

## Utility Manual

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Dear Reader:

The following document was created from the MTAS website ([mtas.tennessee.edu](http://www.mtas.tennessee.edu)). This website is maintained daily by MTAS staff and seeks to represent the most current information regarding issues relative to Tennessee municipal government.

We hope this information will be useful to you; reference to it will assist you with many of the questions that will arise in your tenure with municipal government. However, the *Tennessee Code Annotated* and other relevant laws or regulations should always be consulted before any action is taken based upon the contents of this document.

Please feel free to contact us if you have questions or comments regarding this information or any other MTAS website material.

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## Utility Manual

**Reference Number:** MTAS-833

The purpose of this section is to provide cities with a better understanding of funding water and sewer utility operations. Water and sewer operations are often very costly, but they protect public health and the environment. Water and sewer services are necessary if communities are to grow and attract new investment.

This section is to be viewed as a tool in helping cities make sound financial decisions. Each utility operation is different, and not everything discussed is applicable in every city's situation.

## Definitions: Utilities

**Reference Number:** MTAS-1435

**Enterprise Fund:** This type of fund is used to report any activity for which a fee is charged to external users for goods or services, and is accounted for in a manner similar to private business. The costs (expenses, including depreciation) of providing the service is recovered through user charges. Some audits use the term Proprietary Fund instead of Enterprise Fund.

**Statement of revenues, expenses, and changes in Net Position:** This statement is known as the income statement for a private business. It analyzes revenues and expenses in order to determine the change in net position (profit or loss).

**Statement of Net Position:** This statement is known as the balance sheet for a private business, and is a statement of assets, liabilities, and net assets.

**Depreciation:** The orderly expensing of a long-term asset over its useful life rather than it being totally expensed at the time it is acquired.

**Long-term Asset:** These are assets that have a useful life of more than one year. Examples in a water and sewer system are pumps, pipes, and vehicles.

**Capital Budget:** This is an informal budget used to plan new water and sewer projects and equipment purchases over the next several years.

**Note about accounting changes:** In recent years the Governmental Accounting Standards Board (GASB) issued changes to the terminology and presentation of certain financial information. One of the biggest changes affecting utilities is that grants now appear as part of the profit and loss of the utility rather than as an adjustment to equity (retained earnings/net assets/net position).

## Enterprise Funds

**Reference Number:** MTAS-834

Cities usually operate their utility services in one of two ways. The city may have a separate utility board of commissioners that oversees and funds all utility operations, or the water and sewer utilities may be part of the city budget, and the aldermen serve as the utility board. In either situation, water and sewer utility funds should be set up in a separate fund known as an enterprise fund. Cities may have one enterprise fund for the water operation and another enterprise fund for the sewer operation. However, in most cases it is perfectly permissible to have a combined water and sewer fund. This option has two important advantages for the city:

- Costs can be spread over a larger customer base; and
- Consolidation makes it easier to address administrative, management, and bookkeeping problems.

If the utility elects to operate with a combined fund, bookkeeping should still segregate expenses for water and sewer so that accurate records will be maintained for the cost of operating the water and

sewer systems. This is especially important when the utility is seeking grants and loans, as most agencies want to see the costs for water and sewer separately as they compare to revenues.

Enterprise funds differ from the city's general fund in several ways. Enterprise funds are concerned with income, while the general fund looks at both income and fund balance. Producing an income is important because it is the means of providing funds for capital projects, new equipment, etc. that the utility operation needs. Also, depreciation is used as an expense item in the enterprise fund, while it is not recognized in the general fund.

One other very important aspect of the enterprise fund is the fact that some loan and grant regulations require having a separate fund in order to obtain these monies. This is to assure the lender that there are sufficient revenues being generated by the utility operations to repay the debt.

<b>EXAMPLE OF GENERAL FUND FINANCIAL REPORT</b>			
<b>XYZ City General Fund F/Y Ending June 30</b>			
	<b>BUDGET</b>	<b>ACTUAL</b>	<b>VARIANCE</b>
<b>REVENUES:</b>			
Local Taxes	\$3,000,000	\$3,100,000	\$100,000
Licenses and Permits	\$30,000	\$35,000	\$5,000
Other Revenues	\$200,000	\$190,000	\$(10,000)
<b>Total Revenues</b>	<b>\$3,230,000</b>	<b>\$3,325,000</b>	<b>\$95,000</b>
<b>EXPENDITURES:</b>			
General Government	\$300,000	\$290,000	\$10,000
Administrative	\$200,000	\$210,000	\$(10,000)
Police Department	\$650,000	\$640,000	\$10,000
Fire Department	\$600,000	\$620,000	\$(20,000)
Parks and Recreation	\$300,000	\$275,000	\$25,000
Streets	\$650,000	\$655,000	\$(5,000)
<b>Total Expenditures</b>	<b>\$2,700,000</b>	<b>\$2,690,000</b>	<b>\$10,000</b>
<b>Excess of revenues over expenditures</b>	<b>\$530,000</b>	<b>\$635,000</b>	<b>\$85,000</b>

