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Achieving effective asset management for water and wastewater utilities: A comparison of policy options for a special district and a medium city

Cari K Dale

ACHIEVING EFFECTIVE ASSET MANAGEMENT FOR WATER AND WASTEWATER UTILITIES: A COMPARISON OF POLICY OPTIONS FOR A SPECIAL DISTRICT AND A MEDIUM CITY

A Project

Presented to the

Faculty of

California State University,

San Bernardino

In Partial Fulfillment

of the Requirements for the Degree

Master of Public Administration

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ABSTRACT

Clean and dependable water supplies and reliable sewage conveyance systems have utmost importance to today's economy, lifestyles and quality of life. Water and sewer pipelines, reservoirs, lift stations and water and sewage treatment facilities that deliver water to customers and convey sewage away from homes and businesses make up an intricate network of infrastructure referred to as assets. These assets have extreme value both in a financial and in a service-related sense and as such, need to be managed effectively.

This project examined the need for effective asset management within the utility industry and developed an ideal model for effective asset management drawn from successes experienced in Australia and New Zealand. The ideal asset management model also incorporated elements of programs developed within the United States.

Asset conditions were described for small and medium sized utility groups within the United States. Asset management practices were also closely examined at the City of Ontario Utilities Department, a medium sized utility, and also at the Rainbow Municipal Water District,

a small-sized utility. In addition, gaps between the ideal model and the existing practices at both utilities were investigated and contrasted.

Research was performed using industry and academic literature, lectures, government publications, utility planning documents and personal interviews.

The study concluded that overall asset management within the United States is unsatisfactory, with smaller utilities doing a poorer job overall than their larger counterparts. This trend of larger-sized utilities experiencing greater successes in this area than smaller utilities follows closely with data and practices found at the City of Ontario and at the Rainbow Municipal Water District. Both organizations are yet to achieve the benefits of the ideal asset management model, however recommendations for progressing towards a realistic version of the model were outlined and perceived achievable.

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CHAPTER ONE

INTRODUCTION

Public health and the economy depend on the delivery of clean and safe water and the conveyance and treatment of wastes on a continuous basis for homes and businesses. "America's public water systems create direct economic value across nearly every sector of the economy and every region of the country."[1] The vast network of pipes and distribution mains making up the backbone of water and wastewater systems are community assets and are intricately tied to quality of life and economic vitality.[2] With so much value contingent on utility services, great care must be taken to preserve water and wastewater system assets by actively upgrading, repairing and replacing. Contrary to this principle, critical infrastructure maintenance, repair, renewal and replacement is not occurring at a rate that overcomes the rate of deterioration. When the rate of reinvestment is

[1] American Water Works Association, Dawn of the Replacement Era, Reinvesting in Drinking Water Infrastructure, May 2001, 9.

[2] California Rebuild America Coalition, Foundation for the Future, Rebuilding California Infrastructure for the 21st Century, 3.

less than the rate of deterioration, overall infrastructure condition declines and physically manifests itself in the form of asset failures such as pipeline breaks and leaks, broken valves and even potential contamination of the water.[3] "Failure to maintain infrastructure eventually adds to the costs of operation and can lead to more borrowing than would be otherwise necessary, can cause previous capital investment to be wasted if not adequately protected, can cause economic development in the community to be impeded because of low-quality government services, and will mislead about the total cost of providing services."[4]

Reasons for reinvestment deficiencies include state and local budget crises, voter ignorance of infrastructure needs, diversion of monies toward wartime activities,[5] shrinking maintenance staff,[6] federal program

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[3] Leonard L. Wilson and others, eds., "Cost Savings and Enhanced Reliability for Main Rehabilitation and Replacement", American Water Works Association Journal, 95, no.8, (August 2003), 75, 54-79.

[4] John L. Mikesell, Fiscal Administration, Analysis and Applications for the Public Sector, (Wadsworth, 2003), 56.

[5] Ken Christen, "Infrastructure Outlook Still Troubling, New Reports Find", Water Environment and Technology, 15, no. 12, (December 2003), 23, 23-25.

[6] James Gaha and Tony Urquhart, "Breaking the Cycle of Reactive Work, How Utilities can shift the focus from asset failures to strategic,

shortcomings,[7] and the desire to defer politically unpopular rate increases. Additionally, because much of the infrastructure consists of vast networks of pipes that are buried in the ground, condition assessments are difficult. For these assets, "Out of sight, out of mind" is an appropriate descriptor. Buried water and wastewater assets have therefore suffered from the lack of a thorough analysis of the factors which consider the actual conditions and performance of existing pipes, comparative repair, replacement and rehabilitation costs and potential improvements through various industry rehabilitation methods.[8] This type of analysis could provide the basis for "sound management of buried infrastructure."[9] Without such an analysis, infrastructure further declines.

Additionally, because the large capital dollars needed to put pipes into the ground were originally paid for by previous generations, people tend to take water and

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planned maintenance", Water Environment and Technology, 17, no. 2, (February 2005), 24, 23-26.

[7] Christen, 23.

[8] American Water Works Service Co., Inc. White Paper: Deteriorating Buried Infrastructure, Management Challenges and Strategies, (May 2002), 2.

[9] Ibid.

wastewater infrastructure for granted. The tremendous capital expense of the existing pipes is a cost that today's customers have not had to bear.

Water Resources

Water is a precious resource. In California alone, water supplies have been responsible for growth in urban and agricultural areas such as Los Angeles and the San Fernando Valley.[10] The great projects of this century have also enabled Californians to dam, store and move water throughout much of the state to serve the growing needs of the population. Some of the larger projects include: the Central Valley Project providing 7 million acre-feet annually to agriculture and including 20 reservoirs, 11 power plants, 3 fish hatcheries and hundreds of canals and pumping facilities;[11] the State Water Project incorporating 22 dams and reservoirs and 444 miles of canals to serve 2-3 million acre feet annually to urban and agricultural users;[12] and the Colorado River

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[10] Karen E. Johnson and Jeff Loux, Water and Land Use, Planning Wisely for California's Future, (Solano Press Books, 2004), 8.

[11] Ibid, 9.

[12] Ibid, 10.

Projects including the Hoover Dam, which were built to feed the urban demands of the southern part of the state.[13]

Diversion of water by the great projects has not come without costs, both environmentally and financially. For example, the loss of inflow into the Delta due to upstream diversions, has degraded the fishery in that area.[14] And, the financing of the building of the Colorado River Aqueduct in 1931, cost taxpayers $200 million.[15] Worldwide, industry trends show that water is becoming more and more scarce as it is bought and sold to the highest bidder. Reclassifying it from a resource to a commodity[16] may happen in the future. As consumers, it is important to keep in mind that available fresh water is equal to only one half of one percent of all available

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[13] Ibid, 9.

[14] Milton Kramer, Southern California's Looming Water Shortage: An Overview, p. 3

[15] Robert Gottlieb and Margaret FitzSimmons, Thirst for Growth, Water Agencies as Hidden Government in California, (The University of Arizona Press, 1991), 9.

[16] Maude Barlow and Tony Clarke, Blue Gold, The Fight to Stop the Corporate Theft of the World's Water, (The New York Press, 2002), 86.

water on the Earth.[17] It is a constrained resource and utilities need to ensure that they are doing their part in its efficient use so that every drop taken for consumption is not lost through leaks or pipeline failures. Leakage causes utilities to extract and treat more water than required by customers.[18] For these many reasons, utilities need to be on their toes and proactively implementing policies and procedures to achieve as little loss in the distribution system as possible.

A barrier to achieving low water loss is the reality that many pipes throughout the United States are now at the end of their useful lives. Some of the oldest pipes were constructed of cast iron and were installed in the late 1800s and with an average lifespan of about 120 years. With changing materials and manufacturing techniques, pipe lifespan fell to 100 years for those manufactured and installed in the 1920's and further declined to an average of 75 years for those pipelines installed after the Second World War.[19] To get ahead of

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[17] Ibid, 5.

[18] Leonard L. Wilson, 75.

[19] American Water Works Association, Dawn of the Replacement Era, Reinvesting in Drinking Water Infrastructure, 11.

the deterioration rate, utilities should formulate a well thought-out plan to rehabilitate or replace critical assets (pumping facilities, reservoirs and pipelines) before the end of their useful lives. Replacement and repair decisions should consider the degree of risk that a utility would face if the asset was used to the point of failure. The plan should also include addressing lifetime maintenance costs of assets and the financing of replacements. This risk-based approach safeguards the health and safety of the community, reduces overall costs and increases reliability.

Rehabilitation and renewal implementation becomes increasingly problematic when not fully supported financially and especially when it is not a core business strategy. "We have been mining our assets for the past several decades, balancing operating budget shortfalls by stripping maintenance and reinvestment from our operating programs."[20] Although agencies are investing some money in infrastructure, it is not being done aggressively enough and at a rate that keeps pace with or surpasses the

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[20] Matthew J. Doyle and Rose Duncan, "Protecting Your Assets," Water Environment and Technology, 13, no. 7 (July 2001), 43, 43-47.

workforce, the knowledge and specific expertise used on a daily basis and also a utility's reputation may also be considered assets in one form or another.[23]

Assets may have a short life due either to an inherent feature (perishable goods for example) or because they will be converted into some other asset or consumed within an agency within a short time frame."[24] Assets essentially exist to support the delivery of the utility's program.

What Is Asset Management?

Asset management[25] means understanding the condition of a utility's assets, such as pipes, distribution mains, and appurtenances and having a plan in place to finance needed repairs and maintenance. In its broadest sense, it includes "the use of an analytical and technical system to plan and finance cradle-to-grave repair, replacement, maintenance and disposal of all utility facilities,

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[23] Gary P. Westerhoff, The Evolving Water Utility, (American Waterworks Association, 2003), 213.

[24] Australian National Audit Office, 4.

[25] Westerhoff, 51.

distribution system components and equipment."[26] The Australian National Audit Office further defines asset management as the planning and monitoring of physical assets during their useful lives with the objective of achieving the best possible program delivery strategies.[27] It addresses all aspects of the asset such as planning, use and control.[28] Asset management is a pivotal operating, engineering and financial strategy[29] for utility survival. Achieving effective asset management results in operating in the most cost effective manner as possible,[30] reducing health and safety risks, ensuring reliable services to domestic users and businesses, linking of decision making to value to the customers, communication of the up-front commitment to customers, providing a framework for optimal long-term practices, allowing a utility to demonstrate how revenues are being spent, prioritizing work based on risk, ensuring

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[26] Ibid.

