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Utility Manual

Bill Young
Harriman Utility Board

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Prepared by
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MTAS Utility Finance Consultant

MTAS
MUNICIPAL TECHNICAL ADVISORY SERVICE

A statewide agency of
The University of Tennessee's
Institute for Public Service
in cooperation with the
Tennessee Municipal League

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UTILITY MANUAL

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 costly ventures, but they provide an important public health service and help communities grow and attract new investment.

This manual is a tool to help cities make sound financial decisions. Since each utility operation is different, not everything discussed will apply to every city.

Topics Covered:

- Enterprise Funds
- Funding Sources
- Depreciation
- Capital Budgets
- Operations and Cost-Control Measures
- Management Issues
- Water and Sewer System Security

Definition of Terms:

Enterprise Fund. Fund type used when operations are financed and operated in a manner similar to private business. The costs (expenses, including depreciation) of providing the service is recovered through user charges.

Retained Earnings. Total of all the net incomes and net losses of the enterprise fund since the inception of the water and/or sewer service.

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

Long-Term Asset. Assets with a useful life of several years or longer. For example: pumps, pipes, and vehicles used by a sewer system.

Capital Budget. An informal budget used to plan new water and sewer projects and equipment purchases over several years.

Note about accounting changes:
The Governmental Accounting Standards Board (GASB) has issued changes to the terminology and presentation of certain financial information, which will be phased in over the next several years. For example, retained earnings, which will be referred to several times in this manual, will become net total assets. Utility staff can discuss theses changes with their auditors. Also, MTAS financial and utility consultants are available to assist with questions related to the presentation of financial information.

TABLE OF CONTENTS

ENTERPRISE FUNDS

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 with the aldermen serving as the utility board. In either situation, water and sewer utility funds need to be set up in a separate fund known as an enterprise fund. Cities may have one enterprise fund for the water operation and another 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:

1. Earnings from one department, combined with losses from another may allow the city to have a positive net income and retained earnings. (This is most helpful in cities where water has an income and sewer has a loss.)
2. Costs can be spread over a larger customer base.
3. 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. Separate records are especially important when the utility is seeking grants and loans, because most agencies want to see distinct cost/revenue figures for water and sewer operations.

An enterprise fund differs from the city's general fund in several ways. Enterprise funds are concerned with net income, while the general fund looks only at fund balance. Net income is expressed on an annual basis and becomes part of the retained earnings. Net income is important because it is the means of providing funds for capital projects, new equipment, etc. which 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. We will address all of these issues in more depth in this manual.

Example of General Fund Financial Report:

XYZ City
General Fund
F/Y Ending June 30

Revenues:	**Budget**	**Actual**	**Variance**
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
Expenditures:	**Budget**	**Actual**	**Variance**
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
Excess of Revenues over Expenditures	$530,000	$635,000	$85,000

Example of Water/Sewer Financial Report:

XYZ City
Water/Sewer Financial Report
F/Y Ending June 30

	Enterprise Fund
Revenues:	
Water Sales	$800,000
Sewer Sales	$600,000
Service Charges	$20,000
Other Revenues	$25,000
Total Revenues	$1,445,000
Operating Expenses:	
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)
Net Income	$70,000
Beg Retained Earnings	$500,000
End Retained Earnings	$570,000

(**Note:** The Governmental Accounting Standards Board (GASB) is changing some of the financial reporting standards, which will alter future presentation of the general fund and enterprise fund. Most utilities will work with the auditors to present these changes. MTAS is also available to help staff and officials understand the new requirements.)

The Enterprise Fund is important because loan and grant regulations require a separate fund in order to obtain these monies. The separate fund insures the lender that there are sufficient revenues being generated by the utility operations to repay the debt.

State of Tennessee Requirements

In 1987, the state legislature passed the Wastewater Facilities Act [*Tennessee Code Annotated* (*T.C.A.*) 68-221-1001–1015]. This act provides a method for state intervention into the financial affairs of any financially distressed, publicly owned wastewater facility. This act established the 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.* 7-82-701–706). In 1997 the Wastewater Facilities Act was amended to also include authority over financially distressed water systems, which are not already a combined fund with the sewer system.

Cities are required to have an independent audit of the financial records on an annual basis. Each of these audits are submitted by the auditor to the State of Tennessee Comptrollers office. Audits which show either a net loss or a negative retained earnings 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:

- Retained earnings deficit
- Three consecutive years of net losses
- Being in default on any long-term debt

If the system fall into one of the above situations, the city management will be asked to appear before the WWFB and submit a plan for board approval. The plan should show how deficits will be eliminated and how the enterprise fund will be operated in a positive manner. To help cities draw up such plans, the WWFB has established the following guidelines:

- Retained earnings deficit: A city may have up to ten years to eliminate the deficit.
- Three consecutive years of net losses: A city may have up to three years to begin operating with a positive net income
- Debt default: A city must cure the default within the next twelve months.

