects in our data set were completed between fiscal years 2006 and 2011 rather than between 2005 and 2009 as those reported in the Statewide Benchmarking Study, Public Works/Engineering officials noted that they were more likely to have been affected by below market bids and declining construction costs and thus account for higher project delivery costs. However, when we reduced our data set for small projects to include only those completed between July 2005 and December 2009 similar to the Benchmarking Study, we found project delivery costs to be 46 percent, still 8 percent higher than the statewide average.[82] As discussed above, limited access to public bond markets impacted the City's ability to fund projects from 2004 to 2008, and as a result, no Public Utilities CIP projects were completed between 2005 and 2008. Since the seven projects were completed in 2009, they are more likely to have been impacted by below market bids which contributed to higher project delivery costs.

Third, officials stated that the City's project delivery costs are higher because it does not require prevailing wages for all construction contracts while other cities in the Statewide Benchmarking Study have this requirement. As noted earlier, paying prevailing wages increases the construction contract cost and thus project delivery represents a smaller portion of the total project cost. According to an official, the differences in

[81] These figures are based on the statewide arithmetic average of 38 percent, because the small number of projects limited our ability to use the average determined by the least squares method.
[82] We used the arithmetic average in lieu of an average determined by the least squares method because of the small dataset—only seven Public Utilities CIP projects were completed during this time period so we were not able to expand the population. Therefore, this comparison is based on the statewide arithmetic average of 38 percent.

how prevailing wages are applied could make San Diego's project delivery costs about five to seven percent lower. We could not verify these figures, because they are based on Public Works/Engineering's internal calculations.

We believe that the City's project delivery costs are higher for smaller projects because Public Utilities and Public Works/Engineering are not effectively monitoring and reporting these costs, as recommended by the Project Management Institute, and therefore are not working to ensure that costs stay within an appropriate range.[83] Public Utilities maintains a service level agreement with Public Works/Engineering which describes the roles, responsibilities and expectations of the departments for project delivery and includes performance measures to keep project delivery costs at a certain level.[84] However, we found that the service level agreement does not include a process for tracking and monitoring and reporting project delivery cost performance measures.

Public Works/Engineering officials told us that they have some other methods for monitoring and reporting project delivery costs both at the project level and program level, where all project costs are aggregated. At the project level, the Department (1) includes project delivery cost estimates in pre-design reports and required documents before sending for City Council approval, (2) responds to Public Utilities requests for information about a specific project, and (3) provides project delivery costs to the California Multi-Agency Benchmarking Study for projects completed each year. At the program level, Public Works/Engineering and Public Utilities monitor and report project delivery actual costs compared to goal amounts during monthly management meetings.

However, Department officials are not reviewing and reporting

[83] The Project Management Institute recommends that organizations collect and analyze baseline versus actual data to understand and communicate the project progress and performance and forecast results. Project Management Institute, *A Guide to the Project Management Body of Knowledge 4th Edition* (Newton Square, PA: 2008), p. 266.

[84] Public Works/Engineering implemented performance measures in 2006 as a result of Business Process Reengineering, but has not been tracking these since the City stopped requiring the reporting of these measures in fiscal year 2011. OCA, *Capital Improvement Program: Better Planning and Oversight Are Needed to Effectively Identify Capital Infrastructure Needs and Manage Projects*, OCA-11-027 (San Diego, CA: June 29, 2011), 59.

project delivery costs for each project or generating summary reports at project completion. As a result, the high delivery cost for smaller projects is not observable because likely savings from larger projects overshadow inefficiencies in smaller projects. Without effectively tracking and monitoring project delivery costs the City risks not delivering and implementing projects in the most efficient and cost-effective manner. In addition, a lack of reporting requirements reduces accountability to meet performance measures, reduces transparency over the true cost to deliver projects, and inhibits the ability to identify areas of inefficiency.

Project Managers Are Not Consistently Charging Project Expenditures to Appropriate Line Item Elements of the Project

Because of their scale and cost, capital projects can represent a significant risk for local governments. Consequently, governmental entities should establish policies and procedures to support effective capital project monitoring and reporting to mitigate such risks as well as improve financial accountability and enhance operational effectiveness.[85] Based on our review of 58 projects, we found that 44 or about 76 percent had charges that are not considered direct expenses. For example, the Comptroller's Office does not consider transportation expenses to be direct expenses, but Public Works/Engineering officials believe transportation expenses directly related to projects should be billed as direct costs rather than out of overhead. Project managers have been charging these prior to being advised that the Comptroller's Office does not allow any transportation expenses to be charged as direct expenses. Department officials said they identified these errors six months prior and made requests to the Comptroller's Office to address but the issues remain outstanding and unresolved. We also found one case where a project manger created an additional Work Breakdown Structure element for a historical and environmental impact monitoring contract, because she did not did not know where to place these charges using SAP's cost structure.

Project managers are not consistently charging project expenditures to appropriate accounts because the City (1) has not documented policies on what charges are allowable direct

[85] GFOA, *Best Practice: Capital Project Monitoring and Reporting* (Chicago, IL: October 19, 2007), 1.

capital expenses and (2) did not provide sufficient training and guidance when it switched from its previous financial system, AMRIS, to the new system, SAP, in fiscal year 2010. According to officials, City staff overseeing the transition from AMRIS to SAP assumed that many aspects of the new system, including how to charge projects using the system's cost structure template, are self-explanatory. But this has not been the case, and Public Works/Engineering officials told us that the learning curve has significantly impacted its ability to manage projects. Without additional documented policies and procedures, project managers and City staff will continue to have a limited understanding of the City's financial system, projects will continue to incur incorrect charges which must be backed out by budget analysts, project expenditure data will be inaccurate, and internal controls will be ineffective.

The Process to Identify Actual Project Charges is Inefficient and Challenging

Accurate information and effective data systems are critical for measuring project performance and making informed decisions about changes in scope, budget, and schedule. To ensure that capital project monitoring and reporting practices are effective, organizations should periodically (1) inspect reporting data for accuracy and completeness and (2) review for the existence and adequacy of quality assurance and control measures in each phase of capital projects.[86] We found that it is challenging to determine actual expenditures for projects that were initiated in the City's former financial system, AMRIS.[87] Many reports in SAP do not contain project-to-date expenditure data, so multiple reports must be obtained from two different systems to get a clear view of actual expenditures. For example, to identify the total cost spent in design and construction over the life of a project, we had to use both SAP and AMRIS and obtain at least five different reports which was complicated and time consuming. In addition, we found that the total expenditures for project design and construction management which are reported separately in the California Benchmarking Study cannot be separated. For example, budget reports indicate that the Miramar Water Treatment Plant Ozone Equipment/Installation project incurred design

[86] GFOA, *Best Practice: Capital Project Monitoring and Reporting* (2007), 2-3.
[87] Historical information prior to fiscal year 2010 was not transferred over into the City's new financial system.

and construction management expenses of $1.73 million and $1.7 million, respectively. However, a combined $3.44 million in design and construction management expenses is not identified in either actual expenditure line item for design or construction management.