<b>XYZ CITY</b>	
<b>WATER/SEWER FINANCIAL REPORT</b>	
<b>F/Y Ending June 30</b>	
	<b>Enterprise</b>
	<b>Fund</b>
<b>Revenues:</b>	
Water Sales	\$800,000
Sewer Sales	\$600,000
Service Charges	\$20,000
Other Revenues	\$25,000
<b>Total Revenues</b>	<b>\$1,445,000</b>
<b>Operating Expenses:</b>	
Operating and Maintenance	\$700,000
Depreciation	\$150,000
Administrative	\$250,000
Other Expenses	\$100,000
<b>Total Expenses</b>	<b>\$1,200,000</b>
<b>Operating Income</b>	<b>\$256,000</b>
<b>Interest Income</b>	<b>\$25,000</b>
<b>Interest Expense</b>	<b>(\$200,000)</b>
<b>Change in Net Assets</b>	<b>\$81,000</b>
<b>Beginning Net Assets</b>	<b>\$500,000</b>
<b>Ending Net Assets</b>	<b>\$581,000</b>

## State of Tennessee Requirements

**Reference Number:** MTAS-835

In 1987, the state legislature passed the Wastewater Facilities Act. T.C.A. § 68-221-1001 to 1015. This provides a method for the state to intervene in the financial affairs of any financially distressed, publicly owned wastewater facility. This act established the Water and Wastewater Finance Board (WWFB) to oversee financially distressed municipal wastewater systems. (Utility districts have a similar oversight board that covers their operations: the Utility Management Review Board, T.C.A. § 7-82-701 to 706.) In 1997 the Wastewater Facilities Act was amended to also include authority over financially distressed water systems that do not already have a combined fund with the sewer system.

Cities are required to have an annual independent audit of their financial records. Each of these audits is submitted by the auditor to the Tennessee Comptroller of the Treasury. Audits that show a net loss or negative net position are forwarded to the staff of the Wastewater Financing Board for further review and possible action if the system falls into one or more of the following situations:

- Two consecutive years of negative change in net position;
- Being in default on any long-term debt; or
- Deficit in net position in any one year.

City management will be asked to appear before the WWFB and submit a plan, for board approval, that will eliminate the deficits and operate the enterprise fund in a positive manner. The WWFB has established certain guidelines for the city to accomplish this:

- Deficit in net position — the WWFB may allow the city a period of time of up to 10 years to eliminate the deficit; or
- Two years consecutive negative changes in net position — the WWFB may allow the city a period of time of up to three years to begin operating with a positive change in net position.

In Tennessee, the state comptroller prescribes accounting standards and procedures. Some of the alternatives discussed in this manual exceed “recommended practices and procedures.” The comptroller has the final say over what’s acceptable in municipal accounting practices.

## Funding Sources

**Reference Number:** MTAS-836

A water and sewer utility operation has several options for generating revenues through its normal service provisions. These consist of user charges, tap fees, service fees, penalties or late charges, and surcharges.

## User Charges

**Reference Number:** MTAS-1380

Generally, most of the revenues of a water and sewer utility are in the form of user charges. These charges are measured and accounted for by water meters. Water usage is calculated on a monthly basis (normally) and this usage is applied to the city’s water rates. Cities will use an ascending or increasing-block rate schedule when there is a need to encourage water conservation as a result of increased demand on a dwindling water supply.

In many cities sewer charges are based on water usage amounts determined from meter readings. If the city provides only sewer service it will obtain the usage amounts from the utility districts or whoever is providing water service. In the past, sewer charges were typically structured similar to water rates, although in some cities the sewer rate was expressed as a percentage of the water bill. Today, for many utilities sewer charges are now higher than water charges as the costs of meeting all the requirements of operating a sewer system have increased dramatically. In addition, sewer rate structures typically may use increasing block rates.

