

AUDIT REPORT

CITY AUDITOR

Report Date:	December 1, 2016
Department:	Water Resources
Subject:	Asset Management Program
Lead Auditor:	Kate Witek

OBJECTIVE

This audit was conducted to determine whether internal controls and processes related to Water Resources asset management are adequate to provide reasonable assurance that:

- Asset lifecycle, condition, and maintenance data are actively maintained and used to inform capital improvement planning.
- Asset information is complete and accurate.
- Critical risks related to asset management are minimized.

SCOPE & METHODOLOGY

To accomplish our objectives, we:

- Reviewed governmental and industry regulations, guidelines, and best practices¹ for the management of water and wastewater utility assets and infrastructure.
- Reviewed Council Reports & approved minutes; budget presentations; and information published on the Water Resources website, including the department's Strategic Plan.
- Interviewed staff in the Water Resources and Financial Services departments.
- Toured water and wastewater facilities.
- Reviewed Asset Management Project expenditures, funding sources, forecasting models, risk assessments, and other related records.
- Analyzed data from multiple systems used to track capital assets, capital improvements, maintenance, and related activities, including the Advanced Maintenance Management System (AMMS); the Cityworks database (CMMS); and the Advantage Financials Fixed Assets (FA) system.
- Tested the asset tracking/inventory process.

BACKGROUND

The City of Mesa Water Resources department maintains approximately \$1 billion in capital assets; including a water treatment plant, 3 wastewater reclamation plants, 33 groundwater wells,

¹ The US Environmental Protection Agency (USEPA) Office of Water (OW) has published extensive guidance on asset management for water and wastewater utilities. This guidance includes a well-developed framework of best practices and standards, which provided the majority of the criteria we used to evaluate the Water Resources department's asset management program and practices.

2,364 miles of water mains, and 1,781 miles of wastewater mains. Water Resources also participates with the City of Phoenix in the joint-use of the Val Vista water treatment facility and a wastewater facility in Tolleson, AZ. An additional water treatment plant in the southeast area of the City is under construction and is expected to be completed in 2018.

The City recognizes the importance of maintaining and investing in water and wastewater infrastructure and assets, both above and below ground, to improve reliability and prevent service disruptions. To that end, the Water Resources Department's Capital Improvement Plan currently includes \$96M for 47 separate Lifecycle/Replacement/Reliability bond projects. Lifecycle projects are identified and prioritized by management using data from multiple sources, including but not limited to two separate asset management systems, GIS tools, and institutional knowledge.

The 2013/2014 Strategic Plan published by the Water Resources Department includes a stated goal to:

"Develop and implement an asset management program through which all assets are identified, characterized, and mapped in GIS, and through which maintenance and replacement is documented, analyzed and predicted," using "condition assessment and predictive failure analysis to replace/rehabilitate infrastructure at the most cost-effective time."

This goal envisions a fully developed and operational asset management program. To make that a vision a reality will require dedicating considerable staff time, expertise, and other resources to the program. The department's Asset Management Group is charged with this responsibility, but this group is comprised of employees with many other responsibilities; therefore, the department has made limited progress toward this goal.

CONCLUSION

In our opinion, internal controls and processes related to Water Resources asset management are adequate to provide reasonable assurance that asset information is accurate and actively maintained, and that critical risks related to asset management are minimized. We found that the asset management program is working well in many areas, particularly in the monitoring of water and wastewater pipe systems. However, we also found that there are opportunities for improvement in some areas. Our observations and recommendations are summarized below. For additional details, and responses from management, please see the attached Corrective Action Plans (CAPs).

OBSERVATIONS & RECOMOMENDATIONS

1. Although the Water Resources department does have an "Asset Management Group" and already engages in many of the asset management best practices recommended by the industry, they have not adopted a formal written policy establishing an asset life-cycle management program as an ongoing operational activity. We are recommending that they do so, to provide clear direction to staff and to ensure that a comprehensive asset management program remains a strategic priority for the department.