This is occurring for two reasons. First, although SAP has broader capabilities, it has not been set up to report project-to-date information and is generally being used as an annual financial reporting system. Second, the City's previous financial system's data organization format is different from the City's current financial system. Consequently, all carryover data that could not be categorized in the new system was consolidated into one category—the labor interface item—which includes design, construction management, and vendor invoice payments. City officials said this process does not have significant accounting impacts in that it does not impede the City's ability to settle projects. A Public Works/Engineering official told us that the different databases are a real but short-term problem but will become less of an issue as time goes on and projects that were started in AMRIS are completed. However, this does impact project managers', budget analysts', and engineering staff's ability to efficiently and effectively manage projects by not having a clear picture of where money is being spent during the project implementation process. Further, project implementation can take three years and often longer, and it is important that project managers and other stakeholders have a clear picture of where money is being spent during this time. Without documented policies and procedures and improvements for using the City's financial system, current processes for tracking, monitoring, and reporting project costs will remain inefficient and overly time consuming. Further, the need to use combined data from multiple reports to identify project costs increases the risk for reporting errors and lacks transparency for stakeholders over project costs.

Recommendations To improve the monitoring and reporting of project delivery costs, we recommend that the Public Works Director: (Priority 2)

11. Revise the service level agreement with the Public Utilities Department to describe specific requirements to monitor and report project delivery costs.

12. Develop project-level delivery costs progress reports from the Project Portfolio Management Integrator or other sources to track, monitor, and report planned versus actual costs on a monthly basis for all active projects.

13. Report final project delivery costs versus total construction costs at the completion of each project. Annually, compile, consolidate, and analyze performance data of completed projects to identify inefficiencies and enhance performance and value, such as by developing a Process Improvement Plan as recommended by project management guides and standards.

To improve the financial management and budgeting of capital projects, we are recommending that the City Comptroller: *(Priority 2)*

14. Develop a regulation process narrative that outlines charges that are appropriate direct expenses.

15. Establish a policy and guidelines to streamline the process to identify costs related to construction management and the construction contract that requires:

- all city labor for construction management, excluding city forces, to be charged to Construction Administration (WBS .06.02);
- all construction contract vendor payments to be charged to Field Construction (WBS .06.01.02); and
- the correction of all inaccurate charges within a timely manner.

To improve the management and transparency of capital projects, we are recommending that the Public Works Director and the Enterprise Resource Planning Support Director work

together to: *(Priority 2)*

16. Establish a more effective process for obtaining input from Public Works/Engineering regarding SAP concerns impacting project management and address high priority issues expeditiously.

17. Develop and implement a tool to allow budget-to-date actual expenditures, such as for planning, design, and construction, to be available in one document or report.

Finding 4: *The City is Not Charging Overhead, Which Impacts Public Utilities' and Other Departments' Forecasts of Future Project Costs*

Accurately forecasting the cost of future projects is vital to the survival of any organization contemplating future construction, and indirect costs rates or overhead is an important consideration in the analysis of project cost proposals.[88] As discussed in finding three of this report, the Public Works/Engineering Department charges Public Utilities and other client departments project delivery costs for the services that it provides; this includes overhead.[89] Overhead are indirect costs or administrative expenses that cannot be allocated to a specific project and are generally related to overall operating expenses, such as advertising, depreciation, insurance, and rent. Therefore, these costs must be shared among projects or functions. Organizations calculate indirect cost rates or overhead to reasonably determine the proportion of indirect costs that each program should bear; this is the ratio of the indirect costs to the direct costs and generally is expressed as a percentage.

The Comptroller's Office develops overhead rates for City departments based on an annual review of each department's direct and indirect costs.[90] The City's guidance for developing overhead rates requires that overhead fees charged to other City departments must be reviewed annually by responsible departments to ensure an appropriate cost recovery level. In addition, the Comptroller's Office is responsible for reviewing the department's cost analysis to ensure the appropriate overhead rate is applied and Financial Management will ensure the proper methodology was used.[91] However, we found that the City has not charged overhead since the beginning of fiscal

[88] National Institute of Building Sciences, *Whole Building Design Guide: Cost Estimating* (Washington, D.C.: May 28, 2010).
[89] Project delivery costs are the sum of all agency and consultant costs associated with project planning, design, bid, award, construction management, and closeout activities. *California Multi-Agency CIP Benchmarking Study: Annual Report* (2010), 2.
[90] Although the *California Multi-City Benchmarking Study* includes overhead rates for each of the eight participating cities, we did not include a comparison here because each City uses different methodologies to calculate overhead rates.
[91] City of San Diego, *Process Narrative: Maintaining User Fees, PN-0167* (San Diego, CA: Aug. 12, 2010), 2.

year 2012, because it lacks an effective methodology for doing so. In previous years, the Comptroller's Office's methodology was based on reports from AMRIS, the City's former financial system, that included all job orders charged by each department in the second to last fiscal year. For example, the Comptroller's Office reviewed job orders charged to projects during fiscal year 2009 to determine overhead rates for fiscal year 2011. The Comptroller's Office's cannot use this same methodology for fiscal year 2012 because the City's new financial system—SAP—does not require specific job orders for billing direct and indirect costs which has been a key driver to determining overhead rates for each department.[92]

According to Comptroller's officials, they are working to develop a new methodology for calculating appropriate overhead rates within the limitations of SAP, and they believe it will require a standard combination of charges made to cost centers, employee levels, and internal orders. The methodology will likely be a work in progress as the department becomes more familiar with the capabilities of the SAP system. Comptroller's officials told us they expect to have the new methodology in place by the end of October 2011, and a retroactive adjustment to overhead will not be necessary because it will not currently running the billing program until the new rates are in place. Without an appropriate indirect cost or overhead rate structure, Public Works/Engineering, Public Utilities, and other departments will not be able to accurately forecast the costs of future projects, make informed decisions regarding the feasibility of projects, or effectively monitor project costs. Further, charging appropriate overhead rates for the Public Works/Engineering Department is important to maintain the accuracy of the General Fund and enterprise funds.

[92] SAP replaced AMRIS in fiscal year 2009, and SAP's Human Capital Management application—which includes human resources/personnel, benefits and payroll functions—was implemented on January 1, 2010.

Recommendations To ensure that the City charges appropriate overhead rates, we are recommending that the City Comptroller: *(Priority 1)*

18. Develop an effective methodology for developing overhead rates and make retroactive adjustments if needed to ensure that departments correctly receive overhead funds as budgeted and billed in fiscal year 2012.

Conclusion

Providing effective water and wastewater systems are critical to public health, the environment, and the economy. Water systems provide drinking water free of contaminants and wastewater treatment systems prevent pollutants from reaching our rivers, lakes, and coastlines, preventing water-borne diseases, and preserving our environment. San Diego depends on clean rivers, lakes and coastline for water-based recreation and tourism. For the first time a significant amount of underground infrastructure is at or near its expected service life and will need to be replaced, and the City is facing pressure to upgrade its aging and deteriorating infrastructure to serve growing demands and meet new and existing regulatory requirements. Further, the Public Utilities Department faces challenges in identifying funds to pay for the needed infrastructure, since most must be financed through rate increases which are also driven by other factors, such as the rising cost of purchased water.

An asset management strategy has the potential to help organizations better identify needs and plan future investments and can provide proactive management of infrastructure and justification and support for capital planning, including investment levels and future requirements.[93] The Department has taken some steps for implementing asset management, but by not fully assessing the conditions of its assets, the Department will not have information on water pipes that are at high risk for failure and cannot make informed decisions regarding capital needs for these assets. Without an asset management plan, the Department will not have a road map to ensure that various asset management efforts will be effectively implemented and coordinated across the Department. Continued improvement of the Department's

[93] U.S. Government Accountability Office, *Water Infrastructure: Comprehensive Asset Management Has Potential to Help Utilities Better Identify Needs and Plan Future Investments*, GAO-04-461 (Washington, D.C.: March 19, 2004), 5.

asset management program will result in better decision making.