<b>EXAMPLE OF A WATER RATE STRUCTURE WITH A VOLUME INCLUDED IN THE MONTHLY MINIMUM</b>
First 2,000 gallons (minimum bill) — \$8.00
Excess over 2,000 gallons \$2.75 per thousand gallons

**EXAMPLE OF A UNIFORM RATE STRUCTURE WITH NO VOLUME ON THE MINIMUM BILL**

Minimum bill — \$8.00

Every 1,000 gallons  
\$2.20 per thousand gallons

**EXAMPLE OF A WATER DECLINING RATE STRUCTURE**

First 1,000 gallons (minimum bill) — \$7.50

Over 1,000 to 5,000 gallons  
\$2.50 per thousand gallons

Over 5,000 to 10,000 gallons  
\$2.00 per thousand gallons

Over 10,000 to 100,000 gallons  
\$1.50 per thousand gallons

Over 100,000 gallons  
\$1.00 per thousand gallons

**EXAMPLE OF AN ASCENDING RATE STRUCTURE**

First 1,000 gallons (minimum bill) — \$7.50

Over 1,000 to 5,000 gallons  
\$1.75 per thousand gallons

Over 5,000 to 10,000 gallons  
\$2.00 per thousand gallons

Over 10,000 to 100,000 gallons  
\$2.25 per thousand gallons

Over 100,000 gallons  
\$2.50 per thousand gallons

## Rates

**Reference Number:** MTAS-837

Several factors should be considered when determining the rate schedule for water and sewer services:

- Operating and maintenance costs;
- Depreciation;

- Debt principal and interest; and
- Capital requirements (this would include new lines, equipment, etc.).

Rates should be put in place sufficient to generate revenues to fund these items and to build a cash reserve to handle emergencies and other fund needs.

One of the most important points to consider is the necessity of planning and monitoring water and sewer fund needs. Cities often wait until they are in financial distress before increasing rates. Then large rate increases are necessary. These increases upset customers and hurt the public perception of the utility operation. A planned program of much smaller, gradual rate increases will help provide the needed income and prevent the city from getting into financial distress.

MTAS consultants can assist you with rate issues or perform a rate study for your city to help you determine exactly what your water/sewer rates need to be.

## Meters

**Reference Number:** MTAS-838

The main source of information for revenue is water meter readings. Care should be taken to make sure meters are properly read and maintained. Any discrepancies or questions about readings should be noted and handled before billings are sent to customers. Occasionally, a meter reading may have to be estimated due to inaccessibility of the meter location. The account should be noted as estimated for future reference and, if at all possible, should be read at the next billing period.

**Automated Meter Reading** — One of the more recent changes in meter reading is the availability of automated meter reading (AMR). AMR is being done in several forms. Devices may be installed on the meter, which allow the meter reader to use a touch wand to obtain the reading. Apartment buildings and condominiums that are metered separately may be networked so that touching only one meter reads an entire group. There also are radio read devices that let the meter reader simply drive past the location. A special device on the meter sends a signal that is picked up by the equipment in the meter reading truck. The most advanced systems can have all the meters read from a central location through either radio or cell phone transmission.

**Advanced Metering Infrastructure**--- AMI is an integrated system of water meters, communications and data management. It allows real time data access.

**Meter Maintenance** — It is important that water meters record usage as accurately as possible. Water meter readings result directly in water and sewer revenues for your city. As meters age they become more inaccurate and usually fail to record all of the water passing through them. Therefore, a regular program for changing out older water meters should be put into place. Replacing older meters on schedule will help the city maintain the revenue level it needs. Recommended schedules include changing out the meters every eight to 12 years or when a meter has recorded 1 million gallons of usage. The information from the meter manufacturer will provide guidance on expected lifetime of a meter. Large industrial or commercial meters should be tested periodically to certify their accuracy. Many times, these larger revenue sources will account for the greater percentage of the city's revenues. It is always better to test these meters at the location under the same conditions as normal service. Also, remember that sewer billings are computed based on water usage. If the water reading is less than accurate it will also affect sewer revenue.

**Other Metering Concerns** — It is usually recommended that each separate service location have its own water meter and sewer service. Sometimes multi-family dwellings will service all users through one master meter. The city needs to have policies in place that address minimum billing and other rates in master metering or the system will not realize as much revenue from these master meters as they normally would from individual metering. However, additional revenues in these situations may be offset by increased maintenance costs of the lines and meters necessary to serve each customer. Cities need to establish uniform policies for handling customer metering concerns for multi-family dwellings, and commercial and industrial customers. This will allow your employees to answer customer questions and ensure that the city is treating all customers fairly.



## Unmetered Services

**Reference Number:** MTAS-1593

Some customers have water services that are unmetered. These would include private fire hydrants, fire suppressant systems and sprinklers. Some utilities have flat charges that are billed each month so that the service is available if needed. Usually these charges are based on the number of hydrants, size of suppressant system or sprinkler heads in service. Municipal fire hydrant maintenance may be charged to the city's general fund. One very important thing to remember is that utilities should derive 90 to 95 percent of their revenues through user charges.

## Tap Fees

**Reference Number:** MTAS-1436

Whenever customers request a new service tap for either water or sewer, a tap fee should be required. Sometimes cities charge artificially low tap fees as a means of encouraging new growth. When the tap fee doesn't even cover installation costs the difference must be made up through user charges to all ratepayers.