In addition, certain amendments have been made to the law to reduce the number of cities classified as financially distressed. These amendments include:

- Water or wastewater systems with a total equity at least four times greater than total debt don't have to consider depreciation expense in computing net income or retained earnings;
- Water or wastewater facilities with 900 or fewer customers don't have to consider depreciation expense on assets acquired with grant funds;
- New wastewater systems don't have to include depreciation as an expense during the first seven years of operation; and
- Amounts derived from tap fees, connection charges, or other related fees and charges that are considered contributed capital shall be considered revenue.

For those cities with financially distressed water or wastewater funds, city officials have probably been made aware of the situation by their independent auditors and the State Comptroller's Office. Cities and utility districts with systems that are considered financially unsound are required to answer to the appropriate board.

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 is acceptable in municipal accounting practices.

FUNDING SOURCES

The water and sewer utility operation has several options for generating revenues: user charges, tap fees, service fees, penalties or late charges, and surcharges. Grants and loans are other ways to obtain funds.

User Charges

Generally, most of the revenues that are provided for 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 a city's water rates. Typical rate structures for cities consist of a minimum bill for usage levels of zero to two thousand gallons and a charge for each thousand of gallons used over the minimum. Some water rate structures may have several declining rate steps.

Example of a water/sewer rate structure:

First 2,000 gal. (minimum bill)	$ 8.00
Excess over 2,000 gal.	$ 2.75 per thousand gal.

Example of a water declining rate structure:

First 1,000 gal. (minimum bill)	$ 7.50
Over 1,000 to 5,000 gal.	$ 2.50 per thousand gal.
Over 5,000 to 10,000 gal.	$ 2.00 per thousand gal.
Over 10,000 to 100,000 gal.	$ 1.50 per thousand gal.
Over 100,000 gal.	$ 1.00 per thousand gal.

Example of an ascending rate structure:

First 1,000 gal. (minimum bill)	$ 7.50
Over 1,000 to 5,000 gal	$ 1.75 per thousand gal.
Over 5,000 to 10,000 gal.	$ 2.00 per thousand gal.
Over 10,000 to 100,000 gal.	$ 2.25 per thousand gal.
Over 100,000 gal.	$ 2.50 per thousand gal.

Cities will use an ascending or increasing-block rate schedule when there is a need to encourage water conservation as a result of an increased demand on a dwindling water supply.

Sewer charges are also based on the water meter usage amounts from meter readings. If the city provides sewer service only, they will obtain the usage amounts from the utility districts, or from whoever is providing water service. Sewer charges also are typically structured like water rates, although in some cities the sewer rate may be simply expressed as a percentage of the water bill. For many utilities, sewer charges are now greater than water charges, as costs have increased dramatically to meet all the requirements of operating a sewer system.

Rates

Several factors should be considered to determine the rate schedule for water and sewer services:

- Operation and maintenance costs
- Depreciation
- Debt principal and interest
- Capital need requirements (this would include new lines, equipment, etc.)

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

It is very important to plan and monitor the water and sewer fund needs. Many times cities wait until they are in financial distress before increasing rates, and then large rate increases are necessary. These increases upset the customers and hurt the public perception of the utility operation. A planned program of small, gradual rate increases will help provide the needed income and prevent the city from getting into financial distress.

MTAS has a publication entitled *Basics of a Utility Rate Study* that can provide you with more information about rates. It is available free of charge to your city and can be obtained from a consultant or by calling the MTAS office. Also, MTAS finance and utility consultants can assist you with rate issues or do a rate study for your city to help determine exactly what your water/sewer rates need to be.

Meters

Revenue from sale of water is based entirely on meter readings, so 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 to 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 time.

Meter Maintenance. It is important that the water meters record usage as accurately as possible. Water meter readings directly result 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 replacing older water meters should be put into place. Replacing older meters on schedule will help the city maintain the revenue level they need. Recommended schedules include changing out the meters every six to eight years or when the meter has recorded 1,000,000 gallons of usage. Large industrial or commercial meters should be tested on a periodic basis to certify their accuracy, since many times these larger revenue sources will account for the greater percentage of the cities revenues. It is always better to test these large meters at the site under normal service.

Remember that the sewer billings are computed as a result of water usage. If the water reading is not accurate, it will also affect the sewer bill.

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 policies that address the billing of minimum bills 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 should establish uniform policies for handling customer metering concerns such as multi-family dwellings and commercial or industrial customers. Uniform policies will help your employees answer customer questions easily and treat 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.