[27] Australian National Audit Office, 2.

[28] Doyle, 44.

[29] Australian National Audit Office, 28.

[30] Government Accounting Office, Water Infrastructure, (Washington D.C.: GPO: 2003), 17.

compliance with regulatory mandates, providing better information to the public and to the Board to show that a customer's substantial investment is being managed effectively[31], and allowing agencies to do more with less.

Poor asset management carries many inherent risks, the most obvious being increased costs for pipeline repairs. "One dollar spent now for proper maintenance can save five times that much in repair costs just a few years down the line."[32] Poor asset management contributes to water outages and customer interruptions, potential for direct contamination of the distribution system,[33] health and safety risks associated with cross-connections,[34] broken pipelines, decreases in asset value, and reduction in the hydraulic capacity due to internal pipe corrosion, increased disinfectant demands due to corrosion products, and biofilms and regrowth of biofilms.[35] The California Rebuild America Coalition warns that lack of clear public

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[31] Westerhoff, 210.

[32] California Rebuild America Coalition, Foundation for the Future, Rebuilding California Infrastructure for the 21st Century, 3.

[33] American Water Works Association and Economic Engineering Services, Inc., White Paper: New or Repaired Water Mains, (2002), 1.

[34] Ibid.

[35] American Water Works Service Co., Inc., 1.

policy and ad hoc decisions which fail to invest in California's infrastructure "diminish our quality of life and lead to an enormous growing price tag for making it right again."[36] Other negative impacts include increased demand for new assets, minimization of existing asset service potential, increases in the overall costs of owning an asset (as considered by use of the life-cycle costing technique) and also decreasing focus of results.[37] Less apparent outcomes include loss of or increased costs of insurance coverage, loss of economic vitality, impairment of a utility's credit rating and ability to raise capital[38] and environmental and public health impacts associated with sewer overflows.[39]

Purpose

The purpose of this graduate project was to take an in-depth look at asset management in the United States, at the existing asset management practices at the City of

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[36] California Rebuild America Coalition, 2.

[37] Australian National Audit Office, 2.

[38] AWWA, Dawn of the Replacement Era, 20.

Ontario's Utility Department and at the Rainbow Municipal Water District. A further goal of this study was to develop an ideal asset management model which could be used for any utility agency, including a financial policy which complied with GASB34, evaluation and planning policies and implementation of high performance organizational structures. Additionally, the political realities of adopting the "best" policy to achieve an effective asset management program and the concept of policy leadership were also examined.

To accomplish the goals of this paper, the following research objectives were pursued:

- Description of the state of affairs,
- Description of the ideal effective asset management model,
- Review of the current asset management practices at both the City of Ontario Utilities Department and the Rainbow Municipal Water District,
- Identification of gaps between the model and existing practices,

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[39] Dean J. Gipson and Ernesto Aguilar, "CCTV Inspects City's Pipes", Public Works, Engineering, Construction and Maintenance, 135, no. 8, (July 2004): 34, 34-38.

- Recommendations for the development of realistic asset management programs for the City of Ontario and the Rainbow Municipal Water District.

Research Methods

A combination of technical papers, academic literature, technical presentations, government documents and utility planning documents were used to gather relevant and timely data regarding this asset management. When warranted, personal interviews were used to supplement existing data.

Limitations

Limitations with this project included limiting the scope of the project to only two water municipalities. The study was therefore focused and did not include differences, which might be exhibited at extremely large or extremely small sized utilities. Additionally, because it is focused, it does not consider the way in which other utilities of similar size operate, plan and are managed throughout the United States or internationally. The study is also limited to the window of time in which it

was researched and compiled. The time constraints on this study are limited to a six (6) month time period. And lastly, this study is limited due to availability of data and documents within each agency and the small set of technical data available within the utility community.

CHAPTER TWO

THE IDEAL ASSET MANAGEMENT MODEL

Asset management began in Australia, as a result of an Australian government mandate requiring publicly owned utilities to change their business processes in order to compete on an equal basis with privately owned utilities.[40] The deadline to complete operational changes was the year 2000. Since then, several asset management program models have been developed in the United States of varying design. These include models by Camp, Dresser & McGee, Westerhoff and the United States Environmental Protection Agency. Throughout Australia and New Zealand, no single set of asset management principles is used. However, utilities generally adopt common asset management principles related to risk, customer value and cost[41]. Typically the U.S. models tend to be "how-to" focused as opposed to the Australian model which links strategic planning concepts into the Asset Managqement Plan and

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[40] Westerhoff, 207.

[41] Ruben R. Robles P.E., "Asset Management", California Water Environment Assocation Annual Conference, Palm Springs, CA, April 14, 2005

incorporates policy elements as driving philosophies, a missing component of the U.S. models. This chapter compiles all program models, with greater emphasis on the Australian model, to create an "Ideal Asset Management Model." The ideal model "complements the Information System, Human Resource and Financial Management strategies."[42] The Ideal Asset Management Model integrates asset strategies with strategic planning and is achieved by linking the assets with program delivery expectations and strategies.[43]

Strategic Planning

Effective asset management must start with strategic planning, which requires a utility to make fundamental decisions about its purpose, structure and functions.[44] By taking a strategic approach to business operations, the utility is ensured that its direction is aligned with its vision and with strategies that support the overall

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[42] Australian National Audit Office, 11.

[43] Ibid.

[44] Environmental Protection Agency, Office of Water, Asset Management: A Handbook for Small Water Systems, One of the Simple Tools for Effective Performance (STEP) Guide Series, (Washington, D.C.: GPO, September 2003), 6.

objectives of the utility.[45] It is a programmatic approach that is developed to respond to a specific challenge and to achieve a designated objective.[46] It is thinking strategically and then articulating that thinking into a plan that is directional in nature.[47]

A strategic plan will require that major stakeholders such as members of the community, staff, unions, politicians and persons representing the regulatory community, participate in the strategic planning process. The final product will typically include a letter from the executive director and a vision statement about what the stakeholders decided they want the utility to be. The vision statement would also include the utility's mission, purpose and values or principles by which the utility will operate. For instance, the Eastern Municipal Water District's mission statement is to provide safe and reliable water and wastewater services to the community in an economical, efficient, and responsible manner, now and

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[45] Westerhoff, 61.

[46] Ibid, 41.

[47] Ibid, 61.

in the future.[48] The strategic plan also describes the utility's major challenges and goals, objectives, pathways and strategic actions. Goals should span all of the activities covered by the utility. Goals are achieved through specific objectives, usually attached to one functional area within the organization. Strategic actions are the specific activities pursued to achieve an objective.[49] The strategic plan concludes with appendixes and an acknowledgment of the participants.

Overall, strategic planning is the primary planning effort necessary to successfully manage any business because it establishes and defines the service delivery level and therefore, determines the standards by which assets, in the case of a utility, must be maintained and managed. At Eastern Municipal Water District, their mission statement is to provide reliable water and wastewater services. This mission has therefore set a standard by which they conduct planning and carry out operations and maintenance tasks both short-term and long-term. Assets there must be managed so that they perform

[48] Eastern Municipal Water District, Strategic Plan, September 2003, ii.

[49] Westerhoff, 77.

in a reliable manner. Defining the service objectives frames the degree to which the actions take place to support the objective. "Taking time to define service levels at the outset will enable a utility to identify short-term improvements while aligning with ultimate goals."[50] Knowing the service level will also minimize the life-cycle costs of owning the assets.[51]

The strategic plan also frames service levels and strategies for other resource requirements such as information systems, human resources, and finances, which support program deliveries and effective asset management implementation.

Asset Lifecycle Plans

"A formal structure is needed to promote and maintain a common understanding of (a) utility's asset management goals.[52] The asset lifecycle plans are the means to

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[50] James Gaha and Tony Urquhart, "Breaking the Cycle of Reactive Work, How Utilities can shift the focus from asset failures to strategic, planned maintenance", Water Environment and Technology, 17, no. 2, (February 2005), 23.

[51] Harlow, Kenneth, "PART 4: Asset management: Getting serious", Water Online, January 4, 2001, 1.

[52] Westerhoff, 215.

define what needs to be done, are dynamic and should be referred to, reviewed, and updated regularly. Each stage of the asset life cycle is accounted for and well defined in one of the asset lifecycle plans. The plans are: acquisition, operations and maintenance, disposal, and funding of the asset. "All utility departments should participate in some of the asset management activities required during each stage of an asset's life cycle."[53] These plans can also be a primary way for management to communicate its intentions to staff.

Acquisition Plan

The acquisition plan explains the basis for deciding whether to acquire or to replace assets with the premise that all existing assets are being used to their full capacity, meet functional requirements and are performing at optimum levels. The plan documents what was considered in coming to the acquisition decision, what the alternatives were and the estimated life cycle costs.[54] The life-cycle costs include the cost to acquire land or

[53] Ibid, 217.

[54] Australian National Audit Office, 12.

the physical asset itself, planning costs, operation and maintenance over the lifetime of the asset, repair and renewal, and disposal. These life-cycle costs are important to consider because a decision to acquire an asset based on the lowest overall cost but which ignores future operating costs, may result in higher overall costs over the life of the asset.[55]

In addition, the acquisition plan explains considerations of non-asset solutions such as the use of the private sector to contract out functions, which will provide a service for the asset or by active intervention in the market to influence demand for services and assets. The private sector can be used to contract out functions such as meter testing, electrical maintenance, inspection of cathodic devices, pressure reducing station valve adjustments and repairs, motor rewinding, dipping and baking, and even roofing and carpentry work.

The influence over demands for services and assets is termed demand management.[56] An example of demand management for water and wastewater utilities is the

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[55] Ibid, 3.

[56] Australian National Audit Office, Appendix

promotion of conservation practices, devices, plants and outreach programs, which reduce overall water consumption through either physical means or by behavioral changes. A further example of a demand management program is the use of recycled water. Recycled water is wastewater that has been treated to tertiary levels and disinfected. It can be used to irrigate landscaping, crops, within the manufacturing industry, for irrigation on orchards and vineyards, for groundwater replenishment, and for irrigation on golf courses. The use of recycled water can supplement a utility's total water supply portfolio and can reduce overall demands for potable water. Development of a well-thought out acquisitions plan can reduce demand for the addition of new assets, lower overall costs and improve service delivery.[57]

Operations Plan

The operations plan establishes the standards whereby assets are efficiently used to support program delivery. The plan attempts to maximize the efficient use of assets by providing a balance between minimizing inefficient uses

[57] Ibid, 12.

and maximizing efficient uses. Inefficient use of assets by both underutilization and over utilization can carry risks. Underutilization may increase the costs to deliver services and also prompt unnecessary acquisition of assets whereas, over utilization may deteriorate asset performance and condition, shorten the asset life and also increase ongoing operations and maintenance costs associated with the asset. For water and sewer pipelines, assets are used 24/7 and underutilization or over utilization concepts are not applicable since the intensive use of these types of assets is inherent to their function and design. The assets to be concerned with in relation to under and over utilization pertain to motors, pumps and certain types of valves, switching gear, electrical starters or other assets, which have a limited number of movements in their lifetime before failure occurs.

