



Municipal Technical Advisory Service  
INSTITUTE *for* PUBLIC SERVICE

# Utility Board Manual

Eric Spencer, Finance & Accounting Consultant  
Steve Wyatt, Utility Operations Consultant

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The purpose of this manual 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 provide a public health service. Also, water and sewer services are necessary if communities are to grow and attract new investment.

This manual 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.

### **Topics Covered by the Utility Manual**

- Enterprise Funds
- Funding Sources
- Depreciation
- Capital Budgets
- Operations and Cost-Control Measures
- Management Issues

### **Definitions**

**Enterprise Fund:** This fund is a type of Proprietary Fund. This fund may be 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 like non-governmental business. The costs (expenses, including depreciation) of providing the service are recovered through user charges.

**Statement of Revenues, Expenses, and Changes in Net Position:** This statement is known as the income statement for a non-governmental business. It analyzes revenues and expenses to determine the change in net position (profit or loss).

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

**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 a spending plan used to show pending and 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 or loss of the utility rather than as an adjustment to equity.

## **ENTERPRISE FUNDS (Proprietary Fund)**

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 council members serve as the utility board. In either situation, water or 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 three important advantages for the city:

- Combination of earnings from one department with losses from another may allow the city to have a combined positive net income. (This is most helpful in cities where water earns an income and sewer shows a loss).
- 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 separate 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. Though making a profit is not the purpose of a utility operation, they should be self-sufficient enterprises that operate on sound business principles. This manual provides more information about all these issues in subsequent sections.

**Example of General Fund Financial Report Referred to as the “Statement of Revenues, Expenditures, and Changes in Fund Balance”**

XYZ City			
General Fund			
F/Y Ending June 30			
	<b>Budget</b>	<b>Actual</b>	<b>Variance</b>
<b>Revenues:</b>			
Local taxes	\$3,000,000	\$3,100,000	\$100,000
Licenses & permits	\$30,000	\$35,000	\$5,000
Other revenues	\$200,000	\$190,000	\$(10,000)
Total revenues	\$3,230,000	\$3,325,000	\$95,000
<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 & recreation	\$300,000	\$275,000	\$25,000
Streets	\$650,000	\$655,000	\$(5,000)
Total expenditures	\$2,700,000	\$2,690,000	\$10,000
Net Change in Fund Balance	\$530,000	\$635,000	\$105,000

Beginning Fund Balance           \$800,000  
 Ending Fund Balance            \$1,435,000

**Example of Water/Sewer Financial Report Referred to as the “Statement of Revenues, Expenses, and Changes in Net Position”**

XYZ City	
<b>Water/Sewer Financial Report</b>	
<b>FY Ending June 30</b>	
	<b>Enterprise Fund</b>
<b>Operating Revenues:</b>	
Water sales	\$800,000
Sewer sales	\$600,000
Service charges	\$20,000
Other revenues	\$25,000
Total revenues	\$1,445,000
<b>Operating Expenses:</b>	
Operating & maintenance	\$700,000
Depreciation	\$150,000
Administrative	\$250,000
Other expenses	\$100,000
Total expenses	\$1,200,000
Operating income	\$245,000
Interest income	\$25,000
Interest expense	\$(200,000)
Change in net position	\$70,000
Beginning net position	\$500,000
Ending net position	\$570,000

## **State of Tennessee Requirements**

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. However, in 2023, these boards were combined into one utility oversight board known as the Tennessee Board of Utility Regulation (TBOUR).

Cities are required to have an annual independent audit of their financial records. Each of these audits is submitted to the Tennessee Comptroller of the Treasury. Audits that show an indicator of financial distress are forwarded to the staff of the Tennessee Board of Utility Regulation for further review and possible action if the system falls into one or more of the following situations:

- Two consecutive years of a negative statutory change in net position.
- Being in default on any debt instruments; or
- Deficit in total net position.

Statutory change in net position is defined as total revenues less all grants, capital contributions, and expenses.

City management will be asked to appear before the TBOUR and submit a plan, for board approval, which will eliminate the deficits and operate the utility in a positive manner.

In cities with financially distressed water or wastewater systems, city officials have probably been made aware of the situation by their independent auditors and the Tennessee Comptroller's office. Cities and utility districts with systems that are considered financially unsound are required to answer to the TBOUR.

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

## FUNDING SOURCES

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

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 monthly (normally), and this usage is applied to the city's water rates. Examples of various types of rate structures include:

Example of a water rate structure with a volume included in the monthly minimum.

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

Cities will use an ascending or increasing-block rate schedule when there is a need to encourage water conservation because 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 like 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.

## **Rates**

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 potential 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. When it comes to establishing rates, an understanding of operational costs and a good capital improvement plan are the foundation of building a rate structure.

MTAS finance and utility consultants can assist you with rate issues or perform a rate study for your city to help you determine your water/sewer rates.

## **Meters**

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 possible, should be read at the next billing period.

## **Automated Meter Reading**



Water utilities are utilizing more Automatic Meter Reading (AMR) or Advanced Metering Infrastructure (AMI) in obtaining accurate meter information.