Master planning provides a blueprint for local governments to identify and prioritize needs and fund them in the most efficient and cost-effective manner. Without developing comprehensive plans that are in-line with best practices, the Department cannot provide transparent and fully supportable capital investment decisions to City Council Members, ratepayers, and other stakeholders. By not communicating its capital infrastructure needs, including the consequences of not financing projects, to ratepayers other stakeholders, the Department risks not being able to secure the needed funds to implement capital projects.

Capital projects can represent a significant risk for local governments because of their scale and cost. Establishing policies and procedures to support effective capital project monitoring and reporting will mitigate such risks, improve financial accountability, and enhance operational effectiveness. Without effectively tracking and monitoring project delivery costs the City risks not delivering and implementing projects in the most efficient and cost-effective manner. In addition, a lack of reporting requirements reduces accountability to meet performance measures, reduces transparency over the true cost to deliver projects, and inhibits the ability to identify areas of inefficiency.

Recommendations

We are making 18 recommendations to improve planning and oversight so that the City will effectively identify capital infrastructure needs and manage quality capital projects within budget and schedule. We have assigned priority numbers to these recommendations to provide the Administration with implementation targets. See Appendix VI for our recommendation priority guide.

Finding 1

To improve Public Utilities' Asset Management Program, we are recommending that the Director: (Priority 3)

1. Work with Public Works/Engineering and Development Services to develop a documented process that insures all information and documents on completed projects are provided to Public Utilities in a timely manner and include this in service level agreements with these departments.
    - The process should include a control for Public Utilities to ascertain that Public Works/Engineering and Development Services are providing all information within the agreed upon timeframe.
2. Determine the frequency of which the condition of appropriate assets should be assessed and establish a schedule for these assessments, particularly for water transmission mains.
    - Reassess the most cost effective approach for assessing the condition of and prioritizing water distribution pipes as the Department develops its replacement program for asbestos cement pipes, such as the use of predictive software to forecast asset condition.
3. Develop a schedule for implementation of SAP Enterprise Asset management (EAM) and provide updates on progress to the Independent Rate Oversight Committee (IROC) and other stakeholders.
    - To ensure that all City departments, including Public

Utilities, derive benefits from the Departments SAP EAM implementation, coordinate with the Enterprise Resource Planning Department's efforts to merge with the existing EAM system, which the Transportation and Storm Water Department currently uses.

4. Assess whether the current criteria and process for determining whether to develop a full BCE for a project is sufficient to ensure that all appropriate capital projects are justified.
   - Ensure that BCE abstracts consistently include the necessary financial and other data to support business decisions.
5. Provide input to the Capital Improvement Program Review and Advisory Committee (CIPRAC) regarding the prioritization ranking tool, so that appropriate changes can be made to Council Policy 800-14.
6. Complete a consolidated asset management plan and ensure it is in line with best practices and includes a schedule for implementation with a combination of short-, mid-, and long range initiatives to ensure that funds and staff availability are not barriers to successful implementation.
   - Ensure that the plan includes:
     - measurable goals and objectives;
     - clear, numeric goals for the target level of condition the Department wants to achieve for appropriate assets; and
     - performance measures that are linked with these goals.
   - Monitor and report out performance measures to IROC, City Council, customers, and other stakeholders.

Finding 2

To improve capital planning and increase transparency and public awareness of capital needs, we recommend that the Director of Public Utilities: (Priority 3)

7. Develop a comprehensive Wastewater Master Plan based on a full assessment of the wastewater system's needs and best practices when it updates this plan in three to five years.

- Provide links to other plans or documents when best practice elements are excluded from master plans.

8. Conduct regular updates to master, CIP, and financing plans.
   - Update water and wastewater master plans every three to five years.
9. Include the basis for determining the funding mix in future Master Plans, CIP plans, or a financing plan and make these available to the public.
10. Improve the Department's strategy for communicating capital needs to stakeholders, including providing estimated deferred maintenance and unfunded needs if needed rate increases are not secured and implications of deferring projects.

Finding 3

To improve the monitoring and reporting of project delivery costs, we recommend that the Public Works Director: (Priority 2)

11. Revise the service level agreement with the Public Utilities Department to describe specific requirements to monitor and report project delivery costs.
12. Develop project-level delivery costs progress reports from the Project Portfolio Management Integrator or other sources to track, monitor, and report planned versus actual costs on a monthly basis for all active projects.
13. Report final project delivery costs versus total construction costs at the completion of each project. Annually, compile, consolidate, and analyze performance data of completed projects to identify inefficiencies and enhance performance and value, such as by developing a Process Improvement Plan as recommended by project management guides and standards.

To improve the financial management and budgeting of capital projects, we are recommending that the City Comptroller: (Priority 2)

14. Develop a regulation process narrative that outlines charges

that are appropriate direct expenses.

15. Establish a policy and guidelines to streamline the process to identify costs related to construction management and the construction contract that requires:

    - all city labor for construction management, excluding city forces, to be charged to Construction Administration (WBS .06.02);
    - all construction contract vendor payments to be charged to Field Construction (WBS .06.01.02); and
    - the correction of all inaccurate charges within a timely manner.

To improve the management and transparency of capital projects, we are recommending that the Public Works Director and the Enterprise Resource Planning Support Director work together to: (Priority 2)

16. Establish a more effective process for obtaining input from Public Works/Engineering regarding SAP concerns impacting project management and address high priority issues expeditiously.

17. Develop and implement a tool to allow budget-to-date actual expenditures, such as for planning, design, and construction, to be available in one document or report.

Finding 4

To ensure that the City charges appropriate overhead rates, we are recommending that the City Comptroller: (Priority 1)

18. Develop an effective methodology for developing overhead rates and make retroactive adjustments if needed to ensure that departments correctly receive overhead funds as budgeted and billed in fiscal year 2012.