In establishing tap fees cities should consider that the new customer is connecting to an existing plant system for which they have shared no costs. To this extent tap fees may include more than just the cost to the utility of the physical installation. Several methods of calculating tap fees may be used. Primarily, they will use asset or plant in-service costs being shared by all customers. This cost should be updated from time to time to reflect customer/cost changes. It is not unusual for cities to charge \$1,000 to \$2,000 for tap fees. Although this may seem high, it is relatively low compared to the cost of digging a well or installing a septic tank. City auditors or MTAS finance and accounting personnel can assist in calculating the tap fee.

Tap fees will be recorded as revenues for the system. Tap fees provide an important resource for water and sewer utilities to recover installation costs from customers.

## Service Fees

**Reference Number:** MTAS-1594

Water and sewer utilities should charge customer service fees for various parts of their operation. One reason is that customers using the utilities' labor, equipment, and materials should bear the largest burden of the cost. This helps keep rates lower for all users and provides important revenues to the utilities.

## Types of Fees

**Reference Number:** MTAS-839

### ***Customer Service Fees***

Whenever a customer requests that a water meter be put into service a utility employee usually must go to the service location to obtain a meter reading and turn on the meter. A flat fee to recover the employee's labor and vehicle cost is charged. These fees are non-refundable.

### ***Collection/Reconnection Fee***

When a customer service visit is necessary to reconnect a service that was terminated for nonpayment, the utility may charge the customer a service fee. These fees are non-refundable.

### ***Damage Costs***

Occasionally a customer will damage a water meter or meter connections by turning the service on or off without using the proper tools. A utility will want the customer to reimburse the costs of the meter, connections, etc. that were damaged. Actual labor costs or a customer service fee may also be charged.

***Fees for Calls Outside of Normal Working Hours***

The utility may choose to charge for customer-initiated service calls outside of normal working hours. This charge may be actual costs incurred or a flat fee that has already been established for these types of calls. Either way the goal is to recover some, or all, of the costs involved.

***Returned Check Service Fees***

A city may choose to charge a service fee for handling returned checks. This is easily justified because some costs are incurred by the water and sewer utility to collect these monies. Sometimes having a published charge discourages customers from giving the utility bad checks. Cities should consult their auditors or attorneys when establishing these fees as there are maximum charges allowable under state law. It is important for utilities to view service fees as a way to recover the costs of providing specific services to their customers. Utilities should avoid inflated service fees that can harm customer relations. Also, it is important that the customer be aware of fees before the service is provided. At the time a customer applies for service he or she should be given a handout that lists appropriate policies or fees. These may also be published in local newspapers and newsletters or inserts that customers receive. This is especially important when changes are made to existing fee schedules.

## Penalties and Surcharges

**Reference Number:** MTAS-840

***Penalties or Late Charges***

Normally, utility billings specify a date by which the bill should be paid. Customers can be encouraged to make payment by this date through the use of a penalty or late charge. (Sometimes late charges are referred to as forfeited discounts.) If the billing is not paid by the due date a charge (typically 5 to 10 percent) will be added to the amount due. Utilities, as all other businesses need to maintain a steady cash flow in order to pay their bills. The late charge will help keep the cash flowing, and, when it is necessary to add the penalty, help offset the extra cost of collecting past due accounts.

***Surcharges***

Some city sewer systems have industrial customers that inject large amounts of industrial waste into the sewer. If these pollutant levels exceed the levels considered as "normal domestic sewage" the customer may be charged a surcharge to offset the cost of treating this higher strength wastewater. A surcharge also may encourage industrial customers to develop pre-treatment facilities to treat these types of wastes before they enter the city sewer system. The purpose of surcharges is to recover some costs that otherwise would have to be paid by all customers through higher rates. MTAS can provide the city with operational technical assistance to help determine surcharges.

## Depreciation

**Reference Number:** MTAS-841

One of the most misunderstood aspects of water and sewer utility accounting is depreciation. Because depreciation does not involve paying out cash funds, like all other expenses, many city officials don't want to recognize it as a legitimate expense. In accounting terms depreciation is the orderly write-off of a long-term asset over its useful life. Rather than expensing a new piece of equipment, such as a truck, at the time of the purchase, a portion of the cost of the truck is expensed each year for several years. In reality, depreciation is very important to a city's utility operation for another reason. By funding for the depreciation expense each year, the utility can set aside funds to purchase a new truck when the old one is no longer of use. Depreciation provides the city with an orderly way to have the funds necessary for new capital purchases. Rather than being viewed in a negative way, depreciation should be seen for its positive results.