Automatic Meter Reading (AMR) is a one-way communication from the water meter data sender to a receiver where the data is collected on a device that is later used to download the information into the billing system. The normal transfer is either drive-by metering or touch-read metering.

Advanced Metering Infrastructure (AMI) can be a one-way, two-way or hybrid system of communication with the smart meter system and the metering database. The communication is normally done by radio or cell phone signals.

### **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 may become inaccurate and fail to record all 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. 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, because 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**

Some user charges, such as fire hydrants and sprinklers, are unmetered. Flat charges are billed each month so that the service is available if needed. Usually, these charges are based on the number of hydrants or sprinkler heads in service. Fire hydrants or fire protection is usually charged to the city's general fund.

One important thing to remember is that utilities should derive 90 to 95 percent of

their revenues through user charges.

### **Tap Fees**

Whenever customers request a new service tap for either water or sewer, a tap fee is required. Sometimes cities charge artificially low tap fees as a means of encouraging new growth. When the tap fee does not 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 must 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 drilling a well or installing a septic tank. MTAS finance and accounting consultants can assist in calculating the tap fee.

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

### **Service Fees**

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.

### **Other Types of Fees**

**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.

**Collection/Reconnection Fee:** When a customer service visit is necessary to either collect a bill or reconnect a service that was terminated for non-payment, the utility may charge the customer a service fee.

**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 may want to have the customer 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 attorneys when establishing these fees as there are maximum charges allowable under state law.

It is important for utilities to review service fees 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, they 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 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 using 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 with all other businesses, need to maintain a steady cash flow to pay their bills. These charges will help offset the extra cost of collecting past due accounts.

### **Surcharges**

Some city sewer systems have industrial customers that inject substantial amounts of industrial waste into the sewer. These customers may have to operate under a National Pollutant Discharge Elimination System (NPDES) permit specifying certain levels of waste that will be collected and treated by the system. If these levels are exceeded, the customer may be charged a penalty or surcharge. This surcharge is assessed because it costs more for the lines, pumping stations, and plants to handle and treat this type of waste. A surcharge also may encourage industrial customers to develop pre-treatment programs 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. It is also to encourage industries to follow their waste discharge permits. MTAS can provide the city with operational technical assistance to help determine surcharges.

### **Other Funding Sources**

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 several 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. When you consider that a water or wastewater plant may be financed for 30 years or more, the interest costs may total more than the amount borrowed over the term of the loan. In period of declining interest rates, cities may want to consider refinancing their debt. 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. Also, most all debt issued must be approved by the Tennessee Comptroller of the Treasury.

## **DEPRECIATION**

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 do not 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 of its useful life. Depreciation is 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.

## **CAPITAL BUDGETS (also called a Capital Improvements Plan)**

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 position. This should be done at the time of acquisition rather than waiting until the end of the year, even though that is a widespread practice. During the fiscal 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 five to ten years. This will help to accomplish several things:

- The city will have a plan for the orderly replacement of equipment and the 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.

**Example of a Capital Budget**

<b>XYZ City</b>					
<b>Capital Budget</b>					
<b>FY 2023 - FY 2027</b>					
<b>Capital Item</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>FY 2027</b>
Maple Street water line	\$20,000	\$10,000			
Replace pickup 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>

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. The capital budget should also be used to assess and establish financing options used to cover the projects, for example, cash, debt issuance, and grant proceeds.

**OPERATIONS AND COST-CONTROL MEASURES**

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 help 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**

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 monthly. 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 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 workflow 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 reconciled 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 reconciled monthly.

## **Collections**

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. Alternative payment methods that take advantage of current technologies have also been implemented. 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 them on the 10th of the month, and they 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 the payment is past due. Cities sometime 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**

Customers should 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 enough 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 to whatever time the city uses for cut-offs. The deposit amount needs to be enough to cover this usage period as much as possible.

### **Non-refundable Connection Fees**

Instead of deposits, cities may want to use non-refundable 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**

Trained competent personnel, properly maintained 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**

Cities should employ competent, professional personnel in utility operations. Water and wastewater plant operators should meet at least the state minimum certification requirements. Operators 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**

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 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 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**

The Tennessee Comptroller's Office is the over-sight agency for water loss for municipal water systems. Effective in 2022, any municipal water system that does not sell 60% or greater of the water they produce or purchase for use will fall under the authority of the Tennessee Comptroller's Office.

### **Infiltration/inflow (I & I)**

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.

Sewer systems are built with pumping stations that pump to the treatment plant. Obviously, if a significant amount 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 reach 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 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 must be made.

Utilities can do 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. 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. Using 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**



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.
- 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 five to ten 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, and as discussed earlier in this manual, it is a 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, which will require the city to obtain grants or borrow funds. By planning for these projects several years in advance, cities can 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**

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 important roles. The body:

- 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 conduct 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' jobs 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 managed 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. 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**

Water and sewer systems are complex and vast operations that are open to possible terrorists' attacks. 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 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, 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. Utility staff should take seriously any threat made by anyone. Sometimes it is easy to brush off the local who has been disgruntled with the utility for years. But this may be the one time they are 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.

Cyber Security is a requirement from the Tennessee Comptroller's office. Every Utility must have a Cyber Security Policy by July 1, 2023.



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