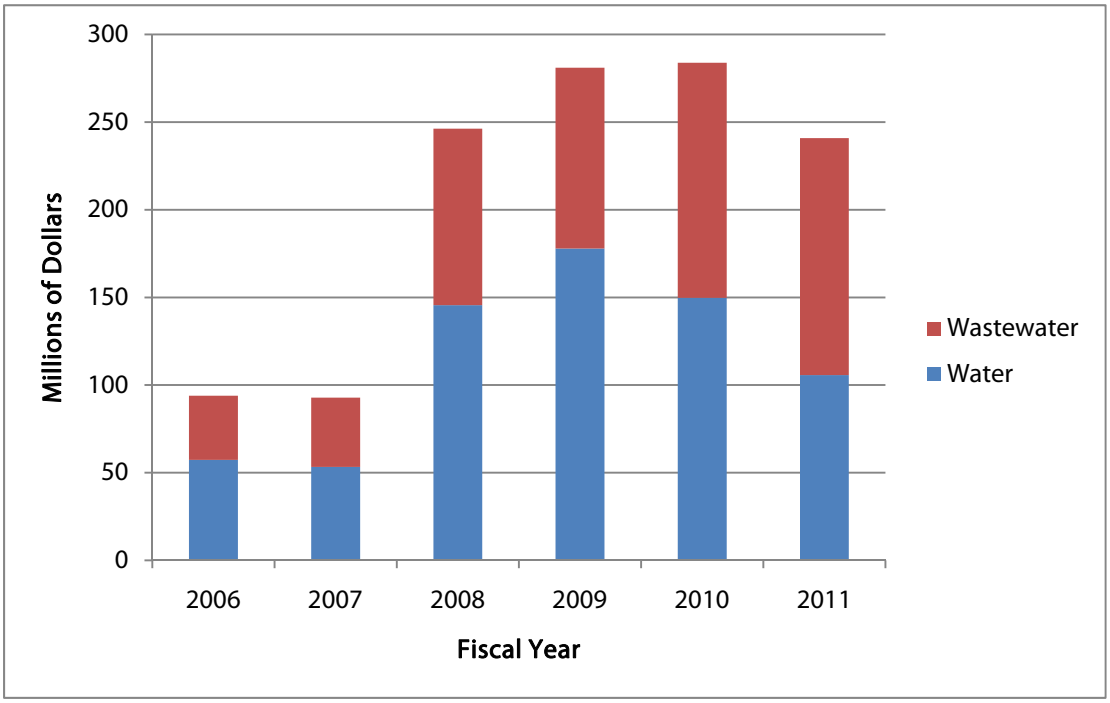
Appendix I: Public Utilities CIP Budget

Public Utilities CIP Budget as a Percentage of Total, Fiscal Years 2006-2011
Millions of Dollars

	2006	2007	2008	2009	2010	2011	Total
Water CIP	57.3	53.3	145.6	177.9	149.8	105.7	689.6
Wastewater CIP	36.6	39.5	100.7	103.1	134.1	135.2	549.2
Total Public Utilities CIP	93.9	92.5	246.3	281.0	283.9	240.9	1,238.8
Public Utilities Operating Budget	697.9	702.4	730.1	753.2	748.0	771.0	4402.7
Total Public Utilities Budget	791.8	795.2	976.4	1,034.2	1,031.9	1,011.9	5,641.4
CIP as Percentage of Total Budget	12	12	25	27	28	24	22

Source: OCA analysis of Public Utilities data.

Water and Wastewater CIP Budgets, Fiscal Years 2006-2011



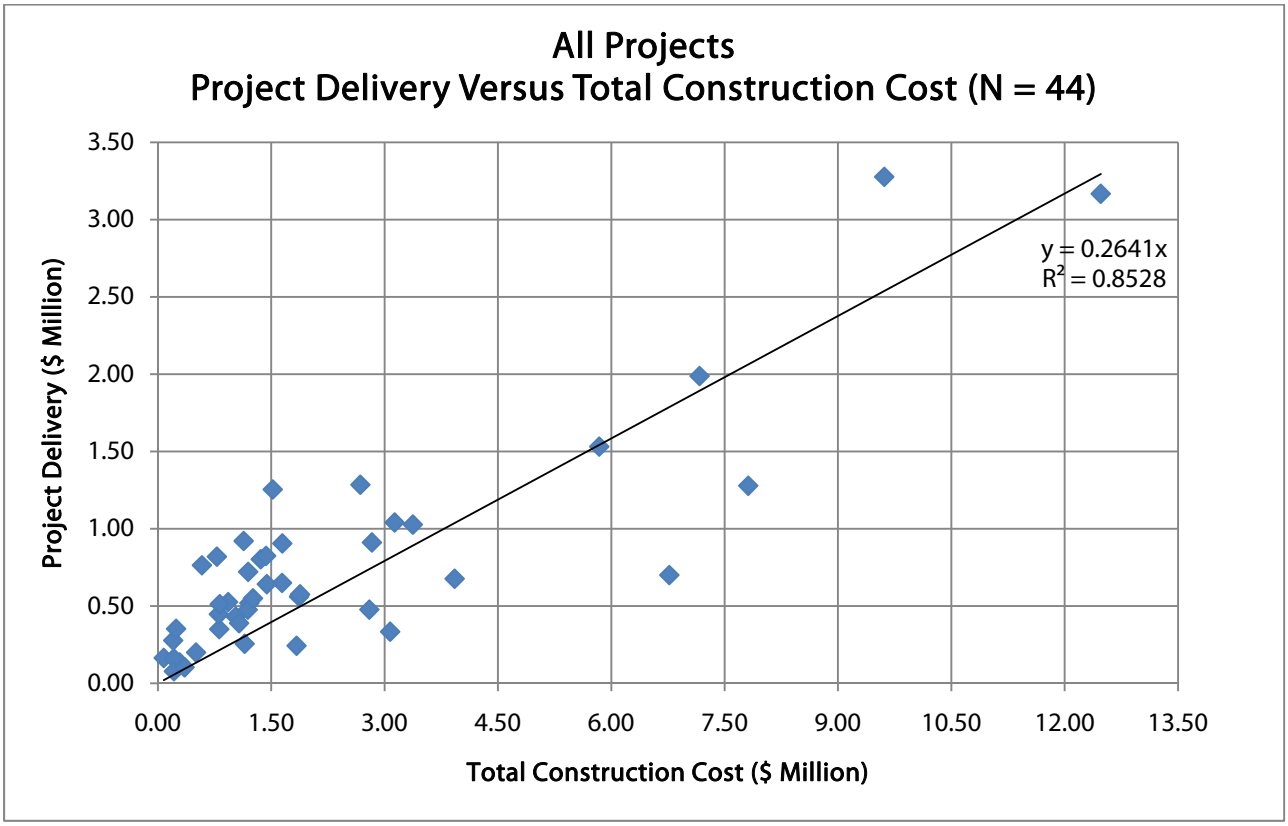
Source: OCA analysis of Public Utilities budget data.

Appendix II: Regression Analysis Results

As discussed in finding three, we created data models of the component costs of project delivery versus the total construction cost. A simple, arithmetic mean is sensitive to outliers. As few as one or two projects of very high or low values will skew the mean in either direction, thus we analyzed the data based on 47 projects using regression analysis; 30 of these projects fit the smaller projects subset criteria. A regression analysis minimizes this variability because it reduces the amount of error due to outliers. These 47 projects are the result of our review of all Design-Bid-Build projects implemented between fiscal years 2000 and 2010 and completed between fiscal year 2006 and 2010. The results of the analysis are presented below.