Remember that it is through user charges that utilities will derive 80 to 90 percent of their revenues.

Tap Fees

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. But if 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 new customers are connecting to an existing plant system for which they have shared no costs. Therefore, tap fees must include more than just the physical installation costs to the utility. Several methods of calculating tap fees may be used. Usually, all customers share the asset or plant in service costs. These costs need to be updated from time to time to reflect customer/cost changes. It is not unusual for cities to charge $1000 to $2000 for tap fees. Although this amount may seem high, it is relatively low compared to the cost of digging a well, or installing a septic tank. The city auditors, or MTAS accounting personnel, can assist in calculating the tap fee.

Tap fees are generally considered contributed capital, but they often are presented as revenues of the system, which is perfectly permissible. Tap fees provide an important resource for water and sewer utilities to recover installation costs from customers.

Service Fees

Water and Sewer utilities should charge service fees for various parts of their operation. Since customers use a utility's labor, equipment, and materials directly, they should bear the largest burden of the cost. These fees help keep rates lower for all users and provides important revenues to the utilities.

Types of Service Fees:

Customer Service Fees. When a customer requests water meter service, a utility employee must usually go to the service location to obtain a meter reading and/or turn the meter on. A flat fee to recover the employee's labor and vehicle cost is charged. Normally these fees range from $20 to $50 per service call and are nonrefundable if the service is ended.

Collection/Reconnection Fee. When a customer service visit is necessary to either collect a bill or reconnect a service which was terminated for non-payment, the utility may charge the customer a service fee. Typically these fees are also $20 to $50 per service call and are nonrefundable.

Damage Costs. Occasionally a customer will damage the water meter or meter connections by turning the service on or off without having the proper tools. A utility may want to have the customer reimburse the costs for the meter, connections, etc. which 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 customers for customer-initiated service calls outside of normal working hours. This charge may be actual costs incurred or a flat fee which 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 fee is easily justified since some costs are incurred by the water and sewer utility to collect these monies. Having a published charge may discourage customers from giving the utility checks which are returned. Cities should consult their auditors or attorneys in establishing these fees, as there are maximum charges allowable under state law.

Service fees are a way to recover costs of providing specific services to their customers. Utilities should avoid inflated service fees which can harm customer relations. It is important that the customer be aware of fees *before the service is provided.* At the time customers apply for service, they should be given a handout that lists appropriate policies or fees. Policies and fees may also be published in local newspapers and newsletters/inserts provided to customers. Publishing this information is especially important when there are any changes 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 through the use of a penalty or late charge. (Sometimes late charges are also referred to as forfeited discounts.) If the billing is not paid by the due date, a charge of 5-10 percent will be added to the amount due. Utilities, like all other businesses need to maintain a steady cash flow in order to pay their bills on time and operate smoothly. Late charges 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 who inject large 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 industry 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. Also, a surcharge may encourage an industry to develop a pre-treatment program to treat these types of wastes before they enter the city sewer system. The purpose of surcharges is to recover some costs which otherwise would have to be paid by all customers through higher rates. It is also to encourage industries to be in legal compliance with their waste discharges. MTAS can provide the city with operational technical assistance to help them in determining surcharges.

Grants and Loans

City water and sewer operations need to make capital purchases or improvements. Some of these purchases, such as a small line installation or a vehicle, may be relatively low cost and paid for out of normal operating funds. However, some capital projects, a new water plant for example, may cost several million dollars. For these large projects, the city needs grants and loans that will be repaid over a number of years. Whenever possible, cities should apply for grants to help lower the amount that has to be borrowed.

Since interest costs are a major consideration, cities should "shop around" for the best available rate. When you consider that a water or wastewater plant may be financed over 30 years or more, the actual interest costs may total more than the amount borrowed over the term of the loan. In recent years, many cities have refinanced their debt to take advantage of the declining interest rates. Remember that interest expense is a part of the income statement of the utility operation. Certainly any time cities incur major new debt, they should complete a revenue/rate study to be sure they can pay the principal and interest.

MTAS has available a free publication entitled *Finding Money III*, which is an excellent resource to help cities locate possible grants and loans. To obtain a copy, you may contact the utility or finance consultants or call the MTAS office.

DEPRECIATION

One of the most misunderstood aspects of water and sewer utility accounting is depreciation. Since depreciation does not involve paying out cash funds to anyone, many city officials don't want to recognize it as a legitimate expense. Also, the general fund, which operates the other city functions, does not account for depreciation. 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 truck cost is expensed each year for several years.