The operations plan also identifies who in the organization has responsibility for the operation, control of, access to and security of assets within the system. Depending on the organization, this could be one person or several people. The United States Environmental

Protection Agency mandated water utilities to develop a Vulnerability Assessment addressing security of their water system. The assessment addresses several aspects related to protection, consequences of and response to malevolent acts against a water system. This mandate has thrust water professionals into the security realm, an area often disregarded prior to the attacks of 9/11 but presently, one, which has become an important component of an effective operations plan.

The operations plan also specifies the performance standard against which the asset will be measured, for instance; for a pump and motor used in the operation of a groundwater well, the standard could be the overall efficiency of the pumping system as measured against an acceptable overall efficiency.

Also included in the operations plan are estimated annual operating costs and training needed for staff to properly use the asset. In the case of water pipeline operators, commonly referred to as distribution operators, training of a technical nature considering hydraulic transients, pipe failure mechanisms, corrosion control and operational strategies for reducing or eliminating pipe

failures is critical.[58] For groundwater well operators, training related to electrical performance monitoring, motor bearing maintenance, lubrication of deep well shafts, and vibration analysis may prove beneficial.

The operations plan also includes specifics regarding the collection, monitoring and reporting of performance data. A utility not only needs to collect the performance data, but they also need to ensure that they collect good data that they need.[59] Data that should be collected is outlined in the asset supply profile. Ideally, these data would be collected and entered directly into a computer program such as a work management system or a database. In any case, the system should be capable of data manipulation and extraction into usable formats. Many systems are proficient in producing reports either automatically at a designated interval or by manually requesting the report from the system. Both the operations plan and the maintenance plan which follows, are considered living documents and as such, should be

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[58] American Water Works Service Co., Inc., 32.

[59] Ruben R Robles, P.E.

updated periodically to reflect changes to service delivery standards.

Maintenance Plan

A maintenance plan establishes standards for the amount of use, the overall condition, maintenance and performance of assets. These factors can be established more reasonably when consequences of risk are considered. Once the risk for a particular asset is known, a rational decision can be made.[60] Agencies must approach risk in a reasonable fashion and strive towards managing risk, which is the most systematic and quantifiable manner of managing risk and one that makes business sense. By managing risk in this manner, the utility accepts that there will be some assets allowed to be operated to the point of failure because the risk associated with the failure is low. Conversely, assets that have a high risk associated with their failure, are considered to be critical to the system or may exhibit high costs associated with its loss, would be managed in a much more aggressive manner. "A

[60] Pervaiz Anwar, P.E., "Asset Management: Incorporating Risk Costs In Asset Decisions", CWEA Annual Conference, Palm Springs, CA., April 15, 2005.

relatively low main break frequency may be acceptable in most instances; however, if the main is serving a critical customer, such as a hospital, or would have a great impact on the community (such as closing down a major road), even a low break frequency may not be tolerable. Other information, such as coordination with municipal work (e.g. street paving) is also important to factor into any decisions regarding pipe maintenance vs. replacement."[61] Additionally, utilities that manage risk by totally avoiding failure of all assets, without regard to their criticality, will probably go broke trying. Therefore, facilities should try to allocate resources to where they are needed the most and also away from where they are not needed.[62]

Resources (manpower, costs and equipment), that are required to operate and maintain the assets, are also an element of the maintenance plan.[63] These resources include energy costs, costs associated with cleaning,

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[61] American Water Works Service Co., Inc., 29.

[62] Pervaiz Anwar, P.E.

[63] Australian National Audit Office, 13.

aligned with the desired condition of the asset in terms of its functionality, level of amenity, compliance with mandates and economic performance,[66] risk factors, and desired level of service. "A performance based management approach would allow for proactive planning. For example, if specific vintages of pipe are reactively being replaced at a high rate, proactive decisions can be made for similar vintages of pipe exposed to similar operating conditions before they stop providing an acceptable level of service to the customer."[67]

Consideration should also be given to assets that require little or no maintenance as compared to those which require periodic maintenance, and still others which require only periodic inspections or a combination of the above. The principles of assets management apply to all assets but they do not necessarily apply equally. "The characteristics of the assets will dictate the extent and degree to which a particular principle is applied. One gauge of the relative importance of each management principle to particular groups of assets is the amount

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[66] Australian National Audit Office, 44.

outlaid at each stage of their lives. For example, the ubiquitous furniture and fittings (typically high volume, low value item) provide an essential service and their contribution to an organization needs to be recognized. By their nature however, they are typically low maintenance items. It may suffice simply to monitor their condition in lieu of a costed, preventive maintenance plan. However, if they constitute a relatively large percentage of the total value of total assets held, acquisition, and replacement planning assume greater importance."[68]

Maintenance that is planned will ensure the delivery of maintenance services such as inspection and servicing, in a way, which minimizes interruption to customers using the service. This also ensures that maintenance tasks are performed in the most cost-efficient manner possible.[69]

In summary, the maintenance plan provides the basis for stating why an asset is maintained at a particular frequency or in a particular way. The objective of both

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[67] American Water Works Service Co., Inc., 27.

[68] Australian National Audit Office, p. 10.

[69] Australian National Audit Office, 44.

the operations and maintenance plans is to ensure that assets are maintained as necessary to support program delivery, that they are appropriated used, that preventive maintenance is maximized and reactive maintenance is minimized, and that they remain appropriate to the requirements of the program.

Disposal Plan

The purpose of a disposal plan is to provide a framework which considers alternatives for disposing of surplus, obsolete, poorly performing or unserviceable assets with the objective of maximizing monetary returns to the utility and minimizing surplus assets. Ideally, all assets, which are seldom used, are expensive to operate or have lost their original design capacity, should be evaluated at regular intervals to determine why they are underutilized or performing poorly and the condition corrected or otherwise, disposed of.[70] Assets to consider for disposal include vacant and excess properties, poorly performing pumps and motors, obsolete electrical panels and associated equipment, excess or

[70] Australian National Audit Office, p. 14

older materials held in storage, reservoirs with extensive water losses or older water metering devices. Additionally, for pipeline disposal, more emphasis should be put on performance of the pipeline. "Decisions on the need for maintenance or replacement of a pipe should be based solely on how the pipe performs. Similar types of pipes in different operation conditions will perform differently. For example, a thin walled spun cast pipe operating under low pressure and installed in non-corrosive soil may provide considerably longer service than one operating at a higher pressure in corrosive soils. Pipes should remain in service, regardless of their physical attributes, until they stop providing the level of service that is expected of them, or until it can be proactively predicted that they will soon stop providing this service."[71]

Not all assets need to be disposed of because they are at the end of their predicted useful lives. "The actual life of individual assets will vary from the 'average' life established for that class of asset.

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[71] American Water Works Service Co., Inc. 28.

Therefore, it is important that condition monitoring and performance assessments are undertaken, with the results linked to an appropriate management information system."[72]

Additionally, the anticipated price for disposal needs to be evaluated in terms of the costs derived and the benefits received. This evaluation is performed and evaluated from a business perspective and decisions are based upon underlying financial factors. Benefits considered include the economy, the number of assets in question and also environmental concerns. Assets can be disposed of by public auction, trade-in, write-off, to other government agencies, or cash payment.[73] "Whatever method is chosen it is important, not least for accountability and transparency, that a properly costed evaluation of relevant disposal options is prepared."[74]

Funding Plan

The funding plan establishes how costs associated with the acquisition, operations and maintenance of assets

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[72] Australian National Audit Office, 47.

[73] Ibid, 47.

[74] Australian National Audit Office, 47.

and other supporting operations will be paid for. Many agencies struggle each year with stretching dollars to fund needed activities; therefore, a firm funding policy that deals with replacements and predetermined service levels ensures sound infrastructure and should "prevent gradual deterioration due to under funding."[75] Copious funding is used in the near, short-term when the utility has no choice but to react to an asset repair need or an asset problem requiring either corrective or reactive maintenance.[76]

Initially, the current financial condition of a utility must be known. "A utility must have accurate, detailed, and timely data that are generally summarized as information in balance sheet and income statements."[77] The plan should also identify the capital financing alternatives such as internal funding (pay-as-you-go), debt financing for short or long term debt, leasing or

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[75] Mike Bell, "Establishing a Financial Policy for Funding Asset Replacements", Water Engineering and Management, 146, no. 11 (November 1999)., 24, 24-26.

[76] Camp, Dresser & McGee, Infrastructure Asset Management, A Practical Guide for Utility and Public Works Directors, 5.

[77] American Water Works Association, Manual of Water Supply Practices, Water Utility Capital Financing, AWWA M29, 2nd Edition, (American Water Works Association, 1998) 11.

grants. "Because of the size of most CIPs, utilities generally rely on debt for a large proportion of their capital-financing needs."[78] And, "although many water and wastewater providers obtain funds from the federal government to finance the costs of capital improvements, most of the funds that systems use for both capital and operations and maintenance comes from revenues derived from user fees."[79] Annual capital and operating expenses as well as anticipated revenues should also be estimated. If necessary, the utility should reevaluate its acquisition plan in order to stay within its financial capability.

Asset Supply Profile

Before a utility can effectively manage their assets, they must know what assets they have and what condition they are in.[80] The actions to account for and assess conditions of assets can occur concurrently and

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[78] Ibid, 22.

[79] Environmental Protection Agency, Office of Water, The Clean Water and Drinking Water Infrastructure Gap Analysis, (Washington, D.C.: GPO, September 2002), 17.

[80] Environmental Protection Agency, Asset Management: A Handbook for Small Water Systems, (Washington, D.C.: GPO), 8.

collectively, and are known as inventory and condition assessments.[81]

Once assets are known, the Australian National Audit Office recommends that at a minimum, asset information be tracked within several different layers. These include:

-Acquisition (Date of acquisition, supplier, reference, cost)

-Identity (Description, model, manufacturer, serial number, unique asset number)

-Accountability (Location, program, custodian, restrictions, cultural "identifier")

-Performance (Capacity, condition, useful life, residual value, warranties, measures)

-Disposal (Capacity, condition, useful life, residual value)

-Accounting (Historic cost, replacement value, depreciation rate, accumulated depreciation)[82]

Ideally, this data should be captured in an electronic format such as a Geographic Information System program, with the data readily accessible.