Regression Analysis Results for All Projects, Fiscal Years 2000-2010

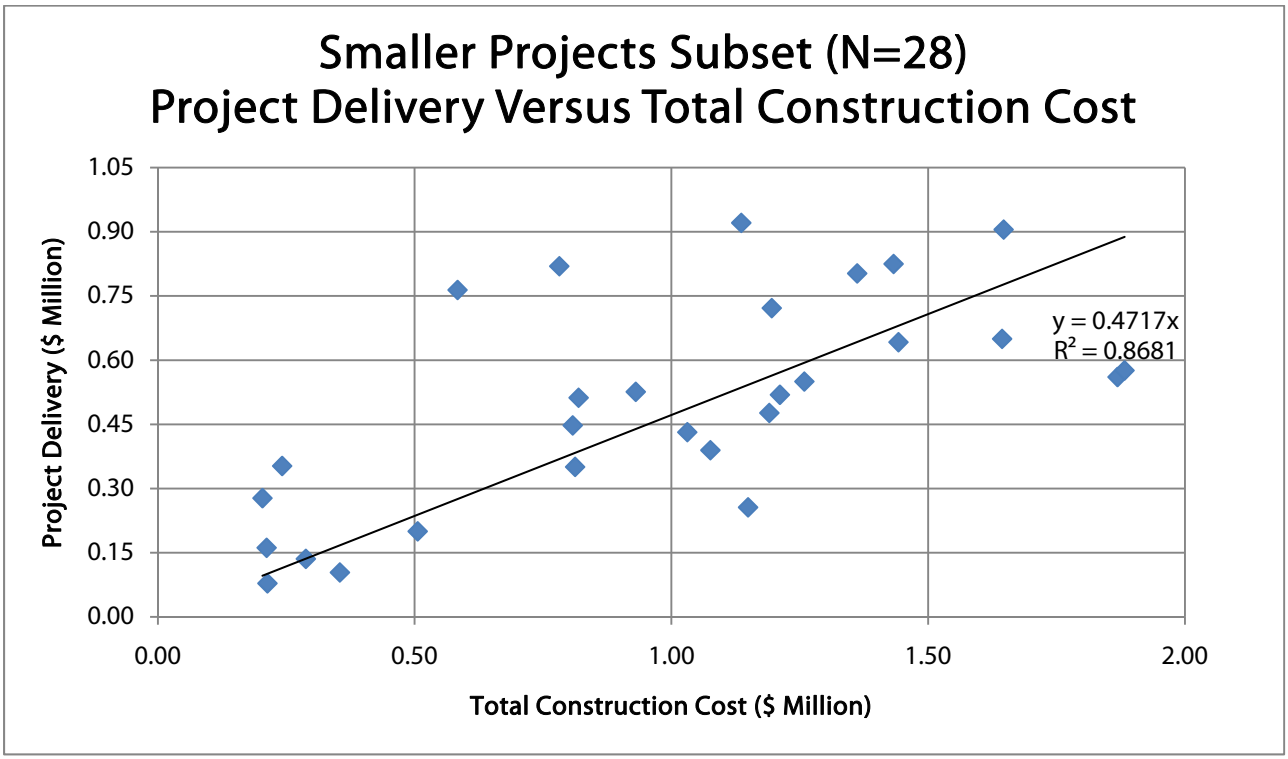
	Number of Projects	Project Delivery Cost		
		% of TCC	R^2	P-value
Smaller Projects Subset	44	26%	0.85	<.001



Note: Three outliers were removed.

Regression Analysis Results for Smaller Projects Subset, Fiscal Years 2000-2010

	Number of Projects	Project Delivery Cost		
		% of TCC	R^2	P-value
Smaller Projects Subset	28	47%	0.87	<.001



Note: Two outliers were removed.

Appendix III: Priority Ranking Factors

The City lacked effective prioritization until fiscal year 2008 when (1) Council Policy 800-14 was revised to establish guidelines for priority ranking of all CIP projects[94] and (2) the City established the CIP Review and Advisory Committee (CIPRAC) to provide a cross-functional review of the prioritization process to ensure guidelines were followed. The purpose of the prioritization policy is to establish an objective process for ranking projects so that officials have a basis for selection. CIPRAC developed a tool for scoring projects based upon the narrative criteria contained in Council Policy 800-14. The tool was initially created to prioritize transportation projects and was expanded by CIPRAC in 2011 for application to other types of projects.

Total Percentage	Overall Ranking Factor	Sub-factors and Percentages	
25	*Factor 1* – Health and Safety Effects	15	What is the imminent severity of the risk to health and safety by not conducting this project?
		10	Does this project eliminate or reduce risk to health and safety?
25	*Factor 2* – Regulatory or Mandated Requirements	25	Is this project required in part or in whole by legal mandate?
15	*Factor 3* – Implication of Deferring the Project	4	If deferred, will this project's total cost increase?
		3	If deferred, will operations and maintenance costs increase?
		4	If deferred, will this project have negative public perception?
		4	If deferred, will this project cause delays to other projects?
10	*Factor 4* – Reduction in Annual Recurring Costs or increase in longevity of the capital asset	10	What are the lifecycle increases and operations and maintenance costs or savings?
10	*Factor 5* – Community Investment	10	Once constructed, does this project contribute to improved economic growth?
5	*Factor 6* – Implementation	3	Does this project comply with the General Plan, community and financing plans, and master plans?
		2	Is the project straightforward and can it be executed in a reasonable timeframe?
5	*Factor 7* – Project Cost and Non-City Funding Opportunity	3	What is the degree to which the project is funded?
		2	Can this project be funded with non-City sources?
5	*Factor 8* – Project Readiness	2.5	What is the timeline to complete the current phase of the project?
		2.5	What milestones have been completed in the current phase of the project?

Source: OCA analysis of Council Policy 800-14, non-Transportation and non-Public Utilities scoring guidelines.

[94] Council Policy 800-14 was adopted for transportation projects in fiscal year 2007 and revised in fiscal year 2008 to incorporate the prioritization of all CIP projects. The scoring system for transportation projects includes additional ranking factors, such as capacity and service and revitalization.

Appendix IV: Regulatory Requirements for Water and Wastewater

Public Utilities water and wastewater operations are regulated, respectively, by the California Department of Public Health, which is concerned with the quality and safety of drinking water and the Environmental Protection Agency (EPA) which is concerned with pollution from sewer spill. Underinvestment of water and sewer and an aged and deteriorating infrastructures resulted in actions by these two regulatory agencies. In 1997, the California Department of Public Health issued a compliance order containing 83 items and requiring the City to complete various water projects. The California Department of Public Health issued this order because the City failed to adhere to a compliance agreement it signed three years earlier. Similarly, EPA took action against the City, which entered into various consent decrees with the federal government.

Consent Decrees with US Environmental Protection Agency

Agreement	Date Filed	Expiration Date
Partial Consent Decree	April 2005	June 2006
Second Partial Consent Decree	July 2006	June 2007
Final Consent Decree	July 2007	July 2013

Source: OCA analysis of Consent Decrees.

Summary of Consent Decree Requirements

Plan	Summary of Requirements
Sewer Overflow Response and Tracking	Additional reporting on sanitary sewer overflows and backups, and maintaining a response log; Crew staffing to respond to SSOs within thirty minutes Operate a flow metering alarms system to detect flow reductions
System-wide Cleaning Program	Clean each small diameter gravity collection sewer pipe once every five years
Accelerated Cleaning	Clean a minimum of 1,500 miles of pipe per year
Root Control Program	Clean at least 350 miles of pipe each year using mechanical root control Clean at least 150 miles of pipe each year using chemical root control
Sewer Pipe Inspection and Condition Assessment	Inspect all blocked pipes with CCTV within two weeks of a sanitary sewer overflow Inspect at least 40 miles of pipe with CCTV each year
Sewer Repair, Rehabilitation and Replacement	Repair all Acute Defects within one year of discovery of the defect Maintain a log of all Acute Defects Maintain a rolling ten year CIP
Fats, Oils & Grease Blockage Control	Conduct residential outreach programs Inspect food service establishments at least once every two years for compliance with regulations
Canyon Area Spill Elimination	Complete economic and environmental analyses for 42 canyons Conduct inspections of canyon area trunk sewers
Pump Station and Force Main Spill Reduction Action	Complete a list of projects for upgrading and replacing various pumps and motors
Other Sanitary Sewer Overflows	Secure 600 manhole covers each year Submit an annual report to the EPA
Capacity Assurance	Monitor and analyze capacity and sewer flow in large trunk sewers Complete specified capacity improvement projects

Source: OCA analysis of Final Consent Decree dated January 29, 2004.