Depreciation is very important to a city's utility operation for another reason. By funding for the depreciation expense each year, the utility is able to accumulate funds to purchase a new truck when the old one is no longer usable. So 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 for the city, depreciation should be seen for its positive results.

CAPITAL BUDGETS

One of the most neglected areas in water and sewer utility operations is long-range planning for capital needs–a capital budget. In accounting terms, an expense item is generally something that is consumed shortly after its purchase, for example: office supplies, small hand tools, and nuts and bolts. Capital purchases or projects are those larger, more expensive, items that have a longer useful life. If you install 2000 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 income statement; it would be recorded as a capital item on the balance sheet. 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 aid the city in providing necessary funding for the projects.
- The plan will allow the city to prioritize the needs and schedule the work.

XYZ City
Capital Budget
F/Y 2000 - F/Y 2004

Capital Item	F/Y 2002	F/Y 2003	F/Y 2004	F/Y 2005	F/Y 2006
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				
Total	$45,000	$20,000	$22,000	$40,000	$10,000

The capital budget is 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 needed revenue dollars are being used to improve the water and sewer operations.

OPERATIONS AND COST-CONTROL MEASURES

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

Operations

Trained and competent personnel, properly maintained facilities and equipment, and a planned program of capital improvements are some of the operational concerns which confront city water and sewer systems. Proper attention to these concerns will result in more efficient service to the 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 for the utility operations. Water and wastewater plant operators should meet at least the state minimum certification requirements. Operators should 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 which are competitive with other area utilities.

Properly Maintained Facilities

The value of the assets of a city water and sewer system will 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. and thus delays the need for costly replacements. Also, poor maintenance usually results in more operational problems. These problems will often cost the city in overtime pay, or the city may have to contract outside the city personnel to make repairs and restore service. Employees should maintain regular maintenance schedules and make necessary repairs as needed.

Water Loss and Infiltration/Inflow

It is important to control water loss from water systems and infiltration/inflow (I & I) into the sewer systems.

Water loss. This includes accounted for losses and unaccounted for losses. Water loss is determined by comparing the reports of actual water treated and pumped into the system by the water plant to the number of 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 water system each month. Some of that water loss can be identified and accounted for. These accounted for losses are the result of:

- Washing of filters at the water plant
- Water used from fire hydrants in firefighting
- Water used in flushing of water lines (especially important to flush dead end lines)
- Leaks that have been found and repaired

In order to account for these losses, the city utility personnel, or perhaps engineer, may have to estimate the amount of water lost. This is done by knowing line sizes, flow rates, etc. Once cities have identified all the losses they can, the remainder of the water loss is classified as unaccounted for. Unaccounted for water loss is usually caused by leaks and meters which are either stopped or registering less than the actual flow of water through them. As a general rule, cities should strive for a maximum of 10-15 percent unaccounted for loss.

Infiltration/inflow (I & I). This 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 which are either leaking or located in a low-lying area prone to being underwater
- Through storm water drains or down spouts which 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. Since no customer is being billed for the I & I, the additional pumping costs are lost dollars. Once the water from I & I reaches the plant, the treatment costs rise as well. This cost increase is due to additional labor, 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, necessitating plant expansions costing thousands or even millions of dollars.

Utilities can do several things in order to help eliminate I & I. Manholes located in low lying areas can be raised or moved. When rains are occurring, utility employees can inspect manholes 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 or rented. (Perhaps cities located near each other could agree to purchase and share a camera.) There are also companies whom 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 down spouts which are connected to the sewer system. Property owners can be notified to remove the drains and down spouts from the system. Those who refuse may be cited under the cities sewer use ordinances.

Cost-Control Measures

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 a 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 billings may be prepared and mailed at one time. Larger systems may want to do cycle billing. In this case, meter reading routes are divided into groups called cycles. Billings are prepared and mailed using these cycles based on a monthly schedule. This cycle billing can help the city have a smoother work flow and provide a better cash flow. Whether billings are done all at once or by 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 customers 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 on a monthly basis.

Collections

Normally, cities collect water and sewer billings through either 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 which take advantage of current technologies. Bank drafts, credit cards, and Internet banking are ways to speed up collection for the water and sewer fund and provide convenience for the customer.

Cities should establish policies for collection of past due payments and bad debts. Customers should be given a reasonable amount of time to pay the bill without incurring any penalties. For example, the utility bill would be mailed to customers 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 payment is now past due. The past due statement also gives a date by which the bill must be paid before further action is taken—up to and including termination of service. 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 later on.

Deposits

Customers should be charged a deposit to insure 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. To calculate an appropriate deposit amount, remember that the delinquent customer is still using the water/sewer service from the time the meter is read through whatever time period allowed before the city cuts off the water service. The deposit amount should 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 deposit refunded. Remember, if you establish these types of policies, that the purpose of a deposit is to insure payment of the outstanding bills should the customer be unwilling or unable to pay.