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[81] Australian National Audit Office, 16.

[82] Ibid, 26.

The condition assessment establishes the condition of the existing assets in the system and can be used to make a comparison to that which is the desired condition standard. The "gap" between existing and desired conditions establishes corrective maintenance required to bring the asset to the condition standard. Condition assessment data help establish a routine preventive maintenance schedule, a long-term program for maintenance as well as addressing the deficiencies found as a result of the "gap" comparison. These schedules for maintenance should be included in an update of the maintenance plan. "Water quality complaints also create the need for condition information to know which procedure to use (e.g., flushing or cleaning). In distribution system operations, condition information is required to schedule tasks such as testing and valve operation."[83] Condition assessments should be conducted at regular intervals (at least every 3 years as required by GASB 34) and the collected data tied to financial reporting and included in the performance-monitoring plan.

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[83] Neil S. Grigg, "Assessment and Renewal of Water Distribution Systems", Journal American Water Works Association, 97, no. 2 (February 2005), 61, 58-68.

A good tool to use for sewer pipeline condition assessments can be developed using the National Association of Sewer Service Company's (NASSCO) sewer pipe condition rating system.[84] The most important tool in assessing the condition of sewer pipelines is the internal television inspection. NASSCO provides a pipeline assessment and certification program that "provides standardization and consistency in the way sewer pipe condition is evaluated. It creates a comprehensive and reliable set of data to describe sewer pipes for use in prioritization, planning and renovation of wastewater collection systems."[85]

The NASSCO program ensures that sewer pipelines are consistently described both within an agency and throughout the industry. For example, descriptive problems for area reduction due to attached solids, settled deposits and water depth[86] and provided. The NASSCO system also assists with consistently documenting

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[84] Camp, Dresser & McGee, 6.

[85] Rod Thornhill P.E., "NASSCO's Pipeline Assessment and Certification Program (PACP)", Trenchless Technology, (August 2001)

[86] NR Orman and JE Lambert, Manual of Sewer Condition Classification, 4th Edition, (WRc.October 2004).

broken and deformed pipe vs. cracked and fractured pipe. The types of cracks such as longitudinal, circumferential, multiple and spiral are also classified.[87] The classification system also documents the various types of defects, the shape,[88] and the material type.

For water pipelines, "there is no standard procedure to record data on leaks, breaks, and condition indicators. Utilities should manage existing data, analyze pipes without digging them up, get good drawings and inventory information, and use software to analyze data effectively."[89] Condition indicators such as the physical integrity of the pipe, repair history and operability are important indicators for decision makers involved with the acquisition plan while water loss, pressure, flow, complaint frequency, quality of water and energy are important to those involved with the operations and maintenance plans.[90]

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[87] Ibid, 39.

[88] Ibid, 29.

[89] Neil S. Grigg, 58

[90] Ibid, 66.

For other assets such as motors, pumps or even buildings in which the condition is a function of its useful life, conditions of "poor," "fair," "good," or "excellent" are more appropriate descriptors.[91] In many cases, the condition of an asset directly relates to its remaining useful life. "In these cases - for a mechanical blower for example, it may be more expedient to directly estimate the useful remaining life of the asset than it is to say it is in "fair" or "poor" condition."[92]

Once assets are inventoried and their condition is assessed, they will need to be prioritized for rehabilitation and repair. This should be done according to their importance to the overall system. "Prioritization means ranking your system's assets to help you decide how to allocate resources."[93]

These variegated roles may include integration of work teams with specialties in engineering, financial planning, accounting, utility maintenance, operations, and

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[91] Camp, Dresser & McGee, 7.

[92] Ibid,

[93] Environmental Protection Agency, 14.

sometimes, law.[94]

The Australian asset management handbook prescribes achieving the best possible match of assets with the expected program delivery strategies.[95] "Revenue needed to keep assets functioning at the level of service demanded by customers is a function of the remaining useful life of all assets, the money to replace, and the ability to preserve those assets through optimal repair and replacement planning."[96]

Performance Monitoring

Performance monitoring allows assets to be evaluated in terms of their physical condition, their functionality, their use and also their financial performance.[97]

Performance monitoring closely mirrors that of the Government Accounting Standards Board (GASB) Statement No. 34. Since GASB 34 is a financial reporting mandate for state and local governments in the United States, the

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[94] Camp, Dresser & McGee, 9.

[95] Australian National Audit Office, 2.

[96] Camp, Dresser & McGee, 7.

[97] Australian National Audit Office, 18.

performance-monitoring plan becomes highly important for compliance purposes. GASB 34 was "driven by the effort to ensure that governments provide information about the full cost of providing government services, something that the omission of a reflection of cost from the existing infrastructure has prevented in the past."[98]

Performance of an asset's physical condition, "requires regular inspection and assessment of required maintenance costs."[99] Once the initial condition assessment is completed as part of the asset supply profile, the physical condition should be assessed at least every three years. If the condition of the assets does not meet the condition standard, the utility must report the asset as a depreciation on the expense report.[100] In addition, the utility needs to report "the expenses actually incurred to maintain your infrastructure network to the target (condition standard) level. These annual expenses will include the large amounts that would

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[98] John L. Mikesell, Fiscal Administration, Analysis and Applications for the Public Sector, (Wadsworth, 2003), 56.

[99] Australian National Audit Office, 43.

[100] Harlow, Kenneth, GASB 34 - An Infrastructure Heresy, [article on-line] (Brown & Caldwell website, accessed on 2/22/2005), available from http://www.bcwaternews.com/AssetMgt/AM02_Heresy.pdf; Internet.

normally be spread over many years under the depreciation approach."[101] This approach in reporting allows a utility to tie infrastructure condition directly to expenditure levels and helps to justify needed expenditures. This also provides an analysis of the preceding year's activities and lays out the utility's overall financial condition. Elements included in the analysis are: financial information regarding assets, liabilities, revenues, and expenses. In addition, the analysis includes capital asset and long-term debt activity. The analysis concludes with "a description of currently known facts, decisions, or conditions that are expected to have a significant effect on the (utility's) future financial position and operations."[102]

Performance monitoring uses full accrual accounting for all activities occurring within the utility. "Accrual accounting reports all of the revenues and costs of

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[101] Ibid.

[102] Government Accounting Standards Board, Government Accounting Standards Board Statement No. 34, Basic Financial Statements—and Management's Discussion and Analysis—for State and Local Governments, (Norwalk, CT.: Financial Accounting Foundation) 1.

providing services each year."[103] This type of accounting allows a utility to produce information for decision makers to assess both whether "current-year citizens paid for the services they received in the current year, or if the costs of services were skirted to future-year citizens and, whether a (utility's) financial position has improved or deteriorated as a result of the year's operations.[104] By reporting in this manner, a citizen or other interested individual should be able to determine the extent that a utility has invested in assets.

In addition to physical condition and its ties to financial performance, the functionality of an asset should be evaluated. "How effective is the asset? Indicators include user satisfaction."[105] During a recent trip to Australia and New Zealand to study asset management, staff at the Sacramento Regional County Sanitation District found that many utilities there published key performance indicators for customer service levels and operations levels on the internet. If the

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[103] Ibid.

[104] Ibid.

[105] Australian Asset Management Model, 43.

utility did not meet the key performance indicators, the customer was given a rebate.[106]

Additionally, a utility should determine how much an asset is used. How many hours does it stay in operation, how many miles was it driven and how much space did it occupy? Bottom line, this method of reporting will allow, "the users of financial statements to assess whether the government's finance have improved or deteriorated."[107]

Procedures, Systems And Training

The "doing" of asset management requires that the large amount of data and information collected from each asset be captured, stored and available for analysis. "Procedures support consistent application of definitions, standards and efficient work practices. It is essential they are disseminated throughout the agency. The management information system is more than an asset register. It should support budgeting, planning and management of assets and provide an effective means of

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[106] Ruben Robles.

[107] Government Accounting Standards Board, 1.

reporting asset performance."[108] Information management systems that are typically used in asset management are: Capital improvement program (CIP) planning and management system, Geographic information system (GIS), Financial accounting system (FAS), Computerized maintenance management system (CMMS), and an Asset management system (AMS).[109] A GIS system helps determine the best uses of capital dollars.[110]

"Training programs need to be tailored to the needs of staff. Program managers require an understanding of the principles of asset management and the associated budgeting and accounting processes. Staff with responsibility for operation, maintenance and disposal requires more in-depth training."[111] By supporting a learning culture, the utility may be able to achieve great benefits. For example, training and learning increase employees' understanding of their roles and the goals and

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[108] Australian National Audit Office, 29.

[109] Westerhoff, 223-224.

[110] Scott Cattran, Public Works, "Web-Based Application Improves Asset Management," Engineering, Construction and Maintenance 134, no. 5, (May 2003) 16, 14-21.

[111] Australian National Audit Office, 29.

values of the organization. This understanding may lead to increased efficiency, translation of goals into day-to-day tasks, proficiency and doing the job correctly. Career development coaching and management training are also believed to reduce stress on the job. Training specifically targeted towards problem-solving skills also may reduce stress and aid in daily decision-making. Closing the gaps between job expectations and reality are also stress reducers. High levels of stress have been shown to increase absenteeism and turnover and decreases in this area may lead to increased productivity and longevity in the workforce.[112] Coaching may foster leadership development, allow for succession planning and allows older, more seasoned employees to pass along "institutional memory"[113].

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[112] Evan M. Berman and others, eds. Human Resource Management in Public Service, (Sage Publications, Inc., 2001) 205.

[113] State of California, California Performance Review Report, Government for the People for a Change, [document on-line] (Sacramento: accessed on 3/3/2005); available from http://cpr.ca.gov/report/; Internet.

CHAPTER THREE

ASSET MANAGEMENT IN THE UNITED STATES AND IN CALIFORNIA

Throughout the United States, poor asset management practices are common, as indicated by general asset condition and asset age. This sweeping conclusion is supported by national survey results collected by the U.S. Government Accounting Office. Their survey revealed that one out of every ten utilities surveyed had 50% of more of their total pipelines nearing the end of their useful life and one in three surveyed, 20% of pipelines were at the end of their useful life.[114] With such a vast quantity of pipelines in the United States at this critical stage in their lifespan, naming today's utilities era, the replacement era,[115] by the American Water Works Association is quite appropriate.