2. Water Resources asset management systems contain condition and useful life information for many critical assets; however, there are other assets for which this data has not yet been recorded. This additional data could be useful when planning and budgeting for capital maintenance and replacement needs. Also, due in part to system limitations, the current systems do not contain context-specific maintenance information; for example, run time and environmental conditions. We are recommending that staff periodically assess the physical condition and remaining useful life of critical capital assets, where the benefits of undertaking the assessment outweigh the costs. This information should be recorded and used in a structured process to identify and prioritize repair/replace decisions.
3. Water Resources Engineers perform risk assessments to monitor and identify assets for repair/replacement, but the process is not comprehensive. Additionally, the rating scales used to evaluate risks could be more consistent among engineers. We are recommending that the department develop a consistent assessment procedure to be used, when appropriate, for evaluating risks associated with certain critical assets. The resulting data should be used to inform both short- and long-term CIP planning.
4. The Asset Management Project Advisory Committee does not include staff from the department's plants and facilities. We are recommending that management include representatives from these locations on the Committee.

CAP#1 : Asset Management Program Policy

Observation: The Water Resources department has established a strategic goal of implementing a comprehensive asset management program, and has established an Asset Management Group; but they have not formally adopted a policy which establishes a comprehensive asset life-cycle management program.

Criteria: According to the EPA's Best Practices Guide, "*Asset management is maintaining a desired level of service for what you want your assets to provide at the lowest life cycle cost. ... Asset management is implemented through an asset management program and typically includes a written asset management plan.*"

The Government Finance Officers Association (GFOA) Best Practice Advisory *Adopting Financial Policies* recommends that governments formally adopt "*Capital policies that cover the lifecycle of capital assets, including capital improvement planning, capital budgeting, project management and asset maintenance.*" The GFOA also maintains that capital policies support good bond ratings and can help reduce the cost of borrowing.

Comment: Water Resources already engages in many of the asset management best practices recommended by the industry, such as condition testing and predictive risk modeling for underground assets (pipes). However, without a formal policy (a management directive), the department has not yet fully realized its goal of having a fully developed asset management program as stated in its strategic plan.

Recommendation: Water Resources management should develop and implement a policy, and related procedures, to establish a comprehensive asset management program as an operational activity.

Management Response: Agree.

Implementation Plan: The Department agrees with the need to have a comprehensive policy. After developing a Vision Statement laying out the strategic objectives and a high level Implementation Plan, the Department worked with users to obtain their feedback prior to releasing a policy. The Vision Statement was completed in September 2015, followed by the Implementation Plan in December 2015. After these

activities were completed, the Department developed a short concise policy which aligns with the Strategic Plan.

Individual or Position Responsible: Dan Cleavenger, Water Resources Department Director

Estimated Completion Date: Done

CAP#2: Incomplete Data in Asset Management Systems

Observation: Some asset records in Water Resources' asset databases do not contain all available information; and there are no policies/procedures requiring staff to record/maintain context-specific maintenance information, such as runtime and environmental conditions, which may be useful in assessing risks. There is also no policy requiring that assets be periodically inventoried. If this data is not captured and continually maintained, it cannot be used to identify and prioritize repair/replace decisions.

Criteria: The GFOA Best Practice Advisory, *Capital Asset Maintenance and Replacement*, recommends that governments establish an inventory system, including regularly measuring the physical condition of all critical assets, and assessing remaining asset useful life to appropriately plan and budget for capital maintenance and replacement needs.

The GFOA Best Practice Advisory, *Capital Planning Policies*, recommends that capital planning policies include identification of how decisions are made in the capital planning process, including a structured process for prioritizing need and allocating limited resources.

Comment: Water Resources asset management systems contain condition and useful life information for many critical assets; however, there are other critical assets for which this data has not yet been recorded, but for which this additional data could be useful when planning and budgeting for capital maintenance and replacement needs. Also, due in part to system limitations, the current systems do not contain context-specific maintenance information; for example, run time and environmental conditions.