Appendix V: Project Delivery Costs for Small Projects

Project	Design Initiation	Notice to Proceed	Length of Design (Years)	Notice of Completion	Total Construction Costs (Thousands of Dollars)	Project Delivery Costs (Thousands of Dollars)	Project Delivery as Percentage of Total
Water Group 665 (OT) (03)	10/20/1997	3/24/2010	12.4	10/31/2011	1,031.0	431.7	42
Sewer & Water Group 747 (CC30VC)-1	9/30/2002	3/18/2009	6.5	2/18/2011	1,644.0	649.9	40
3000 - Wtr GJ 753 CI (CC33VC)	11/25/2003	7/11/2008	4.6	7/09/2010	807.8	447.6	55
Water Group CI 911 (765)	4/01/2008	7/16/2010	2.3	3/03/2011	1,211.3	519.1	43
Water Group 785 (CM)	7/01/2005	4/01/2009	3.8	4/13/2011	1,868.8	560.7	30
Sewer & Water Group 796 (EA)-1	12/26/2003	7/18/2008	4.6	6/28/2010	288.1	135.7	47
Sewer & Water Group 683A (CH)	2/27/2003	11/18/2008	5.7	12/29/2010	505.9	200.0	40
Sewer & Water Group 829 (CH)	12/01/2006	6/04/2009	2.5	7/09/2010	211.8	161.6	76
Fault Crossing Retrofits to Lg Pipelines	4/03/2006	10/14/2008	2.5	4/16/2010	1,361.8	802.8	59
LJ Country Club Resemerg Relining Repair	10/31/2008	1/16/2009	0.2	5/28/2009	213.3	78.4	37
Barrett Reservoir Outlet Tower Upgrade	6/29/2001	3/27/2007	5.7	2/13/2009	1,647.1	905.2	55
54th Street	1/06/2004	11/29/2010	6.9	6/03/2011	203.5	277.6	136
7TH & BROOKES ST. ACCEL	8/4/2004	7/14/2008	3.9	9/18/2009	1,075.9	389.6	36
6300 Alvarado Channel Pipe Crossing	7/12/2005	10/07/2010	5.2	6/14/2011	242.0	352.8	146
PS Group IV (Mission Bay Comfort Pump Stations)	4/1/2003	12/31/2007	4.8	9/25/2009	1,432.7	824.9	58

Project	Design Initiation	Notice to Proceed	Length of Design (Years)	Notice of Completion	Total Construction Costs (Thousands of Dollars)	Project Delivery Costs (Thousands of Dollars)	Project Delivery as Percentage of Total
Sewer & Water Group 731 (PN6) (DEF)	9/3/2002	5/15/2009	6.7	9/22/2010	930.6	526.1	57
Sewer Group 766 (OT)	9/25/2003	12/04/2009	6.2	1/06/2011	1,136.1	921.0	81
Sewer & Water Group 772 (KE)	9/11/2003	9/29/2010	7.1	11/07/2011	1,442.2	642.1	45
Bird Rock Sewer Improvements	7/26/2004	9/05/2007	3.1	1/08/2010	1,149.3	256.1	22
Sewer & Water Group 829 (CH)	12/1/2006	6/04/2009	2.5	7/09/2010	819.3	512.3	63
Sewer Main Pipeline Rehabilitation Phase I-1 GRC, Part 1	3/02/2009	4/14/2009	0.1	10/30/2009	354.3	104.0	29
Penasquitos Views TS 12/10 EPA	4/20/2001	1/14/2009	7.7	7/29/2010	781.7	819.6	105
Sewer PS 18 Phase II	10/07/2004	6/01/2007	2.6	4/08/2009	1,882.6	576.0	31
DAKOTA CANYON ACCELERATED	4/24/2002	12/13/2007	5.6	7/9/2009	1,195.4	721.8	60
60th Street	11/08/2002	4/20/2009	6.5	8/02/2011	583.6	764.1	131
Quincy Street & Wilbur Ave.	2/01/2008	10/29/2009	1.7	2/01/2011	1,190.7	476.7	40
Famosa Accel. - Sewer & Water	7/30/2004	6/29/2009	4.9	10/31/2011	1,258.9	550.2	44
Sewer & Water Group 731 (PN6) (DEF)-1	9/03/2002	5/15/2009	6.7	9/22/2010	812.5	350.6	43

Source: Public Works/Engineering Department.

Appendix VI: Definition of Audit Recommendation Priorities

DEFINITIONS OF PRIORITY 1, 2, AND 3
AUDIT RECOMMENDATIONS

The Office of the City Auditor maintains a classification scheme applicable to audit recommendations and the appropriate corrective actions as follows:

Priority Class[95]	Description[96]	Implementation Action[97]
1	Fraud or serious violations are being committed, significant fiscal or equivalent non-fiscal losses are occurring.	Immediate
2	A potential for incurring significant or equivalent fiscal and/or non-fiscal losses exist.	Six months
3	Operation or administrative process will be improved.	Six months to one year

[95] The City Auditor is responsible for assigning audit recommendation priority class numbers. A recommendation which clearly fits the description for more than one priority class shall be assigned the higher number.

[96] For an audit recommendation to be considered related to a significant fiscal loss, it will usually be necessary for an actual loss of $50,000 or more to be involved or for a potential loss (including unrealized revenue increases) of $100,000 to be involved. Equivalent non-fiscal losses would include, but not be limited to, omission or commission of acts by or on behalf of the City which would be likely to expose the City to adverse criticism in the eyes of its residents.

[97] The implementation time frame indicated for each priority class is intended as a guideline for establishing implementation target dates. While prioritizing recommendations is the responsibility of the City Auditor, determining implementation dates is the responsibility of the City Administration.

Appendix VII: Management's Response

THE CITY OF SAN DIEGO

MEMORANDUM

DATE: September 26, 2011

TO: Eduardo Luna, City Auditor

FROM: Roger Bailey, Director of Public Utilities

SUBJECT: Appendix VII. Management Response to Public Utilities Capital Improvement Program Audit Report (draft) - AMENDED

Attached is a revised Management Response to replace the version submitted on Friday, September 23. The response to recommendation #5 has been amended.

The response has been coordinated with the departments of Public Works, Enterprise Resource Planning Support and Development Services, and the City Comptroller, and is forwarded for inclusion in the subject audit report.

Roger S. Bailey

Attachment: Appendix VII. Management Response

cc: Jay Goldstone, Chief Operating Officer
Wally Hill, Assistant Chief Operating Officer
Ken Whitfield, City Comptroller
Debra Bond, Director – Enterprise Resource Planning Support
Kelly Broughton, Director – DSD
Tony Heinrichs, Director – Public Works

Management's Response to Report Recommendations

The City acknowledges the Office of the City Auditor review of the Public Utilities Department Capital Improvement Program performed in response to a request from the Independent Rates Oversight Committee (IROC). The Public Utilities Department, along with Public Works - Engineering, has successfully executed more than $700 million dollars of capital improvements over the last 5 years. These successfully executed projects were planned, designed and constructed to industry standards and help ensure the Department remains in regulatory compliance and provides reliable, uninterrupted water and wastewater services.