Interestingly, a utility's size correlates to its success or failure with its ability to effectively

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[114] United States General Accounting Office, WATER INFRASTRUCTURE, Information on Financing, Capital Planning and Privatization, (Washington D.C.: GPO, August 2002), 39.

[115] AWWA, Dawn of the Replacement Era, 11.

implement replacement programs. For example, 35% of smaller utilities serving populations of 10,001 - 25,000 people and 41% of water systems serving 25,001 - 50,000 people were those in which 20% or more of their pipelines were in poor condition and needing replacement, according to the GAO survey. Conversely, only 24% of the largest water systems serving populations of over 100,000 people experienced 20% or more of their pipelines in poor condition.[116] The correlation between utility size and the implementation of successful replacement programs is similar for wastewater infrastructure. 42% of smaller wastewater systems, those systems serving 10,001 to 25,000 people, have at least 20% of their sewer pipelines in poor condition as compared to 24% of larger sized systems.[117]

Poor asset management may be caused by inadequacies in funding. For example, public works infrastructure spending in the 1960's consisted of 20% of California statewide spending as compared to 3% presently, despite increases in growth.[118] Downward spending trends are also

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[116] U.S. Government Accounting Office, WATER INFRASTRUCTURE, 39.

[117] Ibid, 40.

[118] American Society of Civil Engineers, San Diego Section, 2004 Report Card for San Diego Infrastructure, [document on-line] (2004,

evident nationally. A nationwide survey conducted by the U.S. Government Accounting Office revealed that 1/3 of all utilities surveyed had deferred expenditures for maintenance, minor, and major capital improvements in their most recent fiscal year.[119]

Another method that indicates performance related to asset management, is a grading system administered by the American Society of Civil Engineers. Its San Diego section graded water and wastewater systems in 2004. This group gave a B- grade to wastewater collection and treatment systems and a B grade to water supply, treatment and distribution systems in San Diego. Further, wastewater systems were described as in poor physical condition and requiring routine inspection and funding for maintenance and other improvements to comply with mandates and discharge regulations. Additionally, respondents stated that the operations and maintenance of their collection systems were fair and on the verge of being poor. Water supply in San Diego did not fare much better since it was described as being in fair to good

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accessed on December 17, 2004); available from http://www.asce-sd.org/news_detail.asp?ID=81; Internet.

[119] Government Accounting Office, WATER INFRASTRUCTURE, 37.

condition.[120] Effective asset management in the San Diego region has not yet caught on.

A similar study conducted in the Inland Empire revealed a B- grade for wastewater and a C+ grade for water infrastructure. The American Society of Civil Engineers recommended that agencies with older water infrastructure find ways to repair or replace assets, among other things, as this would allow the region to be better off as a whole.[121]

Additionally, according to a study conducted by the U.S. Government Accounting Office, more than 2/3 of all utilities surveyed nationwide have asset management plans but many of the plans lack key elements or did not cover all of the utilities' assets in their plans.[122] This same survey revealed that more than 1/3 of utilities had 20% or more of their water pipelines nearing the end of their useful life and that for 60% of water utilities surveyed, replacement and rehabilitation programs were at levels

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[120] American Society of Civil Engineers, San Diego Section, 8.

[121] American Society of Civil Engineers, 9.

[122] Government Accounting Office, WATER INFRASTRUCTURE, 34.

less than the desired customer service levels.[123] And, in the City of Atlanta, sewer overflows have been so bad that the city has been under a federal consent decree since 1997.[124]

There is further data to suggest that infrastructure is not being managed effectively at the State level. Nationwide, state governments are doing a fair job, as indicated by the Government Performance Project. This study gave report cards to the 50 states. The study gave grades on four areas of management: Money, People, Infrastructure and Information. Infrastructure was graded according to the state's ability to conduct a needs assessment, for maintaining infrastructure according to a life-cycle asset management approach, for conducting condition assessments and setting priorities for maintenance and renewal, and for providing funding that minimizes the facility's life-cycle costs to ensure defined service levels, among other things.[125]

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[123] Ibid, 37.

[124] Rob McManamy, "Drip, Drip, Drip: The Unseen Crisis", Public Works, Engineering, Construction & Maintenance, 135, no. 7, (June 2004), 50, 48-50.

[125] Katherine Barrett and Richard Greene, Grading the States '05, A Management Report Card, [document on-line] (2005, accessed on March

The 50 state average for Infrastructure management was a B-. Utah, which was given an A grade for infrastructure, boasts a statewide strategic planning document, known as Utah Tomorrow, which creates a clear overall direction for its managers and workforce. This message also translates to the Legislators who understand that well maintained assets cost less.[126] New Mexico's D+ infrastructure grade was given due to a fractious approach to capital investment that has left the state ill equipped to deal with deficiencies in assets.[127]

California, where the Department of Transportation's maintenance budget has been shifted to the general operating budget for the past two years,[128] received a C grade for infrastructure. California was rated strong in areas requiring governmental coordination for interstate infrastructure management however, California and most of the other states, cities, and water districts have a long way to go to reach effective asset management.

15, 2005); available from http://governing.com/gpp/2005/intro.htm; Internet

[126] Ibid, 88.

[127] Ibid, 74.

[128] Ibid, 30.

CHAPTER FOUR

ASSET MANAGEMENT AT

RAINBOW MUNICIPAL WATER DISTRICT

Current Asset Management And History At Rainbow Municipal Water District

Rainbow Municipal Water District, located in Fallbrook, California, provides water and sewer services to parts of Bonsall, Rainbow, and Fallbrook in unincorporated areas of North San Diego County.[129] Rainbow is a Special District formally formed in 1953 under the Municipal Water District Act of 1911.[130] This Special District was never a full-fledged system from the beginning[131] since it was oddly pieced together from half a dozen mom and pop set-ups for water district services.[132] This piecing together of odd systems, in combination with the topography of the service area, represent some of the

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[129] Dudek and Associates, Inc., Rainbow Municipal Water District, Water Master Plan, (September 2001), 1.

[130] Rainbow Municipal Water District, Water Supply Assessment and Verification Report, Meadowood Specific Plan, (December 2004), 10.

[131] Rainbow Municipal Water District General Manager Greg Ensminger, interview by author, telephone interview, 24 April 2005.

[132] Ibid.

obstacles that presently work against implementing effective asset management at the District.

The service terrain is mostly hilly and mountainous with some more accessible valleys. This type of terrain creates extreme variations in pressures to the customer with pressures of 5 psi at higher elevations and greater than 300 psi also occurring in some areas. Individual pressure reducing valves are required for customers in order to avoid damage to internal appliances.[133] The District presently services approximately 7,100 potable water connections, a portion of all customers also receive sewer service.

Water pipeline infrastructure consists of 17 water storage tanks and reservoirs, 7 pump stations and 300 miles of pipeline (1.5 million lineal feet) ranging from 4-42 inches in diameter.[134] Many of the earlier pipes were laid without engineered drawings or standards and some waterlines have been found to consist of steel pipe of

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[133] Dudek and Associates, Inc., 28.

[134] Ibid, 1.

different qualities, diameters and metal thicknesses among the same stretch of pipe.[135]

Wastewater within the District involves over 265,000 linear feet of gravity pipelines ranging in size from 6-28 inches, six lift stations and over 10,000 feet of forcemain.[136] Gravity sewer materials range from polyvinyl chloride (PVC), ductile iron (DIP), and vitrified clay pipe (VC). Forcemains are cast iron (CI) and PVC. In addition, there are approximately 1,100 manholes in the service area.[137] Dudek and Assoc., the District's engineering firm, established regional standards to design future pipelines; these standards include sizing and slope criteria. Based on gaps between the design criteria and existing sewer pipe, several gravity pipelines did not meet the design criteria. Those pipes were considered for addition into the present sewer Capital Improvement Projects.[138]

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[135] Rainbow Municipal Water District General Manager Greg Ensminger.

[136] Dudek and Associates, Inc., Rainbow Municipal Water District, Sewer Master Plan, (September 2000), 1.

[137] Ibid, 9.

[138] Ibid, 9.

Presently, 100% of the water serving the community is imported through San Diego County Water Authority (SDCWA), a wholesale agency of the Metropolitan Water District (MWD). Metropolitan supplies consist of water imported from the Colorado River and State Project Water from the Sacramento River Delta. Water is delivered from MWD and SDCWA aqueduct systems through 6 active connections.[139] Rainbow is SDCWA's fifth largest customer and has an annual water demand of 30,000 Acre-Feet. Presently, Rainbow does not have surface water, groundwater or reclaimed supplies of its own.

"The District has been neglected since 1979,"[140] since there has been no historical funding of infrastructure replacement. And, even up to three years ago, when the present General Manager was hired, there was no crew assigned to valve maintenance and no maintenance of valves at all. On the wastewater side, there was also no maintenance occurring. In addition, there had been no asset management programs in place of any kind and the same was true administratively. As a result, "the system

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[139] Dudek and Associates, Inc., Rainbow Water Master Plan, 8.

[140] Rainbow Municipal Water District General Manager Greg Ensminger.

is literally deteriorating and exploding faster than we can fix it,"[141] stated General Manager Greg Ensminger. Ensminger also stated that due to frequent turnover with General Managers and Board Members at the District, "the momentum comes to a screeching halt, therefore, it is impossible to get any sort of asset management in place."

In addition to these issues, the District has had the difficult task of both trying to build-in management principles related to asset management, which should have been in place years ago while still "keeping the water flowing."[142] Asset management at Rainbow is definitely reactionary at this time, even though projects are being completed and more are on the books. Rainbow has a long history of poor asset management. Some examples of asset failures include the following. In 1993, 6 separate incidents spilled over 13 million gallons of sewage, a valve failure caused a sewage spill on May 31, 2004,[143] in 1993, a failed backflow device caused the Department of Health Services to issue Citation 04-138, due to a Maximum

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[141] Ibid.

[142] Ibid.

[143] Rainbow Municipal Board Meeting Minutes of 6/2/04

Contaminant Violation for total coliforms,[144] and a pressure reducing station malfunction over-pressurized an area causing nine main line breaks in weak pipes (8" pipeline and greater in size) to occur on February 10, 2005, over 1,000 customers were out of water.[145] These are only a few of the infrastructure problems that the District has faced.