Non-Refundable Connection Fees

Instead of requiring a deposit, cities may want to charge a non-refundable connection fee. A deposit is recorded as a liability on the balance sheet 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.

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 with long-range planning. 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
- Renovations or replacement of water treatment plants
- Renovations or replacement of wastewater treatment plants
- Major equipment and vehicle replacements or additions

Once capital projects are identified, a list should be compiled of all projects and their approximate cost. Then a city's staff and officials can prioritize the list for the next four or five years, determining which projects should be completed by what date. Once priorities and target dates have been established, cities will have a better idea of the funds needed for the projects. The result is a helpful tool for the utilities, a capital projects budget. 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 ones 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 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 insure the city still has enough income for normal operations and maintenance.

MANAGEMENT ISSUES

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

- Set policies, procedures, and guidelines for the utility operation
- Hire and maintain a competent, well-trained staff
- Provide the resources for the staff to carry out the functions of the utility

Every city utility system ought to have a policies and procedures manual that contains the rules and regulations of the utility. Employees should be expected to follow the policies and procedures as established by the governing body. Employees' jobs are much easier when they have clear guidelines to follow for dealing with customers and making daily decisions regarding the utility operations. The manual also gives the city officials an opportunity to 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 change and state and federal laws change.

Policies should also be set for line extensions of the water and sewer system. These policies should address how new developments will be served and also direct how the new lines are to be funded. These policies will help ensure that extensions are handled in a uniform and fair manner.

One of the challenges for management is the staffing of positions. Utility managers should have the expertise to oversee the operation and be able to work closely with the 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 for the staff in order to maintain a high level 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 personnel responsible for the work 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 will help them put together their plan.

City officials are ultimately responsible for the financial situation of the water and sewer system. They must set rates, borrow monies, and authorize budgets. Management staff and officials must work closely together to insure 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 which, by nature, lend themselves 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 which can be taken to minimize the danger and deal with a situation should it arise.

The greatest threat to water and sewer systems is likely to come from a home-grown saboteur, not an international terrorist group. Almost every city utility system has a disgruntled customer or ex-employee. Such a person may seek to damage the system in such a way as to render it difficult to provide water or treat wastewater. For example, he may destroy the power supply to the water plant, making it impossible to treat and pump water. It is unlikely that a substance could be introduced into the water supply that would injure or kill large numbers of people, but many other things could be done to damage the system. Water and sewer systems store on site many potentially dangerous chemicals, such as chlorine. Also, as previously mentioned, a saboteur 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 might kill the trained and certified personnel, leaving the system without qualified operators.

Water and sewer systems should take every step to mitigate these threats. First and foremost cities should have plans and preparation in place to deal with a terrorist event should it occur. The plan should involve not only the utility staff but also local law enforcement, fire, rescue, medical, and any other relevant emergency staff. If everyone knows their contacts and roles in the emergency, it will be much easier to deal with a crisis. It is hard to pull things together 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. Careful screening during the hiring process may weed out people who would later become disgruntled employees or ex-employees. Alerting utility personnel to potential threats is vital. For example, personnel should always question anyone seen around the facilities to determine if they are present for legitimate purposes, and then report any unusual activity. Utility staff should take any threat seriously. 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. But if plans and preparations are in place, the response will be more effective and the remedy much quicker. MTAS utility consultants are available to assist you with more detailed information on security measures. They can help you evaluate your current situation.

Appendix 1: WASTEWATER SERVICE CONNECTION FEES

The following was prepared by Ron Darden, MTAS Municipal Management Consultant.

Municipal wastewater connection fees are commonly charged to new customers based on the existence of a water meter or on some other basis such as per unit. Some municipalities charge varying fees depending on the size of the water meter. When calculating such a fee, be sure to follow these guidelines:

- Make wastewater fees fair to residential, commercial, and industrial customers.
- Base service connection fees on the premise of one wastewater connection for one customer.
- Require new customers to pay for the cost of connecting to the wastewater system.
- Do not allow residential customers to share a common meter or connection to avoid the rate system designed for the recovery of capital and operating costs.
- Do not permit commercial and industrial customers to use a single meter or connection to avoid capital and operating costs of the wastewater system.
- Require all customers to pay a minimum wastewater service connection fee.