## Other Funding Sources

**Reference Number:** MTAS-1381

City water and sewer operations need to make capital purchases and improvements. Some of these, such as a small line installation or a vehicle, may be of relatively low cost and paid for out of normal operating funds. Some capital projects, a new water plant for example, may cost several million dollars. For these types of projects the city will need to obtain grants and loans and repay these costs over a number of years. Cities should apply for grants to help lower the amount that has to be borrowed. Interest costs are a major consideration, so cities should “shop around” for the best available rate. In recent years many cities have refinanced their debt to take advantage of declining interest rates. Remember also that interest expense is a part of the statement of revenues, expenses and changes in net position of the utility operation. Certainly any time a city is going to incur a major new debt, it should complete a revenue/rate study to be sure it can pay the principal and interest.

## Capital Budgets

**Reference Number:** MTAS-842

One of the most often neglected areas of water and sewer utility operations is long-range planning for capital needs. In accounting terms an expense item is generally something that is considered consumed shortly after its purchase. Examples are office supplies, hand tools, and nuts and bolts. Capital purchases or projects are larger, more expensive items that have a longer useful life. If you install 2,000 feet of new sewer line you expect that line to last for several years. The cost of the line and its installation would not be expensed on the statement of revenues, expenses and changes in net position, but would be recorded as a capital item on the statement of net assets. At the end of the financial year capital items are recorded as a part of the utility plant and are then depreciated over their useful life.

City water and sewer utilities should develop a plan for capital needs for the next four to five years. This will help to accomplish several things:

- The city will have a plan for the orderly replacement of equipment and utility infrastructure;
- This plan will help the city provide necessary funding for the projects; and
- The plan will allow the city to prioritize its needs and schedule the work.

The capital budget should be viewed as a tool for the city to use and revise as needed. It will need to be updated on an annual basis. The capital budget also helps the city demonstrate to ratepayers where revenue dollars are being used to improve water and sewer operations.

<b>XYZ CITY — CAPITAL BUDGET</b>					
<b>F/Y 2006 - F/Y 2010</b>					
<b>Capital Item</b>	<b>F/Y 2006</b>	<b>F/Y 2007</b>	<b>F/Y 2008</b>	<b>F/Y 2009</b>	<b>F/Y 2010</b>
Maple Street Water Line	\$20,000	\$10,000			
Replace Pick-Up Truck			\$12,000		
New Pump Water Plant				\$30,000	
Elm Street Line Upgrade		\$10,000	\$10,000	\$10,000	\$10,000
New Backhoe	\$25,000				
<b>Total</b>	<b>\$45,000</b>	<b>\$20,000</b>	<b>\$22,000</b>	<b>\$40,000</b>	<b>\$10,000</b>

## Operations / Cost Control Measures

**Reference Number:** MTAS-843

Proper attention to the operation of a municipal utility can have a positive impact for the city in several ways. Routine maintenance ensures a better, more reliable service for customers. Maintaining and promoting a trained, efficient work force leads to good operations. Accurate accounting, billing, operational, and other records helps city officials make sound operating decisions. Perhaps most importantly, and most overlooked by many cities, is that paying attention to the operation of the water and sewer systems reduces operating costs.

## Customer Accounting / Billing

**Reference Number:** MTAS-1382

### **Customer Accounting**

Customer accounting consists of several different issues. A good customer accounting system will reduce bad debt loss and improve internal control, cash flow, and net income.

### **Customer Billing**

Customer billing for water and sewer services is usually done on a monthly basis. Billing may be done "in house" by the city's computer system; billing software packages are readily available. Some cities may choose to use an outside billing service. In that case the city will read the meters and provide the information to the vendor for billing.

In smaller systems all of the billing may be prepared and mailed at one time. Larger systems may want to do cycle billing. Meter reading routes are divided into groups called cycles. Bills are prepared and mailed using these cycles based on a monthly schedule. Cycle billing can help the city have a smoother

work flow and provide a better cash flow. Whether billing is done all at once or in cycles, care should be taken to send customers their bills at approximately the same time each month. This cuts down on customer complaints and allows them to better budget for the utility payment.

As a part of the billing and accounting process, cities should maintain proper accounts receivable records. Billing totals and payments should be recorded and balanced to accounts receivable totals. One way to accomplish this is for cities to maintain an open balance that reflects outstanding balances on each customer's account. The open balance would contain an "aging" of account balances so that past due accounts could be flagged for collection. Accounts receivable should be balanced monthly.

## Collections

**Reference Number:** MTAS-1383

Normally, cities collect water and sewer billings through walk up/drive up collections or through the mail. These payments usually consist of cash or personal checks. In recent years cities have added alternative payment methods that take advantage of current technologies. Bank drafts, credit cards, and Internet banking are ways to speed collection for the water and sewer fund and provide convenience for the customer.