Inspection of pipe laid in the ground has also lacked skilled attention: a recent broken pipe was exposed to discover a handwritten inspection note on the pipe to "fix here." The breaks and subsequent claims became so serious that the District's insurance carrier, Joint Powers Insurance Agency (JPIA), threatened to cancel. "JPIA (has been) watching Rainbow for 13-14 years because (the) District promised to budget money for infrastructure however, by the end of the year, this hadn't been done,"[146] stated a former Director on the Board. The deterioration of the system became so bad that last year, the Board had

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[144] California Department of Health Services, Citation 04-138.

[145] Rainbow Municipal Water District Newletter, Issue No. 7, March, 2005.

[146] Rainbow Municipal Water District, Board Meeting Minutes of April 21, 2004.

declared Public Health and Safety Emergency for both the water and sewer systems.

Recently, a 40.9 million dollar bond was recommended by the Citizen's Review Committee,[147] to fund needed infrastructure repair projects. The bond was brought to a vote and was easily defeated. Due to the bond defeat, the District implemented a "pay-as-you-go" system, which allocates $4 million/year to infrastructure maintenance and repairs. "The long-term objective of the CIP (Capital Improvement Plan) is to reach a level wherein this "pay-as-you-go" system can maintain the existing and future infrastructure at an acceptable and reliable service level. To that end, it will be necessary to establish a reasonable goal for annual infrastructure replacement that is acceptable from both a fiscal and operational standpoint. Industry standards identify a typical replacement program targeted at annually replacing approximately 2 percent of a District's pipelines. Such a program would result in replacement of the District's

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[147] Citizen's Review Committee, Final Report, Rainbow Municipal Water District, February 2, 2004.

entire system of pipelines over an approximate 50-year period."[148]

Projects considered for the Capital Program are also reviewed from an engineering and maintenance perspective and categorized according to the following; replacement, expansion or combination. The District prioritizes capital program projects, "by ranking projects within each category under a variety of project considerations. These ranking are evaluated in a formal process using a Risk Management approach."[149]

Ideal Asset Management Model Versus Actual Conditions

Actual asset management practices at Rainbow Municipal were compared against the Ideal Asset Management Model. If the area of comparison was presently being met by activities at the District, it was indicated as such with a plus (+). A minus sign (-) indicates that the area was not being met and improvement was needed. If the area was somewhat but not fully being met, a plus sign and IN,

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[148] Rainbow Municipal Water District, Fiscal Year 2004-2005 Budget Document, 33.

signifying improvement needed, was indicated (+ IN).

(-) Strategic Planning

    (-) Mission Statement

    (-) Goals and Objectives

(-) Acquisition Plan

    (-) Considerations for acquisition decision

    (-) Listing of alternatives

    (-) Estimated life-cycle costs

    (+ IN) Non-asset solutions

    (+) Demand management

(+ IN) Operations Plan

    (+) Maximize efficient use

    (+) Minimize inefficient use

    (+) Assignment of responsibility

    (-) Performance standards for assets

    (+ IN) Annual operating cost estimates

    (+ IN) Staff training for asset use

    (+) Collection of performance data

(+ IN) Maintenance Plan

    (-) Condition standard

    (+) Maintenance standard

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[149] Ibid, 35.

(-) Performance standard

(+) Details of required resources

(-) Disposal Plan

(-) Review of expensive, surplus or unserviceable assets

(-) Business model of evaluation for disposal

(-) Funding Plan

(-) Performance Monitoring

(-) GASB 34 compliance

(+ IN) Procedures, Systems and Training

(+ IN) Information systems for budgeting

(+) Information systems for planning

(-) Information systems for management of assets

(+ IN) Training programs for staff

(+ IN) Asset Supply Profile

(+ IN) Tracking of asset information

(-) Condition Assessment, sewer

(-) Condition Assessment, water

(+) Prioritization of assets for repair/rehabilitation

Recommendations

The recommendations contained herein are meant to be realistic in nature. This list is not exhaustive and does not cover all potential areas for improvement within the District. Turning around a utility that historically has conducted little maintenance, has had no asset management plan in place and has not reinvested in its infrastructure, will not happen overnight nor should results be realized immediately. Due to the significance of the services that the District provides, progress towards meeting the recommendations however, needs to be made. Public health and safety are at risk as is the welfare and viability of the community. Rainbow must decide if it wants to ensure that its infrastructure is sustainable and then take steps to progress towards that goal. The following offers suggestions to aid in that undertaking.

Strategic Plan

The District does not have a Strategic Plan, and therefore it's employees and Directors have nothing to guide more grandiose types of activities on a day-to-day

basis and long term. This complicates decision-making by policy makers and inhibits effective performance by staff. Completing and implementing a strategic plan will lay the foundation for an asset management plan to be effective and aligned with the objectives of the District.

Last year, the General Manager conducted a contest among employees to come up with a District "motto" since he realized that staff felt that they were, "in a constant state of starting over"[150] and needed at least a motto that defined Rainbow and their role in the operation of the District. That motto, "Committed to Excellence" should be a starting point for the Strategic Planning process. Further, a presentation given on January 5, 2005 by Larry Sundram, during his first Board meeting as a Director, called for the development of a comprehensive and coherent Strategic Plan.[151] In addition, at the April 6, 2005 Board Meeting, initiation of a Strategic Plan was proposed by the General Manager. Strategic Planning appears to already have a foothold as a viable concept at the

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[150] Rainbow Municipal Water District General Manager Greg Ensminger.

[151] Sundram, Larry, *Rainbow Municipal Water District, The Road Ahead…*, January 5, 2005.

District, in fact very recently, the District launched a Strategic Planning effort.

Acquisition Plan

It is also recommended that the District develop an Acquisition Plan that outlines procedures to document considerations for decisions on new assets. The considerations should include life-cycle costs to the greatest extent possible. The way in which money is spent at the District both operationally and also for capital expenditures has been a concern for ratepayers. By implementation of a life-cycle evaluation process, there is transparency to the public and justification is documented regarding decisions leading to selection of the lowest life-cycle costs for new assets. This documentation may prove beneficial in the future for reference purposes for newly hired personnel and management.

The Acquisition Plan should also address contracting out several specialty maintenance and investigative tasks. These include Cla-Val maintenance of pressure reducing

stations, further leak detection surveying, further Geographic Information System asset mapping, and sewer pipeline camera inspection. In addition, partnering with neighboring agencies for delivery of water or for treatment of sewage would prove beneficial and reduce the need for additional facilities. Though the District is not a coastal community and has no access to the newly proposed desalination facilities in Carlsbad, the District is adjacent to Vallecitos Water District whose General Manager has publicly announced interest in the plant. Water could be "wheeled" through the Vallecitos system and delivered through the Vallecitos-Rainbow interconnect.[152] This water could be taken as a strategy to avoid higher costs charged to the District for excessive use of domestic imported water.

Demand management activities such as water conservation are, for the most part, presently being efficiently administered through the San Diego County Water Authority. The District could benefit by enhancing existing conservation programs by developing conservation

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[152] Ma, Ken, Vallecitos considers desalinated water, North County Times, November 22, 2004.

rebates, programs and education directly targeted at the agricultural community. This customer base uses the majority of water in the District and development of such a program would save money for the users and could also reduce demands through the existing pipelines and storage in the reservoirs.

Operations Plan

The District should continue to enhance energy management of pumping stations by taking advantage of off-peak pumping and copious available storage. Electrical rates should be evaluated annually to ensure that the most effective rate plans are implemented.

Performance standards need to be established for all assets. These can be used as key performance indicators and made available to the public, which will open transparency and show ratepayers that the utility is being operated properly.

Maintenance Plan

Having a thorough understanding of the existing assets and their present condition is critical for Rainbow

Municipal. Therefore, a thorough condition assessment is warranted for both water and for sewer in order to prioritize maintenance and repair work and also to comply with the requirement of GASB 34. Copious data regarding repair history, physical integrities and pipeline materials, collected during leaks and breaks of pipeline should exist and be used to its fullest extent in prioritizing future maintenance and repairs. Data is also available in historical District Water Master Plans.[153] As stated previously, this data would allow a comparison to be made based upon existing conditions of assets to those which are desired. The "gap" between desired and existing would establish a corrective maintenance list, more extensive projects on the list should be added to the list of Capital Improvement projects. A schedule for implementation should consider budget, risk and service factors. Since the District's Capital Improvement plan has not been implemented for quite some time, it will take many years before the results of the prioritized projects have an affect on the amount of reactive vs. preventive

[153] NBS/Lowry, Rainbow Municipal Water District Water Master Plan Update, August 1986, II-2.

maintenance performed at the District. Presently, preventive maintenance is estimated to be 30-40% of all maintenance done at the District[154] since a majority of maintenance activities involve repairs to existing leaks or breaks. Managers should also use condition data to establish short and long-term maintenance schedules so that assets are brought up to the condition standard.

Disposal Plan

Rainbow should develop and implement a Disposal Plan. A thorough review of all potential surplus and unusable assets should be conducted and a business evaluation conducted to determine which should be sold or traded. Surplus assets cost the ratepayers money and the sale of otherwise unusable assets could generate money for the cash strapped District. Consideration should be given to disposing of some of the District's uncovered reservoirs. Since the reservoirs store treated and unprotected potable water, this presents a risk of microbial contamination, even with outflow disinfection in place. In addition,

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[154] Rainbow Municipal Water District Operations and Maintenance Manager Chuck Sneed, interview by author, telephone interview, 26 April 2005.

some of the uncovered reservoirs are known to leak, the District has cumulative storage capacity several times over the average day demand and reservoir property is located on highly valuable residential hilltops. If operationally feasible, these reservoirs should be considered for disposal.

Funding Plan

The District should review its current rates to ensure that they are adequate to fund needed operations and maintenance of the water and sewer system and also to fund the capital improvement projects. With gasoline, personnel and insurance cost increases, budgets stretch each year to provide the same level of services and yet keep overall budget increases to a minimum. To the greatest extent possible, service levels and sustainable infrastructure should not be compromised. By implementation of an effective asset management plan, costs should decrease and the need to increase future rates will, in fact, be able to be reduced due to savings realized internally.

Rate increases should continue to be directly passed through to the customer from the San Diego County Water Authority. If Rainbow absorbs these costs, service delivery and infrastructure cuts must be made which diminishes the overall goals of effective asset management.

In addition, reserves should be increased so that revenue peaks and valleys do not impact the District's ability to have adequate cash flow. The recent rains of early 2005 impacted revenues for the District as many agricultural users reduced or stopped watering.