This report outlines a procedure for determining a wastewater service connection fee, sometimes referred to as a tap fee, based upon equity, the actual cost of making the connection, and use of the system. Following this procedure will result in these benefits:

- The often ambiguous application of connection fees to commercial and industrial buildings will be minimized.
- Residential, commercial, and industrial customers will be treated equally in terms of system usage, equity, and cost.
- Flexibility will be maintained in subsidizing new business development on a case by case basis from the city general fund when the city determines it to be in the public interest.
- The need for future rate increases will be minimized.

Equity

Service connection fees should be charged as a means of recovering some of the costs for prior capital expenses and for the actual costs of making the connection. When properly applied, these fees keep the present ratepayers from paying the costs of adding new customers to the system. It is a common practice to base part of these costs on wastewater system equity. Equity represents capital costs that previous customers have already paid for over the years in tap fees and other capital contributions. New customers coming onto the system should be required to make a contribution equal to the equity per customer for customers already in the system. Fairness requires that they pay for, or buy into, prior capital costs of the system.

Here is an example of equity per customer:

Assets June 30, 1999	$11,330,869
Liabilities June 30, 1999	8,429,243
Total Equity June 30, 1999	$ 2,901,625

Equity per customer (total equity divided by an assumed 3,961 customers) is $732.55.

Using this analysis, the connection fee would be $732.55 as an equity contribution to capital recovery. This represents previous contributions to capital made by present customers.

Installation Costs

While the actual installation costs will vary from city to city, this example uses an estimated installation cost of $1,085.08 when made in a paved area and $868.08 when made in a non-paved area. The applicant for a wastewater connection permit may have the option of employing a licensed plumber, approved by the city, to make the actual installation or pay the estimated Wastewater System costs for the installation.

Regardless of the option used, the installation should conform to city standards and specifications. When the applicant furnishes the installation, he should pay an inspection fee to the city. Additionally, the plumber may be required to obtain a street-cut permit to insure that the street is properly repaired. Where an existing installation has already been made and the piping has been installed to the property line, do not charge the applicant for actual installation based on units. If only one physical service connection is made in the street surface, the applicant should not have to pay an additional fee.

System Usage

In an effort to make the tap fee as fair and objective as possible, we here present a method based on commercial, industrial, and institutional water consumption requirements outlined in *State of Tennessee, Department of Environmental and Conservation, Design Basis For New Sewage Works* (see attached tables). These consumption standards are commonly used by engineers in designing water and wastewater systems. A city may, on a case-by-case basis, make adjustments in connection fees for targeting business growth. It would seem appropriate that such adjustments be made with contributions from the city's General Fund so that the integrity of the wastewater rate system is maintained.

Now that the equity costs of the wastewater connection fee have been determined and the actual installation costs have been estimated, it is important to equate the application of these connection fees to wastewater system customer usage. Using 100 gallons per day of water per person and 2.5 residents per household, average usage is seventy-five hundred (7,500) gallons per month. Seventy-five hundred (7,500) gallons per month becomes the basic measure of usage associated with one connection or one unit. The application of all other uses will be computed according to the above-referenced design standards.

Here is a list of standard water consumption requirements and examples of their application to service connection fees:

Residential	100 gal. per day, per person
Apartments and Condominiums	100 gal. per day, per person (Based on the number of meters or rental units)
Schools	16 gal. per day, per person (Based upon projected enrollment)
Churches	3 gal. per day, per person (Based upon membership enrollment)
Civic Clubs	3 gal. per day, per person (Based upon membership enrollment)
Hospitals	300 gal. per day, per bed
Nursing Homes	195 gal. per day, per bed (Based upon the number of patients)
Rooming Houses	100 gal. per day, per person (Based upon the number of roomers)
Commercial and Industrial:	
Car Wash	1500 gal. per day, per wash rack*
Child Care Center	10 gal. per day, per child and adult
Industrial Plant	30 gal. per day, per employee*
Launderette	250 gal. per day, per machine
Laundry	5000 gal. per day*
Motels	38 gal. per room, per day
Office Building	12 gal. per day, per 100 SF*
Physician's Office	200 gal. per day, per examining room*
Restaurants	20 gal. per day, per seat
Retail Store	150 gal. per day, per 1000 SF floor*
Service Station	10 gal. per day, per vehicle served*
Shopping Center no food	150 gal. per day, per 1000 SF floor
Theater	3 gal. per day, per seat

**Community Water Systems*, Fifth Ed., by Joseph S. Ameen, S.M., Sanitary Engineer.

Applications Example:

A 10,000 SF office building. The basic equity connection fee, as previously calculated, is $732.50. The number of units is 12 gallons per day per 100 SF (from the above usage standards) or 1,200 gallons per day. Multiplied by 30 days in the month, the usage is 36,000 gallons per month. Divide this by the 7,500-gallon base for each unit or tap and you get 4.8 units. To determine the connection fee, multiply 4.8 times $732.55 and add the costs for actual physical connection fees in the paved or surfaced areas or areas outside paved areas.