Recommendation: Water Resources asset management procedures should require a periodic assessment of the physical condition and remaining useful life of critical capital assets, where the benefits of undertaking the assessment outweigh the costs. This data should be recorded in asset management systems and used to prioritize repair/replace decisions in a structured capital planning and maintenance process.

Management Response: [Agree.](#)

Implementation Plan: The Department is in the process of developing a program to support the condition testing program for critical assets. The following general steps will be followed:

- Define condition assessment objectives and drivers, condition rating system and desired outcomes
- Define performance measures and failure modes
- Identify potential test procedures, monitoring modes, performance evaluations, and inspection procedures
- Develop a draft condition assessment plan
- Define pilot program for testing of condition assessment program for two selected asset types (future goal)

The Water Resources Department will complete the condition assessment procedures by the completion date below.

Individual or Position Responsible: Carlos Padilla, Water Resources Assistant Director

Estimated Completion Date: 11/30/2017

CAP#3: No Comprehensive Predictive Risk Assessment Process

Observation: While WR engineers perform risk assessments to monitor and identify some assets for repair/replacement (primarily for below-ground assets), the department has not developed comprehensive risk assessment procedures for all critical assets.

Criteria: Industry best practice, cited in a 2007 joint study by the Water Environmental Research Foundation, American Water Works Association, and the US Environmental Protection Agency, *Condition Assessment Strategies and Protocols for Water and Wastewater Utility Assets*, recommends monitoring critical assets and performing recurring risk assessments, using uniform condition criteria and risk ratings, to help identify, document, and prioritize assets for repair or replacement.

Comment: Currently, once an asset has been identified as a possible CIP project by maintenance staff, an engineer is assigned to complete a risk assessment. However, performing a risk assessment for an asset that has already been identified as a possible capital improvement project may not identify all needs or the most critical overall need.

Also, we found inconsistencies in the risk rating methods used by different engineers. For example, ratings assess consequence of failure/likelihood of failure (COF/LOF) based on a 1-5 rating scale. Some engineers add these two ratings together (1-10), and some multiplied the two ratings (1-25). This makes the data less useful for prioritizing CIP projects.

Recommendation: Water Resources management and engineering staff should develop a risk based assessment procedure for critical assets. Depending on the type of asset, this procedure could include targeted monitoring, condition testing, inspections, and maintenance history to evaluate the probability of failure. This information should be used to help prioritize CIP projects.

Management Response: Agree.

Implementation Plan: The objective is to develop risk assessment and management procedures. This will include the following steps:

- Define a policy statement that states clear objectives and purposes to guide the management of risk
- Identify the risks that will be managed focusing on physical failure risks and operational risks
- Develop rating system with associated weights tied to condition rating, maintenance/failure history, consequences of failure, probability of failure, etc.

Define how the output from the risk management procedures will be used to help prioritize CIP projects.

Individual or Position Responsible: Carlos Padilla, Water Resources Assistant Director

Estimated Completion Date: 11/30/2017

CAP #4: Project Advisory Committee

Observation: Plant/facility staff do not participate on the Project Advisory Committee assisting in the development of the asset management program.

Criteria: The United State Environmental Protection Agency, Office of Groundwater and Drinking Water, advises that successful asset management requires a dedicated team, including "utility operators with knowledge of current infrastructure assets".

Comment: A shared vision and action plan are the foundation for a successful life-cycle asset maintenance/management program. Developing a vision should bring all stakeholders together to reach consensus on program objectives and to help prepare a plan for successful program implementation.

Recommendation : Management should assign plant staff to the Asset Management Project Advisory Committee work group.

Management Agree.

Response: Implementation Plan: The Department is now embarking on reviewing the asset management systems at the plants so it makes sense now to include plant staff in the internal committee referenced above. Up to this point the Department has been reviewing the water distribution and wastewater collection assets (non-plant assets).

Individual or Position Responsible: Dan Cleavenger, Water Resources Department Director

Estimated Completion Date: Done