Performance Monitoring

Rainbow has such a long history of under-funded or unfunded capital improvement programs. Accrual accounting procedures, as required by GASB 34, will demonstrate, hands down, whether the system as a whole is being run into the ground or whether progress is being made. The pay-as-you-go method of financing, which includes actions to improve processes, save costs in energy and outsource operations has nearly been used to its fullest extent over the years. Presently, $4 million is being allocated

towards improvement projects and reflects pay-as-you-go funding. However, if condition assessments reflect that the District has failed to maintain the condition standard and assets must be appreciated, the pay-as-you-go method would actually defer expenses to future ratepayers. This, in fact, incurs debt, rather than avoid it.

Procedures, Systems And Training

The District needs to update its information programs to improve efficiency, facilitate record keeping and to ensure data management can be used for effective decision making. This involves coordinating needs for all of the asset management plans so that they work together through technology. Additions that the District might consider include systems that enhance capital planning and budgeting. Other systems such as the existing Geographic Information Systems (GIS) and Supervisory Control and Data Acquisition Systems (SCADA) could be more effective if linked to a formal Work Management System. The Work Management System should link employee labor, materials and other asset costs to the job so that the District can evaluate overall costs to provide services. Such a system

is presently being considered for purchase, as is a system which effectively tracks valve maintenance activities.[155] Enhancement of the GIS system could prove extremely beneficial from a planning and from an operational perspective. GIS is a powerful tool, various exhibits and evaluations are possible within seconds with an up-to-date system. Sorting of pipeline failure data according to type, age and area, for instance, can be quickly generated and used to link failures to characteristics of the material, soil or other. Data sorts are endless, depending on the data kept in the system. An up to date GIS system can assist multiple departments in accomplishing the goals set forth in the District's strategic plan. Training should be provided to staff so that they are proficient in its use.

Asset Supply Profile

Condition assessments need to be a priority for Rainbow, both from an operational perspective and also to comply with GASB 34. Condition assessments can be

[155] Rainbow Municipal Water District Operations and Maintenance Manager Chuck Sneed.

accomplished by conducting in-pipe video of the sewer lines, typically this can be reasonably done by an outside contractor. Due to health and safety liabilities and the monetary fines which accompany sewer spills, agencies need to ensure they are doing their due diligence to prevent spills from occurring. Camera inspections can show potential blockages caused by grease and roots, can show damages in pipe joints and can also show effects of soil compression on the pipe integrity.

For water pipelines, operators can conduct leak testing of suspect sections of pipe. There are several types of leak detection equipment available on the market. These studies can also be done by an outside contractor or, if smaller sections are involved, done by in-house staff with proper leak detection equipment.

Implementation

Many of the recommendations given are low cost because they can be accomplished in house and can also be quickly developed and implemented. Recommendations that can be accomplished within a six (6) month timeframe include: strategic planning.

Other recommendations that can be accomplished in the next 12 month require authoring plans and training of staff; however, these also be accomplished at a low cost. They include: the acquisition plan, the agricultural conservation program, performance standard development, the disposal plan, and the funding plan.

More extensive time, 24- 36 months, should be given to other recommendations that require expenditures for systems or studies. These include: complete assessment of the system starting with the most critical assets first and based upon risk factors, information systems enhancements and additions. Additionally, partnerships with other agencies and updates to the maintenance and operations plans should be ongoing activities.

CHAPTER FIVE

ASSET MANAGEMENT AT THE CITY OF ONTARIO

Current Asset Management And History at the City of Ontario

Incorporated in 1891 as one of California's first model communities, the City operates under a council-manager form of government. Today, the City of Ontario is described as the "economic heart" of the Inland Empire due to the vast economic development occurring in the area. The City is governed by five elected officials and is organized into several departments including but not limited to: Development, Redevelopment, Housing, Engineering, Planning, Economic Development, Public Works, Code Enforcement, Police, Fire and Community Services. The Utilities Department which manages the water and sewer systems, is located under the Public Works Department.

The City and the City's water system were initially established and designed by George Chaffey. "Chaffey laid miles of cement pipe for this purpose and later the San Antonio Water Co. drove a tunnel into the head of the canyon to tap the underground flow—then an innovation in

the field. The need for electric power to lift water from deep wells led to the establishment of the Ontario Power Co."[156]

The City was also a contributing factor in the adoption of the Laguna Declaration by the Metropolitan Water District. The Declaration allowed the amendment of MWD's policy to include imported water service for agricultural areas, a specified use which was previously restricted.[157]

Ontario's 50-mile service terrain is relatively flat with gentle slopes to the north.[158] Presently, there are four (4) pressure zones with more being planned as the southern portion of the City is developed. Pressures within the system remain relatively constant. Water infrastructure consists of eleven (11) reservoirs, twenty (20) active wells, twelve (12) booster stations and forty (40) pressure reducing stations. Water is delivered

[156] City of Ontario, [electronic document] (Accessed on April 25, 2005); available from http://www.ci.ontario.ca.us/index.cfm/22/17099; Internet.

[157] Robert Gottlieb and Margaret FitzSimmons, Thirst for Growth, Water Agencies as Hidden Government in California, (Tucson, The University of Arizona Press, 1991) 11.

[158] Boyle Engineering, City of Ontario Water Master Plan, August 2000, 3.

through approximately 2.6 million feet[159] of water pipeline ranging in size from 4" - 36" in diameter. Pre 1940's water pipe materials consist of cast iron, steel pipe that is not wrapped or coated, cement mortar lined and wrapped steel. There are also a few pipes existing in this age category where the pipe material is unknown. Other pipes in the City consist of asbestos cement, cement mortar lined steel, ductile iron, copper, galvanized steel, polyvinyl chloride (plastic), reinforced concrete pipe, riveted steel, and spiral weld.[160]

Sewer infrastructure consists of six (6) sewage lift stations and 1,823,000 feet of pipe, some of this pipe dates back to 1895.[161] Pipe materials consist of asbestos cement, vitrified clay, cast iron, ductile iron and ABS truss. Periodically, City personnel still discover orangeburg service laterals installed after World War II.[162] This material consists of rolled tar paper and is

[159] Ivan Sanchez, Water Pipeline Statistic, City of Ontario internal memo, October 29, 2003.

[160] City of Ontario GIS Exhibits, 2005.

[161] Ivan Sanchez, Sewer Pipeline Statistics Internal Memo, City of Ontario, October 29, 2003.

[162] City of Ontario Utilities Operations Manager Victor Moraga, interview by author, telephone interview, 26 April 2005.

far inferior to the older clay pipe installed at the turn of the century.

Water supply sources include imported water from the Metropolitan Water District, groundwater from the Chino Basin and recycled water. The City owns a majority share in the Agua de Legos treatment facility in Upland which treats imported water from the Metropolitan Water District. On an annual basis, imported water consists of 15-20% of the total water supplied in the City. Ontario also has a base water right to pump 11,374 Acre Feet per year from the Chino Basin Aquifer. The base water right is dependent upon the safe yield of the basin and the 1978 Chino Basin judgment.[163] Pumping beyond the base water right mandates replenishment obligations (recharge of the aquifer). Recharge is accomplished by percolation of either captured storm water, or recharge with recycled water or untreated imported water. The City pumps water from the aquifer from 20 deep turbine wells, drilled as far back as the 1920's. Wells were constructed using several different techniques, from cable tool wells common

[163] *Chino Basin Municipal Water District v. City of Chino, et al.*, San Bernardino Superior Court, No. RCV 51010, formerly No. 164327.

among older wells to reverse rotary wells which are typically drilled today. Several of the wells were drilled for agricultural use and later purchased by the City. Their construction and depth, therefore, varies from wells designed for municipal use. Each of the City's wells is constructed of varying casing (lining) material of different qualities, strengths and grades. The City also is supplied with recycled water from the Inland Empire Utilities Agency. Currently, the City has a handful of recycled water users with expansion of use planned in the future.

The most recent sewer master plan did not recommend any additional sewer pump stations. "However, in the case that a pump station is necessary, it must be designed to be reliable, and sized with sufficient capacity. It must contain redundant equipment as well as an emergency power supply, and be able to notify the appropriate personnel in the event of a failure."[164] Capital improvement projects at this time are primarily driven by the need to provide services to new development in the south of the City.

[164] AKM Consulting Engineers, Sphere of Influence Sewer Master Plan, prepared for the City of Ontario, (January 2000), 4-6.

Victor Moraga, one of two Utilities Operations Managers for the City, describes both the water and sewer systems as in "fair" condition. He adds that he has seen lots of defects in sewer pipe that is fifty (50) years or older and feels that the City has fallen behind with replacement of sewer capacity projects to upsize pipelines and handle larger flows. The City has experienced increased flows in pipelines due to changed uses in the City. Whereas in the 40's, 50's and 60's, lots were big for single family homes, and presently, those same lots have duplexes or have more than one family living in a single family home. This all contributes more flows into the system.[165] He also adds that the galvanized service lines which feed into homes decrease in inner diameter over time and cause service related problems for customers. The system also experiences problems where dissimilar metals are used causing corrosion on unprotected sections of pipe.

The City's present annual water demand equates to approximately 45,000 Acre Feet, that demand is anticipated

[165] City of Ontario Utilities Operations Manager Victor Moraga.

to nearly double in the next twenty years as the City is built out.

Ideal Asset Management Model Versus Actual Conditions

The same rating system used for Rainbow's actual conditions is also used in the City of Ontario comparison. If the area of comparison was presently being met by activities at the City, it was indicated as such with a plus (+). A minus sign (-) indicates that the area was not being met and improvement was needed. If the area was somewhat but not fully being met, a plus sign and IN, signifying improvement needed, was indicated (+ IN).