Cities should establish policies regarding collections of past due payments and bad debts. Generally, a customer will be given a reasonable amount of time to pay the bill without incurring any penalties. For example, a customer's bill would be mailed to him on the 10th of the month and he would have until the 25th to render payment. If the bill is not paid by the due date, a penalty amount, normally a percentage of the outstanding balance, is added to the customer's account. If the bill remains unpaid the customer will be notified that payment is past due. Cities sometimes mail a notice that states that the customer's bill is past due and gives a date by which the bill must be paid before further action, up to and including termination of service, is taken. Care should be taken that customers are informed of their right to dispute the past due amount. Any disputes should be handled before a service is terminated. This will save the city legal problems and perhaps public embarrassment.

## Deposits

**Reference Number:** MTAS-1384

Customers can be charged a deposit adequate to ensure that the city will not lose appreciable amounts of money from unpaid bills and bad debts. A deposit should be sufficient to cover the amount that would be outstanding before the service would be cut off for non-payment. In calculating deposit amounts remember that the customer is still using the water/sewer service from the time the meter is read through whatever time period the city uses for cut offs. The deposit amount needs to be enough to cover this usage period as much as possible.

Some utilities have policies that provide for the waiver or refund of deposits if the customer meets certain requirements. For instance a homeowner who provides a notice of good payment history from a previous utility provider may have the deposit waived, or all residential customers who maintain a good payment record for two consecutive years of service will have their deposits refunded. If you establish these types of policies, remember that the purpose of a deposit is to ensure payment for outstanding bills if the customer is unwilling or unable to pay.

## Non-Refundable Connection Fees

**Reference Number:** MTAS-1385

Instead of deposits cities may want to use nonrefundable connection fees. A deposit is recorded as a liability on the statement of net assets and will need to be accounted for as long as the customer has the service. A non-refundable connection fee is recognized as revenue when it is received, and no records need be maintained to keep track of the payment as with a deposit.

## Operations

**Reference Number:** MTAS-844

Trained and competent personnel, proper maintenance of the infrastructure, adequate facilities and equipment, and a planned program of capital improvements are some of the operational concerns that face city water and sewer systems. Proper attention to these concerns will result in more efficient service to customers, better quality of water supplied or wastewater treated, and cost savings to the city.

## Trained and Competent Personnel

**Reference Number:** MTAS-1386

Cities should employ competent, professional personnel in utility operations. Water and wastewater licensed positions should meet at least the state minimum certification requirements. Licensed employees must regularly update their training so that they are able to comply with the latest federal and state regulations. Operations and maintenance personnel need to also have the proper certifications in their respective areas and have a thorough knowledge of the systems' pumping stations, tanks, lines, etc. Operational problems caused by ill-trained or incompetent personnel can cost the city valuable dollars in lost revenues, equipment failures, and even fines resulting from operational or health violations. One of the most important ways for cities to attract and maintain excellent personnel is to provide pay and benefits that are competitive with other area utilities.

## Properly Maintained Facilities

**Reference Number:** MTAS-1387

The value of the assets of a city water and sewer system will most often amount to millions of dollars. Maintaining those assets will cost the city substantial monies in the annual budget. But proper maintenance will actually result in significant long-term savings. Maintenance extends the life of equipment, lines, pumps, etc., putting off costly replacements. Also, poor maintenance usually results in more operational problems. This often will cost the city in overtime pay or even having to contract outside workers to make repairs and restore service. Employees should follow regular maintenance schedules and make necessary repairs as needed.

## Water Loss

**Reference Number:** MTAS-1388

### ***Water Loss and Infiltration/Inflow***

Two areas of concern for water and sewer systems are control of water loss from the water system and infiltration/inflow (I & I) into the sewer system. Water loss can be measured in terms of accounted for losses and unaccounted for losses. Water loss comparisons are made by looking at the reports of actual water treated and pumped into the system by the water plant and comparing them with gallons billed and sold to customers. It is important to understand that every thousand gallons treated and pumped at the water plant costs the water system in labor, chemicals, pumping charges, etc. A certain amount of unmetered water is going to pass through the system each month. Some of that water loss can be identified and accounted for. These accounted for losses are the result of:

- washing filters at the water plant;
- water from fire hydrants used in firefighting;
- tank maintenance; and
- water used in flushing of water lines (especially important to flush dead-end lines).

Effective January 1, 2013 the American Water Works Association (AWWA) water loss methodology must be included in any audited financial statements received by the Comptroller of the Treasury on or after January 1, 2013. The water loss methodology can be obtained from [www.AWWA.org](http://www.AWWA.org) [1].