The connection fee for such an office building would be:

Installation by the customer	
4.8 times $732.55 (equity fee)	$3,516.24
Installation provided by customer	0.00
Inspection fee (assumed)	150.00
Total cost of equity and installation	**$3,666.24**
Installation by the City	
4.8 times $732.55 (equity fee)	$3,516.24
Installation provided by the city in street	1,085.08
Total cost of equity and installation	**$4,601.32**
4.8 times $732.55 (equity fee)	$3,516.24
Installation provided by the City out of Street	868.08
Total cost of equity and installation	**$4,384.32**

Additional application examples are provided following the summary.

Summary

This wastewater connection fee procedure allows the new customer to pay a share of the capital and capacity costs of the system and pay the actual costs for making the connection. It keeps the present ratepayers from paying the costs of adding new customers, and it minimizes the need for future increased wastewater rates. Although these fee structures are more comprehensive than those used by many systems, they are based on system costs and accepted design standards for wastewater usage. The procedure requires new customers to pay their fair share; it does not rely on existing customers to pay the costs. The service connection fee is the sum of the equity contribution and the installation costs plus the standard usage factor.

Additional Application Examples of Wastewater Connection Fees:

Apartments, rooming houses, condominiums, duplexes, triplexes, etc. Each unit is assessed a fee of $732.55. The actual cost of installing the connection is added to the fee. These are treated just like a single residential unit.

Barber Shop. 100 gallons per day per chair. Using 2 chairs, 100 x 2 x 30 days equals 6,000 gallons per month usage. 6,000 gal./7,500 residential base usage equals.8 connections. The connection fee would be $586.04 plus the actual cost of installation.

Beauty Shop. 125 gallons per day per chair. Using 4 chairs, 125 x 4 x 30 days equals 15,000 gallons per month usage. 15,000 gal/7,500 residential base usage equals 2 connections. The connection fee would be 2 x $732.55 or $1,465.10 plus the actual cost of installation.

Car Wash. 1500 gal per day per wash rack. Using 6 wash racks, 1500 x 6 x 30 days equals 270,000 gallons per month usage. 270,000 gal./7,500 residential base usage equals 36 connections. The connection fee would be 36 x $732.55 or $26,371.80 plus the actual cost of installation.

Child Care Center. 10 gallons per day per child and adult. Using 20 persons, 10 x 20 x 30 days equals 6,000 gallons per month. 6,000 gal./7500 residential base usage equals .8 connections. The connection fee would be .8 x $732.55 or $586.04 plus the actual cost of installation.

Church. 3 gallons per day per member. Using 300 members, 3 x 300 x 30days equals 27,000 gallons per month usage. 27,000 gal./7,500 residential base usage equals 3.6 connections. The connection fee would be 3.6 x $732.55 or $2,637.18 plus the actual cost of installation. If the connection serves a separate building at the church, an estimate of the number of people who will use the building should be used for the number of members.

Dentist Office. 750 gallons per day per chair. Using 2 chairs, 750 x 2 x 30 days equals 45,000 gallons per month usage. 45,000 gal/7,500 residential base usage equals 6 connections. The connection fee would be 6 x $732.55 or $4,395.30 plus the actual cost of installation.

Department Store. 40 gallons per day per employee. Using 4 employees, 40 x 4 x 30 days equals 4,800 gallons per month usage. 4,800 gal/7,500 residential base usage equals .64 connections. The connection fee would be .64 x $732.55 or $468.83 plus the actual cost of installation.

Drug Store. 500 gallons per day. 500 x 30 days equals 15,000 gallons per month usage. 15,000 gal./7,500 residential base usage equals 2 connections. The connection fee would be 2 x $732.55 or $1,465.10 plus the actual cost of installation.

Hospitals. 300 gallons per day per bed. Using 100 beds, 300 x 100 x 30 days equals 900,000 gallons per month usage. 900,000 gal/7,500 residential base usage equals 120 connections. The connection fee would be 120 x $732.55 or $87,906 plus the actual cost of installation.

Launderette. 250 gallons per day per machine. Using 10 washing machines, 250 x 10 x 30 days equals 75,000 gallons per month usage. 75,000 gal./ 7,500 residential base usage equals 10 connections. The connection fee would be 10 x $732.55 or $7,325.55 plus the actual cost of installation.

Laundry. 5,000 gallons per day. 5,000 x 30 days equals 150,000 gallons per month usage. 150,000 gal./7,500 residential base usage equals 20 connections. The connection fee would be 20 x $732.55 or $14,651.10 plus the actual cost of installation.