The following summarizes the audit findings and recommendations contained in this report and the City's responses to these recommendations.

OCA Recommendations Related to the Asset Management Program (Finding 1):

To improve Public Utilities' Asset Management Program, we are recommending that the Director: (Priority 3)

1. *Work with Public Works/Engineering and Development Services to develop a documented process that ensures all information and documents on completed projects are provided to Public Utilities in a timely manner and include this in service level agreements with these departments.*

    - The process should include a control for Public Utilities to ascertain that Public Works/Engineering and Development Services are providing all information within the agreed upon timeframe.

    Response: Agree with recommendation.

    DSD and E&CP staff has developed a revised As-Built/Closeout process that addresses many of the concerns raised. It will be implemented once they complete the current effort to implement the DSD Project Tracking System (PTS) for inspection by E&CP of Grading and ROW permits. The use of PTS to track inspections and closeout will allow Public Utilities to monitor their progress electronically. Implementation is expected to be completed by June 30, 2012. DSD is also implementing an imaging system to replace the current microfiche archival system for engineering records. This will allow the electronic distribution of As-Built plans and access to an electronic index of the drawings.

2. *Determine the frequency of which the condition of appropriate assets should be assessed and establish a schedule for these assessments, particularly for water transmission mains.*

    - Reassess the most cost effective approach for assessing the condition of and prioritizing water distribution pipes as the Department develops its replacement program for asbestos cement pipes, such as the use of predictive software to forecast asset condition.

Response: Agree with recommendation.

We agree with the establishment of frequencies and schedules for the condition assessment of certain classes of assets. Furthermore, the Public Utilities Department has commenced development of an integrated, system-wide condition assessment program that will be completed by June 30, 2012. This program will delineate the methodology used for determining optimal assessment frequencies and will establish an associated schedule based on these frequencies for the applicable asset classes. In general, assessment frequencies will vary depending upon factors such as the type of asset, the current service condition of the asset, any applicable regulatory requirements, etc. The assessment frequency will also be based on currently utilized and industry standard guidelines.

It should be noted that the Department has conducted a significant number of condition assessments on its infrastructure in recent years and will continue to follow the currently established schedule of assessments. The Department's condition assessment group has concentrated on certain asset classes such as major wastewater treatment facilities, municipal wastewater pump stations and water pump stations. For the coming year, the schedule calls for the assessment of several major water transmission lines and major wastewater interceptor (force) mains. Condition assessments on our largest wastewater pump stations that began in FY11 will be continuing through this year. The Department also performs on-going CCTV inspection and assessment of small diameter wastewater pipelines. The Department will continue the use of predictive condition assessment software as it applies to rotating equipment (vibration analysis, oil analysis) or electrical components (IR/thermography).

3. *Develop a schedule for implementation of SAP Enterprise Asset Management (EAM) and provide updates on progress to IROC and other stakeholders.*

    - To ensure that all City departments, including Public Utilities, derive benefits from the Department's SAP EAM implementation, coordinate with ONESD's efforts to merge with the existing EAM system for streets and storm water.

Response: Agree with recommendation.

The Public Utilities Department will develop a schedule for implementation, contingent upon project approval, and will regularly provide status updates to stakeholders by September 30, 2012. The Department will continue to coordinate with the ERP Department and will endeavor to participate in any City-wide projects that may impact the Department's SAP EAM project.

4. *Assess whether the current criteria and process for determining whether to develop a full BCE for a project is sufficient to ensure that all appropriate capital projects are justified.*

    - Ensure that BCE abstracts consistently include the necessary financial and other data to support business decisions.

Response: Disagree with recommendation. Action completed.

This has been assessed and the current criteria and process described in the Department Instruction (DI) 50.10 and Department Process Narrative for the BCE abstract and full BCE are considered sufficient. The review and approval of BCE abstracts and full BCEs consists of management from various divisions within the Department. The information provided in the BCE abstract includes project summary, alternatives, and cost estimates which are sufficient for the reviewers to determine if the project can move forward or if a full BCE is required. The project cost estimates for the alternatives specified in the abstract are retained in the project file.

5. *Provide input to the Capital Improvement Program Review and Advisory Committee (CIPRAC) regarding the prioritization ranking tool, so that appropriate changes can be made to Council Policy 800-14.*

Response: Partially agree with the recommendation. Action completed.

As a member of CIPRAC, the Public Utilities Department will continue to provide input on all CIPRAC discussions/proposed changes to Council Policy 800-14 and the prioritization ranking tool to ensure that Public Utilities projects can be properly prioritized. The Department considers that the current Council Policy 800-14 provides the proper criteria to prioritize Public Utilities projects. In addition, the current prioritization process and criteria used by Public Utilities has been reviewed and approved by the IROC.

6. *Complete a consolidated asset management plan and ensure it is in line with best practices and includes a schedule for implementation with a combination of short-, mid-, and long-range initiatives to ensure that funds and staff availability are not barriers to successful implementation.*

- Ensure that the plan includes:
  - measurable goals and objectives;
  - clear, numeric goals for the target level of condition the Department wants to achieve for appropriate assets; and
  - performance measures that are linked with these goals.

- Monitor and report out performance measures to the IROC, City Council, customers and other stakeholders.

Response: Partially agree with recommendation.

The Public Utilities Department is in the process of developing an enterprise asset management plan that will be completed by June 30, 2012. This plan will follow best practices and will aggregate current Public Utilities asset management efforts and future initiatives into a single document. The plan will provide a management framework for processes and procedures, and tools and documentation so that the Department is able to demonstrate how it generates and manages information regarding what assets it has, what the on-going condition of those assets are,

what they cost, and how best to maintain, renew and replace those assets. However, the plan cannot ensure that funds and staffing will be available over the life of the plan due to fluctuations in priorities and funding beyond the control of the Department.

OCA Recommendations Related to the Wastewater Master Plan and Communication of Capital Needs to Stakeholders (Finding 2):

To improve capital planning and increase transparency and public awareness of capital needs, we recommend that the Director of Public Utilities: (Priority 3)

7. *Develop a comprehensive Wastewater Master Plan based on a full assessment of the wastewater system's needs and best practices when it updates this plan in five years (or as-needed).*

    - Provide links to other plans or documents when best practice elements are excluded from master plans.

    Response: Agree with recommendation.

    The Public Utilities Department has comprehensive wastewater master planning processes that are comparable to the processes utilized to produce the Water Facilities Master Plan. Through these master planning processes, which include full assessment of the system's need and best practices, the Department has generated prudent documents providing direction for the required wastewater facility improvements in the next 30-40 years. The subject issue is that all these documents were not incorporated in one master plan document. Some documents generated by the master planning processes, such as the project prioritizations and long-term financial projections, were not included in the Metropolitan Wastewater Master Plan or Municipal Wastewater Master Plan for the intent of keeping these plans at a high level. It should be noted that both the Metropolitan and Municipal Wastewater Master Plans and other associated master planning documents played a significant role in successfully guiding the Metro and Muni funded CIP in the past. The Department agrees with this recommendation and will ensure that all relevant documents and plans are linked/referenced to one another for the future master plan updates.

8. *Conduct regular updates to master, CIP and financing plans.*

    - Update water and wastewater master plans every three to five years.