At the June 6, 2012, meeting of the Water and Wastewater Financing Board and the Utility Management Review Board, the following was adopted:

*I. Require that the AWWA Excel spreadsheet (in the specific format created by utilizing the AWWA Free Water Audit Software) be submitted electronically in an Excel format. It is the intention of the boards that the AWWA Excel spreadsheet be filed by the contracted auditor in Excel format at the same time the annual audited financial statements are filed. The spreadsheet is not considered audited information, and is only submitted simultaneously. This requirement should not be confused with and does not replace the supplemental schedule (i.e., the single "Reporting Worksheet") included as part of the annual audited financial statements as required by Tennessee Code Annotated. See <http://www.awwa.org/resources-tools/water-knowledge/water-loss-control.aspx> [2].*

*II. In accordance with T.C.A. § 68-221-1010(d)(1) and T.C.A. § 7-82-401(h)(1), failure to include the required schedule constitutes excessive water loss and ... referral to the appropriate board. **THEREFORE, failure to include the AWWA schedule in audited financial statements received by the Comptroller of the Treasury on or after January 1, 2013, will result in the system being referred to the appropriate board.***

*III. Further, utilities will be referred to the boards based on:*

- A. Incomplete AWWA water audit submitted anytime on or after January 1, 2013;*
- B. For audits received by the Comptroller of the Treasury from 1/1/2013 to 12/31/2014 — Validity score of 65 or less or non-revenue water as a percent by cost of operation system of 30 percent or greater;*
- C. For audits received by the Comptroller of the Treasury from 1/1/2015 to 12/31/2016 — Validity score of 70 or less or non-revenue water as a percent by cost of operation system of 25 percent or greater;*
- D. For audits received by the Comptroller of the Treasury from 1/1/2017 to 12/31/2018 — Validity score of 75 or less or non-revenue water as a percent by cost of operation system of 20 percent or greater;*
- E. For audits received by the Comptroller of the Treasury from 1/1/2019 to 12/31/2020 — Validity score of 80 or less or non-revenue water as a percent by cost of operation system of 20 percent or greater.*

*Failure to achieve the designated levels will result in a referral to the board(s). The requirements will be reviewed by the boards annually to ensure the desired results are being achieved. The levels are subject to change by approval of the board(s).*

Infiltration/inflow (I & I) occurs when outside ground water enters the sewer system. I & I can cost utilities tremendous amounts of money in pumping and treatment costs. Ground water can enter the sewer system in several different ways:

- Through cracks or breaks in the sewer lines;
- Through manholes that are either leaking or located in a low lying area that is prone to being underwater; and
- Through storm water drains or downspouts that are connected to the sewer system.

Many sewer systems are built with pumping stations that pump to the treatment plant. Obviously, if a lot of outside ground water is entering the system, it must be pumped as well. The resulting additional pumping costs are lost dollars as no customer is being billed for the I & I. Once the I & I reaches the plant the treatment costs rise as well through additional labor costs, chemicals, pumping, etc., which are necessary to treat the waste. In a very rainy season, I & I will amount to thousands of dollars each month. In very bad I & I situations the sewer plant may be operating at capacity because of the excess water, and plant expansions costing thousands, or even millions, of dollars have to be made.

Utilities can do several things to help eliminate I & I. Manholes located in low lying areas need to be either raised or moved. Utility employees can inspect manholes when it is raining to see if outside ground water is entering. Leaking manholes can be replaced or repaired. Many sewer utilities use cameras that can be put through sewer lines to check for leakage. These camera units can be bought (perhaps cities located near each other could agree to purchase and share a camera) or rented. There also are companies that cities can contract with to film their lines. Once identified, a priority list can be established for the orderly replacement of the leaking lines. Through the use of smoke testing, utilities can find storm drains and downspouts that are connected to the sewer system. Property owners can be notified to remove the drains and downspouts from the system. Those who refuse may be cited under the city's sewer use ordinances.

## Planned Program of Capital Improvements

**Reference Number:** MTAS-845

One of the most important planning tools for utility operations is the capital improvements plan. Cities can best use their revenue dollars and provide their customers with the most reliable service when long-range planning is done. Areas where capital improvements planning should be done include:

- Water and sewer line extensions or replacements;
- Pump rebuilds and/or replacements;
- Water meter replacements;
- Water tank replacements, refurbishing, and additions;
- Repair and replacement of lift stations;
- Renovation or replacement of water treatment plants;
- Renovation or replacement of wastewater treatment plants; and
- Major equipment and vehicle replacements or additions.

Once capital projects are identified, a list should be compiled of all projects needing completion and their approximate cost. Then, city staff and officials can prioritize the list as to completion dates over the next four or five years. Once this is accomplished, cities will have a much better idea of the funds that will be needed for each project. The result is a capital projects budget, a very helpful tool for the utilities. Unlike the normal city budget, the capital budget is not fixed; it is merely a guide. It will need to be updated annually, as new projects arise and current projects are completed.