Motel. 63 gallons per day per room. Using 50 rooms, 63 x 50 x 30 days equals 94,500 gallons per month usage. 94,500 gal/7,500 residential base usage equals 12.6 connections. The connection fee would be 12.6 x $732.55 or $9,230.63 plus the actual cost of installation.

Nursing Homes. 195 gallons per day per bed. Using 25 beds, 195 x25 x 30 days equals 146,250 gallons per month usage. 146,250 gal./7500 residential base usage equals 19.5 connections. The connection fee would be 19.5 x $732.55 or $14,284.73 plus the actual cost of installation.

Office Building. 12 gallons per day per 100 SF. Using 10,000SF, 12 x 100 x 30 days equals 36,000 gallons per month usage. 36,000 gal./7,500 residential base usage equals 4.8 connections. The connection fee would be 4.8 x $732.55 or $3,516.24 plus the actual cost of installation.

Physician's Office. 200 gallons per day per examining room. Using 4 rooms, 200 x 4 x 30 days equals 24,000 gallons per month usage. 24,000 gal./ 7500 residential base usage equals 3.2 connection fees. The connection fee would be 3.2 x $732.55 or $2,344.16 plus the actual cost of installation.

Residential single unit. 100 gallons per day per person. Using 2.5 persons per household for 30 days, the monthly water usage is 7,500 gallons. This monthly usage represents one equity connection fee. The equity connection fee is $732.55. The cost of actual installation would be added to this fee to establish the wastewater connection fee.

Restaurant. 20 gallons per day per seat. Using 40 seats, 20 x 40 x 30 days equals 24,000 gallons per month usage. 24,000 gal./7500 residential base usage equals 3.2 connections. The connection fee would be 3.2 x $732.55 or $2,344.16 plus the actual cost of installation.

Schools. 16 gallons per day per person. Using 300 enrollment, 16 x 300 x 30 days equals 144,000 gallons per month usage. 144,000 gal/7,500 residential base usage equals 19.2 connections. The connection fee would be 19.2 x $732.55 or $14,064.96 plus the actual cost of installation.

Service Station. 10 gallons per day per vehicle. Using 75 vehicles, 10 x 75 x 30 days equals 22,500 gallons per month usage. 22,500 gal./7,500 residential base usage equals 3 connections. The connection fee would be 3 x $732.55 or $2,197.65.

Shopping Center. 150 gallons per day per 1000 SF. Using 20,000 SF, 150 x 20 x 30 days equals 90,000 gallons per month usage. 90,000 gal./7,500 residential base usage equals 12 connections. The connection fee would be 12 x $732.55 or $8,790.60 plus the actual cost of installation.

Appendix 2: DESIGN BASIS FOR NEW SEWAGE WORKS

Discharge Facility	Design Units	Flow (gpd)	BOD (lb/day)	TSS (lb/day)	low Duration (hr)
Dwellings	per person	100	0.17	0.20	24
Schools with showers & cafeteria	per person	16	0.04	0.04	8
Schools without showers and with cafeterias	per person	12	0.025	0.025	8
Boarding schools	per person	75	0.20	0.20	16
Motels at 65 gal/person (rooms only)	per person	130	0.26	0.26	16
Trailer courts at 3 persons/trailer	per trailer	225	0.60	0.60	24
Restaurants	per seat	40	0.20	0.20	16
Interstate or through-highway restaurants	per seat	180	0.70	0.70	16
Interstate rest areas	per person	5	0.01	0.01	24
Service stations	per vehicle serviced	10	0.01	0.01	16
Factories	per person per 8-hr. shift	25	0.05	0.05	perating Period
Shopping centers (no food)	per 1000 sq. ft. of ultimate floor	150	0.01	0.01	12
Hospitals	per bed	300	0.60	0.60	24
Nursing home (add 75 gal. for laundry)	per bed	120	0.30	0.30	24
Homes for the aged	per bed	60	0.20	0.20	24
Child care center	per child & adult	10	0.01	0.01	perating Period
Laundromats, 9 - 12 machines	per machine	250	0.30	0.30	16
Swimming pools	per swimmer	10	0.001	0.001	12
Theaters, auditorium type	per seat	5	0.01	0.01	12
Picnic areas	per person	5	0.01	0.01	12
Resort camps, day & night with limited plumbing	per campsite	50	0.05	0.05	24
Luxury camps with flush toilets	per campsite	100	0.10	0.10	24
Churches (no kitchen)	per seat	3	0.005	0.005	perating Period

* Includes normal infiltration

NOTE: In all cases, use actual data from similar facilites when possible. Note variations due to factors such as age, water, conservation, etc. Submit all design date used.

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