(-) Strategic Planning

- (+) Mission Statement
- (+) Goals and Objectives

(+) Acquisition Plan

- (+) Considerations for acquisition decision
- (+) Listing of alternatives
- (+) Estimated life-cycle costs
- (+) Non-asset solutions
- (+) Demand management

(+) Operations Plan

(+) Maximize efficient use

(+) Minimize inefficient use

(+) Assignment of responsibility

(-) Performance standards for assets

(+ IN) Annual operating cost estimates

(+) Staff training for asset use

(+) Collection of performance data

(+) Maintenance Plan

(-) Condition standard

(+) Maintenance standard

(-) Performance standard

(+) Details of required resources

(-) Disposal Plan

(-) Review of expensive, surplus or unserviceable assets

(-) Business model of evaluation for disposal

(+) Funding Plan

(-) Performance Monitoring

(-) GASB 34 compliance

(+) Procedures, Systems and Training

(+) Information systems for budgeting

(+) Information systems for planning

(-) Information systems for management of assets

(+) Training programs for staff

(+) Asset Supply Profile

(+ IN) Tracking of asset information

(-) Condition Assessment, sewer

(-) Condition Assessment, water

(+) Prioritization of assets for repair/rehabilitation

Strategic Planning

Though the City does not have a strategic plan, Departments receive direction for prioritizing projects and for performing specific tasks. This direction comes from the guidelines established by the City Council and found in the budget document. The Council establishes general goals and objectives followed by more specific budget guidelines in support of the goals and objectives. Staff refers to these goals throughout the year to justify expenditures, to prepare budget requests and to maintain consistency among the organization. These goals are:

- Invest in the Growth and Evolution of the City's Economy;

- Operate in a Businesslike Manner;
- Increase Involvement in Inter-governmental Affairs;
- Focus Resources in Ontario's Commercial and Residential Neighborhoods;
- Invest in the City's Infrastructure (Water, Streets, Sewers, Parks, Storm Drains and Public Facilities);
- Maintain the Current High Level of Public Safety; and
- Provide Enhanced Recreational, Educational and Cultural Activities.

And, because there are several commonalities that exist between the City's Budget Document and a typical Strategic Plan, a Strategic Plan could be developed to exist on its own but also be incorporated into the Budget Document. The major challenges facing the City could also be incorporated into the Strategic Plan and the goals and objectives presently used in preparation of the annual budget could be tied to the vision and values statement of the Council. Objectives and strategies could be developed by each Department and serve as guidelines for budget development. In addition, the strategies could be assigned to specific positions within the organization

along with timelines to ensure implementation and accountability.

Acquisition Plan

The City is starting to do a good job by evaluating new assets in terms of their life-cycle costs. Examples of such evaluations include a recent well which had the option of being designed to pump to one of two (2) different pressure zones. After considerations of motor size for each of the zones was considered, the well was designed to pump to the pressure zone requiring the smaller sized motor and lower head. Savings were therefore realized in electrical costs and in future motor replacement costs, which tend to increase with motor size.

Engineering staff and consultants have also done a thorough analysis of considerations for acquisition decisions for well sites using factors such as water quality, well yield, and demand within the pressure zone.

Additionally, Engineering staff just completed a soil corrosion and testing study as it relates to pipeline material selection in an effort to ensure that new assets

will not corrode extensively due to soil corrosivity in the south of the City.

Non-asset solutions are coming into their own as the City has entered into a recent agreement with the Jurupa Community Services District for delivery of water from desalters to the south. The agreement includes a common reservoir and eliminated the need for installation of a parallel pipeline within the City.

As the City also develops with more dense development, the newly installed assets serving these populations will become harder to access. This will affect scheduling of maintenance and repair activities and will also reduce the visibility and access to businesses. Ken Jeske, the City's Director of Public Works wants more coordinated services between other departments for infrastructure improvements such as coordination between water service line replacements and street paving projects.

Operations Plan

The water production department tracks consumption of power on a monthly basis and translates this into kWh/Acre

Foot of water produced. Each month, operators reorganize priorities for automatic well pumping based upon the most efficient producers. The department, though, needs to establish performance standards for wells, pump stations and lift stations. Presently, operations staff are aware of generally accepted standards for certain assets however, these standards are not in writing. All motors used at booster stations, wells and lift stations are tested annually and could easily be compared against the established performance standard.

Further, the City should compile performance data and compare that to which standards have been established. At this time, the report could be internal and used as a indicator of management performance.

Maintenance Plan

Although maintenance standards are well defined, they are not tied to the targeted condition of the asset. The City has established maintenance standards based upon recommended best management practices for the industry, whether these are performance based or based on a desired

condition is unknown. In any case, this needs to be reviewed.

Disposal Plan

Attempts have been made within the department to review unserviceable assets. Recently, the City conducted such a review of well No. 3 which is old, has a damaged casing, a compromised transmission pipe from the well to the reservoir and required extensive equipment replacement. A business model was completed and it was recommended for destruction however, executive staff desired to keep the well hole for groundwater monitoring purposes.

Overall, the City needs to make an extensive effort to look at all assets in storage and unusable as potentially viable for disposal. This includes property in multiple storage locations and some vacated well sites. A model of evaluation for disposal needs to begin with a business evaluation and recommendation to the City Council for auction or other disposal means.

Funding Plan

The City has initiated a comprehensive rate study for water, sewer and solid waste services. It is anticipated that the rate study will reveal slight cost increases to cover operating expenses. Additionally, when warranted, the City has issued Certificates of Participation to finance improvements for water infrastructure.[166] The City is doing a good job in this area.

Performance Monitoring

The City has not done a sweeping condition assessment for either water or sewer infrastructure to be used for compliance purposes for GASB 34, however, the City has reported that, "the City documents that eligible infrastructure capital assets are being preserved approximately at or above the established disclosed assessment."[167] The City Council also adopted a Fixed Asset Management Policy on May 1, 2001 which documents procedures used by the City to comply with GASB 34

[166] City of Ontario, City Council Agenda Report: Issuance of Certificates of Participation to Finance Improvements Needed for the City's Water System, June 15, 2004.

[167] City of Ontario, Comprehensive Annual Financial Report, For Fiscal Year Ended June 30, 2003, 24.

requirements.[168] According to the policy, the assets at valued at historical cost.

In its most recent Comprehensive Annual Financial Report for the fiscal year ending in June of 2003, it was reported that total net assets for infrastructure did increase. This is supported by funding of $20 million in improvements between both water and sewer funds.

"Private-sector standards of accounting and financial reporting issued prior to December 1989, generally are followed in both the government-wide and proprietary fund financial statements to the extent that those standards do not conflict with or contradict guidance of the Governmental Accounting Standards Board. Governments also have the option of following subsequent private-sector guidance for their business-type activities and enterprise funds, subject to this same limitation. The government has elected not to follow subsequent private-sector guidance. As a general rule, the effect of interfund activity has been eliminated from the government-wide financial statements. Exceptions to this general rule are

[168] City of Ontario, Fixed Asset Management Policy, May 2001.

charges between the government's proprietary funds function and various other functions of the government. Elimination of these charges would distort the direct costs and program revenues reported for the various functions concerned."[169]

The Utilities Department should review accounting with the Finance Department to ensure that each is clear on the activities of the other and that data is being gathered in support of complying with the requirements of GASB 34.

Procedures, Systems And Training

The City has done an excellent job to get information systems in place and train personnel in their use. Within the last five years, systems have been added or upgraded for budgeting/accounting, GIS, Work Management System and Customer Information and Billing. Presently, the City is in the process of upgrading and enhancing elements of the Work Management System. It presently ties to GIS. However, future work will also integrate the Work

[169] City of Ontario, Comprehensive Annual Financial Report, For Fiscal Year Ended June 30, 2003, 56.

Management System with the Customer Information and Billing system and also the budgeting/accounting system.

Management of assets are tracked rudimentarily on spreadsheets by several different staff members. Information systems which specifically manage water and sewer assets have not been implemented nor budgeted for the upcoming year. However, if needed, the system may be added in an adjustment to the budget at mid-year. The City should consider looking at several systems and ensure that it will integrate with existing ones for Work Management.

Asset Supply Profile

Condition assessments of both water and sewer are lacking. The City is at a critical point in time because it is in the process of updating water and sewer master plans. These plans contain, among other things, capital improvement project lists and schedules of implementation. It is critical that some evaluation be done so that the information is incorporated in the master plans, is budgeted and also included in rate studies. A condition assessment should be completed to evaluate capacities in

the sewer lines due to changes in land and home use in the area. Ken Jeske, the City's Director of Public Works stated that these higher density trends will continue since the City is moving towards more dense development. The City will need to continue to meet the needs of existing customers in addition to meeting the needs of denser communities.[170] On a positive note, the City did budget for and plans to contract out the internal inspection of all pre-1940's sewer pipe this upcoming budget year and quantify condition according to the NAASCO system.

Implementation

Most of the recommendations provided for the City are also low cost or are already budgeted activities and can be developed and implemented in a short period of time. Development of an operations plan and a disposal plan can be accomplished within a 12 month period. The Finance Department has been helpful in the past in disposing of

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[170] City of Ontario Director of Public Works and Community Services Kenneth L. Jeske, Interview by author, 20 April 2005.

surplus items and their future assistance in this regard will expedite implementation.

Other, more extensive recommendations include Information Systems design of Work Management System components and also Asset Supply Profiles. Each of these can be implemented within a 24 month timeframe and done with the assistance of outside firms. Strategic planning could also take up to 24 months and is considered more time intensive than that occurring at Rainbow due to the numerous City departments included in the plan.

CHAPTER SIX

CONCLUSION

Implementation of an effective management program at both the Rainbow Municipal Water District and at the City of Ontario is reasonable. Many of the recommendations to achieve effective asset management are of low cost and can be done by in-house staff. The key to implementation is becoming familiar with what is desirable and what is existing and then putting recommendations into action to achieve a desired result.

In this study, a small sized utility, Rainbow Municipal Water District, and a medium sized utility, the City of Ontario, were both compared against the ideal effective asset management model. National surveys revealed that smaller sized utilities had less effective asset management programs than their medium sized counterparts, this conclusion is also supported by gap analysis data completed in this study. Medium sized utilities, especially ones at cities, have a distinct advantage over smaller utilities since larger support services within the organization such as finance,

engineering and information technology, exist. Additionally, the City of Ontario and the Rainbow Municipal Water District have distinctly different customer bases with opposite views on infrastructure importance and adequate rates to sustain such. Additionally, political views differ between these entities as City Council members at Ontario strongly support investing and reinvesting in infrastructure due in part to the heavy reliance on business activities and potential attraction of new businesses. For politicians in Rainbow's service area, maintaining low rates for agricultural and domestic users is an underlying factor.

Because infrastructure is so vital to our way of life, our economy, and to our health and safety, politicians must bravely rethink politically unpopular rate increases. If a utility can show that effective asset management is well planned, prioritized and reduces overall costs, rate increases may be more readily accepted by consumers. We do not want to defer the costs of owning today's assets on future generations.

This should be kept in mind: Persons responsible for asset management in the future will be judged according to

their ability to optimize existing asset costs against replacements while at the same time, meeting the service level expected by the customers.[171] Achievable? Yes.

[171] Camp, Dresser & McGee, 5.

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