In addition to planning the use of operating funds, the capital budget allows cities to do long-range planning for major projects, such as new treatment plants, that will require the city to obtain grants or borrow funds. By planning for these projects several years in advance cities are able to find the best possible sources of funds at the cheapest interest rates. Also, sufficient rates can be put into place to pay the new debt service and ensure that the city still has enough income for normal operations and maintenance.

## Management Issues

**Reference Number:** MTAS-1389

Responsibility for the utility system lies ultimately with the city's governing body. Therefore, city officials need to have at least a basic understanding of utility operations. The governing body has several important roles. It:

- sets policies, procedures, and guidelines for the utility operation;
- hires and maintains a competent, well-trained staff; and
- provides the resources for the staff to carry out the utility's functions.

Every city utility system should have a policies and procedures manual that contains the utility's rules and regulations. Employees should be expected to follow the policies and procedures as established by the governing body. This makes the employees' job much easier as they have clear guidelines to follow when dealing with customers and making daily decisions regarding utility operations. The manual also lets city officials hold employees accountable for those rules. The policies and procedures will need to be updated and modified from time to time as the operations of the utilities and state and federal laws change. Policies should also be set for water and sewer line extensions. These policies should address how new developments will be served and how new lines are to be funded. This helps ensure that extensions are handled in a fair and uniform process.

One of the challenges for management is staffing. Utility managers should have the expertise to oversee the operation and be able to work closely with city officials to help them understand the needs of the system. Utility personnel should be expected to read and interpret new regulations. Training opportunities must be provided so that staff can maintain high levels of operation and maintenance. And, officials should expect the utility management to be accountable for the operation of the water and sewer system. Likewise, management should hold staff members responsible for the work that they do.



A wage, salary, and benefit plan should be put in place that is equitable and provides a means to retain competent staff. Utilities can obtain surveys through MTAS, development districts, and other organizations that can help them put together their plan.

City officials are ultimately responsible for the financial situation of the water and sewer system. They must set the rates, borrow the monies, and authorize the budgets. Management staff and officials must work together closely to ensure that resources are provided for the operation, maintenance, and expansion of the system.

## Water and Sewer System Security

**Reference Number:** MTAS-846

Water and sewer systems are complex and vast operations and are open to possible terrorists attack. Much of the water and sewer system is open and cannot be totally shielded from vandalism or destruction. However, there are steps that can be taken to minimize the danger and to deal with any situations that arise.

The greatest threat to water and sewer systems, is likely from someone who is local, instead of an international terrorist group. Almost every city utility system has someone who is a disgruntled customer or ex-employee. These people may seek to damage the system in such a way as to render it difficult to provide water or treat wastewater. For example, they may destroy the power supply to the water plant making it impossible to treat and pump water. It is not likely that a substance could be introduced into the water supply that would injure or kill vast numbers of people, but many other activities could be done to damage the system. Water and sewer systems have many potentially dangerous chemicals, such as chlorine, stored on site. Also, as previously mentioned, they could choose to damage the treatment plant, pumping stations, or water storage tanks. Cities could be without water or sewer service for hours, days, or even weeks. At the greatest extreme, a terrorist could simply kill the certified and trained personnel leaving the system with no qualified operators.

Water and sewer systems should take every step to mitigate this threat. First and foremost, cities should have planning and preparation in place to deal with an event should it occur. A plan should be developed that involves not only the utility staff, but also local law enforcement, fire, rescue, medical, and any other emergency staff that would be a part of the plan. If everyone knows their contacts and roles in an emergency it will be much easier to deal with a crisis than trying to pull this together when working under the stress of an event. Another important part of mitigating the threat is taking preventive steps now. Locking facilities and limiting access to the system is important. Cameras and alarms may be installed where appropriate. Screening personnel as part of the hiring process may prevent the disgruntled employee or ex-employee. Making utility personnel responsible for being alert to potential threats is vital. For example, personnel should always question anyone they see around the facilities to determine if they are present for legitimate purposes, and they should report any unusual activity. And, utility staff should take seriously any threat made by anyone. Sometimes it's easy to brush off the local who has been disgruntled with the utility for years. But this may be the one time he is ready to act.

Hopefully no utility will ever have to face a terrorist action. If plans and preparations are in place the situation will go much smoother and the remedy much quicker. MTAS consultants are available to assist you with more detailed information on security measures and help you evaluate your current situation.

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### Links:

[1] <http://www.AWWA.org>

[2] <http://www.awwa.org/resources-tools/water-knowledge/water-loss-control.aspx>

*DISCLAIMER: The letters and publications written by the MTAS consultants were written based upon the law at the time and/or a specific sets of facts. The laws referenced in the letters and publications may have changed and/or the technical advice provided may not be applicable to your city or circumstances. Always consult with your city attorney or an MTAS consultant before taking any action based on information contained in this website.*

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