    Response: Partially agree with recommendation.

    The Public Utilities Department is in agreement with conducting regular updates to master, CIP and financing plans. However, as the master plans cover periods of 30 to 40 years, the Department feels an update every five years, or as needed, would be more appropriate.

9. *Include basis for determining the funding mix in future Master Plans, CIP plans, or a financing plan and make these available to the public.*

Response: Agree with recommendation. Action completed.

This practice has been implemented and was presented to the IROC on July 18, 2011.

10. *Improve the Department's strategy for communicating capital needs to stakeholders, including providing estimated deferred maintenance and unfunded needs if needed rate increases are not secured and implications of deferring projects.*

Response: Partially agree with recommendation. Action completed.

The Public Utilities Department is currently communicating capital needs through meetings and presentations to stakeholders such as Metro TAC, CIPRAC, IROC, and the City Council. The meetings and presentations are open to the public. The circumstances of deferred maintenance or deferred projects due to underfunding have not occurred in recent years, and the next rate case is not expected in the next couple of years. Although the necessity of communicating the unfunded needs does not exist, the Department will continue the current communication effort to inform the stakeholders of our ongoing and future capital needs. When the time of the next rate case approaches, the Department will strategize and initiate public involvement as it has in past rate cases.

OCA Recommendations Related to the E&CP's Project Delivery Costs (Finding 3):

Public Works/Engineering generally agrees with the recommendations in the report. The department has been working on several issues raised by the audit over the last year, including:

- The department is in the early stages of implementing Project Portfolio Management Integrator (PPMI) which is a Web based version of Primavera software that will provide access to baseline and actual monthly schedule and cost information for all projects in the system. With the implementation of PPMI, all project data will be located in one location on line.
- The department reviews and updates project level schedule and cost information monthly for each project.
- The Public Works Department and Public Utilities Department management teams review and report on projects of particular importance, grant funded projects, regulatory compliance deadlines and all projects showing significant schedule deviations from the baseline on a monthly basis.

The information requested is currently available for all 404 water and sewer projects being managed by the Public Works Department. The sheer volume of information makes considering projects outside of those currently reported on difficult to combine in one report. What will become available with the implementation of PPMI is that all project data will be located in one location on line, and the recommendation to add cost deviations to the reporting will provide further opportunities to address inefficiencies.

The Audit report does explain the three significant differences amongst the projects reviewed and the 2010 Statewide Benchmarking Study projects. The Audit report provides a good background of the delay costs resulting from the lack of access to the bond market, the impact of the economic recession which resulted in bids that were below market, and the fact that all the other cities in the Benchmarking Study require prevailing wages for all construction. In addition it should be noted that the City's restructuring took place in 2007 and in 2008 the DOS accounting system was replaced with SAP. For these reasons the Public Works Department does not believe the projects in this data set are a good reflection of the current organization, nor is the 2010 Statewide Benchmarking Study a proper benchmark. While seven of the 28 projects were completed within a normal design timeframe of less than 2.5 years, only three were completed in the timeframe covered by the 2010 Statewide Benchmarking Study. These three projects have a combined delivery cost of 31% and compare well with the expected average of 33%. Because all the projects in the data set were bid and awarded after the economic recession, it is uniformly accepted that delivery costs, as a percentage of the construction costs, will be greater than prior to that timeframe represented in the benchmarking study.

Given all the changes resulting from the consolidation of project management in the Public Works Department, implementation of a new accounting system, the increase in delivery costs resulting from the recession driven construction costs and the delays resulting from the City's inability to access the bond market, these projects do not reflect the current organization's ability to deliver projects within expected norms. The Department will make the changes noted above and is committed to addressing issues raised in the report to improve project implementation.

To improve the monitoring and reporting of project delivery costs, we recommend that the Public Works Director: (Priority 2)

11. *Revise the service level agreement with the Public Utilities Department to describe specific requirements to monitor and report project delivery costs.*

    Response: Agree with recommendation.

    By June 30, 2012, the Public Works Department will revise the FY2013 SLA to provide the information indicated in the response to Recommendation 13 below, and over the last year has been working to implement Project Portfolio Management Integrator (PPMI) which is a Web based version of Primavera software that will provide access to baseline and real time schedule and cost information for all projects in the system.

12. *Develop project-level delivery costs progress reports from the Project Portfolio Management Integrator or other sources to track, monitor, and report planned versus actual costs on a monthly basis for all active projects.*

    Response: Agree with recommendation.

The implementation of PPMI will provide access to updated schedule and cost information for all projects in the system. The new software will be available by the end of this fiscal year.

13. *Report final project delivery costs versus total construction costs at the completion of each project. Annually, compile, consolidate, and analyze performance data of completed projects to identify inefficiencies and enhance performance and value, such as by developing a Process Improvement Plan as recommended by project management guides and standards.*

    Response: Agree with recommendation.

    By June 30, 2012, the Public Works Department will add this reporting requirement to the FY2013 SLA to provide the information indicated.

To improve the financial management and budgeting of capital projects, we are recommending that the City Comptroller: (Priority 2)

14. *Develop a regulation process narrative that outlines charges that are appropriate direct expenses.*

    Response: Agree with recommendation.

    A process narrative providing guidance to determine capitalized costs for projects will be published by June 30, 2012.

15. *Establish a policy and guidelines to streamline the process to identify costs related to construction management and the construction contract that requires:*

    - All city labor for construction management, excluding City forces, to be charged to Construction Administration (WBS .06.02);
    - All construction contract vendor payments to be charged to Field Construction (WBS .06.01.02); and
    - The correction of all inaccurate charges within a timely manner.

    Response: Disagree with recommendation. Action completed.

    The current system is already structured in this manner.

To improve the management and transparency of capital projects, we are recommending that the Public Works Director and the Enterprise Resource Planning Support Director work together to:

16. *Establish a more effective process for obtaining input from Public Works/Engineering regarding SAP concerns impacting project management and address high priority issues expeditiously.*

    Response: Disagree with recommendation.

    An effective process already does exist. The process involves staff from the operational department, the business process owning department, and the ERP Department. Steps in the process are issue identification, problem definition, root cause analysis, proposed resolution, and subsequent prioritization of SAP system changes if any are required to address the issue.

17. *Develop and implement a tool to allow budget-to-date actual expenditures, such as for planning, design, and construction, to be available in one document or report.*

    Response: Disagree with recommendation.

    The report creation process will continue in its current state which ultimately results in one consolidated report. The tools that are used to create the report will continue to be the original source data systems, SAP, and when project costs have occurred before the implementation of SAP, the AMRIS system. In those cases, the data will be reconciled to the best ability according to the categorization of the postings.

OCA Recommendations Related to the Overhead Charges (Finding 4):

To ensure that the City charges appropriate overhead rates, we are recommending that the City Comptroller: (Priority 2)

18. *Develop an effective methodology for developing overhead rates and make retroactive adjustments if needed to ensure that departments correctly receive overhead funds as budgeted and billed in fiscal year 2012.*

    Response: Agree with recommendation.

    The Office of the City Comptroller is currently evaluating an appropriate methodology utilizing information fields within SAP to develop an accurate overhead rate structure for FY12. The new rates will be applied actively (retroactively) to the appropriate accounting periods in FY12 once the rates are finalized to ensure that charged overhead is materially correct. This work will be completed before November 30, 2011.